The Village of Innis Landing, 800 Yonge Street, Barrie, Ontario

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Hydrogeological Investigation and Water Balance Assessment

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The Village of Innis Landing, 800 Yonge Street, Barrie, Ontario

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1 Introduction

1.1 Project Description

EXP Services Inc. (EXP) was retained by Schlegel Villages Inc. to prepare a Hydrogeological Investigation and Water Balance Assessment Report associated with the proposed development: The Village of Innis Landing, 800 Yonge Street, Barrie, Ontario (hereinafter referred to as the 'Site').

The Site is located at the southeast corner of the intersection of Yonge Street and Country Lane in Barrie, Ontario. The Site development area consists of one (1) undeveloped parcel that is approximately 40,461 m^2 in size. The Site location plan is shown in Figure 1. The proposed development will be conducted in four (4) development phases as follows:

- Phase 1 Development – Six-storey, 192 bed long-term care facility.
- Phase 2 Development – 12-storey, 192 retirement home building (with 3-storey building areas) with a town square.
- Phase 3 Development – 12-storey, 192 retirement home building (with 3-storey building areas).
- Phase 4 Development – Two (2) multi-storey residential buildings (26 storeys and 18 storeys).

It is understood that the proposed development will consist of one (1) common underground parking (P1) beneath Phases 1, 2, and 3 Areas and one (1) level beneath Phase 4 Area. The conceptual architectural drawings are provided in Appendix H.

EXP conducted Preliminary Geotechnical Investigation and Environmental Site Assessment in conjunction with this investigation. The pertinent information gathered from the noted investigations are utilized for these hydrogeological assessments.

1.2 Project Objectives

The main objectives of the Hydrogeological Investigation and Water Balance Assessment are as follows:

- Establish the local hydrogeological settings within the Site;
- Assess construction dewatering flow rates and potential impacts;
- Assess groundwater quality;
- Develop a site-specific water balance for pre- and post-development conditions using a Thornthwaite-Mather water balance approach and provide water balance deficit between pre- and post-development conditions (desk-top);
- Prepare hydrogeological investigation and water balance assessment report; and,
- Complete seasonal groundwater monitoring as per Lake Simcoe Regional Conservation Authority (LSRCA) requirements.

1.3 Scope of Work

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

- Reviewed available geological and hydrogeological information for the Site;

- Developed and conducted Single Well Response Tests (SWRT) on eight (8) monitoring wells installed in geotechnical boreholes during the combined drilling program to assess hydraulic conductivities of the saturated soils at the Site;
- Completed seven (7) rounds of groundwater level measurements at all monitoring wells as part of the preliminary investigation;
- Collected one (1) groundwater sample for analyses of parameters, as listed in the City of Barrie Sanitary and Storm Sewer Use By-Law parameters;
- Conduct seasonal groundwater monitoring with bi-monthly water level measurements with five (5) additional events. Seasonal groundwater monitoring is currently in progress.
- Complete four (4) shallow infiltration tests to depths less than approximately 1 mbgs in unfrozen ground conditions;
- Completed a pumping test and corresponding data analysis to assess aquifer properties onsite;
- Evaluated the information collected during the field investigation program, including borehole geological information, Water Well Records (WWR), SWRT results, groundwater level measurements and groundwater water quality;
- Prepared site plans, cross sections, geological mapping and groundwater contour mapping for the Site;
- Estimated construction dewatering flow rates;
- Assessed potential impacts and recommended mitigation measures; and
- Develop water balance for pre- and post-development conditions using a Thornthwaite-Mather water balance approach and provide water balance deficit between pre- and post-development conditions (desk-top) as per LSRCA requirements.
- Prepared a Hydrogeological Investigation and Water Balance Assessment Report.

The Hydrogeological Investigation and Water Balance Assessment was prepared in accordance with the Ontario Water Resources Act, Ontario Regulation 387/04, the City of Barrie sewer By-Law criteria. The scope of work outlined above was made to assess dewatering and did not include a review of Environmental Site Assessments (ESA).

1.4 Review of Previous Reports

The following reports were reviewed as part of this Hydrogeological Investigation and Water Balance Assessment:

- EXP Services Inc. (February 28, 2022), Draft Preliminary Geotechnical Investigation, Proposed Long Term Care Facility & Retirement Homes, Toronto, ON, prepared for Schlegel Village Inc.
- Anderson Wellsman Architects Inc. (Jan 25, 2022), Master Site Plan, 800 Yonge Street, Barrie, ON, Schlegel Villages Project, prepared for Schlegel Village Inc.

Any past and/or future geotechnical, hydrogeological, environmental and risk assessments, and updated development/architectural plans should be provided to update this hydrogeological report prior to submission of permits and approvals by the municipalities and agencies.

2 Hydrogeological Setting

2.1 Regional Setting

2.1.1 Regional Physiography

The Site is within a physiographic region known as Peterborough Drumlin Field (Chapman & Putnam, 2007). The physiographic landform is named Till Plains (Drumlinized).

Peterborough Drumlin Field is surrounded by Peterborough lowlands. Peterborough Drumlin Field is a rolling till plain with many drumlins in addition to many other drumlinoid hills and surface fluting of the till plain. The general orientation of the drumlin axes in this field is from northeast to southwest, with some local variations.

2.1.2 Regional Geology and Hydrogeology

The surficial geology can be described as coarse textured (foreshore-basinal) glaciolacustrine deposits consisting of sand, gravel, minor silt and clay (Ministry of Northern Development and Mines, 2012). The surficial geology of the Site and surrounding areas is shown on Figure 2.

Based on the available regional geology maps, the subsurface stratigraphy of the Site from top to bottom is summarized in Table 2-1 (TRCA, 2008 and Oak Ridge Moraine Groundwater Program, 2022). The overburden thickness is approximately 140 m.

Table 2-1: Summary of Subsurface Stratigraphy

Stratigraphic Unit	General Description	Top Elevation of Stratigraphic Unit (masl)
Undifferentiated Upper Sediments / Halton Till or Equivalent (Aquitard)	This lithologic unit typically consists of sandy silt to clayey silt till interbedded with silt, clay, sand and gravel.	259
Oak Ridges Moraine or Equivalent (Aquifer)	This geology unit mainly consists of interbedded fine-grained sand and silt deposits where coarse-grained sand and gravel along with clay laminae are locally reported.	256
Newmarket Till (Aquitard)	This lithologic unit mainly consist of a massive and dense silty sand unit.	244
Thorncliffe Formation (Aquifer)	This geology formation generally consists of glaciofluvial (sand, silty sand) or glaciolacustrine deposits (silt, sand, pebbly silt and clay).	N/A
Sunnybrook Formation (Aquitard)	This lithologic unit was deposited near an ice sheet. It predominately consists of silt and clay.	201
Scarborough Formation (Aquifer)	This geology unit is interpreted as deposits of a fluvial-deltaic system fed by large, braided melt-water rivers draining from an ice sheet. It consists of peat sand overlaying silt and clay deposits.	165
Ottawa Group/Simcoe Group, Shallow Lake Formation	Bedrock primarily consists of limestone with interbedded limestone, shale, dolostone and siltstone; shallow lake formation (Ministry of Northern Development and Mines, 2012).	128.0

Regional groundwater across the area flows northeast, towards Hewitt's Creek (Oak Ridge Moraine Groundwater Program, 20222). Local deviation from the regional groundwater flow pattern may occur in response to changes in topography and/or soils, as well as the presence of surface water features and/or existing subsurface infrastructure.

2.1.3 Existing Water Well Survey

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

The MECP WWR database reportedly indicates ninety-seven (97) offsite records within a 500 m radius from the Site boundary. No water wells identified onsite (Figure 3 and Appendix A). Well distances are calculated relative to the Site centroid, therefore some distances in Appendix A exceed 500 m.

The database indicates that the offsite wells are at an approximate distance of two-hundred and thirty (230) meters or greater from the Site centroid. All offsite wells were reportedly identified as monitoring and observation wells, test holes, dewatering wells, water supply wells, abandoned and/or listed with unknown use.

Twenty-seven (27) water supply wells were reported within 500 m distance from the Site boundary. The closest water well to the Site boundary is located approximately 280 m away from the Site centroid and approximately 157 m south of the Site boundary.

The depth to water for all noted well records reportedly range from 0.7 to 21.9 meters below ground surface (mbgs).

It is expected that the area is partially municipally serviced and most of the water supply wells found during the desk top survey are expected to be currently in use. Therefore, it is recommended to conduct a door-to-door private water supply well survey prior to the commencement of construction phase.

2.2 Site Setting

2.2.1 Site Topography

The Site is in an non-urban land use setting. The topography is relatively flat with gradual northwesterly slope towards Lake Simcoe.

As indicated on the borehole logs included in Appendix B, the surface elevation of the Site ranges between approximately 262.0 to 265.9 meters above sea level (masl).

2.2.2 Local Surface Water Features

The Site is within the Hewitt's Creek and Lake Simcoe's watershed areas. No surface water features exist onsite. The Site is not within a flood plain area (Figure 3 B). The nearest surface water features are the tributaries of Lovers Creek, as well as Hewitt's Creek, approximately located one (1) kilometer and 830 meters northwest and northeast of the Site boundaries, respectively. Lake Simcoe is approximately 2.2 km from the Site boundary to the north.

2.2.3 Local Geology and Hydrogeology

A summary of subsurface soil stratigraphy is provided in the following paragraphs. The soil descriptions are based on the geotechnical investigation report (EXP, 2022). They are summarized for the hydrogeological interpretations. As such, the information provided in this section shall not be used for construction design purposes.

The detailed soil profiles encountered in each borehole and the results of moisture content determinations are presented on the attached borehole logs (Appendix B). The interpreted geological cross-section is provided in Figure 5. The soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones for the Hydrogeological Investigation and Water Balance Assessment and shall not be interpreted as exact planes of geological change.

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

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

Topsoil

A surficial topsoil layer was encountered in all boreholes varying in thickness from about 20 mm to 600 mm. The topsoil typically comprised dark brown silty sand and was frozen in all boreholes.

It should be noted that topsoil measurements were carried out at the borehole locations only. A much more detailed analysis (i.e. shallow test pits) is required to accurately quantify the amount of topsoil to be removed for construction purposes. Consequently, topsoil quantities should not be established from the information provided at the borehole locations.

Reworked Native Soils

Reworked native soils, typically consisting of sands and silts were encountered underlying the topsoil in all boreholes with the exception of Borehole 20, extending as deep as 1.4 m. It is believed the soils were disturbed by farming operations carried out over years of operations at the site. Moisture contents of the reworked soils ranged from 4 to 26% with the material typically being frozen to moist with depth.

Sandy Silt

Below the topsoil in Borehole 20 a sandy silt deposit was uncovered extending to 2.9 m depth (Elev. 259.0 m). The sandy silt was loose to dense with depth (N-Values of 7 to 34) and was moist with a water content of 12 to 16%.

Sand

Below the reworked native soils or sandy silt, a major deposit of sand was encountered in all boreholes, extending to the 3.5 to 15.8 m depth of exploration. Four samples of the sand were submitted for gradation, with the results presented on the Grain Size Analysis Report, Figure 22, attached. The material generally graded as sand, trace to some silt, trace to some gravel, locally becoming siltier with depth. Trace clay or cobbles were noted locally. The relative density of the sand is generally compact to very dense (N-Values of 10 to greater than 50) with depth (locally loose), however as wet sands were evident at depth across the site, some SPT N-Values appear to have been hydraulically disturbed and are not considered representative of the true ground strength. Moisture contents of the sand ranged from 1 to 25%, indicating moist to wet conditions, typically with depth. Higher moisture contents also typically coincided with siltier sand deposits.

3 Results

3.1 Monitoring Well Details

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

- Eight (8) overburden monitoring wells, including BH 1, BH 3, BH 5, BH 8, BH 12, BH 13, BH 15 and BH 18 were installed to an approximate depth ranged from 7.56 to 10.07 mbgs.
- Each monitoring well was equipped with a 50-mm (2-inch) PVC casing, an above ground protective casing and 3-meter-long screen.

Borehole logs and monitoring well installation details are provided in Appendix B. The monitoring well locations are shown on Figure 4.

3.2 Water Level Monitoring

As part of the Hydrogeological Investigation and Water Balance Assessment, static water levels in the monitoring wells installed at the Site were recorded in sixteen (16) monitoring events spanning between February 7 2022 to July 3, 2024. A hydrograph and summary of all static water level data as it relates to the elevation survey are provided in Appendix C.

The groundwater elevation recorded in the noted wells ranged from 257.20 masl (8.36 mbgs at BH 13 on February 27, 2023) to 258.73 masl (6.82 mbgs at BH 18 on February 7, 2022).

One (1) map was created for the Site to show groundwater contours of water-bearing zone (Figure 6). Accordingly, the groundwater flow direction in the overburden is interpreted to be northeast of the Site, towards Hewitt's Creek.

Groundwater levels are expected to show seasonal fluctuations and vary in response to prevailing climate conditions. This may also affect the direction and rate of flow.

3.3 Hydraulic Conductivity Testing

Eight (8) Single Well Response Tests (SWRT's) were completed in all monitoring wells, including BH 1, BH 3, BH 5, BH 8, BH 12, BH 13, BH 15, and BH 18. The tests were completed to estimate the saturated hydraulic conductivity (K) of the soils at the well screen depths.

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

Hydraulic conductivity values were calculated from the SWRT and constant rate test data as per Hvorslev's solution included in the Aqtesolv Pro. V.4.5 software package. The semi-log plots for normalized drawdown versus time are included in Appendix D. A summary of the hydraulic conductivities (K-values) estimated from the SWRTs are provided in Table 3-1.

Table 3-1: Summary of Hydraulic Conductivity Testing

Monitoring Well	Well Depth (mbgs) *	Screen Interval (mbgs)		Soil Formation Screened **	Estimated Hydraulic Conductivity (m/s)
		from	to		
BH1	7.56	4.56	7.56	Sand	4.3E-05
BH3	7.68	4.68	7.68	Sand	1.1E-04
BH5	9.12	6.12	9.12	Sand	6.7E-05
BH8	9.34	6.34	9.34	Sand	6.2E-05
BH12	9.28	6.28	9.28	Sand	7.5E-05
BH13	10.07	7.07	10.07	Sand	1.1E-04
BH 15	9.05	6.05	9.05	Sand	9.6E-05
BH 18	8.93	5.93	8.93	Sand	1.0E-04
				Highest Estimated K-Value	1.1E-04
				Arithmetic Mean of Estimated K Values	8.3E-05
				Geometric Mean of Estimated K Values	7.9E-05

Note:
*measured in the field
**based on the geotechnical borehole logs (EXP, 2022)
mbgs: meter below ground surface

SWRTs provide K-estimates of the geological formation surrounding the well screens and may not be representative of bulk formation hydraulic conductivity. As shown in Table 3-1, the highest K-value of the tested water-bearing zone is 1.1E-4 m/s. The arithmetic and geometric means of estimated water-bearing zones are 1.5E-5 m/s.

3.4 Groundwater Quality

To assess the suitability for discharging pumped groundwater into the sewers owned by the City of Barrie during dewatering activities, two (2) groundwater samples were collected. An initial sample was collected from monitoring well BH 5 on February 10 using a peristaltic pump. Prior to collecting the noted water sample, approximately three (3) standing well volumes of groundwater were purged from the referred well. A second sample was collected on March 1, 2023 during a pumping test PW1. The samples were collected unfiltered and placed into pre-cleaned laboratory-supplied vials and/or bottles provided with analytical test group specific preservatives, as required. Dedicated nitrile gloves were used during sample handling. The groundwater samples were submitted for analysis to Bureau Veritas Laboratory, a CALA certified independent laboratory in Mississauga, Ontario.

When comparing the chemistry of the collected groundwater samples to the City of Barrie Sanitary Sewer Discharge Criteria, there were no parameter exceedances to be reported.

When comparing the chemistry of the collected groundwater samples to the City of Barrie Storm Sewer Discharge Criteria, the concentration of Total Suspended Solid exceeded the criteria.

Groundwater samples were collected during the pumping test (March 1, 2023) for the City of Barrie Sanitary Sewer Discharge Criteria and RCAP Comprehensive Drinking Water parameters, with no exceedances reported.

Reporting detection limits (RDLs) were below the Sewer Use By-Law parameter criteria. Laboratory Certificates of Analysis for both well samples are included in Appendix E.

Table 3-2: Summary of Analytical Results from Hydrogeological Samples

Parameter	Units	City of Barrie Sanitary Sewer Discharge Limit	City of Barrie Storm Sewer Discharge Limit	BH 5 February 10, 2022	PW1 March 1, 2023
Total Suspended Solids (TSS)	mg/L	350	15	**25**	10

Note:
Bold – Exceeds City of Barrie Storm Sewer Discharge Limit.

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

Based on the laboratory results, the groundwater is suitable to be released into the sanitary sewer system.

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

The Environmental Site Assessment Report(s) shall be reviewed for more information on the groundwater quality conditions at the Site.

3.5 Infiltration Testing

To measure the in-situ infiltration rate of the surficial soil, EXP completed four (4) *in-situ* infiltration tests (INF1, INF8, INF13, and INF18) within the Site area on April 22, 2022. INF1, INF8, INF13 and INF18 were tested on hand augured holes at approximate depths of 0.58 mbgs, 0.80 mbgs, 0.70 mbgs and 0.90 mbgs respectively.

The infiltration tests were recorded in one (1) second intervals using data loggers installed at the bottom of the boreholes. The field test results were analyzed using Reynolds' analytical solution (Reynolds, 2015).

The stratigraphy of the shallow subsurface in the layer of infiltration testing comprises a sand to silty sand matrix.

Table 3-5 below summarizes the field saturated hydraulic conductivities (K-values) and design infiltration rates, as per the Low Impact Development (LID) Stormwater Management Planning and Design Guide, CVC – TRCA, 2010, Appendix C. The estimated field saturated K-values were correlated to infiltration rates based on the relationship provided in Table C2 (Appendix C) of the guideline.

Infiltration testing locations are marked on Figure 4.

Table 3-5: Summary of Infiltration Testing Results

Infiltration Test Location/ MW ID	Depth of Hole (mbgs)	Formation tested	Field Saturated Hydraulic Conductivity, K_{fs} (cm/s)	Measured Infiltration Rates (mm/hr)	Design Infiltration Rate* (mm/hr)	Percolation Time (min/cm)
INF1	0.58	Sand/Silty Sand	2.0E-04	56	22	27
INF8	0.80	Sand/Silty Sand	4.5E-05	37	15	40
INF13	0.70	Sand/Silty Sand	3.9E-05	36	14	42
INF18	0.90	Sand/Silty Sand	2.3E-05	31	12	48
		MAX	5.7E-06	56	22	27
		MIN	1.3E-04	31	12	48
		Geometric Mean	5.3E-05	39	16	38

Notes:

mbgs – meters below ground surface;

masl – meters above sea level;

Notes: *Safety Factor of 2.5 was applied to calculate the design infiltration rate (Low Impact Development (LID) Stormwater Management Planning and Design Guide, CVC – TRCA, 2010, Appendix C).

mm/hr– millimeters per hour;

min/cm – minutes per centimeter.

Based on the *in-situ* infiltration testing results, measured infiltration rates vary between 31 and 56 mm/hr across the site. The geometric mean measured infiltration rate for the tested soil layers at subsurface is calculated as 39 mm/hr. Using the geometric mean infiltration rate and a safety factor 2.5 (Low Impact Development (LID) Stormwater Management Planning and Design Guide, CVC – TRCA, 2010), a geometric mean design infiltration rate of 16 mm/hr was calculated. The results of infiltration tests completed are presented in Appendix F.

As per the TRCA requirements, one (1) meter separation is required between the inverts of the infiltration systems and the seasonal high groundwater table.

It should be noted that the preliminary infiltration rate estimates should be further refined at the design stage by conducting field percolation tests at selected locations and depths for the purpose of designing Low Impact Development (LID) measures (such as infiltration galleries, swales, soak away pits, and permeable pavement) for the Site.

3.6 Pumping Test

In February 2023, a 10 cm diameter pumping well (PW1) was drilled to a depth of 23.9 mbgs, installed with a 6 m screen. An adjacent observation well (OW1) with a depth of 24.3 mbgs, screened in the same formation, was equipped with a data logger to monitor the response to the pump test. A maximum drawdown of 1.17m was observed in OW1 during a 6-hour pumping test on March 1, 2023, and the water level in OW1 recovered to near static conditions within 25 minutes. The pumping well discharge effluent was sampled within the last hour of the test for Barrie Sanitary and Storm By-law parameters and general chemistry parameters in the RCAP Comprehensive package. Based on an unstable water level response and mechanical issues with the pump, it was suspected that intrusion of silt in the PW1 occurred throughout the test. At the conclusion of the test, the drillers experienced difficulties in removing equipment from the well, including loss of the data logger.

A new pumping well (PW2) was re-drilled adjacent to PW1 to repeat the pumping test on a coarser sand unit to obtain higher quality pumping well data following the challenges with PW1. A two (2) hour constant rate pumping test was performed using PW2, installed at 14.0 mbgs, and water levels were measured across the site at four (4) monitoring well locations.

A total of 909 L were pumped in 2 hours (7.53 L/min) and generated 4.9 m of drawdown in the PW2 pumping well. Upon completion of pumping phase, the pump was stopped, and recovery to the static groundwater level occurred in 30 minutes. The transmissivity of the aquifer was 1.12E-5 m^2/sec which produces a hydraulic conductivity estimate of 7.71E-7 m/sec. The transmissivity values were calculated as per Theis Recovery solution for Pump Test 1 (March 1, 2023), Cooper-Jacob and Theis curve solutions for Pump Test 2, included in the Aqtesolv Pro. V 4.5 software package. The semi logs and pumping test hydrograph can be found in Appendix G. A summary of hydraulic conductivities (K-values) estimated from the pumping test are provided in Table 3-3.

Table 3-3: Summary of Pumping Test Analyses

Date	Monitoring Well ID	Well Depth (mbgs)	Distance From PW (m)	Maximum Drawdown (m)	Pump Test Solution	Transmissivity, T (m^2/sec)	Aquifer Thickness, b (m)	Estimated Hydraulic Conductivity (m/s)
March 1, 2023 (Pump Test 1)	OW1	23.9	3.5	1.17	Theis (Recovery)	1.25E-04	14.5	6.93E-06
March 9, 2023 (Pump Test 2)	PW2	14.0	0.01	4.9	Cooper-Jacob	1.12E-05	14.5	7.71E-07*
March 9, 2023 (Pump Test 2)	OW2	14.0	4.87	0.03	Theis	1.01E-3	14.5	**6.94E-05**

Notes:
* The Cooper-Jacob pump curve fitting analysis on the PW2 data logger profile resulted in a K value that underestimates the soil type of the aquifer. Alternatively, a Forward Pumping Test Simulation with Theis curve fitting was employed to replicate the drawdown observed at OW2 to estimate a representative K value from the pump test.

4 Dewatering Assessment

It is understood that the proposed development will consist of one (1) underground parking (P1) beneath Phases 1, 2, 3 and 4 Areas, with the basement level under Phase IV and behind Phase II and III to be approximately 300 mm lower than Phase I to accommodate exterior parking and drive aisles. Table 4-1 presents the assumptions used to calculate the dewatering rate for the Site. The conceptual architectural drawings provided by Anderson Wellsman Architects is provided in Appendix H. These drawings were coordinated with Tatham's Staging Drawing Set for consistency, as confirmed by the architects on July 2, 2024.

Table 4-1 Construction Dewatering Estimate Assumptions

Input Parameter	Assumption					Units	Notes
	Phases 1	Phase 2	Phase 3	Phase 4	Underground Services		
Ground Surface Elevation	264.75					masl	Proposed finished floor elevation based on the conceptual design (Appendix H)
Groundwater Elevation	259.10	259.40	259.57	259.73	260.23	masl	The highest groundwater elevation of 258.73 masl (6.82 mbgs at BH 18 on February 7, 2022) plus 1 meter to account for seasonal changes. Seasonal high water levels were selected for BH/MWs by Phase.
Underground Structure	P1				N/A	-	P1: One level of underground parking
Lowest Top of Slab Elevation	261.55	261.25	261.25	260.61	N/A	masl	As confirmed by Anderson Wellsman Architects Inc. (December, 2023). Also refer to site plan drawings dated 2024 (Appendix H).
Lowest Excavation Elevation	259.70	259.70	259.70	259.41	260.75	masl	Footing (bearing) elevations for the four building phases confirmed by Structural (Co-Elevate). For underground services, it is assumed to be 4 mbgs. FFEs on Master Site Plan (Appendix H).
Construction Dewatering Elevation Target	258.70	258.70	258.70	258.41	258.41	masl	Assumed to be approximately 1.0 m below the lowest excavation elevation
Bottom Elevation of Water-Bearing Zone	244					masl	Assumed to be top of Newmarket Formation
Excavation Area (Length x Width)	3,640 (65 x 56)	5,332 (124 x 43)	2,976 (124 x 24)	8,350 (167 x 50)	60 (30 x 2)	m^2 (m x m)	Approximate areas for Phases 1 through 4 are based on the conceptual site plan provided by Anderson Wellsman Architects Inc. (Appendix H).

Elevator Pits (Length x Width)	150 (15 x 10)	150 (15 x 10)	150 (15 x 10)	150 (15 x 10)	N/A	m^2 (m x m)	Accounting for 2-3 m around the constructed pit for construction/dewatering access
Hydraulic Conductivity (K)	6.94E-5					m/s	K-value for overburden based on Pump Test 2 (March 9, 2023)
Specific Yield	0.20					1	Assumed

Note:
N/A: not applicable

4.1 Dewatering Flow Rate Estimate and Zone of Influence

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

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

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

Where:

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

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

4.2 Cooper-Jacob's Radius of Influence

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

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

$$R_{cj} = \sqrt{2.25KDt/s}$$

Where:

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

4.3 Stormwater

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

A 25 mm precipitation event was utilized for estimating the stormwater volume. The calculation of the stormwater volume is included in Appendix I.

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

During precipitation events greater than 15 mm (ex: 100-year storm), measures should be taken by the contractor to retain stormwater onsite in a safe manner to not exceed the allowable water taking and discharge limits, as necessary. A two (2) and a one hundred (100) year storm event over a 24-hour period are 56.2 and 123.9 mm, respectively.

4.4 Results of Dewatering Rate Estimates

4.4.1 Construction Dewatering Rate Estimate

For this assessment, it was assumed that the proposed construction plans include an excavation with shoring extending to the Site boundaries. EXP should be retained to review the assumptions outlined in this section, should the assumed shoring design change. Short-term (construction) dewatering calculations are presented in Appendix I. Based on the assumptions provided in this report, the results of the dewatering rate estimate are provided in Table 4-2.

Dewatering estimates for pits (elevator, sump pits) are revised to be 3 m below the top of the lowest slab elevation, with localized dewatering targets 1 m below the lowest slab elevation.

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

Local dewatering may be required for pits (elevator pits, sump pits, raft) and for localized areas with permeable, soft, or wet soil conditions, if the depths of excavations exceed the proposed elevations in this report. Local dewatering is not considered to be part of this assessment, but the contractor should be ready to install additional systems to manage such conditions. Dewatering estimates should be reviewed once the pit dimensions are available.

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

Table 4-2 Summary of Construction Dewatering Rate

Peak Dewatering Flow Rate and Zone of Influence						
Description	Units	Phase 1	Phase 2	Phase 3	Phase 4	Underground Services
		P1				
Estimated Short-Term Dewatering Rate (without safety factor or precipitation)	L/day	262,000	542,000	635,000	882,000	197,000
Estimated Short-Term Dewatering Rate for Elevator Pits	L/day	392,000	489,000	489,000	589,000	-
From Precipitation Event of 25 mm in one day	L/day	91,000	133,000	74,000	209,000	2,000
With Factor of Safety of 2 (excluding precipitation)	L/day	654,000	1,032,000	1,124,000	1,763,000	197,000
With Factor of Safety of 2 (including precipitation)	L/day	745,000	1,165,000	1,199,000	1,972,000	199,000
Radius of Influence from sides of excavation (m)	m	247				

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

If caisson walls are used for decreasing long-term dewatering rates, these should be designed as permanent structures to cutoff groundwater inflow in the long-term. All perforations should be sealed permanently (ex: tiebacks, breaches, and cold joints) with no leakages and inspected. Fillers should extend into low permeability deposits (ex: sound bedrock or till) to cutoff groundwater from water bearing zones. Inspections should be conducted to confirm the depth of low permeability deposits along shoring system and that fillers are keyed into low permeability soil deposits.

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

Dewatering should be monitored using dedicated monitoring wells within and around the perimeter of the excavation, and these wells should be monitored using manual measurements and with electronic data loggers; records should be maintained on site

to track dewatering progress. Discharge rates should be monitored using calibrated flow meters and records of dewatering progress, and daily precipitation as per MECP requirements should be maintained.

4.4.2 Post-Construction Dewatering Considerations

It is our understanding that the preliminary development plan will be made watertight below the one level of underground, corresponding to an elevation of 259.73 masl to account for the seasonal high water table. All subgrade structures above this elevation will be damp-proofed, protected by a weeping tile system. Due to the installation of this foundation drainage system above the water table buffer, limited foundation drainage seepage is anticipated and following storm events.

4.5 MECP Water Taking Permits

4.5.1 Short-Term Discharge Rate (Construction Phase)

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

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

The dewatering estimates including a safety factor and including precipitation is stated below for a PTTW. The MECP construction dewatering rate includes a precipitation volume for the submission of PTTW and is the rate used for the permit application. Based on the MECP construction dewatering, a Category 3 PTTW will be required to facilitate the construction dewatering program of the Site. The proposed development will be constructed in phases. The PTTW volume is provided for Phase 4 which has the highest dewatering rate.

Table 4-3: MECP Construction Dewatering Flow Rate

Scenario	Flow Rate (L/day)
MECP Construction Dewatering Flow Rate **With Safety Factor** of 2 (including rainwater collection for PTTW)	2,000,000 (rounded)

Note: it is assumed that the development will be built in phases, not concurrently.

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

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

5 Site-Specific Water Balance

5.1 Pre- and Post-Development Site Characteristics

5.1.1 Pre-Development Site Characteristics

The Site currently consists of vacant grass land.

A summary of the existing (pre-development) landscape features is provided in Table 6-2 below.

Table 6-2: Pre-Development (Existing) Land Use

Description	Pre-Construction (Existing) (m^2)
Landscape, Open Space (Area available for Infiltration)	40,461
Total Site Area	**40,461**

The pre-development areas provided in Table 6-2 were determined based on a review of available Site plans and are considered appropriate for estimating the water balance. Accordingly, 100% of the total area is assumed to be pervious under pre-development conditions.

5.1.2 Post-Development Site Characteristics

It should be noted that finalized site plan drawings for the post-development may vary after submission of this report. Water balance calculations are subject to a future update if architectural drawings are altered from those provided June 28, 2024 (Master Site {Plan drawing dated July 2022), which the calculations herein are based upon. Table 6-3 provides a summary of the post-development site characteristics based on the assumptions made for the Site.

Table 6-3: Post-Development Site Characteristics

Description	Impervious Areas (ex: Buildings, Roads) m^2	Pervious Areas (ex: Landscape, Roads) m^2	Total Areas Post Construction (Proposed) m^2
Previously Existing Retained Impervious	0	0	0
Buildings Roofs	13,150	0	13,150
Paved Surface (Driveway, Parking Area, Sidewalk, etc.)	20,028	0	20,028
Landscaped	0	7,283	7,283

Description	Impervious Areas (ex: Buildings, Roads) m^2	Pervious Areas (ex: Landscape, Roads) m^2	Total Areas Post Construction (Proposed) m^2
Totals	33,178	7,283	**40,461**

Under post-development conditions, approximately 82% of the Site area is anticipated to be impervious.

5.2 Methodology

5.2.1 Meteorological Data

Meteorological data including average monthly precipitation and average temperatures were obtained from the National Climate Data and Information Archive (Environment Canada) for the Barrie WPCC weather station (Station ID No. 6110557).

Meteorological data of 29 years from 1978 to 2006 was utilized for this assessment. Summaries of the climate data is provided in Appendix J-1.

5.2.2 Modeling

The Thornthwaite water balance (Thornthwaite, 1948; Mather, 1978; 1979) is an accounting type method used to analyze the allocation of water among various components of the hydrologic cycle. This methodology was used to complete the pre-construction (existing conditions) and post development water balance. The model inputs include monthly mean temperature, total precipitation, runoff factor, soil-moisture storage capacity, rain temperature threshold, snow temperature threshold, maximum melt rate and the latitude of the Site. The model outputs include monthly potential and actual evapotranspiration, soil moisture storage, soil moisture storage change, surplus, infiltration, and runoff.

When precipitation (P) occurs, it can either runoff (R) on the surface water system, infiltrate (I) into the ground and evaporate or transpire (ET) from the earth's surface and through the vegetation. The difference between total precipitation (P) and the total of evaporation and evapotranspiration (ET) is defined to be the water surplus (S) which is available for both infiltration (recharge to the groundwater system including interflow) and for runoff. When long-term averages of P, R, I, and ET are used, no net change in groundwater storage (ST) is assumed. Annually, however, there is a potential for small changes in ST.

The annual water budget can be stated as follows:

$$\mathbf{P = ET + R + I + \Delta ST}$$

Where:
P = precipitation
ET = evapotranspiration
R = surface water runoff
I = Infiltration
ΔST = change in groundwater storage

For this assessment, the Thornthwaite and Mather method was used to estimate average infiltration rates. Based on the site conditions, components for infiltration in the noted model were used to estimate infiltration, also accounting for the lateral movement of water in the unsaturated zone in the shallow sub-surface (first few meters) which discharges to surface water features.

Infiltration is governed by the surficial soil types, topography and land cover. On areas with shallow water table, the percolation rate of precipitation into the soils is reduced and considered negligible.

For ease of calculation, a spreadsheet model was used for the computation. The Thornthwaite and Mather Model is based on the United Stated Geological Survey (USGS) graphical user interface (Thornthwaite Monthly Water-Balance program, 2007).

5.3 Climate Data Analysis and Estimating Infiltration Factors

5.3.1 Climate Data Analysis

The mean annual water surplus was calculated using the Thornthwaite and Mather (1955) method. Monthly average precipitation values were obtained for 29 years from 1978 to 2006. Soil moisture storage of 200 mm/yr was assumed for soils and considered representative of the preconstruction site conditions. The closest latitude to the Site is 44°, which was used in the USGS model (2007). Table 6-4 provides a summary of the climatic water balance analysis. Summaries of the input and output climate data are provided in Appendixes J-1 and J-2, respectively.

Table 6-4: Summary of Climatic Water Balance Analysis in Pre-Development Conditions

Soil Moisture Storage (mm/yr)	Precipitation (mm/yr)	Actual ET (mm/yr)	Surplus (mm/yr)
200 mm/yr	933.0	556.3	376.7

Note: ET = Evapotranspiration

The results of climatic water balance analysis for the Site suggest that a water surplus of 376.7 mm/year is available to become surface runoff and infiltration.

5.3.2 Estimating Infiltration Factors

The infiltration is expected to be controlled by topography and soil cover type. Surplus water is portioned between runoff and infiltration based on the controlling factors provided by MOE (1995). It is noted that the controlling sub-factors provided by the MOE were determined to estimate pre-development infiltration rates.

A total infiltration factor for the Site was estimated using the individual sub-factors representative of the topography, soil type and land cover conditions. The surface geology and soil stratigraphy at the Site are presented in Figures 2 and 5, respectively. The existing land use and topography of the Site are shown on Figures 7 and 8, respectively. The final site grading map for the proposed development was not available at the time of preparation of this report. As such, assumptions for topography, soil type, and land cover were made to estimate the infiltration factor for the post-development.

Considering the topography and soil type for the Site, the total weight infiltration factors for the pre-and post-development phases are estimated to be 0.54. The estimated pre-and post-development total infiltration factors represent the fraction of the water surplus available for infiltration. Appendix J-3 provides a summary of the sub factors and total weighted infiltration factor based on the Site conditions.

Using the infiltration factor of 0.54 and water surplus rate volume of 376.7 mm/yr for pre-and post- development phases, the infiltration rate for the entire Site is estimated to be 202.65 mm/yr. The fraction of the available water surplus for runoff is 0.46 (= 1.00 – 0.54) and the annual runoff rate is 174.0 mm/yr (Appendix J-4).

5.4 Pre-Development Water Balance Estimates

5.4.1 Pre-Development Water Balance Analysis

The water balance analysis is based on available information on a regional scale and deemed consistent for the Site.

Table 6-5 provides a summary of water balance analysis for the Site.

Table 6-5: Summary of Overall Pre-Development Water Balance Results

Location	Total Site Area (m^2)	Area Available for Infiltration (m^2)	Precipitation (m^3/yr)	Actual Evapo-transpiration (m^3/yr)	Runoff (m^3/yr)	Infiltration (m^3/yr)
Total Site	40,461	40,461	37,751	22,510	7,041	8,199
Percentage of Total Precipitation (%)			100	59.6	18.7	21.7

The total Site area was used to estimate the total volume of annual precipitation for the Site. As summarized in Table 6-5, the pre-development water balance is as follows: approximately 59.6% of the total precipitation is subject to evapotranspiration, 18.7% to runoff and 21.7 % to infiltration.

The pre-development unmitigated water balance, on a weighted average depth basis (in mm/yr) is as follows:

$$P\ (933.0) = ET\ (556.4) + R\ (174.0) + I\ (202.6) + \Delta ST\ (0)$$

5.5 Post-Development Water Balance Estimates

5.5.1 Post-Development Water-Unmitigated

Based on the assumptions made for this assessment, the total area of impervious surfaces under post-development conditions is approximately 33,178 m^2 representing approximately 82% of the Site area (total area: 40,500 m^2) (Table 6-3). The remaining 10,125 m^2 is assumed to be available to contribute to infiltration during post-development stage (25% of the total land area).

Lot level post-development infiltration sub-factors were determined based on the method recommended by MOE (1995), like the method used for estimating infiltration sub-factors for pre-development site conditions.

The post-development water balance calculations are presented in Appendix J-4. Table 6-6 provides a summary of the water balance assessment.

Table 6-6: Summary of Overall Post-Development Water Balance Forecast-Unmitigated

Location	Total Site Area (m^2)	Area Available for Infiltration (m^2)	Precipitation (m^3/yr)	Evapotranspiration (m^3/yr)	Runoff (m^3/yr)	Infiltration (m^3/yr)
Total Site	40,461	7,283	37,751	4,052	32,223	1,476
Percentage of Total Precipitation (%)			100%	10.7%	85.4%	3.9%

The mitigated post-development water balance, on a weighted average depth basis (in mm/yr) is as follows:

$$P\ (933.0) = ET\ (100.1) + R\ (796.4) + I\ (36.5) + \Delta ST\ (0)$$

5.5.2 Post-Development Water-Mitigated

If no remedial measures are implemented to maintain infiltration, it is expected that infiltration will be reduced from approximately 8,199 m^3/year to 1,476 m^3/year in post-development, resulting in a deficit of 6,724 m^3/yr (Appendix J-4).

To maintain the estimated pre-development infiltration rate of 8,199 m^3/year, mitigation measures should be implemented to maintain the noted infiltration rate volume. The mitigation measures, known as the Low Impact Development (LID) system, are anticipated to consist of infiltration galleries and trenches:

In this approach, infiltration galleries will be utilized to infiltrate roof runoff into the subsurface. Considering a total deficit of 6,724 m^3/yr and the design infiltration rates of 16 mm/hr, the required area for proposed LID system is estimated 545 m^2. The noted proposed area is anticipated to capture 420 m^3 stormwater volume per 2-week period from directing roof run-off, which is equivalent to 41 mm of precipitation per 2-week period per square meter area of the LID system. Accordingly, the estimated infiltration time for captured water in the proposed LID system is estimated 48 hours (Appendix J-5).

5.6 Impact and Proposed Mitigation Measures

Mitigation measures should be implemented to balance the estimated post-development infiltration rate deficit of 6,724 m^3/year (Appendix J-4). To offset the noted deficit, approximately 82% from the available runoff from roof-top water of 8,179 m^3/year (in 8 months) would need be infiltrated. This could be accommodated in Low Impact Development (LID) facilities, such as infiltration galleries and enhanced grass swales implemented onsite to maintain the pre-development infiltration rates during the post-development phase.

As per the CA and MECP guidelines, the invert of the infiltration system needs to be 1.0 m above the highest water level or top of bedrock measured at location of the infiltration system, as a minimum.

To maintain the pre-development infiltration rates during the post-development phase, five (5) Storm tank LID facilities with open bottom are proposed to allow for infiltration, designed to the minimum area and volume specifications (or greater) set out in this water balance assessment. Appendix H includes a master site servicing plan and LID cross-sections detailing the location, size, and design of such LID facilities.

To balance the infiltration deficit in 8 months per year a LID system (infiltration gallery) with a total of approximately 545 m^2 in size would be required. The LID area is based on the estimated design infiltration rate of 16 mm/hr, on the assumption that precipitation is evenly distributed during the year over two-week interval, and bi-weekly volumes from roof will be infiltrated in 48-hour. The infiltration system will need to have a minimum storage of 420 m^3 to store two weeks of precipitation to meet the pre-development infiltration levels, with a required area for proposed LID system is estimated 545 m^2 (Appendix J-5).

As per regulatory requirements, the invert of the infiltration system needs to be 1.0 m above the highest water level measured at the location of the proposed infiltration system, as a minimum.

6 Environmental Impact

6.1 Surface Water Features

The Site is within the Hewitt's Creek and Lake Simcoe's watershed areas. No surface water features exist onsite. The Site is not within a flood plain area (Figure 3 B).The nearest surface water features are the tributaries of Lovers Creek, as well as Hewitt's Creek, approximately located one (1) kilometer and 830 meters northwest and northeast of the Site boundaries, respectively. Lake Simcoe is approximately 2.2 km from the Site boundary to the north.

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

6.2 Highly Vulnerable Aquifers, Significant Groundwater Recharge Areas, and Well Head Protection Areas (HVAs, SGRAs, and WHPA)

Based on the Ontario Source Protection Information Atlas and Lake Simcoe Region Conservation Authority's (LSCA) website, the Site is identified within HVA but not within SRGA and WHPA (Figure 3C).

6.3 Groundwater Sources

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

Twenty-seven (27) water supply wells were reported within 500 m distance from the Site boundary. The closest water well to the Site boundary is located approximately 280 m away from the Site centroid and approximately 157 m south of the Site boundary.

Due to the extent of estimated zone of influence and its near proximity to the locations of water supply wells, a door-to-door wells survey is recommended prior to the commencement of dewatering activities. Moreover, the water supply wells will need to be monitored during the construction phase.

6.4 Geotechnical Considerations

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

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

6.5 Groundwater Quality

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

Based on the laboratory results, the groundwater is suitable to be released into the sanitary sewer system.

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

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

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

The Environmental Site Assessment Report(s) shall be reviewed for more information on the groundwater quality conditions at the Site.

6.6 Well Decommissioning

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

7 Conclusions and Recommendations

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

- When comparing the chemistry of the collected groundwater samples to the City of Barrie Sanitary Sewer Discharge Criteria, there were no parameter exceedances to be reported.
- When comparing the chemistry of the collected groundwater samples to the City of Barrie Storm Sewer Discharge Criteria, the concentration of Total Suspended Solid exceeded the criteria.
- The geometric mean hydraulic conductivity (K) from single well response tests performed on monitoring wells was 7.0E-5 m/s (including wells from the pump test investigation)
- A bi-monthly groundwater monitoring program, encompassing a total of fourteen (14) consecutive events has been completed from February 2022 through December 2023
- To identify the extent of the aquifer, additional drilling and a pumping test was executed in February to March 2023
- To specify the hydraulic properties of the potential aquifer, a six-hour pump test was performed on a 24 m deep 4" pumping well. Due to silt intrusion and adverse impacts on pumping equipment, the pumping well was re-drilled (PW2) to a depth of 14 mbgs in a more permeable sand unit. The test was redone with a two-hour pumping phase at a flow rate of 7.5 L/min, where a maximum drawdown of 4.9 m was measured in the pumping well and 0.03 m in the observation well. The recovery phase showed the groundwater level in PW2 returned to a static level in 30 minutes. Pumping test analysis indicated a transmissivity (T) of 1.01E-5 m^2/s for the aquifer, or a hydraulic conductivity (K) of 6.94E-5 m/s.
- The dewatering estimates have been revisited upon completion of the monitoring program and final design.
- Based on the assumptions outlined in this report, the estimated peak dewatering rate for proposed construction activities is approximately 2,000,000 L/day (rounded) assuming that the development is built in phases. This is the rate which will be required to be discharged to the municipal sewer system and the PTTW. As the dewatering flow rate estimate exceeds 400,000 L/day, a Category 3 PTTW will be required to facilitate the construction dewatering program for the Site.
- The proposed development will be constructed in phases. The PTTW volume is provided for Phase 4 which has the highest dewatering rate.
- It is noted that the originally proposed P2 level was removed from the four Phases in this iteration of the Hydrogeological Report as per updated design specifications provided by the architects.
- A water balance assessment was completed based on the current architectural drawings for the proposed development. In post development, without mitigation measures it is expected that infiltration will be reduced from approximately 8,199 m^3/year to 1,476 m^3/year, resulting in a deficit of 6,724 m^3/yr. To mitigate the post development infiltration deficit, five (5) LIDs will be installed consisting of buried tanks with open bottoms to allow for infiltration with a minimum storage of 420 m^3 to store two weeks of roof runoff with a minimum required area of 545 m^2.
- Due to the proximity of estimated zone of influence to water supply wells in the vicinity of the Site, a door-to-door well survey has been completed and is reported under separate cover.
- The proposed underground structures will be watertight due to the presence of a highly permeable soils and high dewatering flow rates.
- The estimated construction dewatering volumes are based on the assumptions outlined in this report. Any variations in hydrogeological conditions beyond those encountered as part of this preliminary investigation may significantly influence the discharge volumes.

- For the short-term dewatering system (construction phase), it is anticipated that TSS levels and some other parameters (for example, Total Metals) in the pumped groundwater may become elevated and exceed both, Sanitary and Storm Sewer Use By-Law limits. To control the concentration of TSS and associated metals, it is recommended that a suitable treatment method be implemented (filtration or decantation facilities and/ or any other applicable treatment system) during construction dewatering activities to discharge to the applicable sewer system. The specifications of the treatment system will need to be adjusted to the reported water quality results by the treatment contractor/process engineer.
- As per the MECP technical requirement for PTTW, the geotechnical assessment of the stability of the soils due to water taking (ex: settlement, soil loss, subsidence etc.) is required. The water taking should not have unacceptable interference on soils and underground structures (foundations, utilities etc.). A letter related to geotechnical issues as it pertains to the Site is required to be completed under a separate cover.
- An agreement to discharge into the sewers owned by the City of Barrie will be required prior to releasing dewatering effluent.
- The PTTW registration allows construction dewatering discharge of greater than 400,000 L/day. A Discharge Plan (dewatering sketch, sewer discharge agreement) must be developed and applied for any discharges from the Site. The Discharge Plan and monitoring for both water quantity and water quality must be carried at the Site during the entire construction dewatering phase. The daily water taking records must be maintained onsite for the entire construction dewatering phase. The PTTW, Discharge Plan, hydrogeological investigation report, and geotechnical assessment of settlements must always also be available at the construction Site for the entire construction dewatering. EXP should be notified immediately about any changes to the construction dewatering schedule or design, since PTTW will need to be updated to reflect these modifications. The hydrogeological report, PTTW, Discharge Plan and geotechnical assessment constitutes the Water Taking Plan which needs to be available onsite for the duration of construction dewatering.
- In conformance with Regulation 903 of the Ontario Water Resources Act, the installation and eventual decommissioning of any dewatering system wells or monitoring wells must be completed by a licensed well contractor. This will be required for all wells that are no longer in use.

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

8 Limitations

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

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

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

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

Sincerely,

EXP Services Inc.

Jeffrey Leon, M.Sc.
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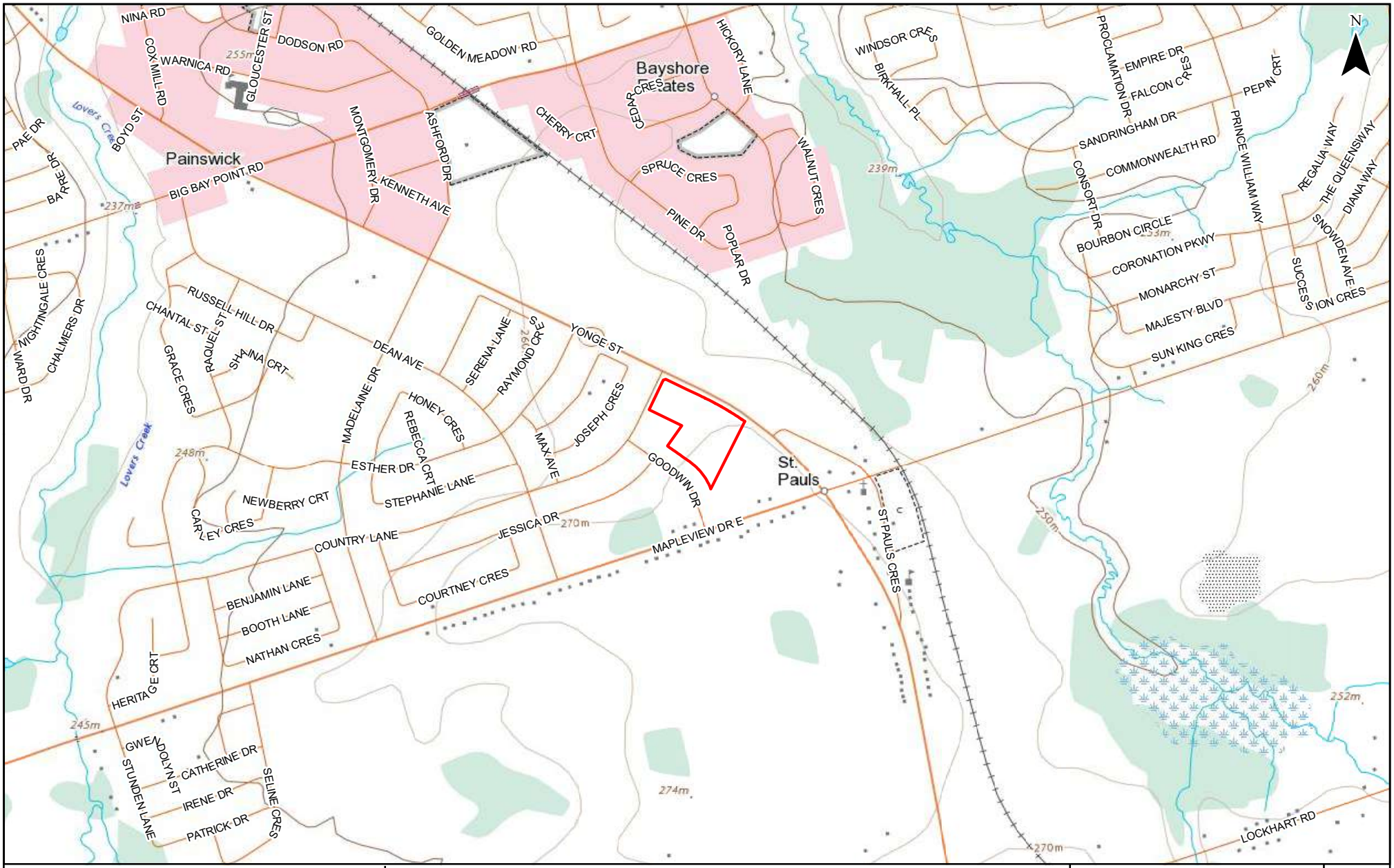
Figures



SCALE:

0 150 300 450 600 750 m

LEGEND:

APPROXIMATE SITE BOUNDARY

SITE LOCATION PLAN

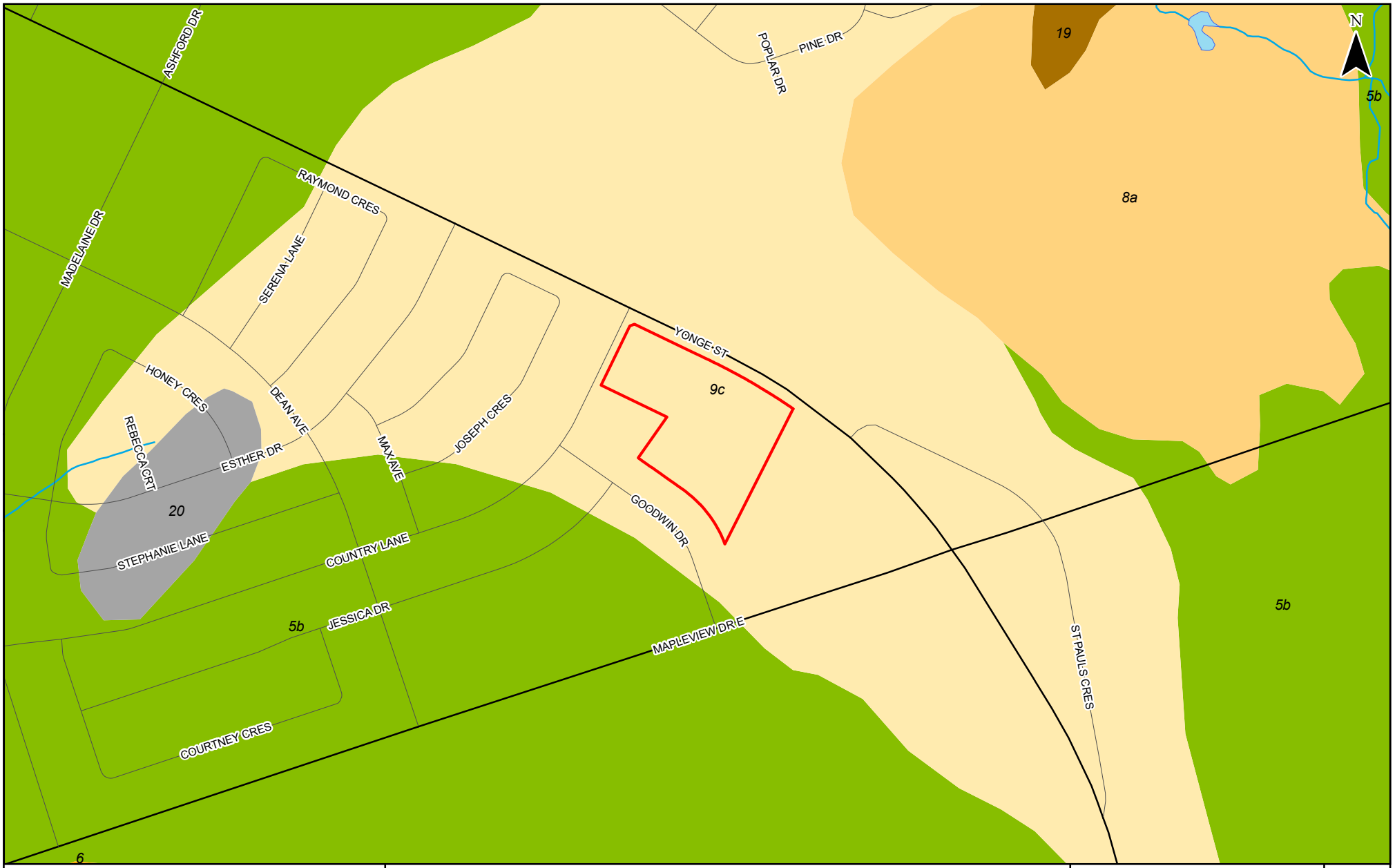
FIGURE: 1

HYDROGEOLOGICAL INVESTIGATION
AND WATER BALANCE ASSESSMENT
800 YONGE STREET
BARRIE, ONTARIO

DRAWN BY:	CHECKED BY:
AC	JS

PROJECT NUMBER: GTR-21023592-A0

DATE: FEBRUARY 2022



SCALE:

0 100 200 300 400 500 m

SOURCE:

BASED ON ONTARIO GEOLOGICAL SURVEY DATA PUBLISHED IN 2010

DRAWN BY:	CHECKED BY:
AC	JS

LEGEND:

- APPROXIMATE SITE BOUNDARY
- 20: ORGANIC DEPOSITS
- 19: MODERN ALLUVIAL DEPOSITS
- 9C: COARSE-TEXTURED (FORESHORE-BASINAL) GLACIOLACUSTRINE DEPOSITS
- 8A: FINE-TEXTURED GLACIOLACUSTRINE DEPOSITS
- 6: ICE-CONTACT STRATIFIED DEPOSITS (FINE SAND TO GRAVEL)
- 5B: STONE-POOR, CARBONATE-DERIVED SILTY TO SANDY TILL

SURFICIAL GEOLOGY

FIGURE: 2

HYDROGEOLOGICAL INVESTIGATION
AND WATER BALANCE ASSESSMENT
800 YONGE STREET
BARRIE, ONTARIO

PROJECT NUMBER: GTR-21023592-A0

DATE: FEBRUARY 2022

SCALE:
0 100 200 300 400 500 m

SOURCE:
BASED ON GOOGLE EARTH IMAGERY DATED 2020,
AVAILABLE WELL RECORD INFORMATION AS OF SEPTEMBER 2019

exp.

DRAWN BY:	CHECKED BY:
AC	JS

LEGEND:

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

MECP WATER WELL RECORDS MAP

FIGURE: 3A

HYDROGEOLOGICAL INVESTIGATION
AND WATER BALANCE ASSESSMENT
800 YONGE STREET
BARRIE, ONTARIO

PROJECT NUMBER: GTR-21023592-A0

DATE: FEBRUARY 2022

Lake Simcoe Region conservation authority

Figure 3B: Regulated Flood Plains

Features

- LSRCA Watershed Boundary
- Lake Simcoe
- Watercourse
- Regulated Area Boundary
- Regulated Area
- Roads
  - Hwy 400 Series
  - Highway, Arterials
  - Local Road
- Railway
- Approximate Site Area

Printed On:
2/22/2022

WGS_1984_Web_Mercator_Auxiliary_Sphere

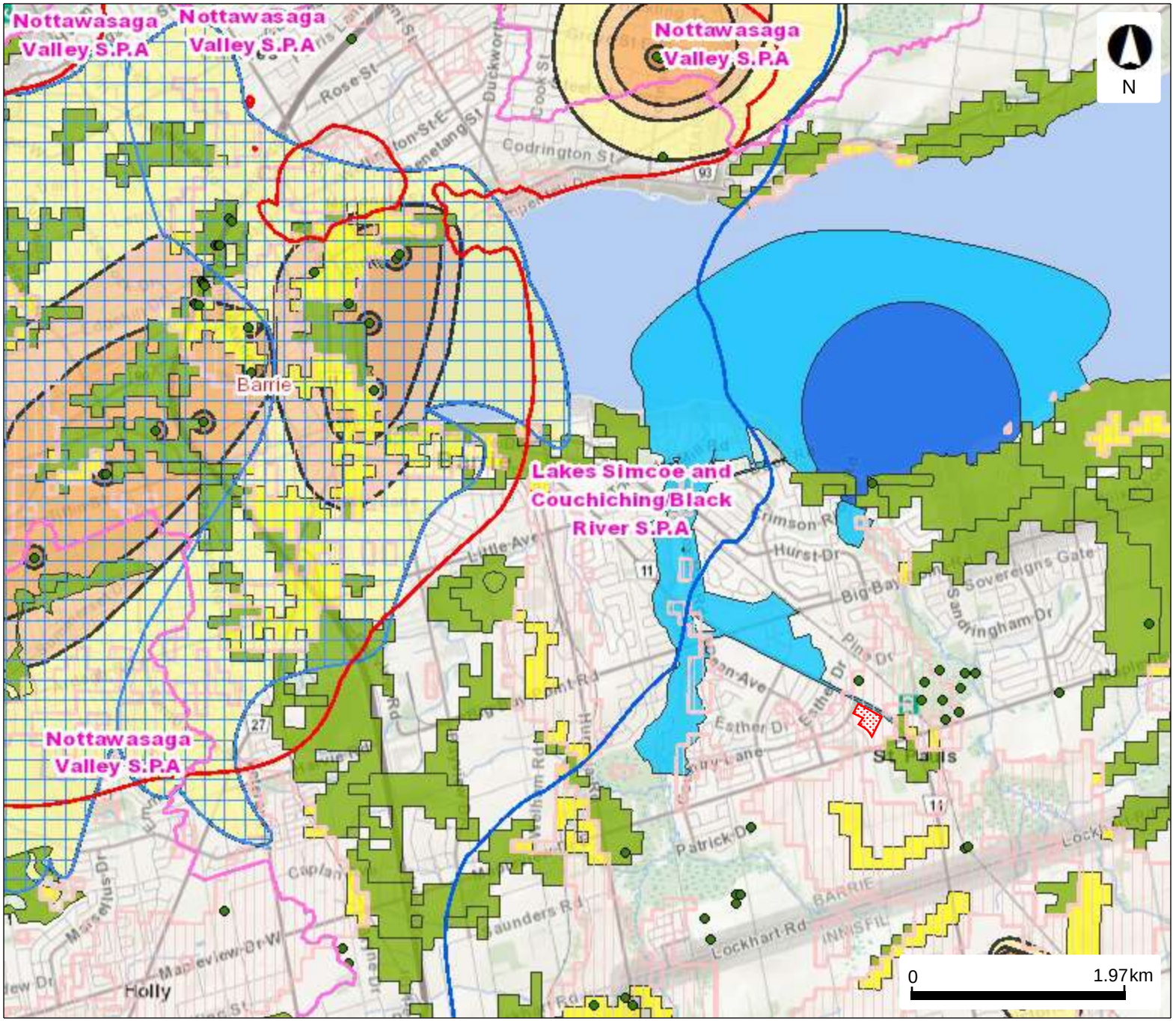
Mapped By:

Scale 1: 56,617

Meters

2,876 0 1,438 2,876

Figure 3C: Vulnerability Areas



Legend

- Source Protection Areas
- Permits To Take Water: Active
- Intake Protection Zone Q
- Wellhead Protection Area Q1
- Wellhead Protection Area Q2
- Issue Contributing Areas
- Highly Vulnerable Aquifers
- Significant Groundwater Recharge Area
  - 0
  - 2
  - 4
  - 6
- WHPA Groundwater Under Direct Influence (WHPA-E)
- Wellhead Protection Area
  - A
  - B
  - C
  - C1
  - D
  - F
- Intake Protection Zone 1
- Event Based Areas
- Intake Protection Zone 2
- Approximate Site Boundary

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Environment, Conservation and Parks (MECP) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Ontario

Map Created: 2/22/2022
Map Center: 44.36714 N, -79.66407 W

SCALE:

0 25 50 75 100 125 m

exp.

DRAWN BY:	CHECKED BY:
AC	JS

LEGEND:

- BOREHOLE (EXP, 2022)
- BOREHOLE / MONITORING WELL (EXP, 2022)
- OBSERVATION WELL (EXP, 2023)
- PUMPING WELL (EXP, 2023)
- INFILTRATION TEST LOCATION
- CROSS SECTION AXIS
- APPROXIMATE SITE BOUNDARY

BOREHOLE / MONITORING WELL LOCATION PLAN

FIGURE: 4

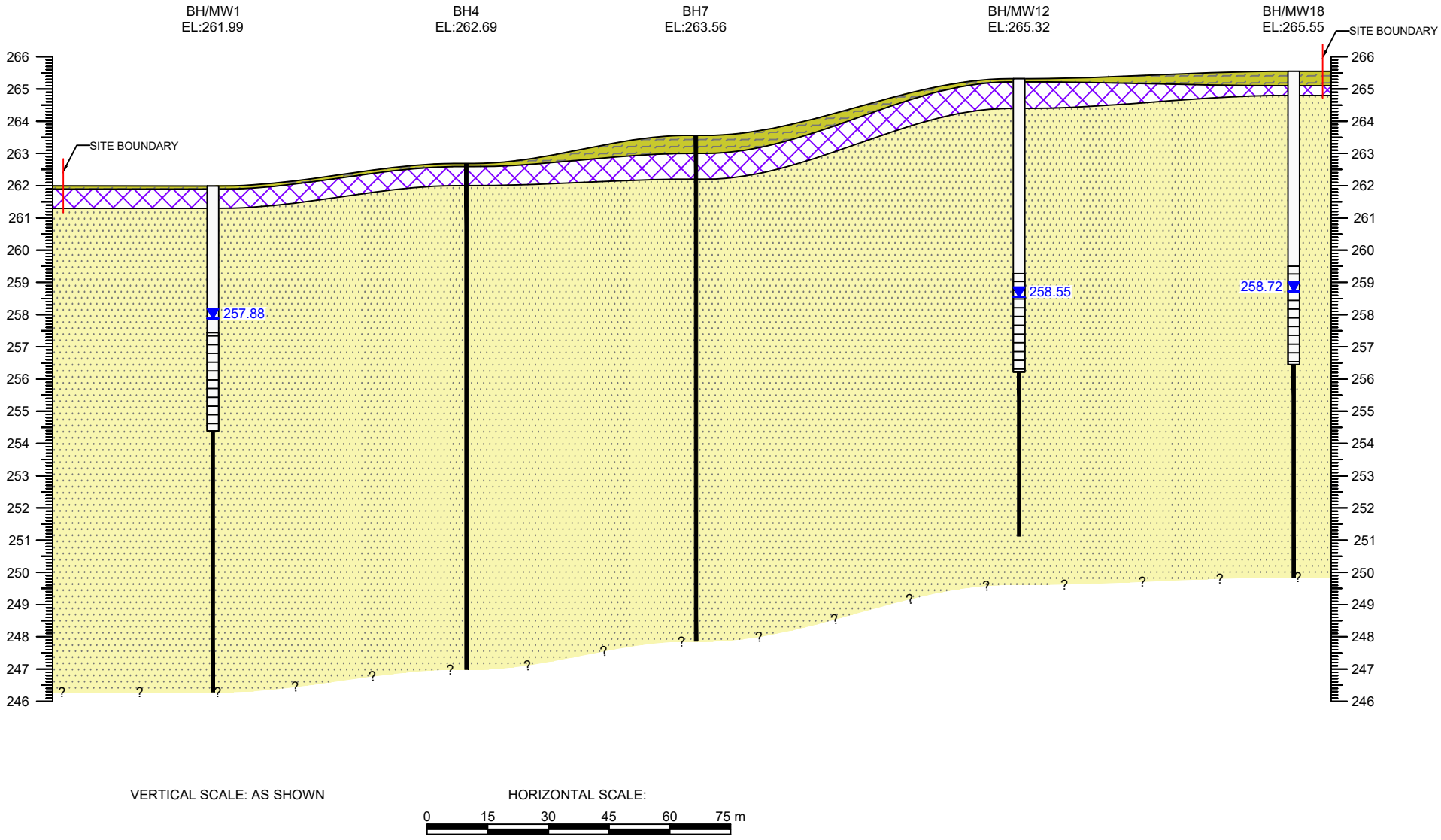
HYDROGEOLOGICAL INVESTIGATION
AND WATER BALANCE ASSESSMENT
800 YONGE STREET
BARRIE, ONTARIO

PROJECT NUMBER: GTR-21023592-A0

DATE: JANUARY 2024

A
NORTHWEST

A'
SOUTHEAST



VERTICAL SCALE: AS SHOWN

HORIZONTAL SCALE:

0 15 30 45 60 75 m

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LEGEND:

- TOPSOIL
- REWORKED NATIVE SOILS
- SAND
- GROUNDWATER ELEVATION (masl) AS MEASURED ON FEBRUARY 10, 2022

TITLE AND LOCATION:

CROSS SECTION A-A'

HYDROGEOLOGICAL INVESTIGATION
AND WATER BALANCE ASSESSMENT
800 YONGE STREET
BARRIE, ONTARIO

PROJECT NO.: GTR-21023592-A0	DWN.: JA
SCALE: AS NOTED	CK: PS
DATE: FEBRUARY 2022	FIG. NO.: 5

E:\BRM\GTR-21023592-A0\60 Execution\65 Drawings_Env\CAD\GTR-21023592-A0.dwg

SCALE:

0 25 50 75 100 125 m

LEGEND:

- BOREHOLE /MONITORING WELL (EXP, 2022)
- XX.XX GROUNDWATER ELEVATION (m asl) AS MEASURED ON FEBRUARY 10, 2022
- GROUNDWATER CONTOUR
- GROUNDWATER FLOW DIRECTION
- APPROXIMATE SITE BOUNDARY

exp.

DRAWN BY:	CHECKED BY:
AC	JS

GROUNDWATER CONTOUR PLAN

FIGURE: 6

HYDROGEOLOGICAL INVESTIGATION
AND WATER BALANCE ASSESSMENT
800 YONGE STREET
BARRIE, ONTARIO

PROJECT NUMBER: GTR-21023592-A0

DATE: FEBRUARY 2022

SCALE:

0 25 50 75 100 125 m

LEGEND:

OPEN SPACE

APPROXIMATE SITE BOUNDARY

DRAWN BY:	CHECKED BY:
AC	JS

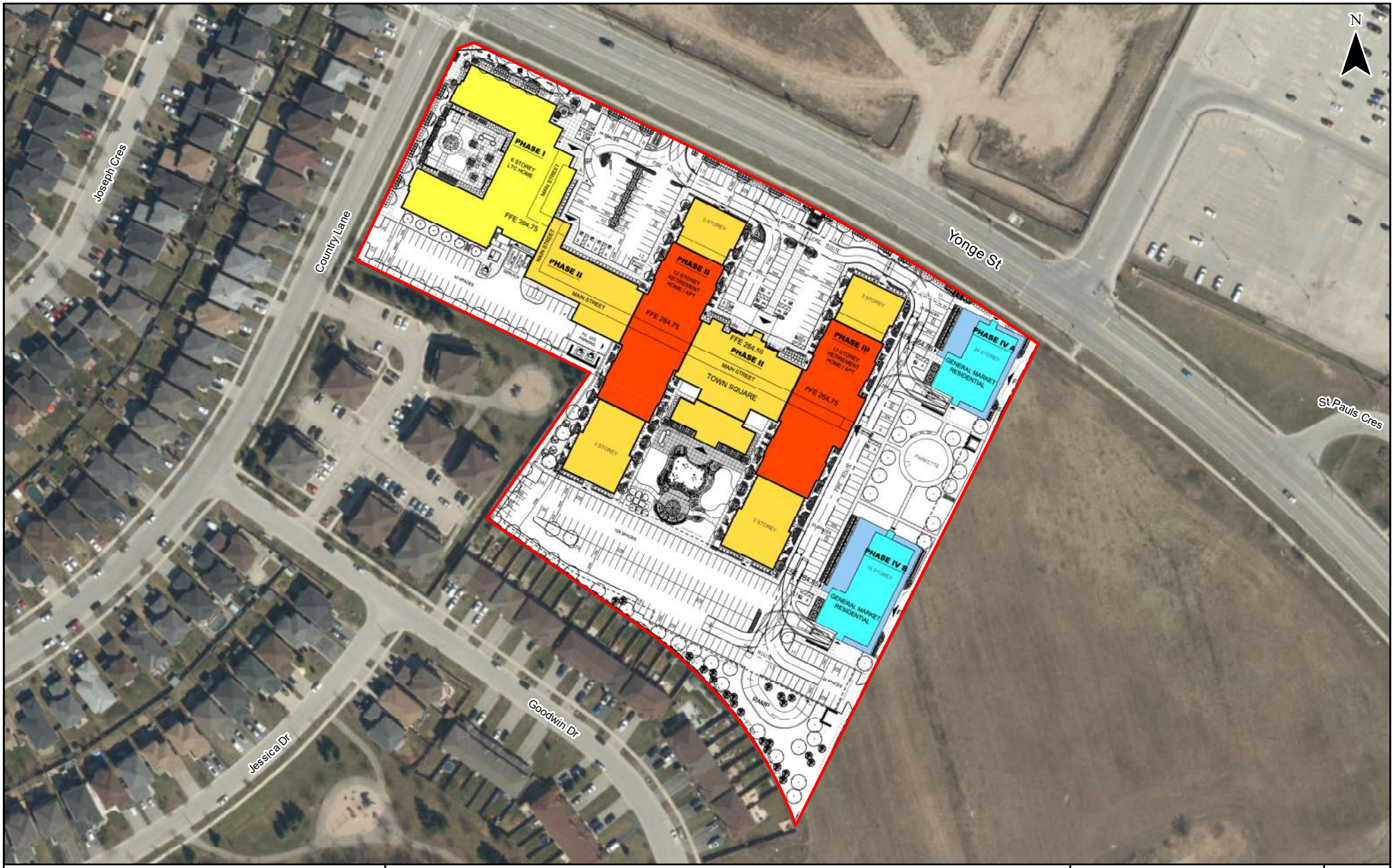
EXISTING LAND USE

FIGURE: 7

HYDROGEOLOGICAL INVESTIGATION
AND WATER BALANCE ASSESSMENT
800 YONGE STREET
BARRIE, ONTARIO

PROJECT NUMBER: GTR-21023592-A0

DATE: FEBRUARY 2022



SCALE:
0 25 50 75 100 125 m

SOURCE:
BASED ON MASTER SITE PLAN - SCHLEGEL VILLAGES, BARRIE.
ANDERSON WELLSMAN ARCHITECTS INC., JULY 12 2022. DRAWING No: SP10.1

exp.

DRAWN BY:	CHECKED BY:
AC	JL

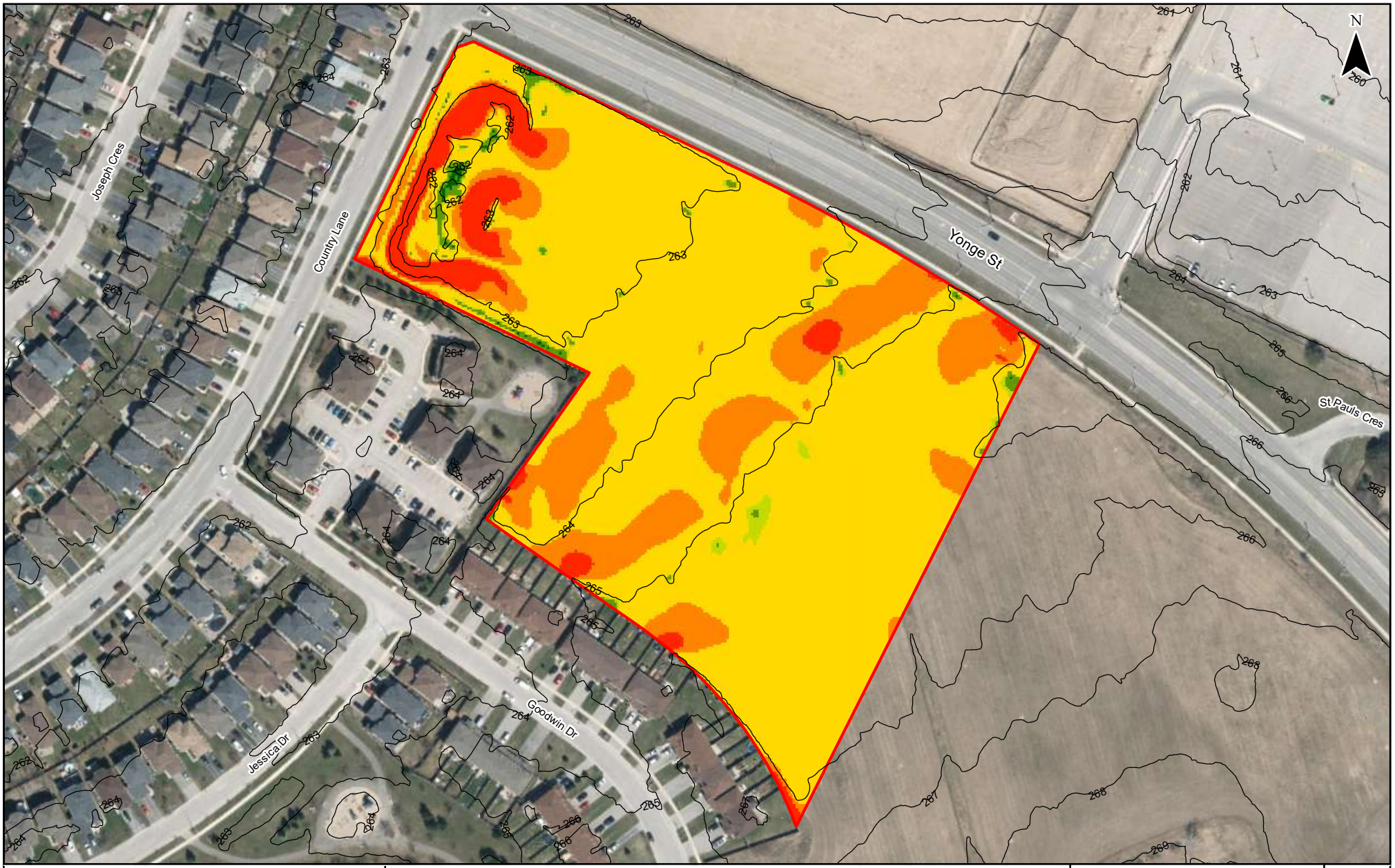
LEGEND:
APPROXIMATE SITE BOUNDARY

PROPOSED LAND USE

FIGURE: 8

HYDROGEOLOGICAL INVESTIGATION
AND WATER BALANCE ASSESSMENT
800 YONGE STREET
BARRIE, ONTARIO

PROJECT NUMBER: GTR-21023592-A0 | DATE: JULY 2024



SCALE:
0 25 50 75 100 125 m

SOURCE:
TOPOGRAPHIC CONTOURS (2016) BASED ON PUBLIC SECTOR INFORMATION MADE AVAILABLE UNDER THE CITY OF BARRIE OPEN DATA PORTAL

exp.

DRAWN BY:	CHECKED BY:
AC	JS

LEGEND:
TOPOGRAPHIC CONTOUR (m asl)
APPROXIMATE SITE BOUNDARY

EXISTING SLOPE (INFILTRATION FACTOR):
- <0.06% (0.30)
- 0.06 - 0.28% (0.25)
- 0.28 - 0.38% (0.20)
- 0.38 - 2.8% (0.15)
- 2.8 - 4.7% (0.10)
- >4.7% (0.05)

EXISTING SLOPE

FIGURE: 9

HYDROGEOLOGICAL INVESTIGATION
AND WATER BALANCE ASSESSMENT
800 YONGE STREET
BARRIE, ONTARIO

PROJECT NUMBER: GTR-21023592-A0
DATE: FEBRUARY 2022

Appendix A – MECP WWR Summary Table

Appendix A
MECP Water Well Database Search Results
(Water Wells within 500 m of Site Boundary)

Off-Site															
BH ID	WELL_ID	DATE	EAST83	NORTH83	ELEVATION (m ASL)	LOCATION ACCURACY	STREET	CITY	DISTANCE FROM SITE CENTROID (m)	CONSTRUCTION METHOD	WELL DEPTH (m bgs)	WATER FOUND (m bgs)	CASING DIAMETER (cm)	1st USE	2nd USE	FINAL STATUS
10379298	5701405	10/30/1965	608901	4911229	270.3	margin of error : 100 m - 300 m			469	Cable Tool	24.4	21.9	15.2	Domestic		Water Supply
10379299	5701406	3/29/1966	608866	4911234	270.5	margin of error : 100 m - 300 m			476	Cable Tool	18.3	18.3	10.2	Domestic		Water Supply
10379300	5701407	6/9/1966	608741	4911198	272.7	margin of error : 100 m - 300 m			565	Cable Tool	19.8	11.3	12.7	Domestic		Water Supply
10379302	5701409	9/14/1966	608786	4911188	272.3	margin of error : 100 m - 300 m			552	Cable Tool	21.9	17.7	12.7	Domestic		Water Supply
10379303	5701410	7/26/1956	609446	4911438	269.2	UTM very unreliable			469	Cable Tool	20.1	16.5	10.2	Domestic		Water Supply
10379304	5701411	6/26/1958	609231	4911256	273.1	margin of error : 100 m - 300 m			461	Cable Tool	19.2	17.7	10.2	Domestic		Water Supply
10379305	5701412	10/2/1959	609372	4911182	273.6	margin of error : 100 m - 300 m			595	Jetting	15.2	13.7	5.1	Domestic		Water Supply
10379307	5701414	7/3/1962	608971	4911290	270.2	margin of error : 100 m - 300 m			393	Cable Tool	18.3	18.3	15.2	Domestic		Water Supply
10379309	5701416	1/22/1966	609461	4911448	268.4	margin of error : 100 m - 300 m			478	Cable Tool	20.7	20.7	10.2	Domestic		Water Supply
10379310	5701417	3/23/1966	609366	4911388	270.7	margin of error : 100 m - 300 m			434	Cable Tool	21.9	21.3	10.2	Domestic		Water Supply
10379311	5701418	3/30/1966	609361	4911398	270.7	margin of error : 100 m - 300 m			424	Cable Tool	21.9	21.9	10.2	Domestic		Water Supply
10379375	5701482	4/12/1964	609230	4911464	270.5	margin of error : 100 m - 300 m			284	Cable Tool	18.9	16.8	10.2	Domestic		Water Supply
10379376	5701483	4/8/1964	609240	4911479	270.3	margin of error : 100 m - 300 m			280	Cable Tool	18.9	16.8	10.2	Domestic		Water Supply
10379379	5701486	6/16/1967	608966	4911382	270.2	margin of error : 100 m - 300 m			304	Cable Tool	18.9	18.9	10.2	Domestic		Water Supply
10379381	5701488	5/11/1967	609552	4911601	263.0	margin of error : 100 m - 300 m			516	Boring	9.1	5.5	76.2	Domestic		Water Supply
10383826	5705950	8/31/1968	608774	4911233	272.1	margin of error : 30 m - 100 m			518	Cable Tool	20.7	16.5	12.7	Domestic		Water Supply
10384899	5707053	2/5/1970	609314	4911423	271.1	margin of error : 30 m - 100 m			372	Cable Tool	18.9	18.9	10.2	Domestic		Water Supply
10386033	5708200	7/9/1971	608914	4911273	270.3	margin of error : 30 m - 100 m			423	Cable Tool	19.5	14.3	12.7	Domestic		Water Supply
10387330	5709510	12/8/1972	609054	4911333	270.9	margin of error : 30 m - 100 m			344	Cable Tool	18.9	9.1	12.7	Domestic		Water Supply
10387425	5709605	1/4/1973	609484	4911423	268.6	margin of error : 30 m - 100 m			510	Boring	6.1	5.2	76.2	Industrial		Water Supply
10387483	5709663	1/11/1973	609404	4911543	268.1	margin of error : 30 m - 100 m			386	Cable Tool	15.5	10.4	12.7	Domestic		Water Supply
10387741	5709921	4/10/1973	608949	4911393	270.1	margin of error : 30 m - 100 m			298	Cable Tool	17.4	10.7	12.7	Domestic		Water Supply
10390827	5713074	4/1/1976	609147	4912143	258.7	UTM very unreliable			478	Cable Tool	19.2	18.3	91.4	Domestic		Water Supply
10392925	5715208	5/15/1978	608964	4911373	270.4	margin of error : 100 m - 300 m			313	Cable Tool	18.0	6.1	12.7	Domestic		Water Supply
10395094	5717401	9/8/1980	609514	4911473	266.4	margin of error : 100 m - 300 m			514	Cable Tool	14.0	12.2	12.7	Domestic		Water Supply
10396133	5718447	3/24/1982	609414	4911273	273.3	margin of error : 100 m - 300 m			549	Cable Tool	18.9	17.7	15.2	Commerical	Domestic	Water Supply
10399560	5721936	7/13/1987	609147	4912143	258.7	UTM very unreliable			478	Cable Tool	20.7	20.4	15.2	Domestic	Municipal	Water Supply
11556723	5740666	5/8/2006	608699	4911968	264.0	margin of error : 10 - 30 m	YOUNG AND ESTER	BARRIE	450		10.0		4.6			
1001850354	7114036	8/30/2008	609113	4912188	257.4	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	516	Auger	6.9		4.1	Dewatering		Dewatering
1002781391	7114036	8/30/2008	609129	4912190	257.2	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	521	AUGER	6.9		4.1	Dewatering		Dewatering

Off-Site															
BH ID	WELL_ID	DATE	EAST83	NORTH83	ELEVATION (m ASL)	LOCATION ACCURACY	STREET	CITY	DISTANCE FROM SITE CENTROID (m)	CONSTRUCTION METHOD	WELL DEPTH (m bgs)	WATER FOUND (m bgs)	CASING DIAMETER (cm)	1st USE	2nd USE	FINAL STATUS
1002781400	7114036	8/30/2008	609128	4912190	257.2	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	520	AUGER	6.9		4.1	Dewatering		Dewatering
1001803813	7111721	6/18/2008	609268	4911412	271.9	margin of error : 10 - 30 m	2243 MAPLEVIEW DR.	Barrie	348							Abandoned-Other
1001803816	7111722	6/18/2008	609279	4911407	271.9	margin of error : 10 - 30 m	2235 MAPLEVIEW DR.	Barrie	359							Abandoned-Other
1001803822	7111724	6/18/2008	609345	4911439	270.5	margin of error : 10 - 30 m	2221 MAPLEVIEW DR.	Barrie	385						Other	
1002781409	7114036	8/30/2008	609127	4912189	257.2	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	519	AUGER	6.9		4.1	Dewatering		Dewatering
1002781418	7114036	8/30/2008	609125	4912189	257.3	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	519	AUGER	6.9		4.1	Dewatering		Dewatering
1002781427	7114036	8/30/2008	609121	4912189	257.3	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	518	AUGER	6.9		4.1	Dewatering		Dewatering
1002781436	7114036	8/30/2008	609119	4912188	257.3	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	517	AUGER	6.9		4.1	Dewatering		Dewatering
1002781445	7114036	8/30/2008	609112	4912188	257.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	516	AUGER	6.9		4.1	Dewatering		Dewatering
1002781454	7114036	8/30/2008	609123	4912189	257.3	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	519	AUGER	6.9		4.1	Dewatering		Dewatering
1002781463	7114036	8/30/2008	609110	4912188	257.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	516	AUGER	6.9		4.1	Dewatering		Dewatering
1002781472	7114036	8/30/2008	609106	4912188	257.6	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	515	AUGER	6.9		4.1	Dewatering		Dewatering
1002781482	7114036	8/30/2008	609102	4912189	257.8	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	516	AUGER	6.9		4.1	Dewatering		Dewatering
1002781491	7114036	8/30/2008	609100	4912189	257.8	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	516	AUGER	6.9		4.1	Dewatering		Dewatering
1002781500	7114036	8/30/2008	609097	4912190	257.9	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	516	AUGER	6.9		4.1	Dewatering		Dewatering
1002781509	7114036	8/30/2008	609093	4912192	258.0	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	518	AUGER	6.9		4.1	Dewatering		Dewatering
1002781518	7114036	8/30/2008	609089	4912194	258.0	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	519	AUGER	6.9		4.1	Dewatering		Dewatering
1002781527	7114036	8/30/2008	609087	4912195	258.0	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	520	AUGER	6.9		4.1	Dewatering		Dewatering
1002781536	7114036	8/30/2008	609082	4912198	258.1	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	523	AUGER	6.9		4.1	Dewatering		Dewatering
1002781545	7114036	8/30/2008	609080	4912199	258.1	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	524	AUGER	6.9		4.1	Dewatering		Dewatering
1002781554	7114036	8/30/2008	609078	4912200	258.2	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	525	AUGER	6.9		4.1	Dewatering		Dewatering
1002781563	7114036	8/30/2008	609076	4912201	258.2	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	525	AUGER	6.9		4.1	Dewatering		Dewatering
1002781573	7114036	8/30/2008	609075	4912203	258.2	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	527	AUGER	6.9		4.1	Dewatering		Dewatering
1002781582	7114036	8/30/2008	609073	4912204	258.2	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	528	AUGER	6.9		4.1	Dewatering		Dewatering
1002781591	7114036	8/31/2008	609071	4912205	258.3	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	529	AUGER	6.9		4.1	Dewatering		Dewatering
1002781600	7114036	8/31/2008	609066	4912207	258.3	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	531	AUGER	6.9		4.1	Dewatering		Dewatering
1002781609	7114036	8/31/2008	609063	4912209	258.4	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	533	AUGER	6.9		4.1	Dewatering		Dewatering
1002781618	7114036	8/31/2008	609059	4912210	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	534	AUGER	6.9		4.1	Dewatering		Dewatering
1002781627	7114036	8/31/2008	609057	4912211	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	535	AUGER	6.9		4.1	Dewatering		Dewatering
1002781636	7114036	8/31/2008	609056	4912212	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	535	AUGER	6.9		4.1	Dewatering		Dewatering
1002781645	7114036	8/31/2008	609055	4912213	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	536	AUGER	6.9		4.1	Dewatering		Dewatering
1002781654	7114036	8/31/2008	609051	4912215	258.6	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	538	AUGER	6.9		4.1	Dewatering		Dewatering
1002781676	7114036	8/31/2008	609048	4912216	258.7	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	539	AUGER	6.9		4.1	Dewatering		Dewatering
1002781685	7114036	8/31/2008	609045	4912218	258.7	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	541	AUGER	6.9		4.1	Dewatering		Dewatering
1002781694	7114036	8/31/2008	609044	4912219	258.7	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	542	AUGER	6.9		4.1	Dewatering		Dewatering
1002781703	7114036	8/31/2008	609043	4912220	258.7	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	543	AUGER	6.9		4.1	Dewatering		Dewatering
1002781712	7114036	8/31/2008	609041	4912222	258.6	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	545	AUGER	6.9		4.1	Dewatering		Dewatering
1002781721	7114036	8/31/2008	609038	4912224	258.6	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	547	AUGER	6.9		4.1	Dewatering		Dewatering

Off-Site																
BH ID	WELL_ID	DATE	EAST83	NORTH83	ELEVATION (m ASL)	LOCATION ACCURACY	STREET	CITY	DISTANCE FROM SITE CENTROID (m)	CONSTRUCTION METHOD	WELL DEPTH (m bgs)	WATER FOUND (m bgs)	CASING DIAMETER (cm)	1st USE	2nd USE	FINAL STATUS
1002781730	7114036	8/31/2008	609036	4912226	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	549	AUGER	6.9		4.1	Dewatering		Dewatering
1002781739	7114036	8/31/2008	609035	4912228	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	551	AUGER	6.9		4.1	Dewatering		Dewatering
1002781748	7114036	8/31/2008	609033	4912229	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	552	AUGER	6.9		4.1	Dewatering		Dewatering
1002781757	7114036	8/31/2008	609031	4912232	258.4	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	555	AUGER	6.9		4.1	Dewatering		Dewatering
1002781767	7114036	8/31/2008	609029	4912234	258.4	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	557	AUGER	6.9		4.1	Dewatering		Dewatering
1002781776	7114036	8/31/2008	609028	4912235	258.4	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	558	AUGER	6.9		4.1	Dewatering		Dewatering
1002781785	7114036	8/31/2008	609021	4912236	258.6	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	560	AUGER	6.9		4.1	Dewatering		Dewatering
1002781794	7114036	8/31/2008	609022	4912237	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	561	AUGER	6.9		4.1	Dewatering		Dewatering
1002781803	7114036	8/31/2008	609020	4912239	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	563	AUGER	6.9		4.1	Dewatering		Dewatering
1003019599	7146493	4/16/2010	609561	4911397	266.7	margin of error : 30 m - 100 m	3272 ST. PAULS CRES	Innisfil	589	Rotary (Air)	17.1	9.1	15.2	Commerical		Water Supply
1003549834	7167232	6/21/2011	609112	4911269	272.2	margin of error : 10 - 30 m	YONGE/MAPLEVIEW		414	Boring	9.1		4.8	Test Hole		Observation Wells
1004692730	7215155	11/15/2013	609530	4911579	263.8	margin of error : 30 m - 100 m	43 ST PAULS CRES	BARRIE	498	Digging			76.2	Domestic		Abandoned-Other
1004692733	7215156	11/15/2013	609537	4911577	263.5	margin of error : 30 m - 100 m	43 ST PAULS CRES	BARRIE	505	Cable Tool			13.3	Domestic		Abandoned-Other
1002781812	7114036	8/31/2008	609018	4912241	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	565	AUGER	6.9		4.1	Dewatering		Dewatering
1002781821	7114036	8/31/2008	609016	4912242	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	566	AUGER	6.9		4.1	Dewatering		Dewatering
1002781830	7114036	8/31/2008	609014	4912244	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	568	AUGER	6.9		4.1	Dewatering		Dewatering
1002781839	7114036	8/31/2008	609013	4912245	258.5	margin of error : 10 - 30 m	PINE DR., SOUTH OF BIG BAY POINT RD.	Barrie	569	AUGER	6.9		4.1	Dewatering		Dewatering
1005229291	7232101	10/7/2014	608930	4911314	270.8	margin of error : 30 m - 100 m	613 MAPLEVIEW DRIVE EAST	Barrie	380	Direct Push	4.3		Monitoring and Test Hole			Test Hole
1005229294	7232102	10/3/2014	608931	4911313	270.7	margin of error : 30 m - 100 m	613 MAPLEVIEW DRIVE EAST	Barrie	380	Direct Push	9.1			Municipal	Dewatering	Replacement Well
1005836925	7254222	11/11/2015	609211	4911388	271.7	margin of error : 30 m - 100 m	651 MAPLWVIEW DRIVE WEST		334	Other Method				Not Used		Abandoned-Other
1006135751	7266357	6/9/2016	609573	4911539	264.2	margin of error : 30 m - 100 m	W DRIVE EAST BETWEEN YONGE ST. AND RAILW	BARRIE	548	Boring	6.1			Monitoring		Observation Wells
1006236175	7270842	8/19/2016	609252	4911772	265.1	margin of error : 30 m - 100 m	833 YONGE STREET	Barrie	230	Boring	4.6			Monitoring		Observation Wells
1006491780	7287378	3/7/2017	609533	4911865	257.4	margin of error : 30 m - 100 m	MAPLEVIEW DRIVE EAST & ST. PAUL'S CRESCENT	Barrie	526	Boring	12.2			Monitoring		Observation Wells
1006491783	7287379	3/7/2017	609591	4911915	255.5	margin of error : 30 m - 100 m	MAPLEVIEW DRIVE EAST & ST. PAUL'S CRESCENT	Barrie	598	Boring	10.7			Monitoring		Observation Wells
1007013604	7308459	9/18/2017	609186	4912137	Approximate location: margin of error : 300 m		YOUNG ST.	BARRIE	482	Boring	6.1	0.7		Test Hole	Monitoring	Observation Wells
1006349264	7280314	1/6/2017	608881	4911304	271.0	margin of error : 30 m - 100 m	613 MAPLEVIEW DR EAST	Barrie	406	DIRECT PUSH			Monitoring and Test Hole			Monitoring and Test Hole
1007257656	7317128		609170	4912127		margin of error : 30 m - 100 m	759 YONGE ST	Barrie	468	Boring				Other		Abandoned-Other
1005319415	7239312	3/26/2014	609451	4911299	271.7	margin of error : 30 m - 100 m			557							
1007009260	7308418	9/28/2017	609180	4911864		margin of error : 30 m - 100 m			233							

Appendix B – Borehole Logs and Grain Size Analysis

Log of Borehole OW1

Project No. GTR-21023592-A0 | Drawing No. 1

Project: Pumping Test | Sheet No. 1 of 2

Location: 800 Yonge Street, Barrie

Date Drilled: February 21 to 23, 2023

Drill Type: Mud Rotary

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test —
Shelby Tube ■
Field Vane Test S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m	Depth (m)
			264.20	0
		FILL some gravel, trace organics	~263.6	
		SAND AND GRAVEL some silt, some cobbles, brown, compact	~261.9	1
		SAND medium to fine grain beach sand moist, brown, compact, trace silt		2
				3
				4
		sand seam		5
				6
		moist to wet		7
				8
				9
				10
		medium to coarse grained		11
				12
				13

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

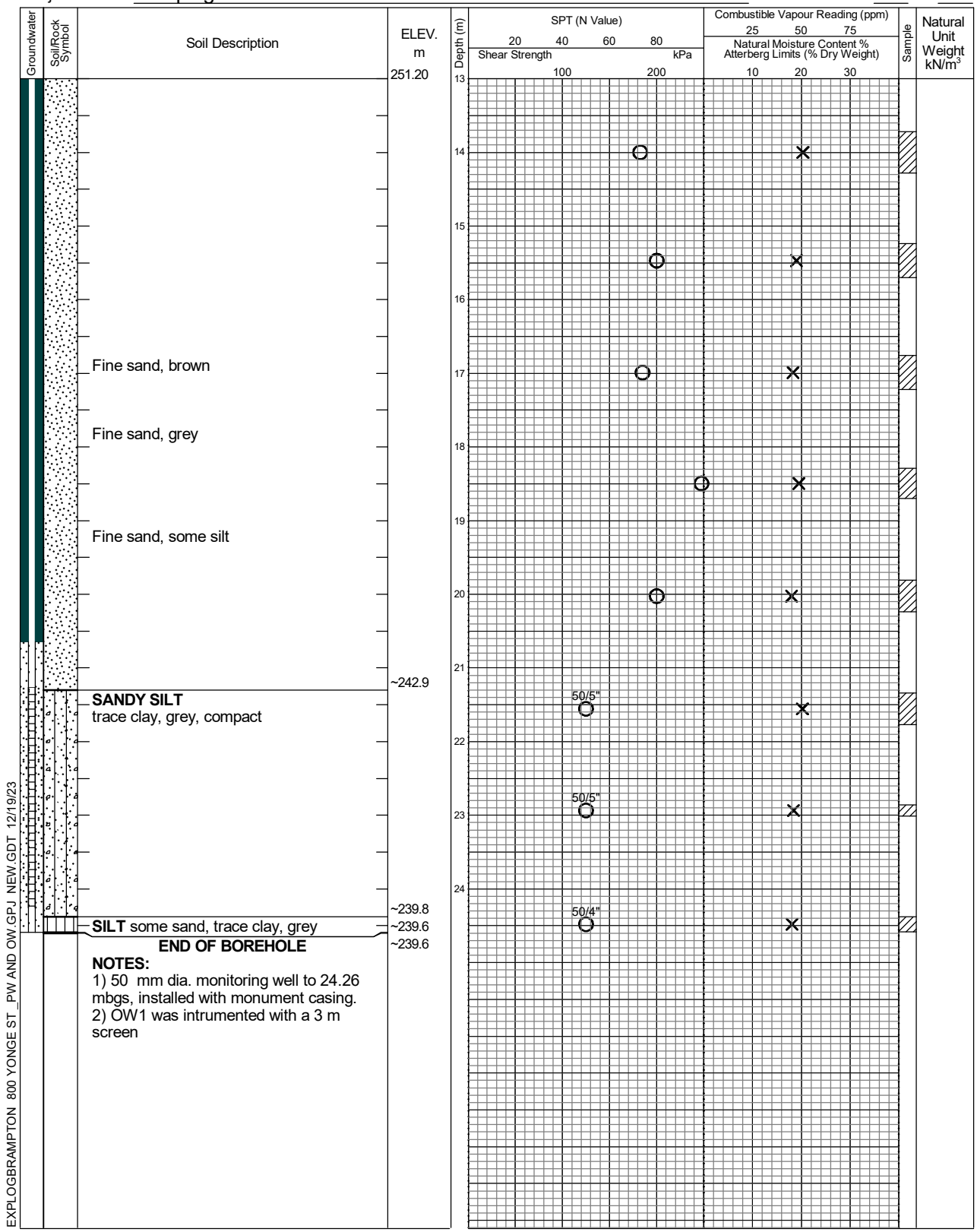
Continued Next Page

Date	Water Level (m)	Hole Open to (m)
February 27, 2023	5.98	on completion
February 28, 2023	7.31	
March 1, 2023	7.31	

Log of Borehole OW1

Project No. GTR-21023592-A0 Drawing No. 1

Project: Pumping Test Sheet No. 2 of 2



Date	Water Level (m)	Hole Open to (m)
February 27, 2023	5.98	on completion
February 28, 2023	7.31	
March 1, 2023	7.31	

Log of Borehole PW1

Project No. GTR-21023592-A0 | Drawing No. 2

Project: Pumping Test | Sheet No. 1 of 1

Location: 800 Yonge Street, Barrie

Date Drilled: February 21 to 23, 2023

Drill Type: Mud Rotary

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test —
Shelby Tube ■
Field Vane Test S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m	Depth (m)
		Please refer to the OW1 soil description for the lithology.	264.10	0
		Please refer to the OW1 description for the lithology.		12
			~240.2	
		END OF BOREHOLE		
		NOTES: 1) Straight drilling, no soil sampling. 2) 100 mm dia. monitoring well to 23.86 mbgs, installed with monument casing. 3) Well intrumented with 6 m screen.		

SPT (N Value): 20 40 60 80
Shear Strength: 100 200 kPa

Combustible Vapour Reading (ppm): 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

Sample | Natural Unit Weight kN/m³

Date	Water Level (m)	Hole Open to (m)
February 27, 2023	7.46	on completion
February 28, 2023	7.06	
March 1, 2023	7.06	

exp.

Log of Borehole OW2

Project No. GTR-21023592-A0 | Drawing No. 3

Project: Pumping Test | Sheet No. 1 of 1

Location: 800 Yonge Street, Barrie

Date Drilled: March 8, 2023

Drill Type: Mud Rotary

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test —
Shelby Tube ■
Field Vane Test S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit —○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Soil Description	ELEV. m	Depth (m)
	264.08	0
Please refer to the OW1 soil description for the lithology.		1 2 3 4 5 6 7
Please refer to the OW1 soil description for the lithology.		8 9 10 11 12 13
	~250.2	
END OF BOREHOLE **NOTES:** 1) Straight drilling, no soil sampling. 2) 50 mm dia. monitoring well installed to 14.57 mTOP with monument casing. 3) Well intrumented with 3 m screen.		

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

Date	Water Level (m)	Hole Open to (m)
March 8, 2023	5.0	on completion
March 9, 2023	6.34	
May 29, 2023	5.99	
July 19, 2023	6.06	

exp.

Log of Borehole PW2

Project No. GTR-21023592-A0 | Drawing No. 4

Project: Pumping Test | Sheet No. 1 of 1

Location: 800 Yonge Street, Barrie

Date Drilled: March 8, 2023

Drill Type: Mud Rotary

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test —
Shelby Tube ■
Field Vane Test ✚ S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m	Depth (m)
		Please refer to the OW1 soil description for the lithology.	264.02	0
		Please refer to the OW1 soil description for the lithology.		7
			~250.0	14
		END OF BOREHOLE		

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

NOTES:
1) Straight drilling, no soil sampling.
2) 100 mm dia. monitoring well 14.04 mbgs, installed with monument casing.
3) Well intrumented with 6 m screen

Date	Water Level (m)	Hole Open to (m)
March 8, 2023	1.52	on completion
March 9, 2023	6.4	
May 29, 2023	6.01	
July 19, 2023	6.09	

EXPLOGBRAMPTON 800 YONGE ST_PW AND OW.GPJ NEW.GDT 12/19/23

Log of Borehole 1

Project No. GTR-21023592-A0 | Figure No. 2

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911778 N 608960 E

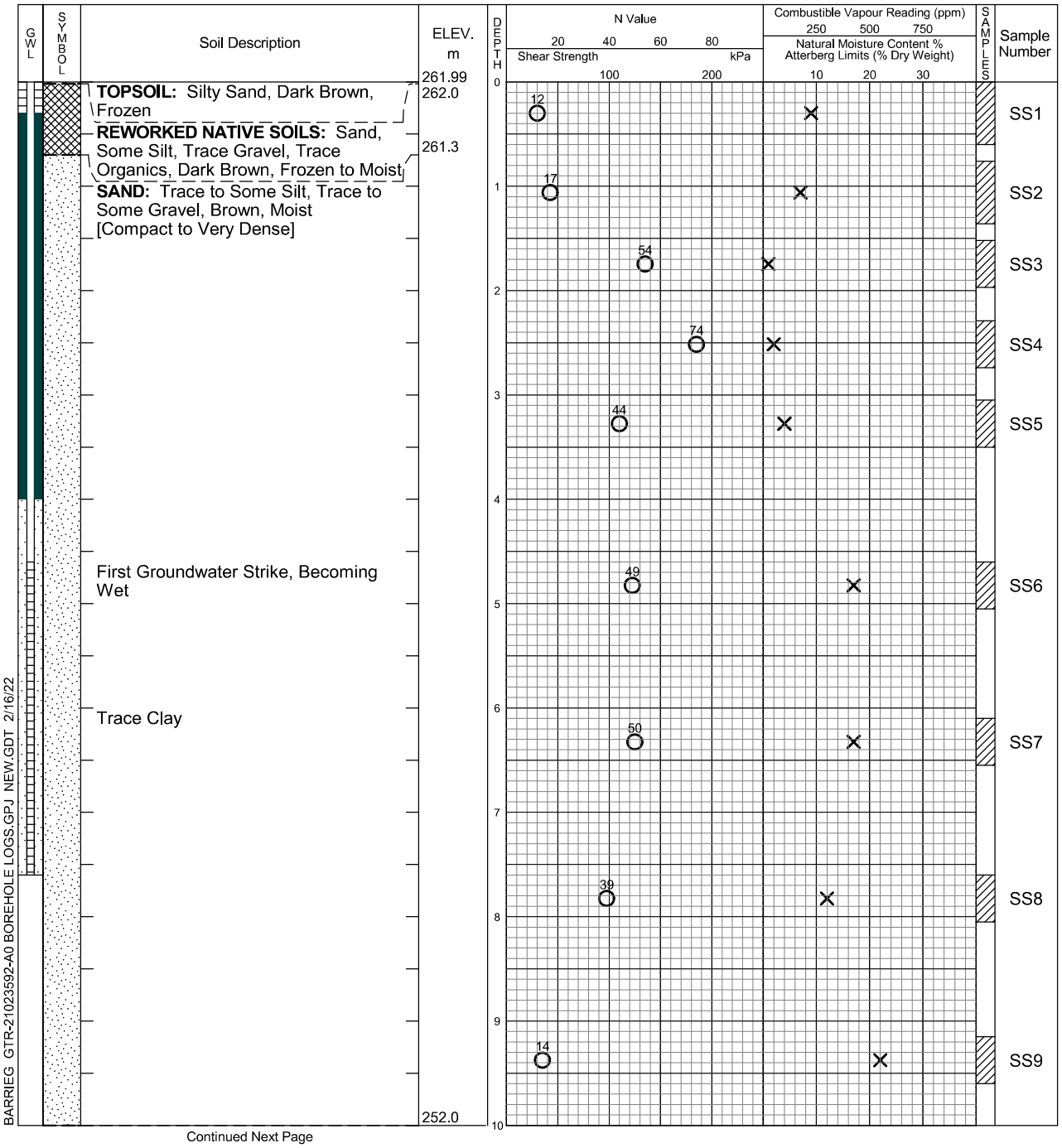
Date Drilled: January 27, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

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Borehole data requires interpretation assistance from EXP before use by others.

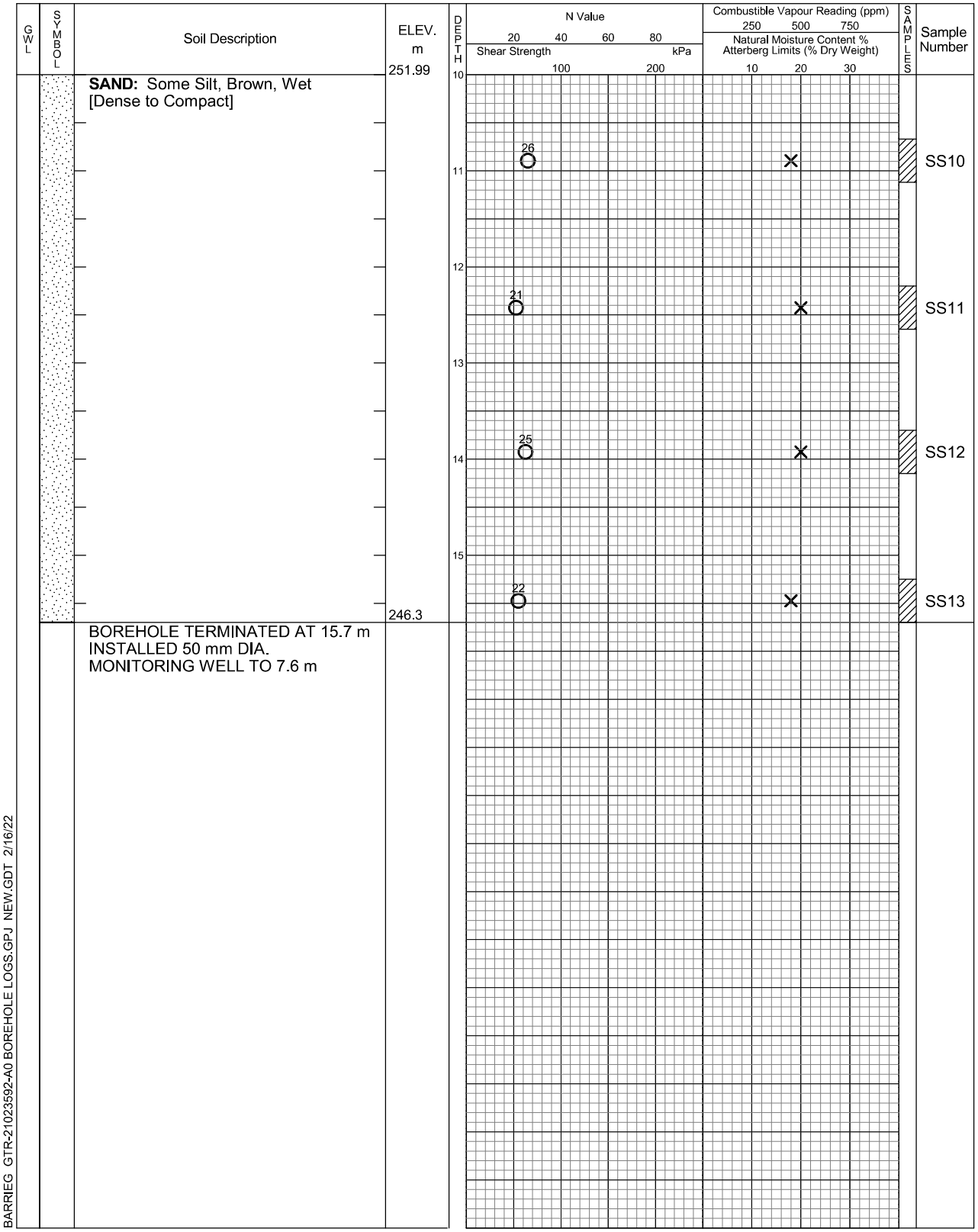
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	4.5	Install
Feb. 10, 2022	4.11 / 257.88	

Log of Borehole 1

Project No. GTR-21023592-A0 Figure No. 2

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	4.5	Install
Feb. 10, 2022	4.11 / 257.88	

Log of Borehole 2

Project No. GTR-21023592-A0 | Figure No. 3

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911759 N 608993 E

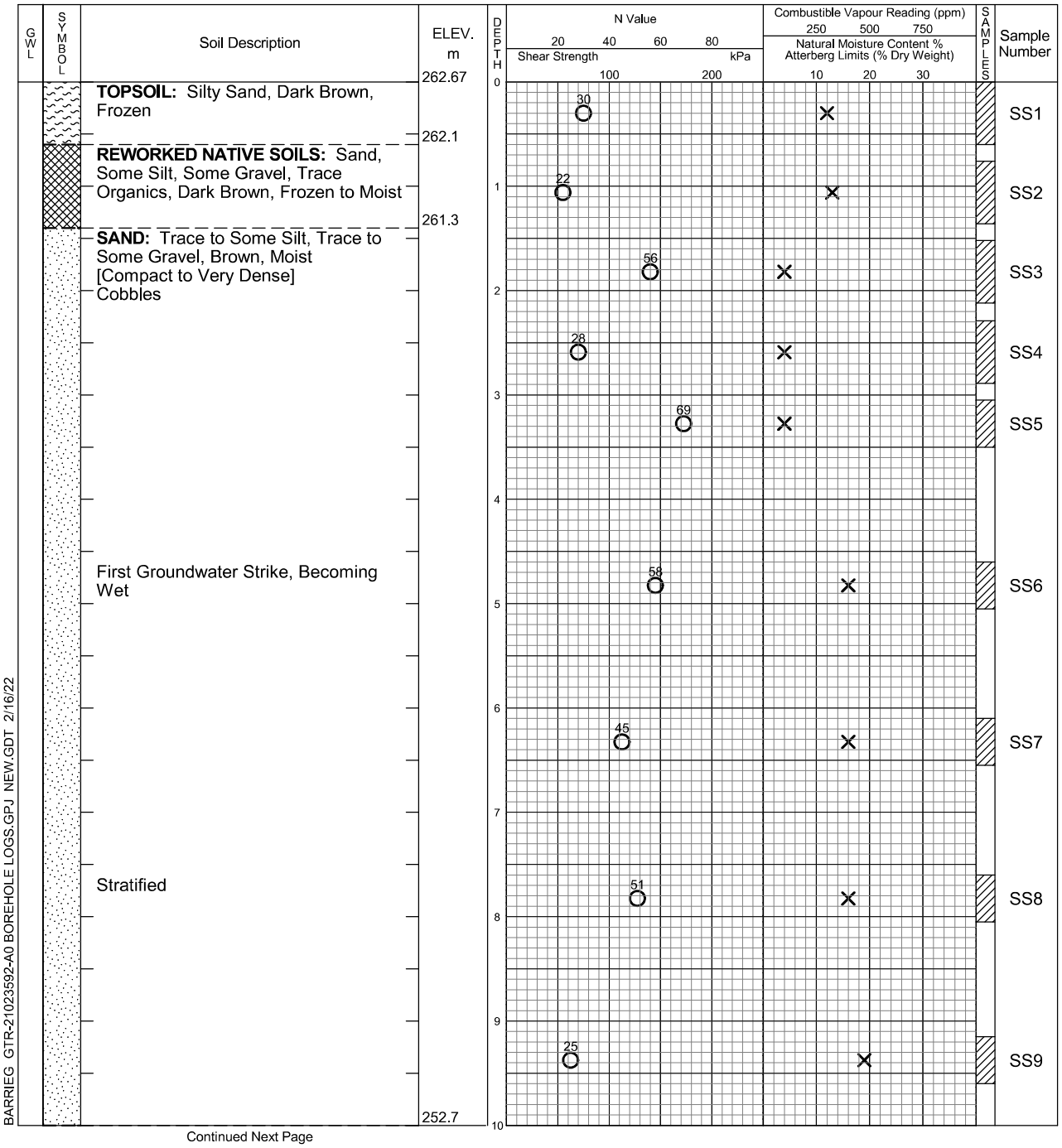
Date Drilled: January 19, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

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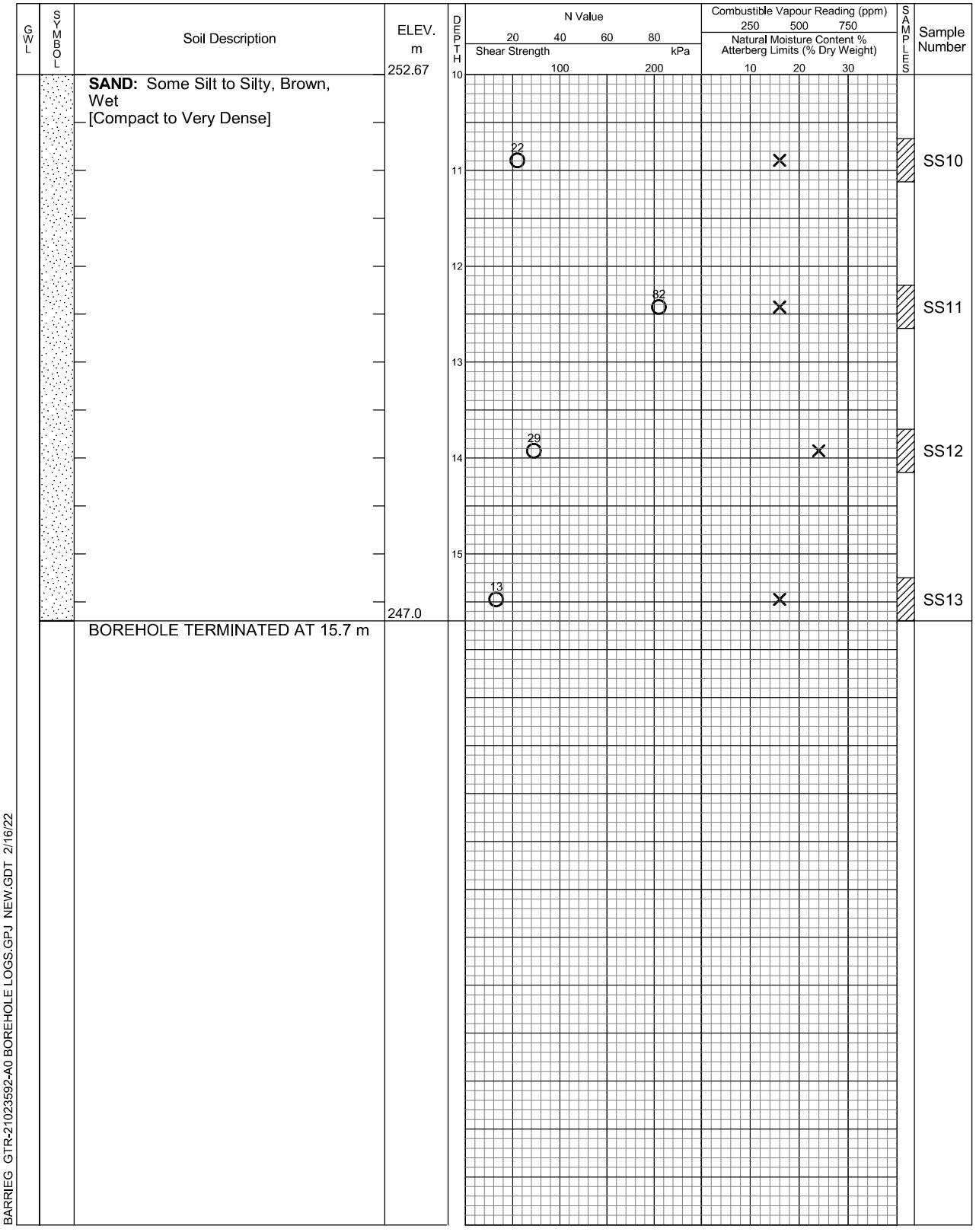
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	4.6	9,2

Log of Borehole 2

Project No. GTR-21023592-A0 Figure No. 3

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	4.6	9,2

Log of Borehole 3

Project No. GTR-21023592-A0 — Figure No. 4

Project: Proposed Long Term Care Facility & Retirement Homes — Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911735 N 608940 E

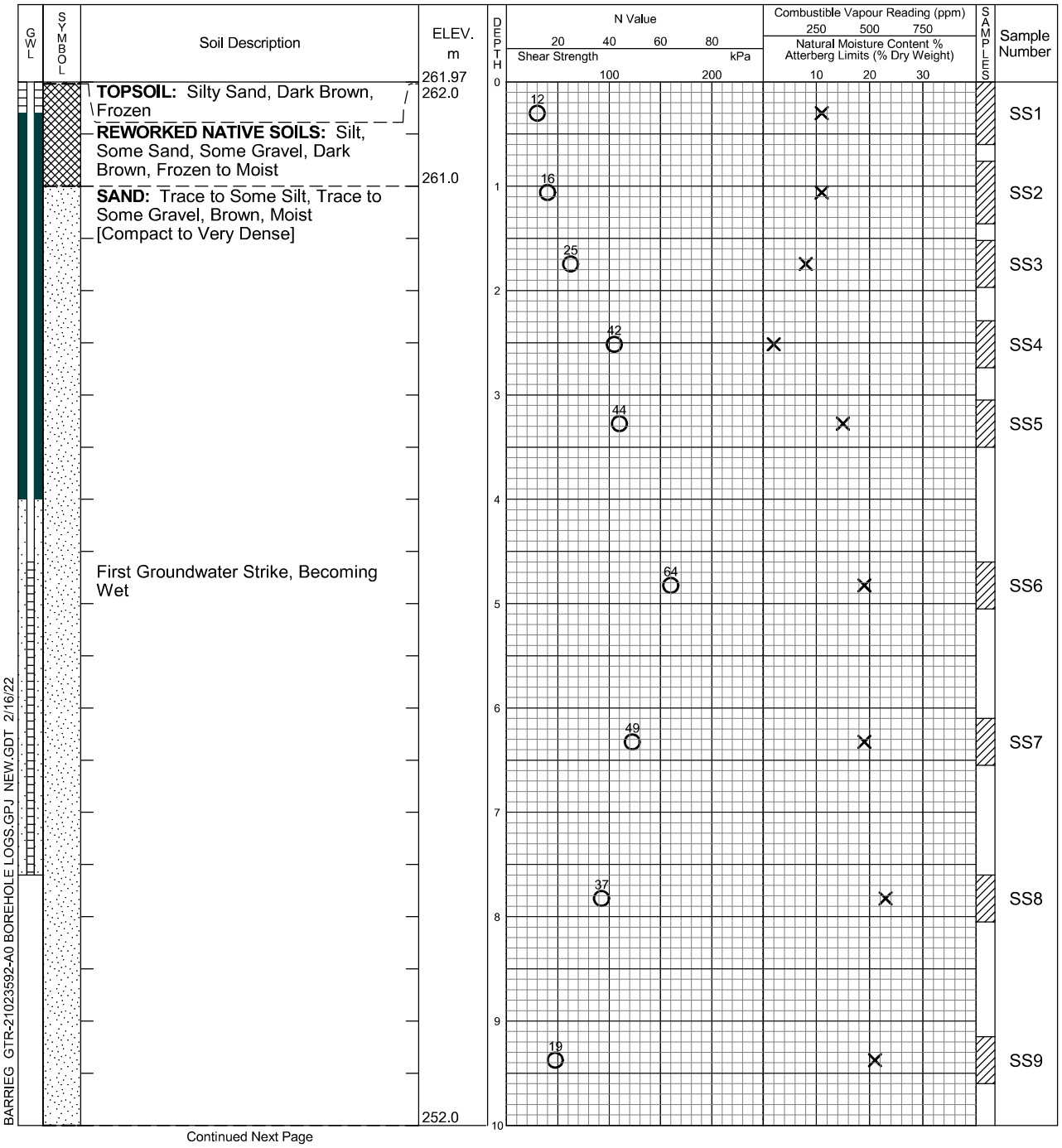
Date Drilled: January 26, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

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Borehole data requires interpretation assistance from EXP before use by others.

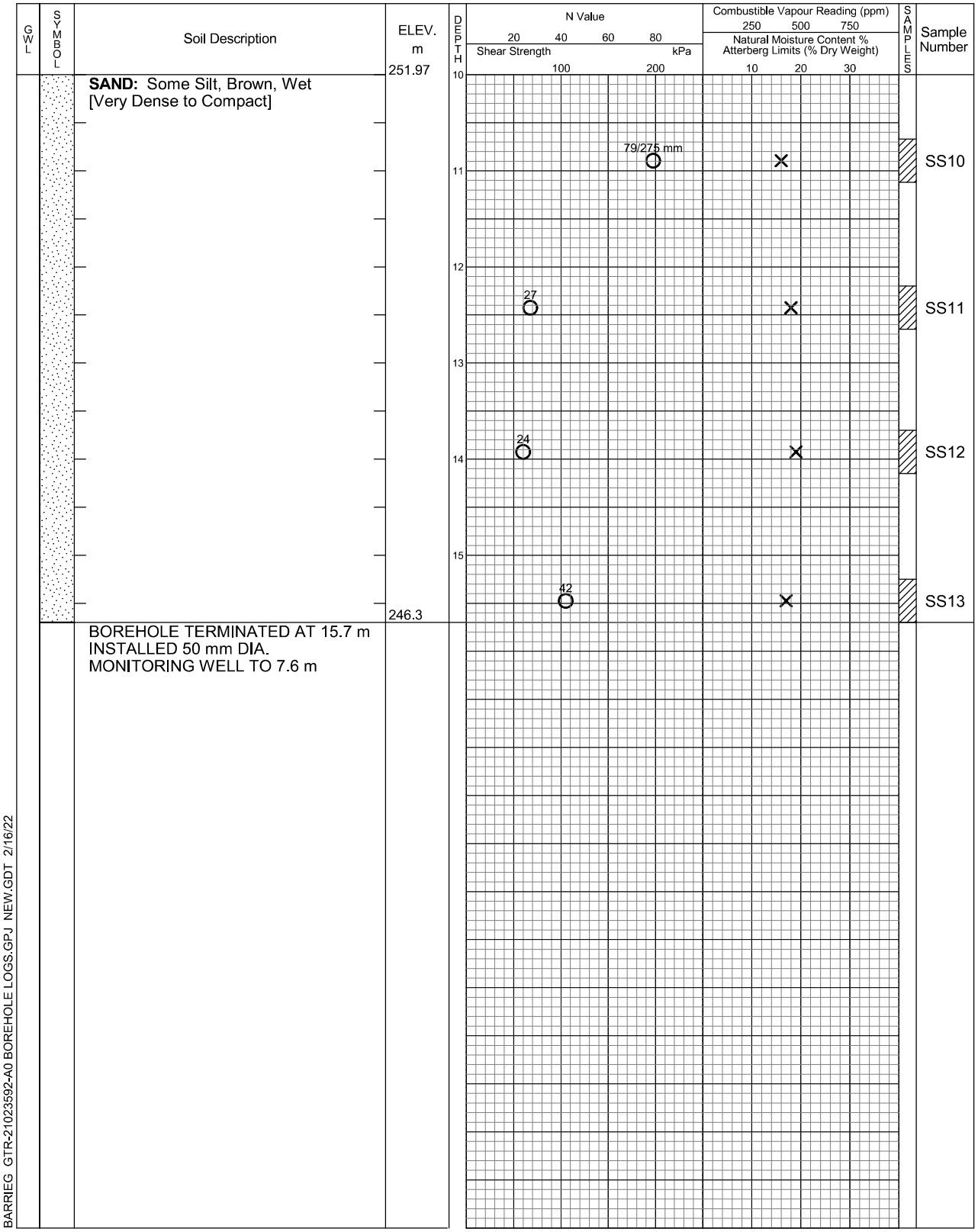
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	Install
Feb. 10, 2022	3.9 / 258.07	

Log of Borehole 3

Project No. GTR-21023592-A0 Figure No. 4

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	Install
Feb. 10, 2022	3.9 / 258.07	

Log of Borehole 4

Project No. GTR-21023592-A0 | Figure No. 5

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911721 N 608981 E

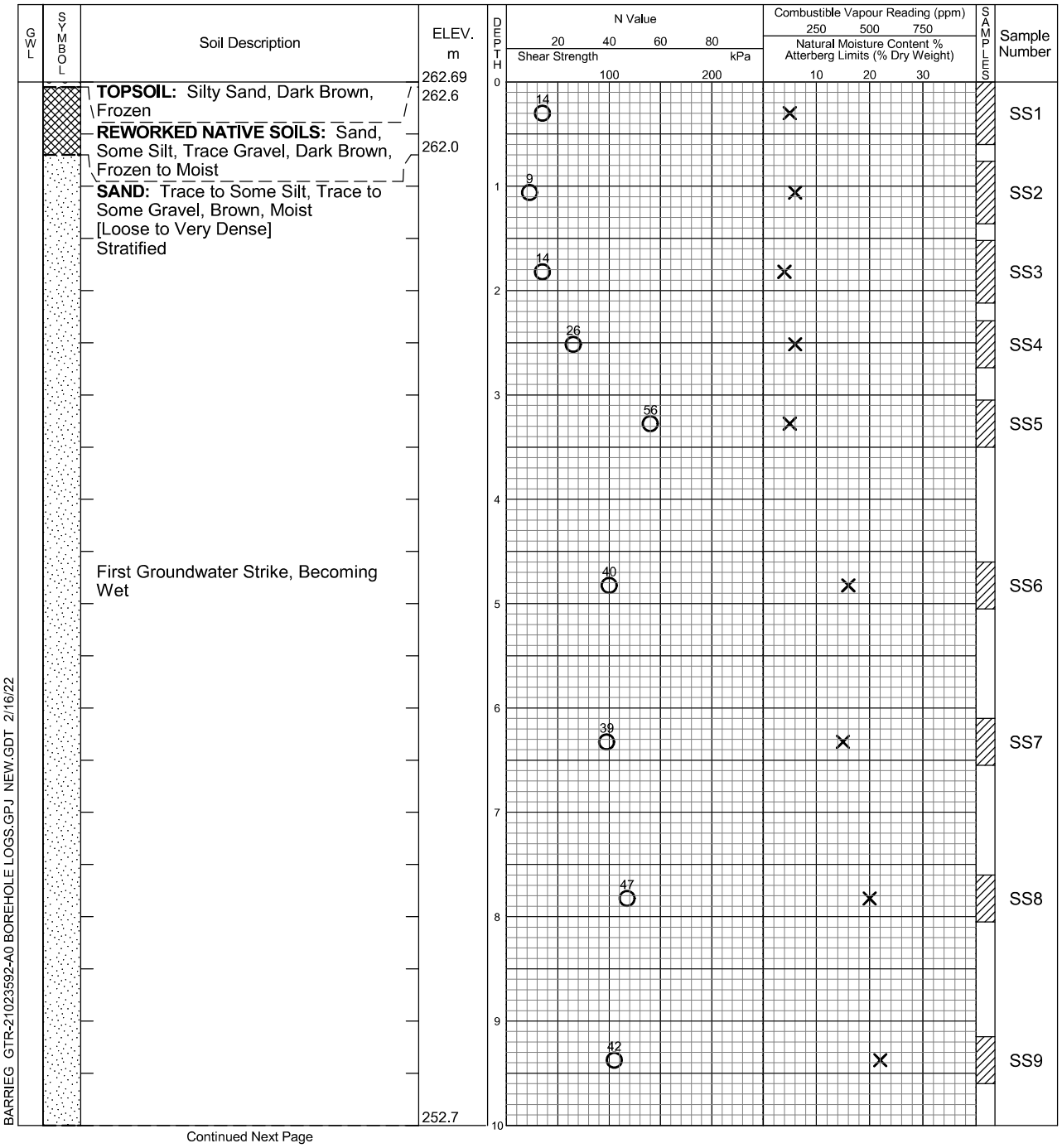
Date Drilled: January 27, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

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Borehole data requires interpretation assistance from EXP before use by others.

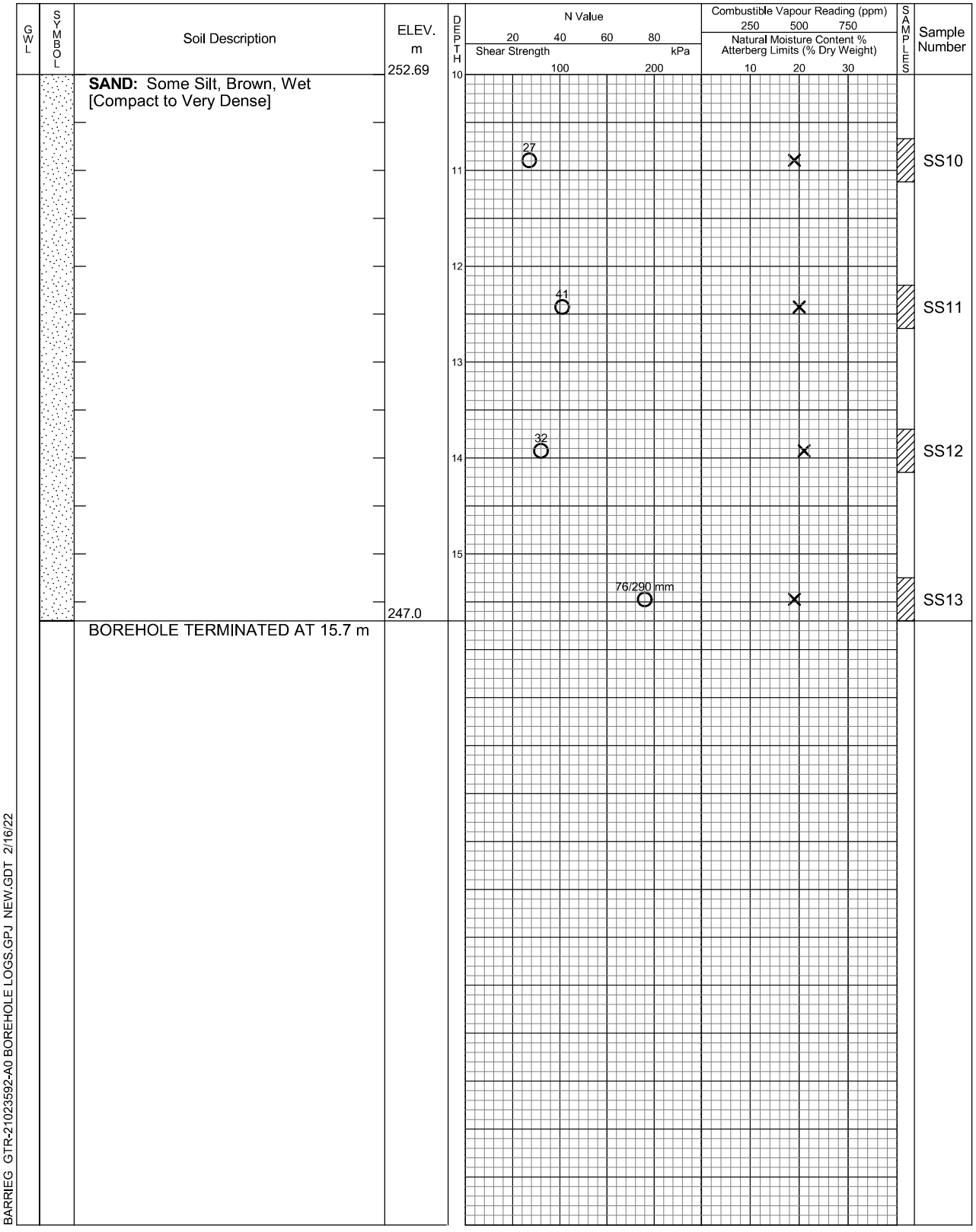
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	4.7	9.4

Log of Borehole 4

Project No. GTR-21023592-A0 Figure No. 5

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	4.7	9.4

Log of Borehole 5

Project No. GTR-21023592-A0 | Figure No. 6

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911739 N 609041 E

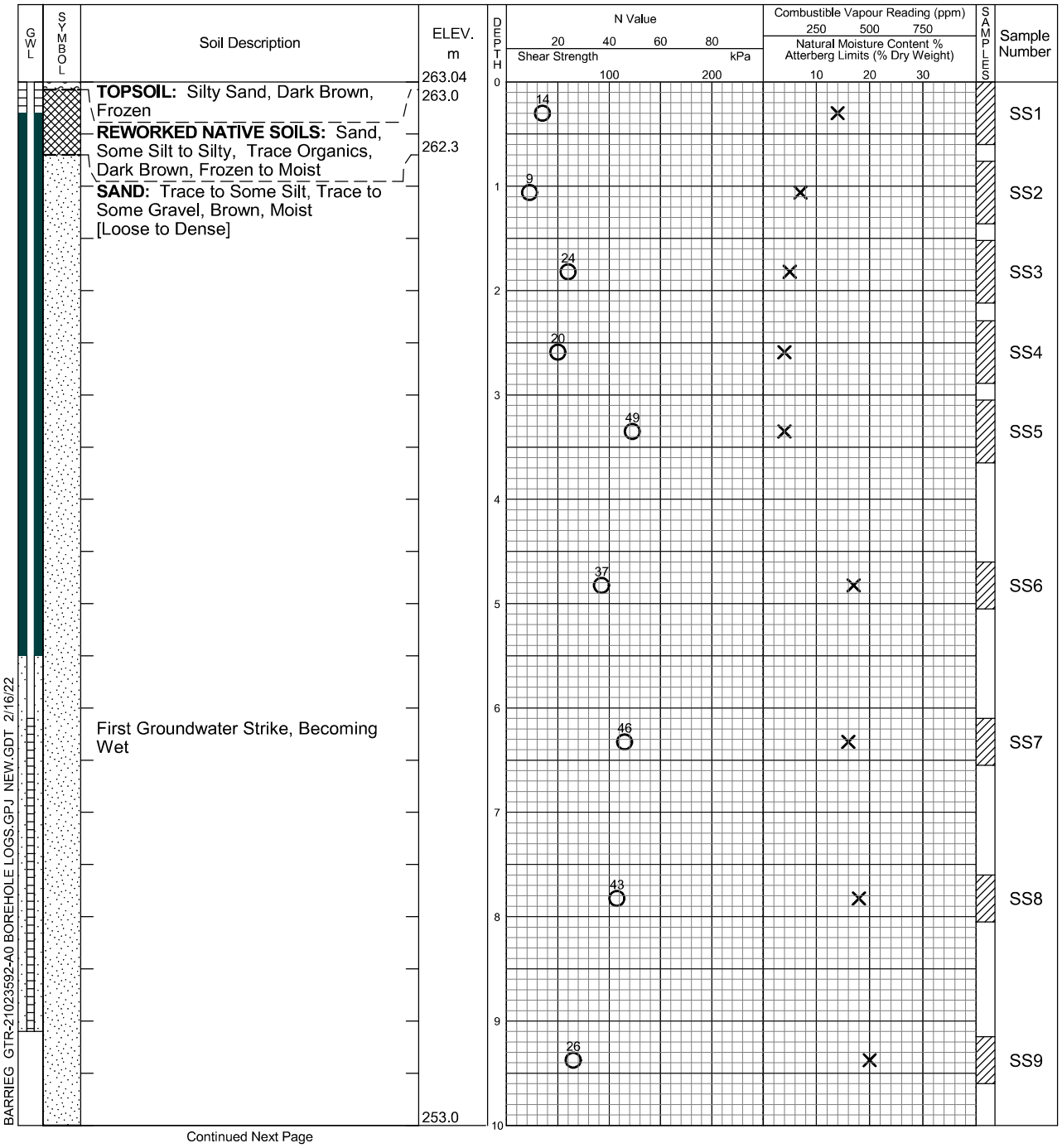
Date Drilled: January 18, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



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BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

EXP Services Inc.
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Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.0	Install
Feb. 10, 2022	5.11 / 257.93	

Log of Borehole 5

Project No. GTR-21023592-A0 Figure No. 6

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample Number
		SAND: Some Silt to Silty, Brown, Wet [Very Dense to Dense]	253.04	10	64/290 mm		SS10	
				11				
				12	48		SS11	
			250.4					
		BOREHOLE TERMINATED AT 12.6 m UPON REFUSAL OF PROGRESSION DUE TO WET SANDS INSTALLED 50 mm DIA. MONITORING WELL TO 9.1 m						

N Value: 20 40 60 80 — Shear Strength: 100 200 kPa

Combustible Vapour Reading (ppm): 250 500 750 — Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.0	Install
Feb. 10, 2022	5.11 / 257.93	

Log of Borehole 6

Project No. GTR-21023592-A0 | Figure No. 7

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911711 N 609028 E

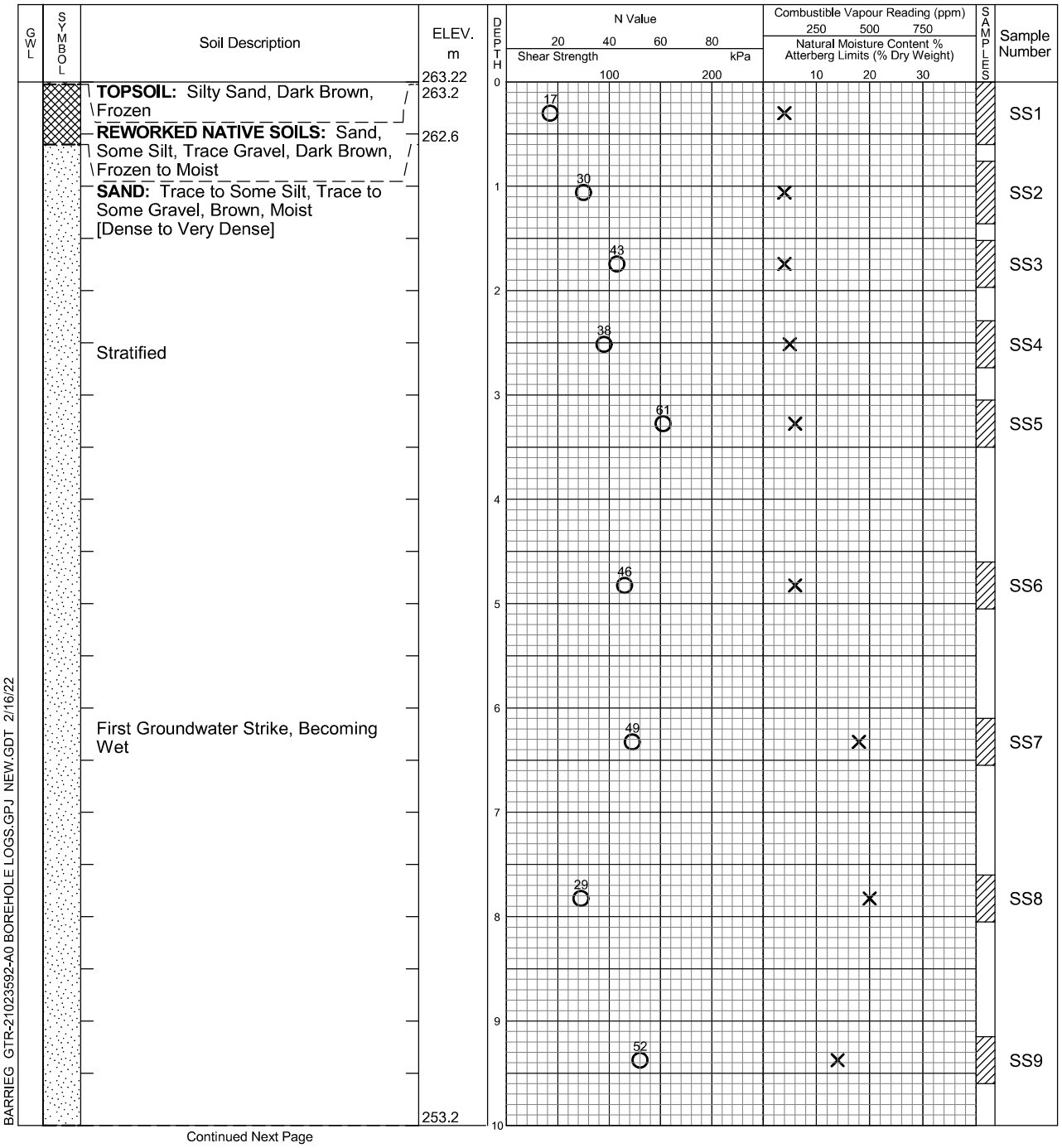
Date Drilled: January 27, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

EXP Services Inc.
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Borehole data requires interpretation assistance from EXP before use by others.

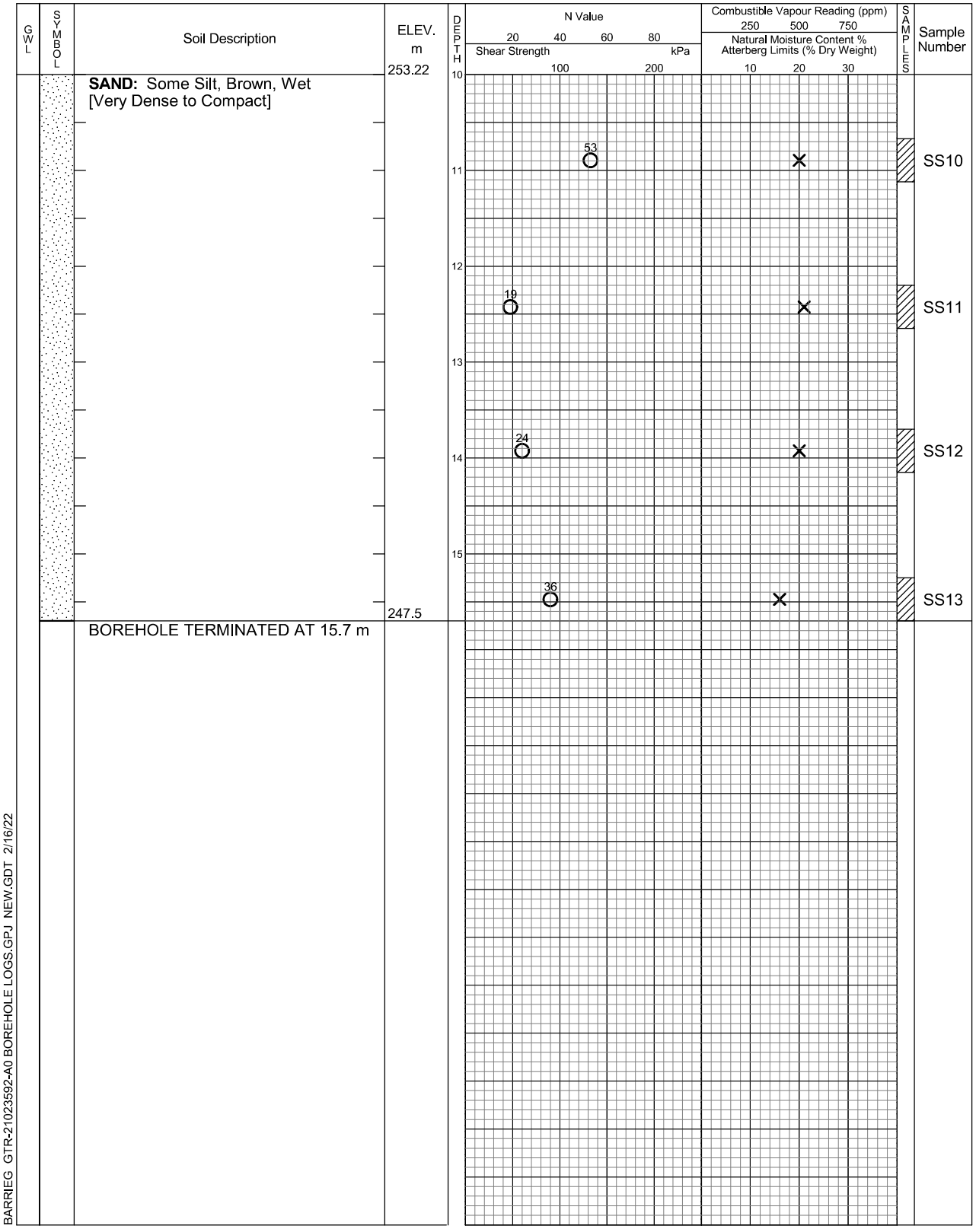
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.1	10.4

Log of Borehole 6

Project No. GTR-21023592-A0 Figure No. 7

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



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Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.1	10.4

Log of Borehole 7

Project No. GTR-21023592-A0 | Figure No. 8

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911675 N 609010 E

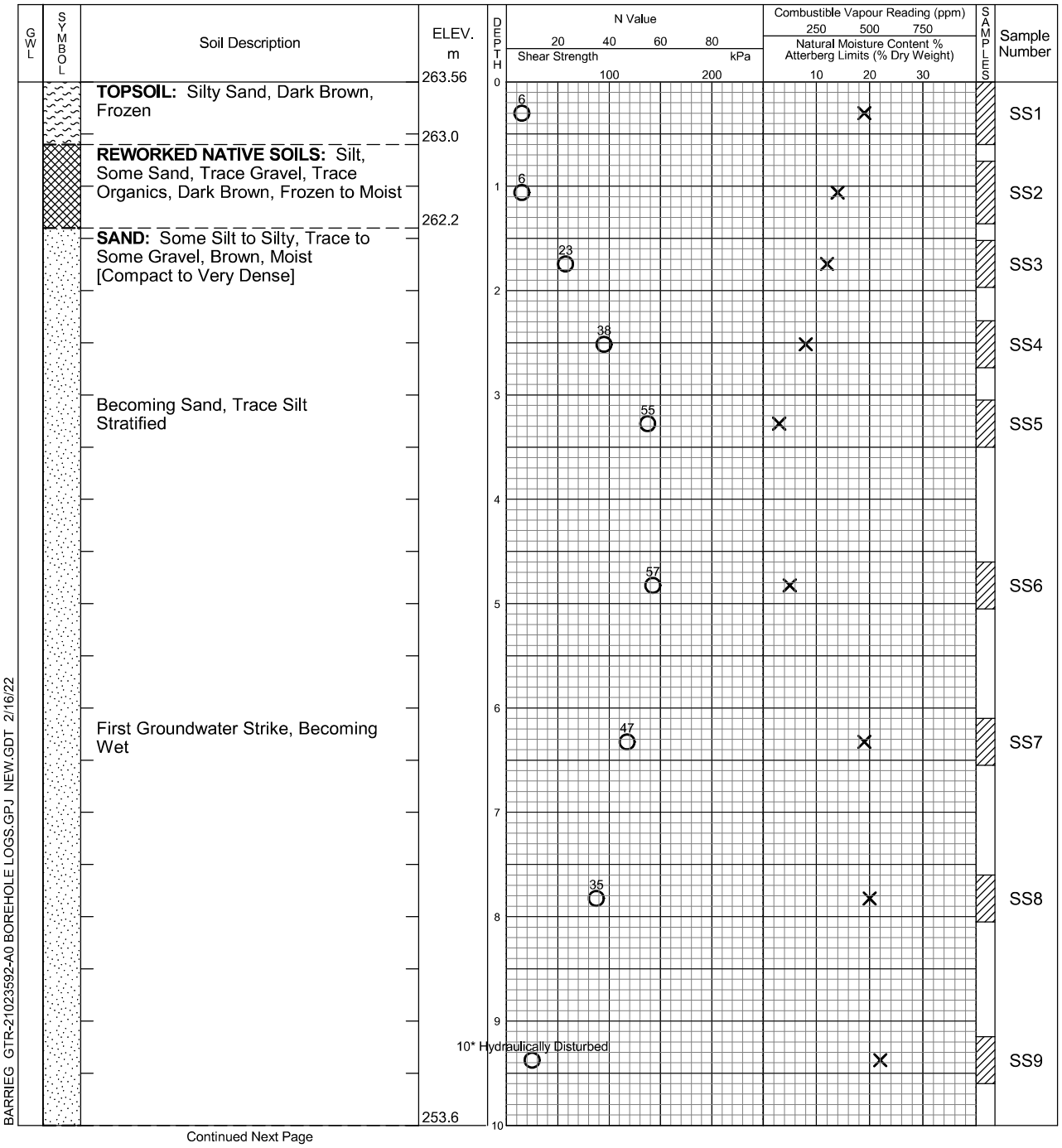
Date Drilled: January 28, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

EXP Services Inc.
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Borehole data requires interpretation assistance from EXP before use by others.

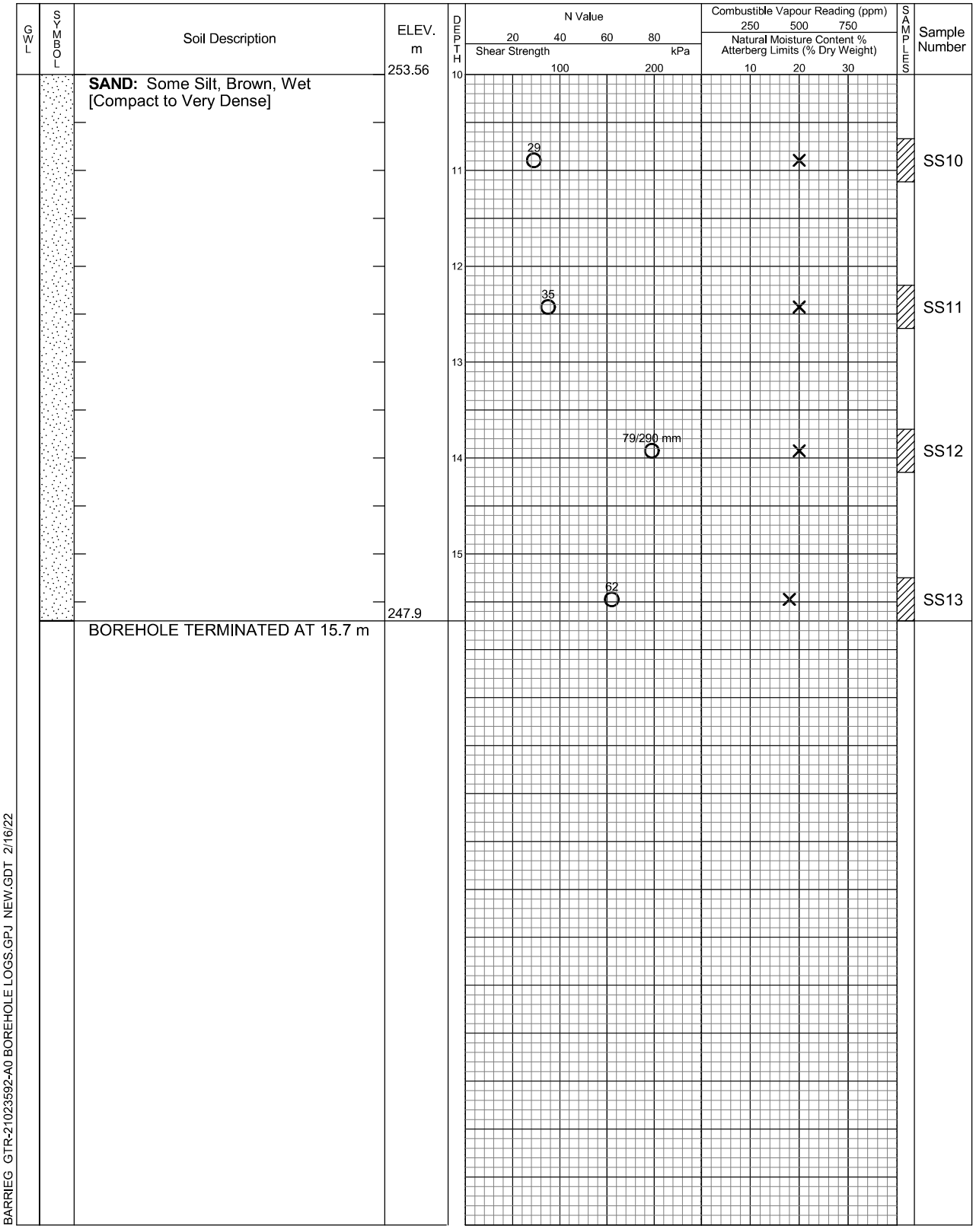
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.1	10.5

Log of Borehole 7

Project No. GTR-21023592-A0 Figure No. 8

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



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f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.1	10.5

Log of Borehole 8

Project No. GTR-21023592-A0 | Figure No. 9

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911644 N 608994 E

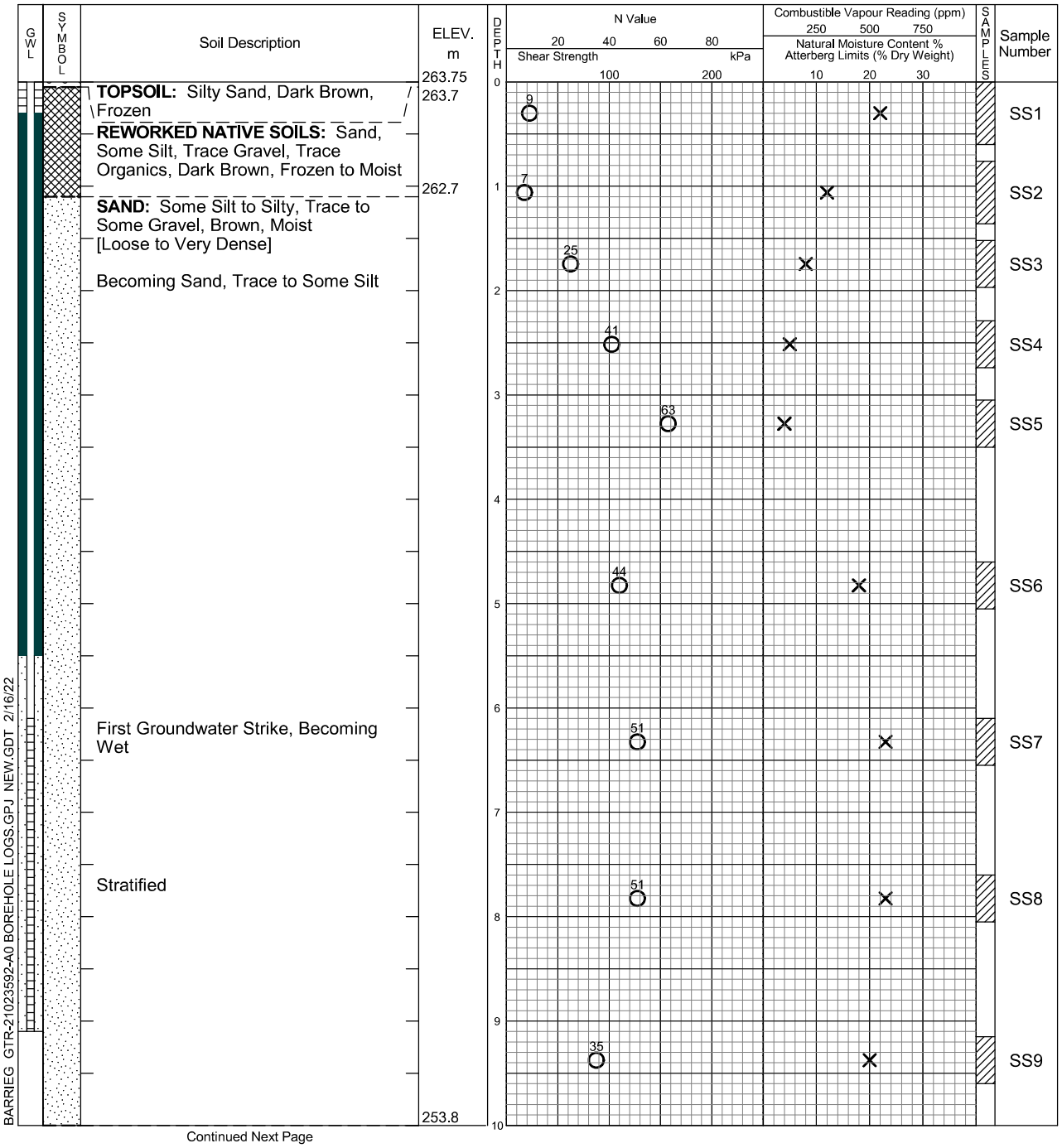
Date Drilled: January 26, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

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Borehole data requires interpretation assistance from EXP before use by others.

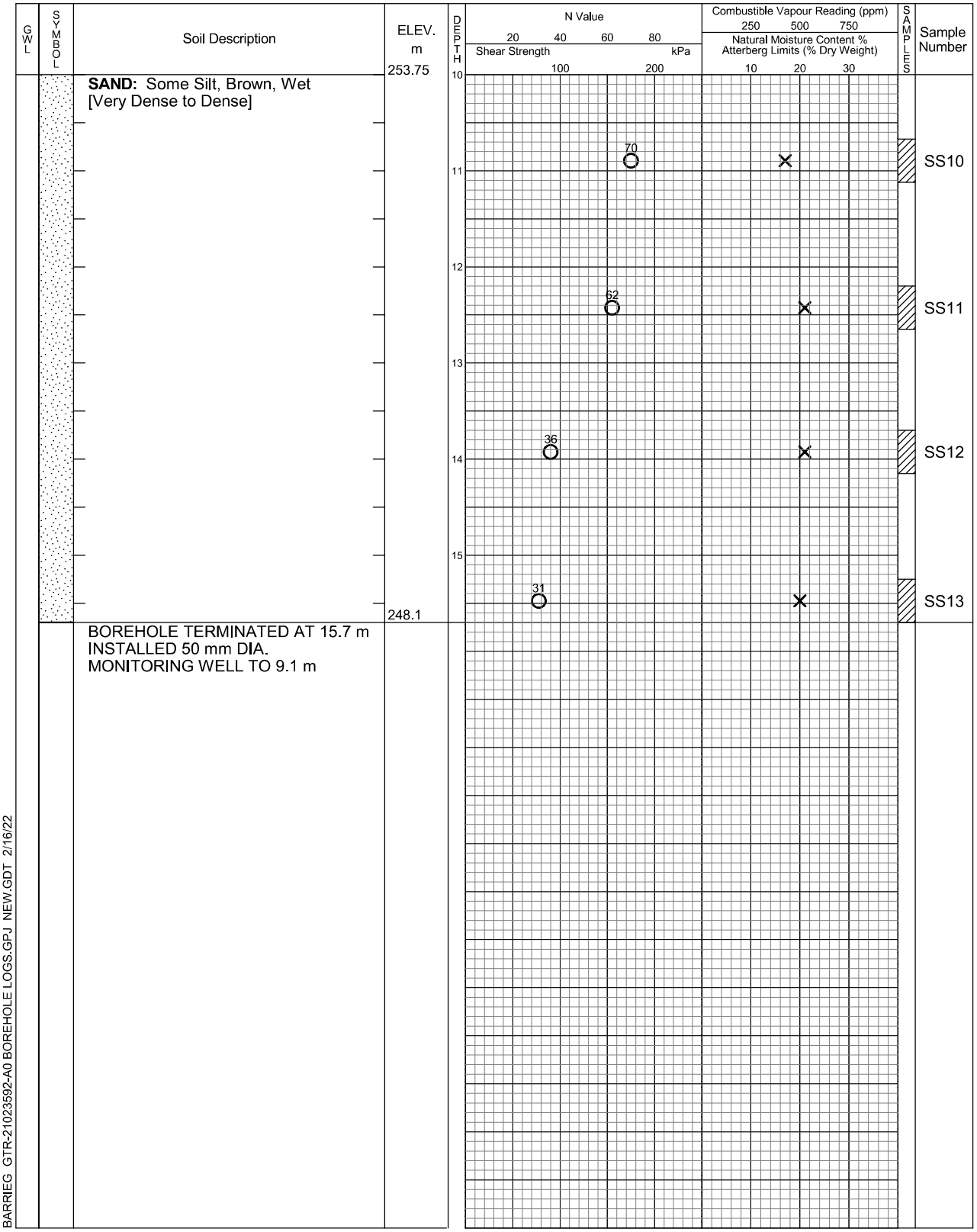
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.1	Install
Feb. 10, 2022	5.36 / 258.39	

Log of Borehole 8

Project No. GTR-21023592-A0 Figure No. 9

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.1	Install
Feb. 10, 2022	5.36 / 258.39	

Log of Borehole 9

Project No. GTR-21023592-A0 | Figure No. 10

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911714 N 609104 E

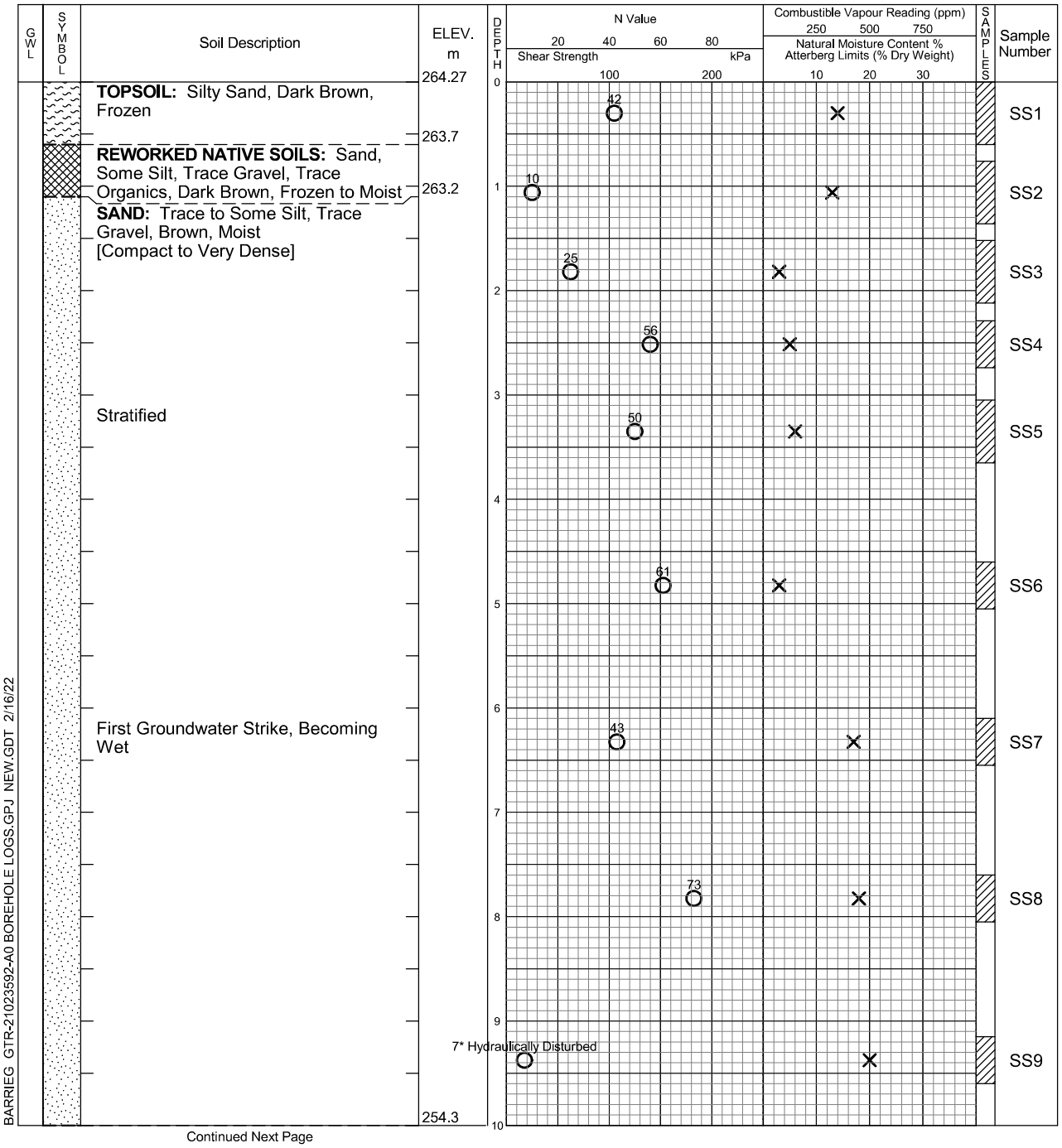
Date Drilled: January 18, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



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BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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Borehole data requires interpretation assistance from EXP before use by others.

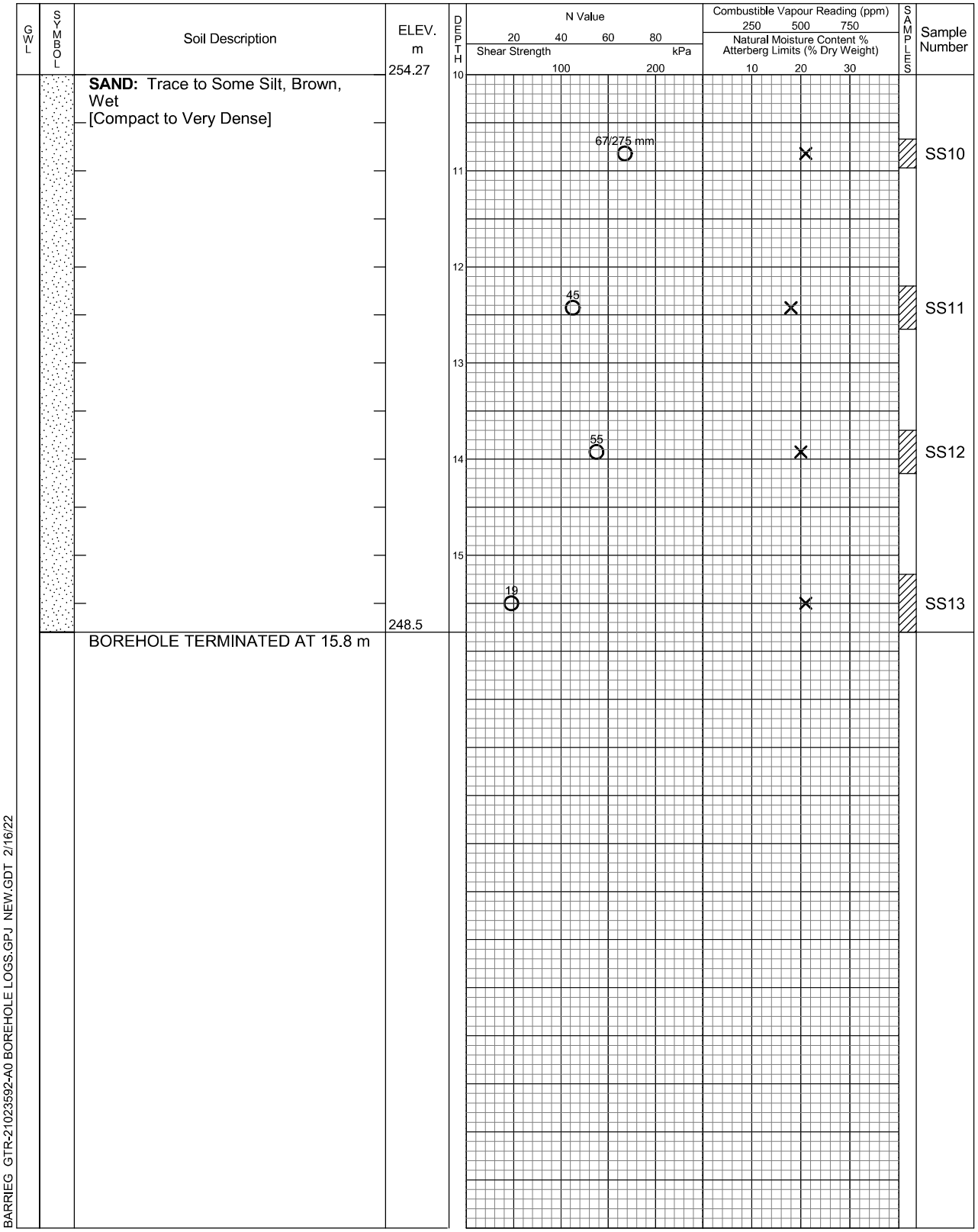
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.3	12.2

Log of Borehole 9

Project No. GTR-21023592-A0 Figure No. 10

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.3	12.2

Log of Borehole 10

Project No. GTR-21023592-A0 | Figure No. 11

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911682 N 609089 E

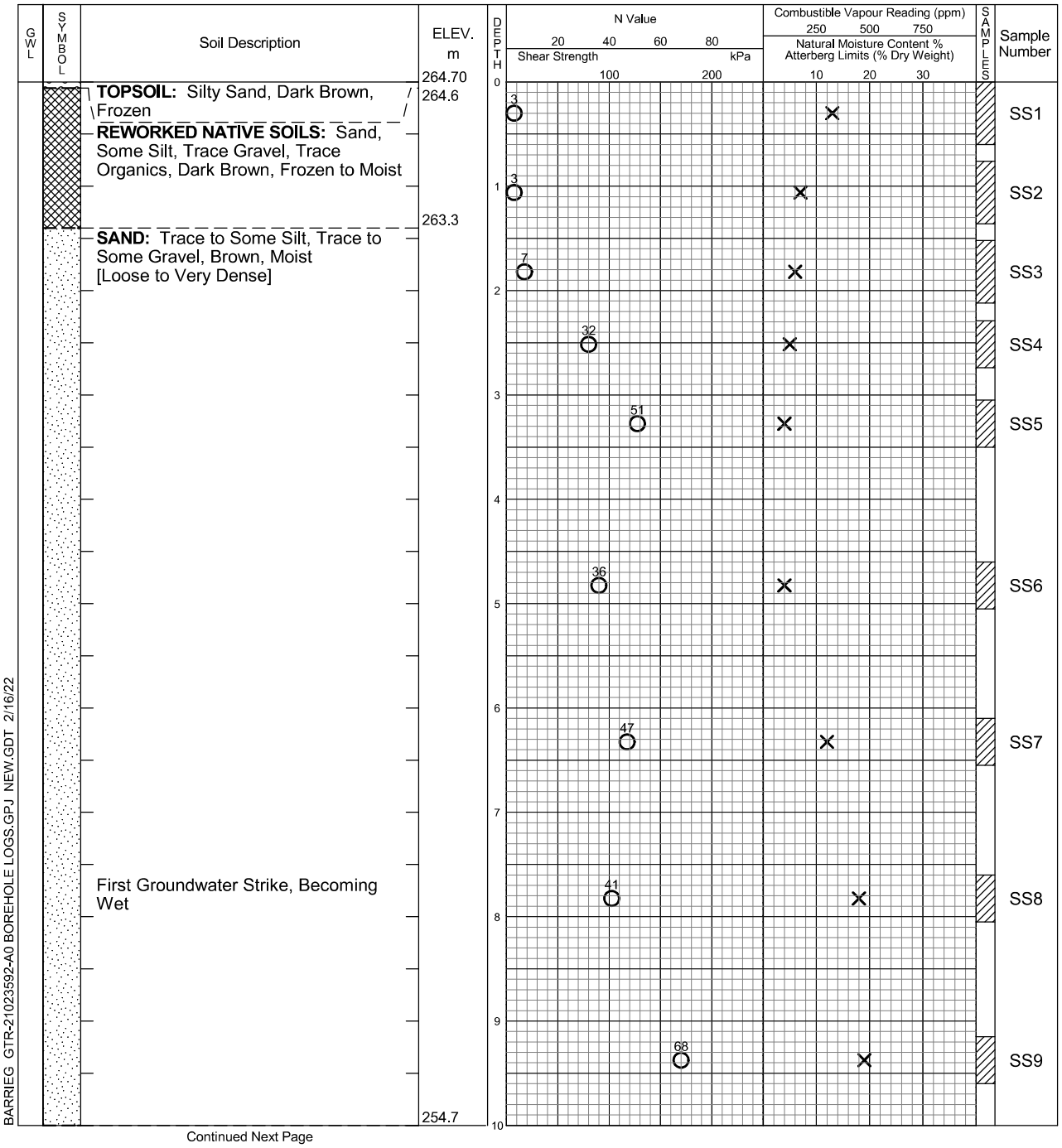
Date Drilled: January 25, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

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Borehole data requires interpretation assistance from EXP before use by others.

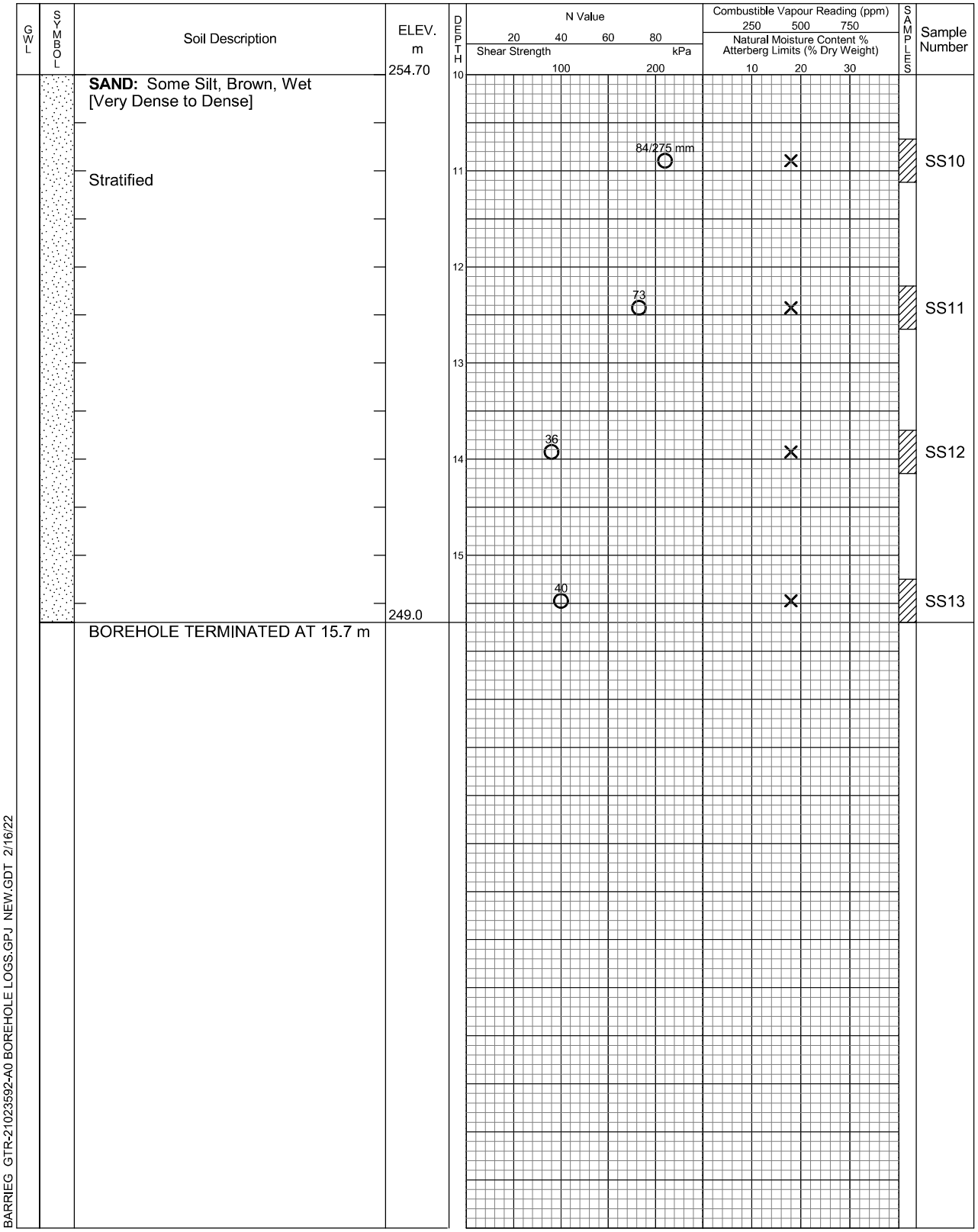
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	12.0

Log of Borehole 10

Project No. GTR-21023592-A0 Figure No. 11

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	12.0

Log of Borehole 11

Project No. GTR-21023592-A0 | Figure No. 12

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911646 N 609071 E

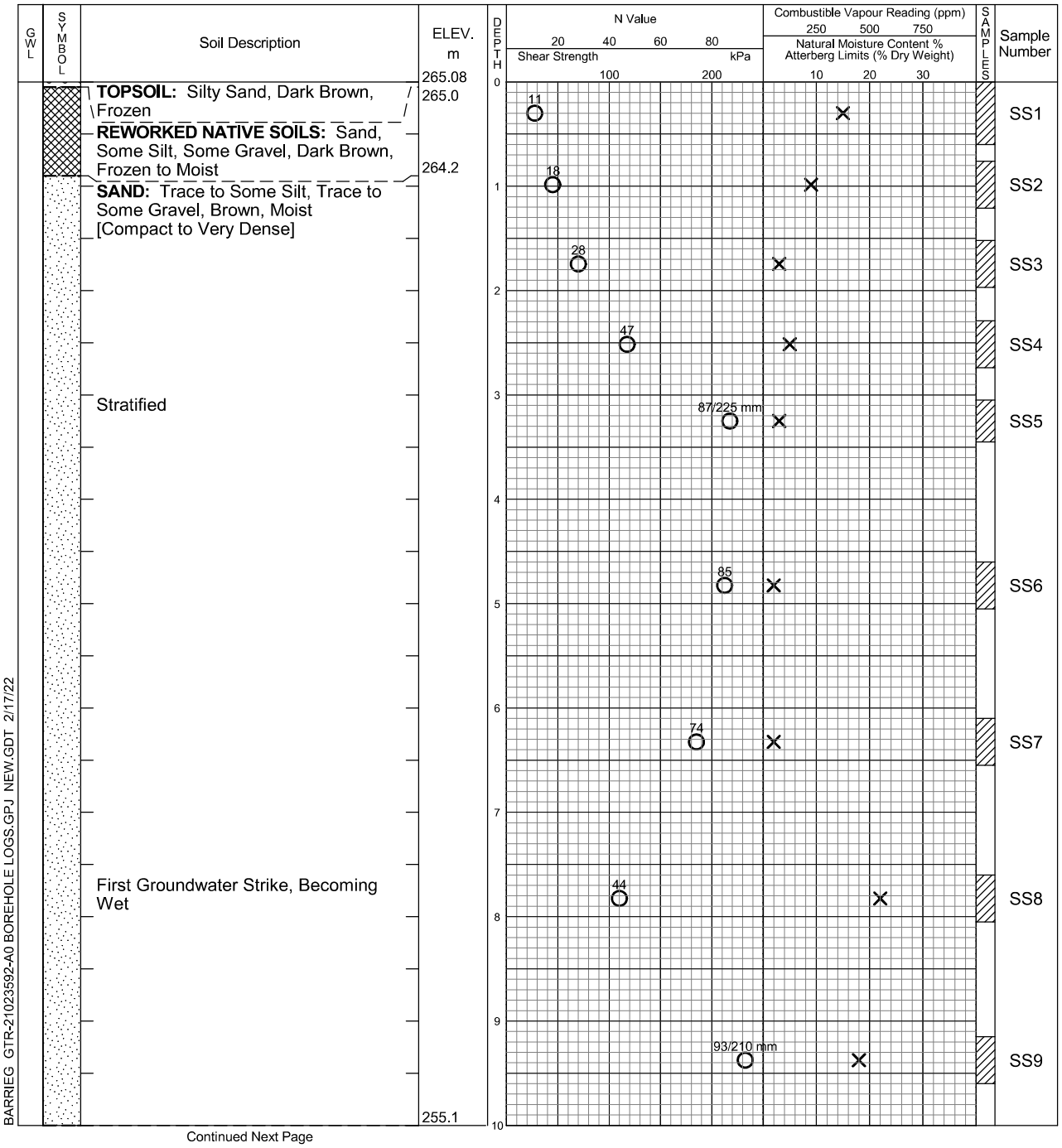
Date Drilled: January 25, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/17/22

Continued Next Page

EXP Services Inc.
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Borehole data requires interpretation assistance from EXP before use by others.

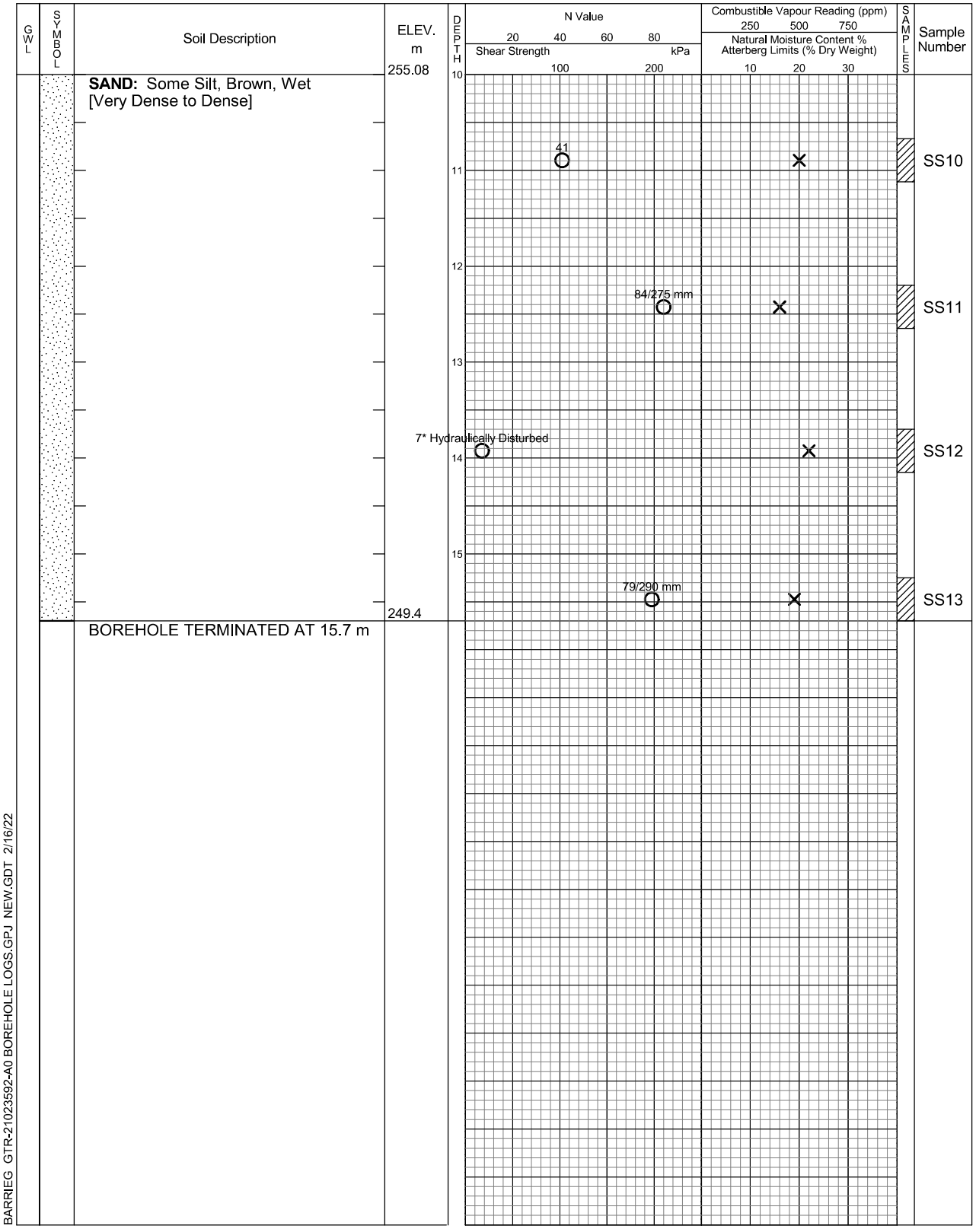
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	13.1

Log of Borehole 11

Project No. GTR-21023592-A0 Figure No. 12

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	13.1

Log of Borehole 12

Project No. GTR-21023592-A0 | Figure No. 13

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911612 N 609057 E

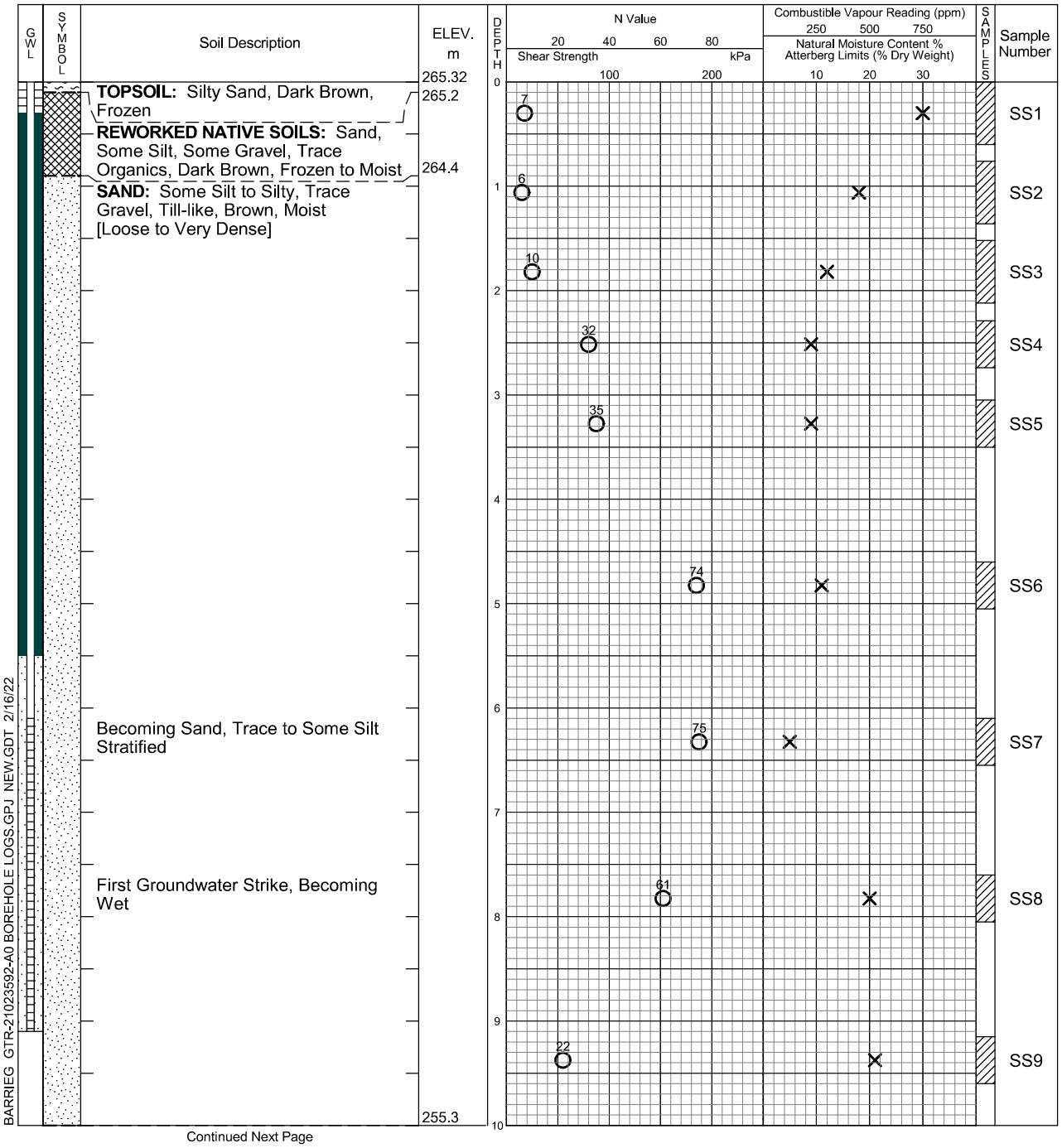
Date Drilled: January 24, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

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Borehole data requires interpretation assistance from EXP before use by others.

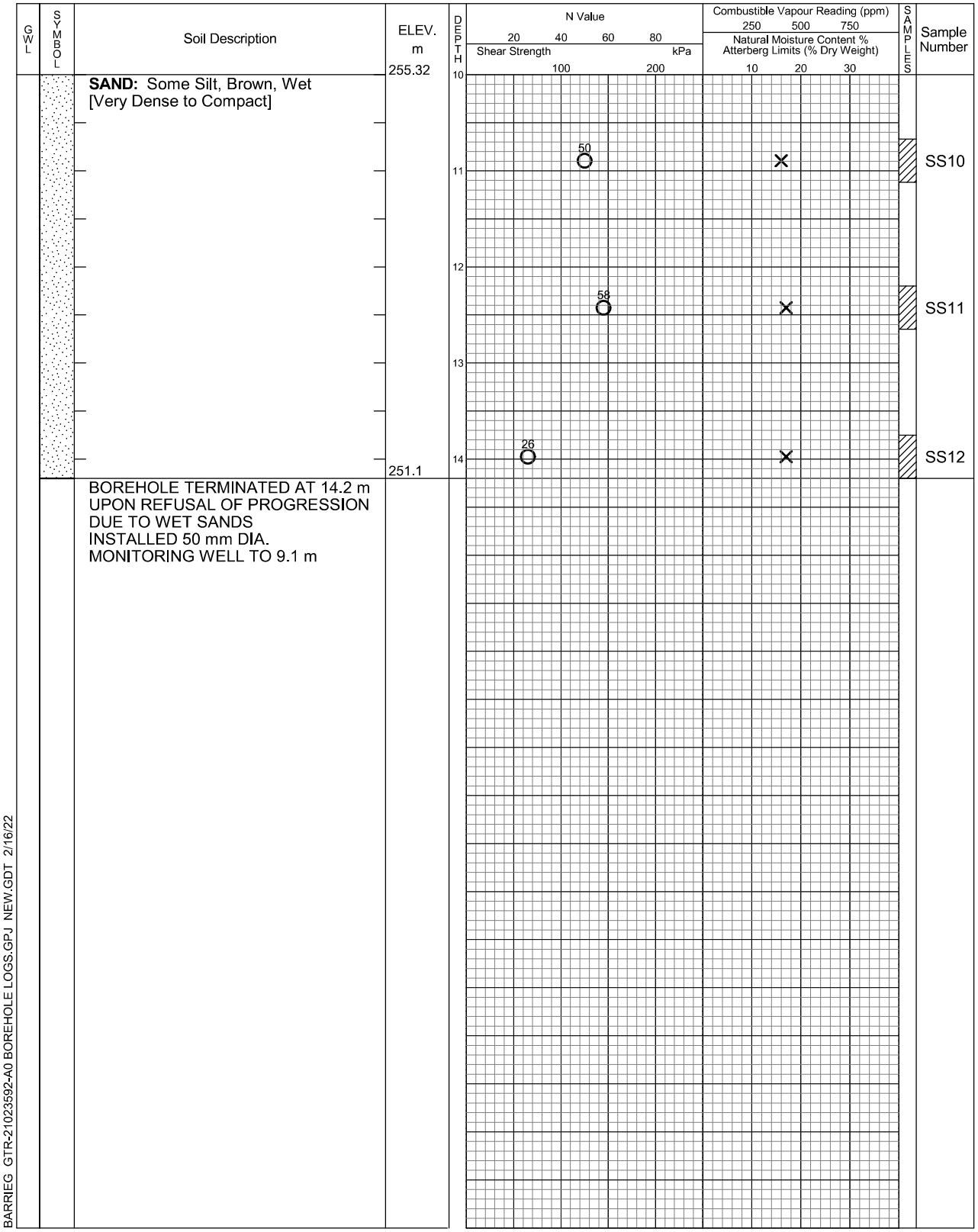
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	Install
Feb. 10, 2022	6.77 / 258.55	

Log of Borehole 12

Project No. GTR-21023592-A0 Figure No. 13

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion Feb. 10, 2022	7.6 6.77 / 258.55	Install

Log of Borehole 13

Project No. GTR-21023592-A0 | Figure No. 14

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911693 N 609144 E

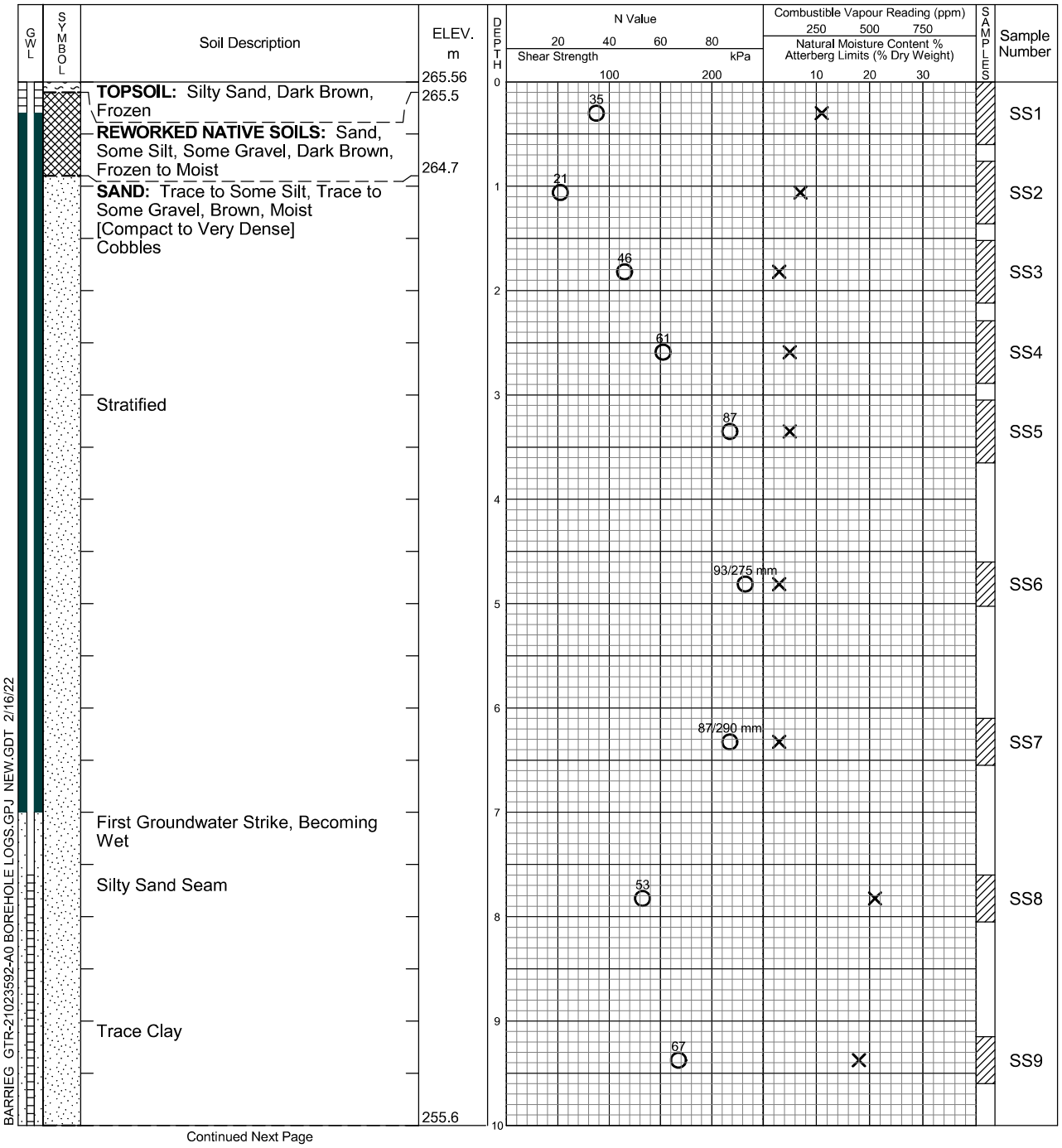
Date Drilled: January 17, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



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BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

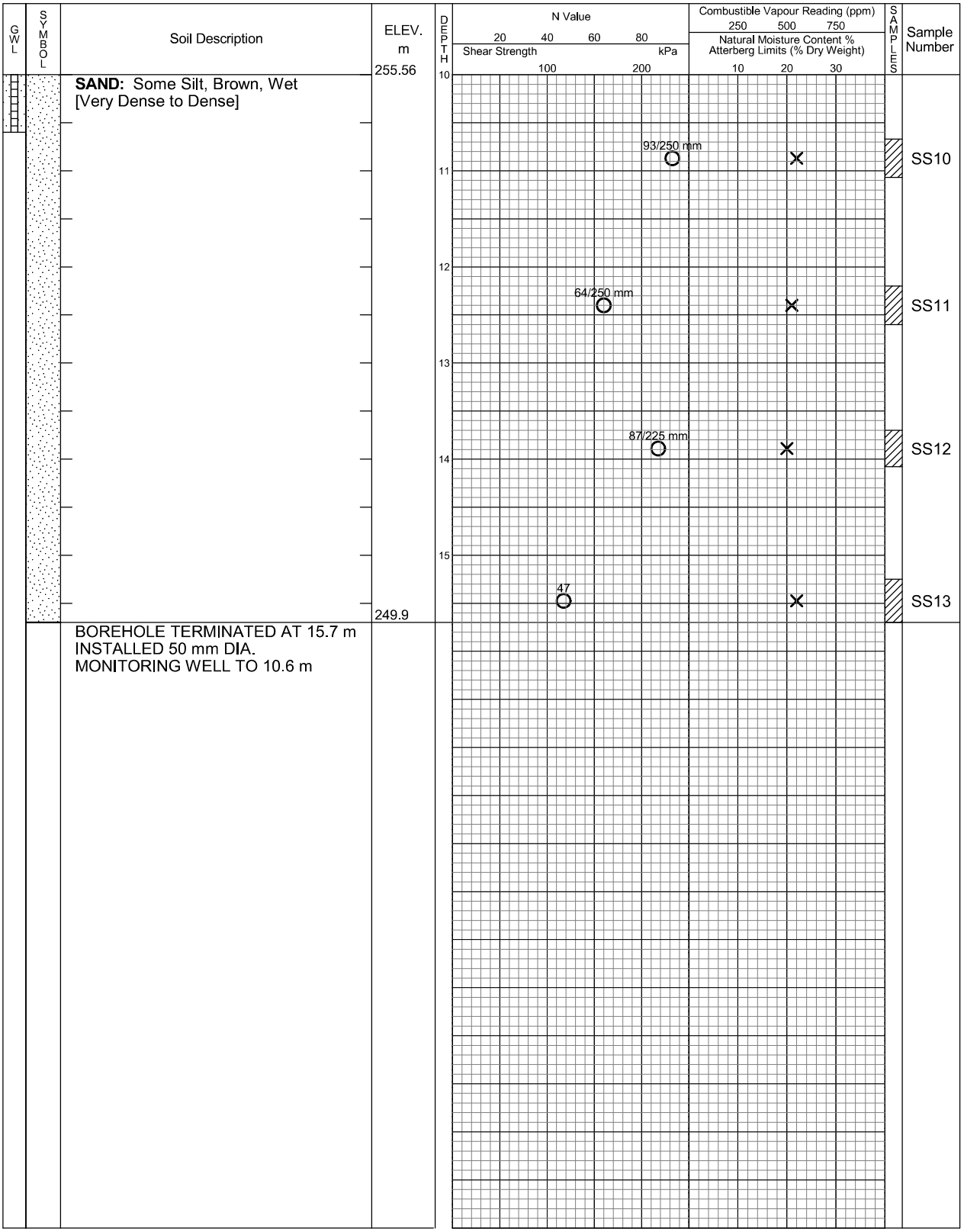
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	Install
Feb. 10, 2022	7.72 / 257.84	

Log of Borehole 13

Project No. GTR-21023592-A0 Figure No. 14

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	Install
Feb. 10, 2022	7.72 / 257.84	

Log of Borehole 14

Project No. GTR-21023592-A0 | Figure No. 15

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911660 N 609131 E

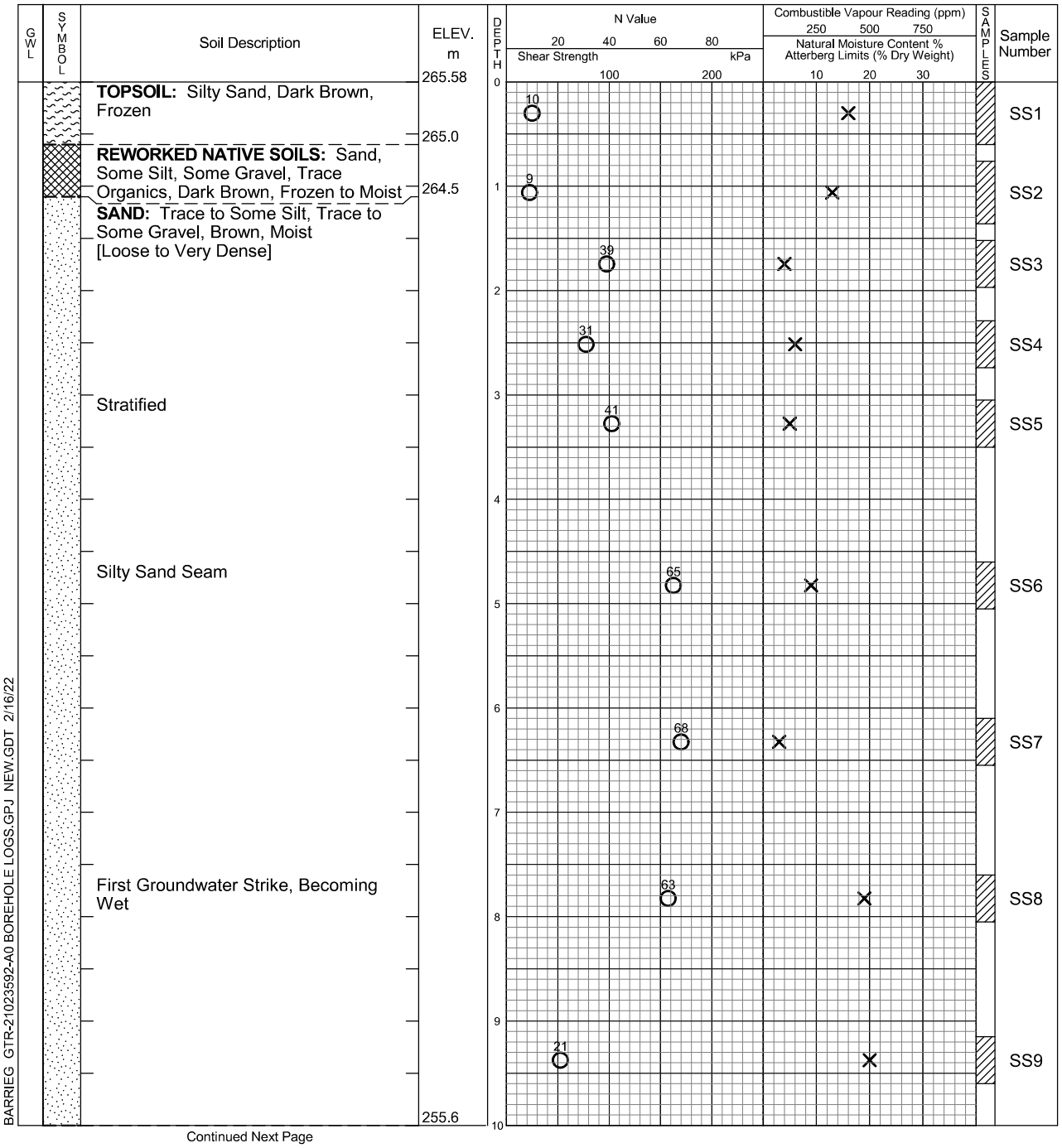
Date Drilled: January 20, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

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f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

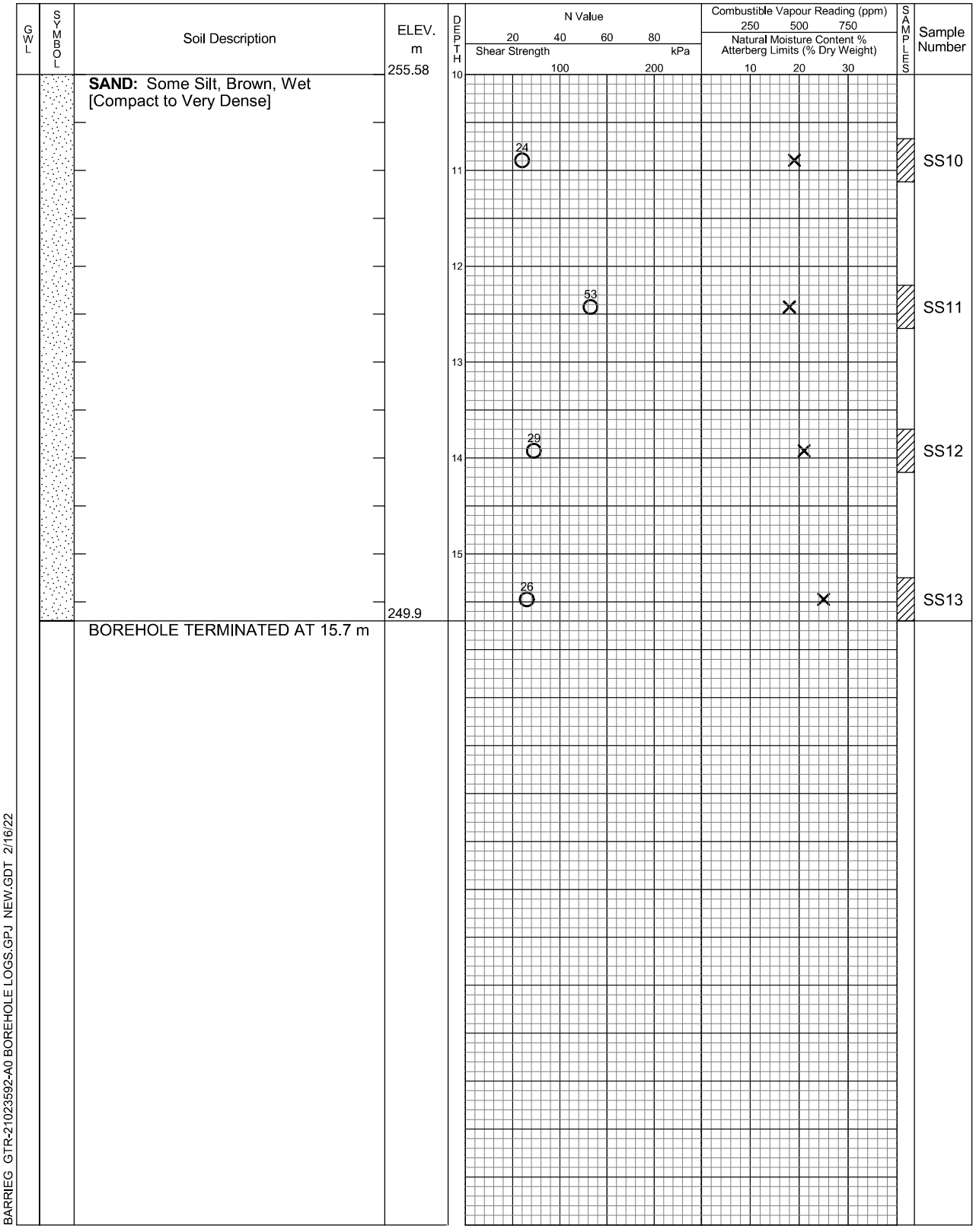
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	11.8

Log of Borehole 14

Project No. GTR-21023592-A0 Figure No. 15

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



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f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	11.8

Log of Borehole 15

Project No. GTR-21023592-A0 | Figure No. 16

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911625 N 609111 E

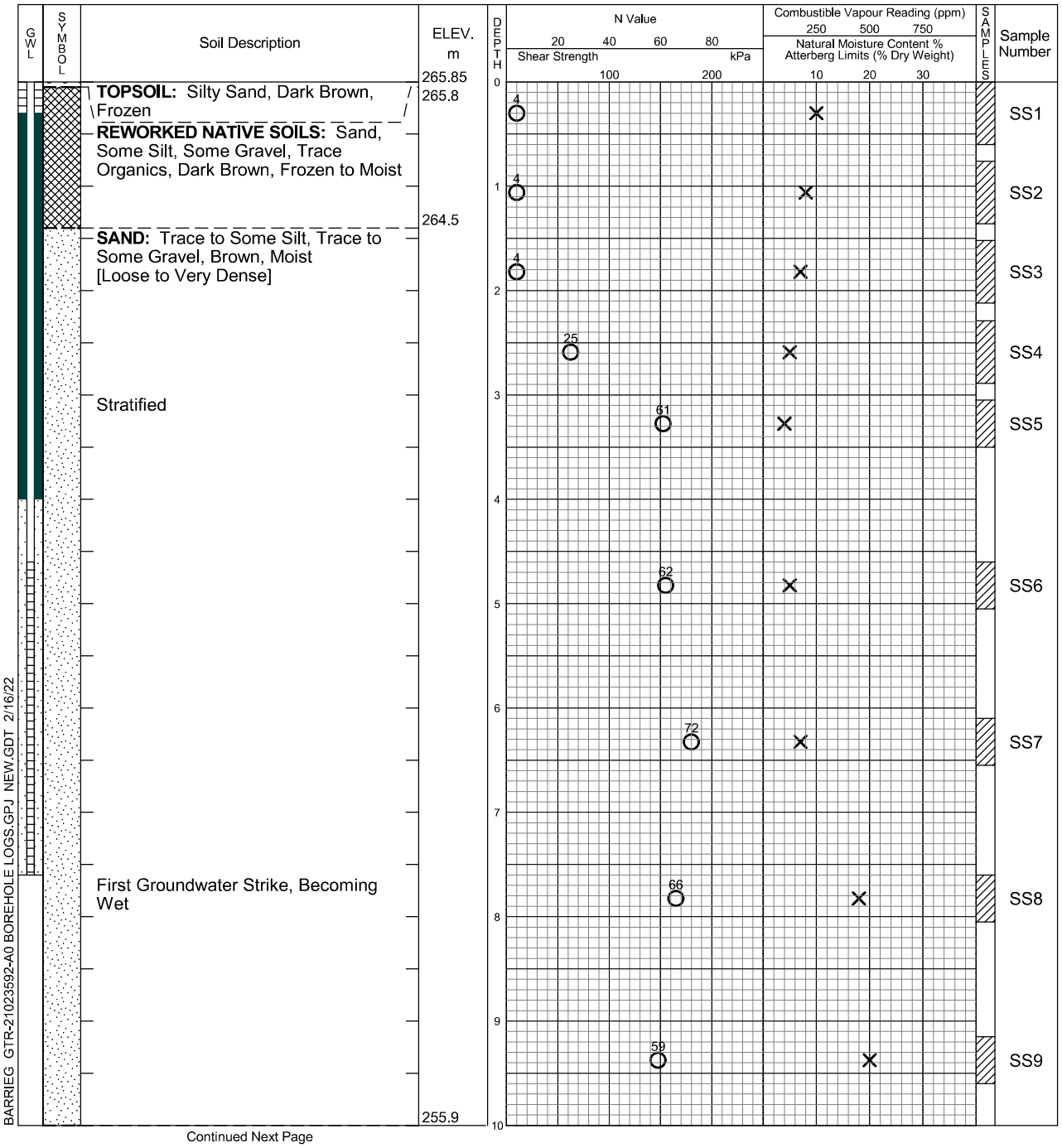
Date Drilled: January 21, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



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BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

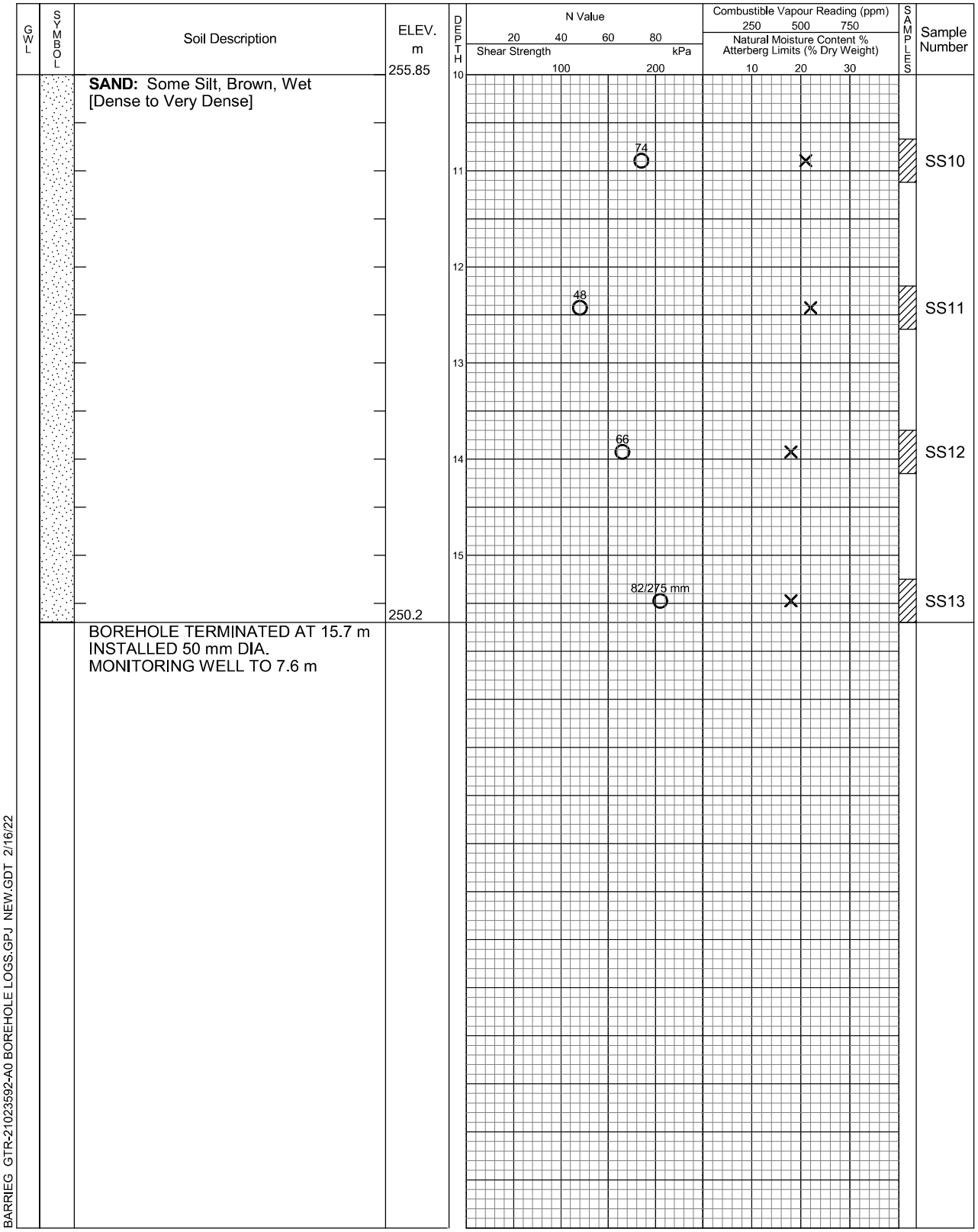
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	Install
Feb. 10, 2022	7.28 / 258.57	

Log of Borehole 15

Project No. GTR-21023592-A0 Figure No. 16

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	Install
Feb. 10, 2022	7.28 / 258.57	

Log of Borehole 16

Project No. GTR-21023592-A0 | Figure No. 17

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911589 N 609094 E

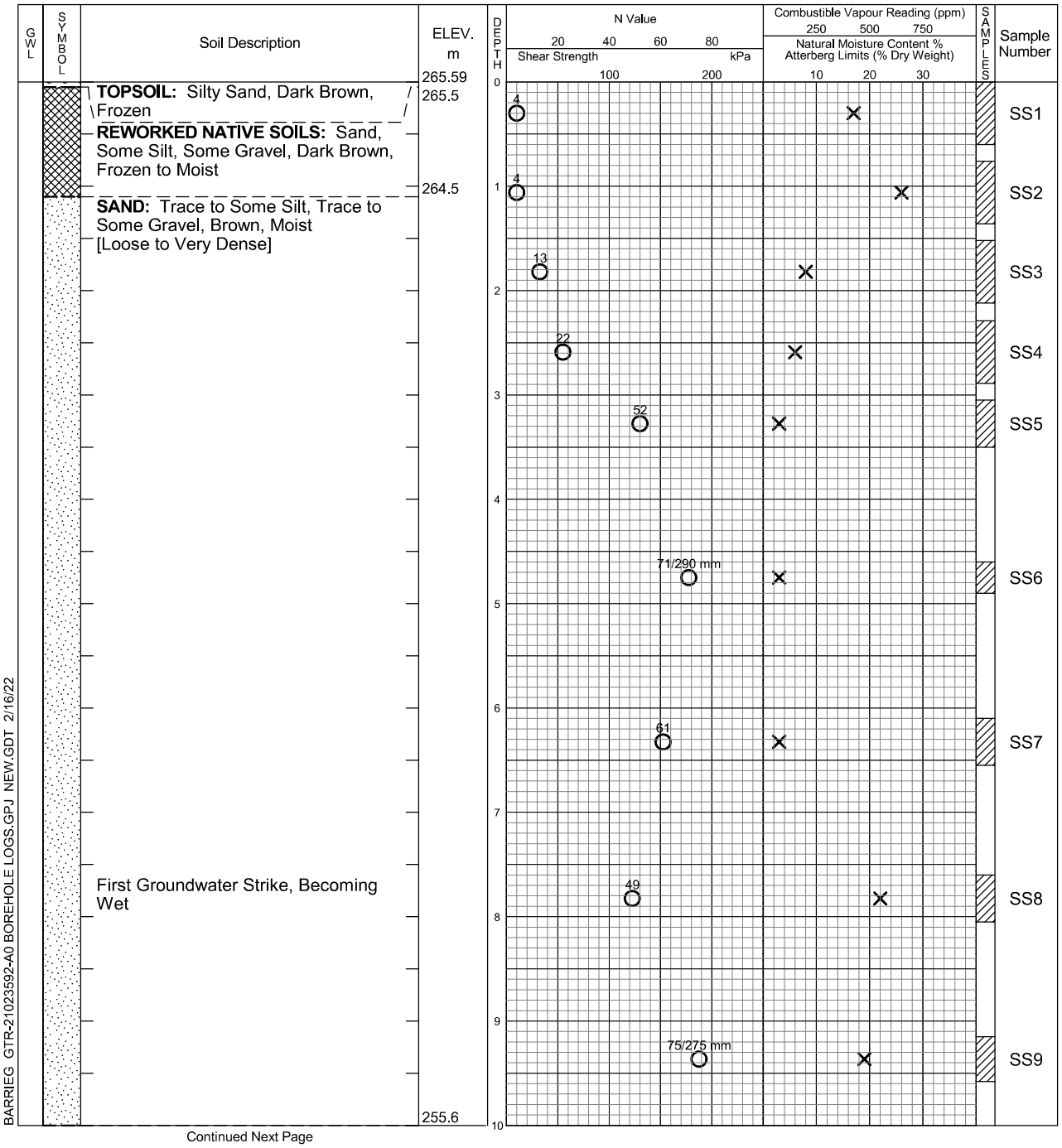
Date Drilled: January 20, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

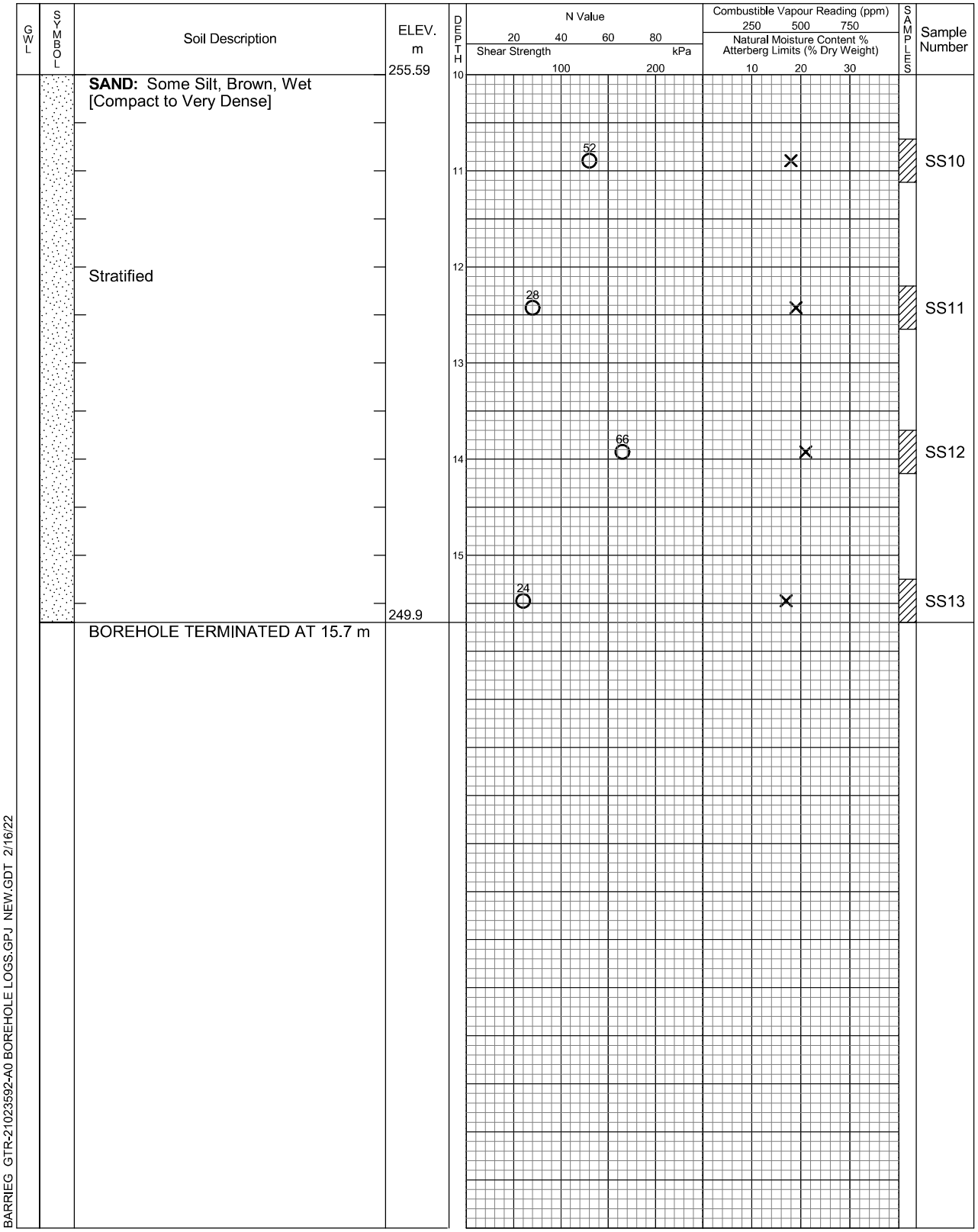
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	10.0

Log of Borehole 16

Project No. GTR-21023592-A0 Figure No. 17

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	10.0

Log of Borehole 17

Project No. GTR-21023592-A0 | Figure No. 18

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911574 N 609054 E

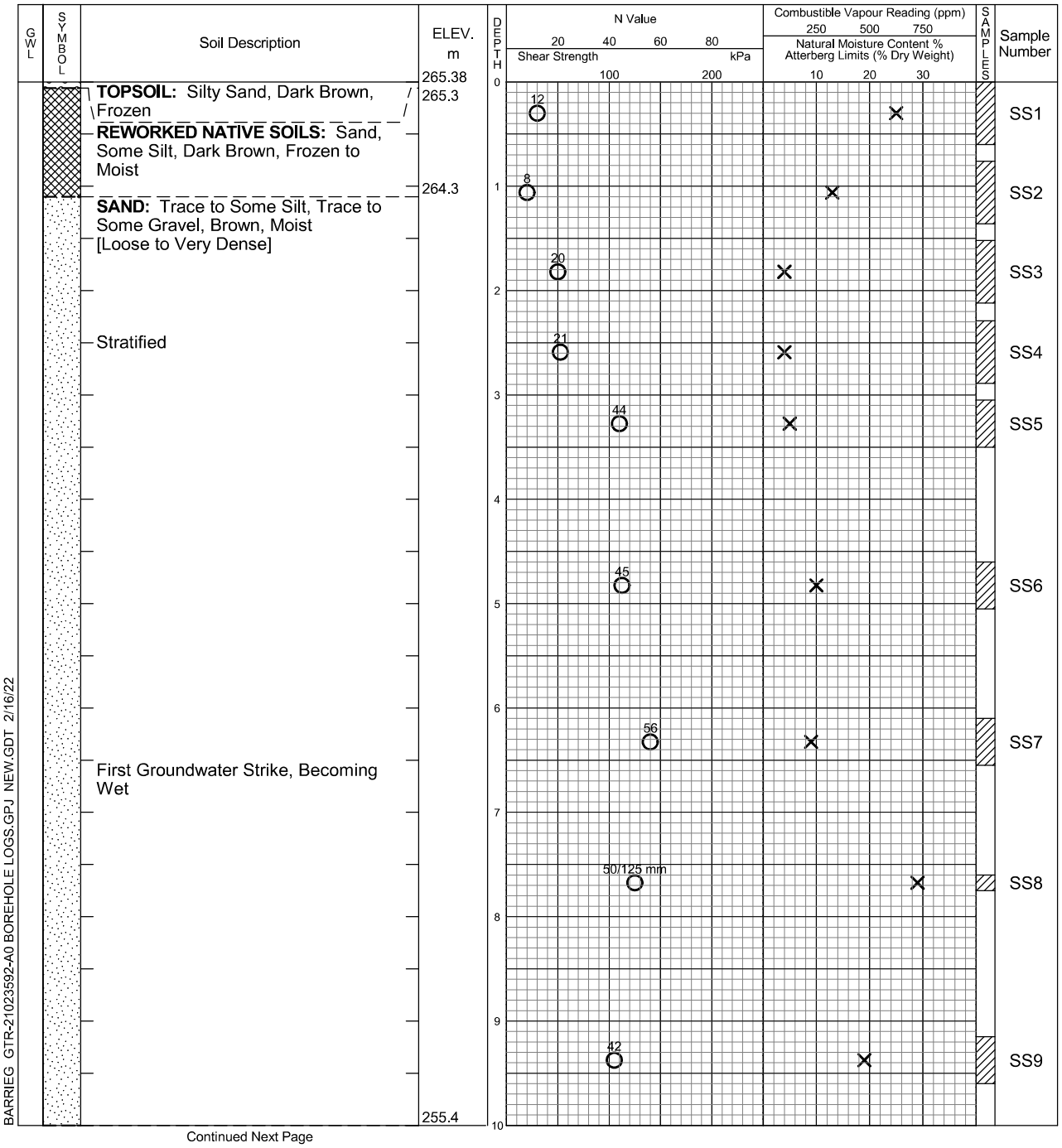
Date Drilled: January 24, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

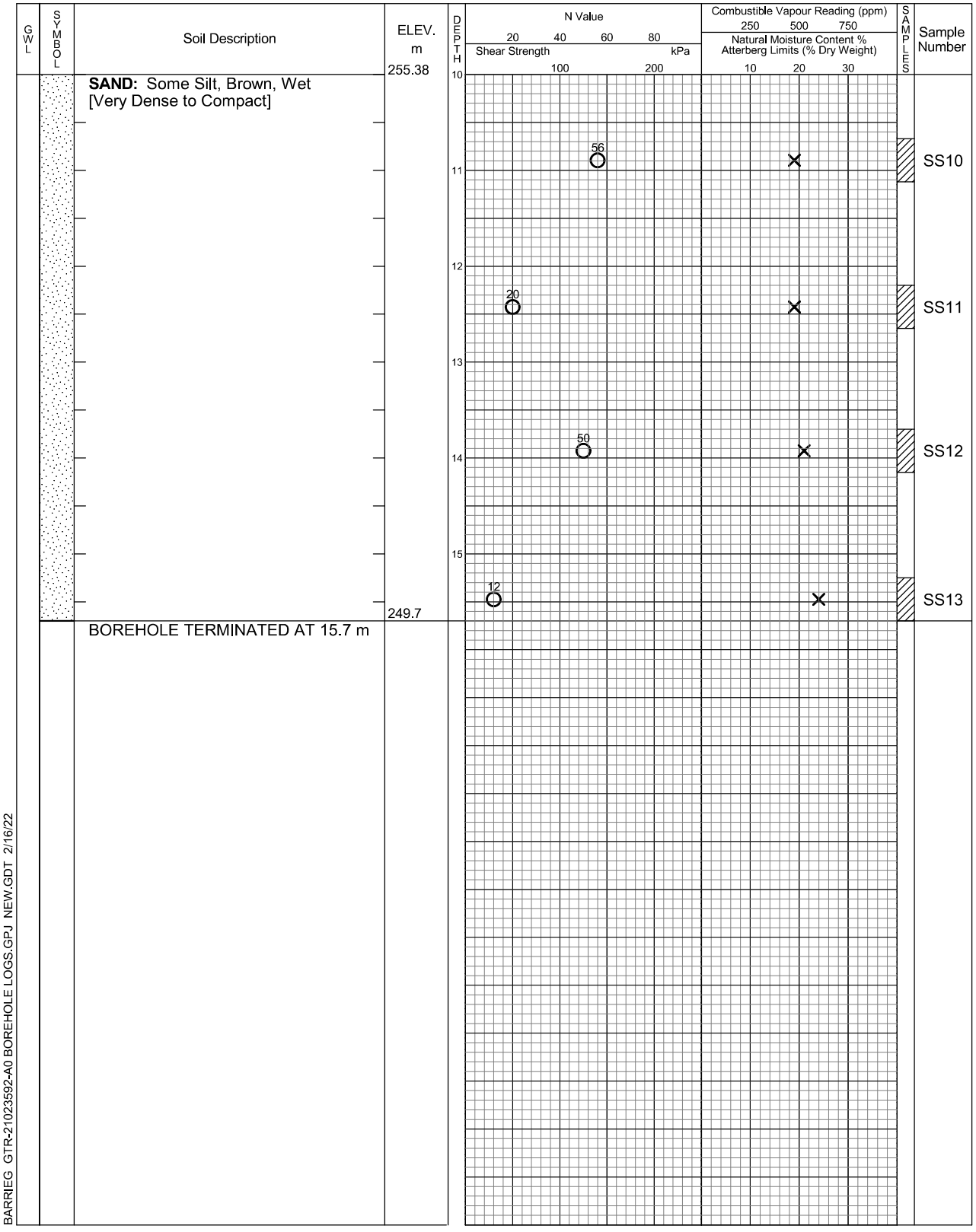
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.5	9.8

Log of Borehole 17

Project No. GTR-21023592-A0 Figure No. 18

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	6.5	9.8

Log of Borehole 18

Project No. GTR-21023592-A0 | Figure No. 19

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 2

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911558 N 609087 E

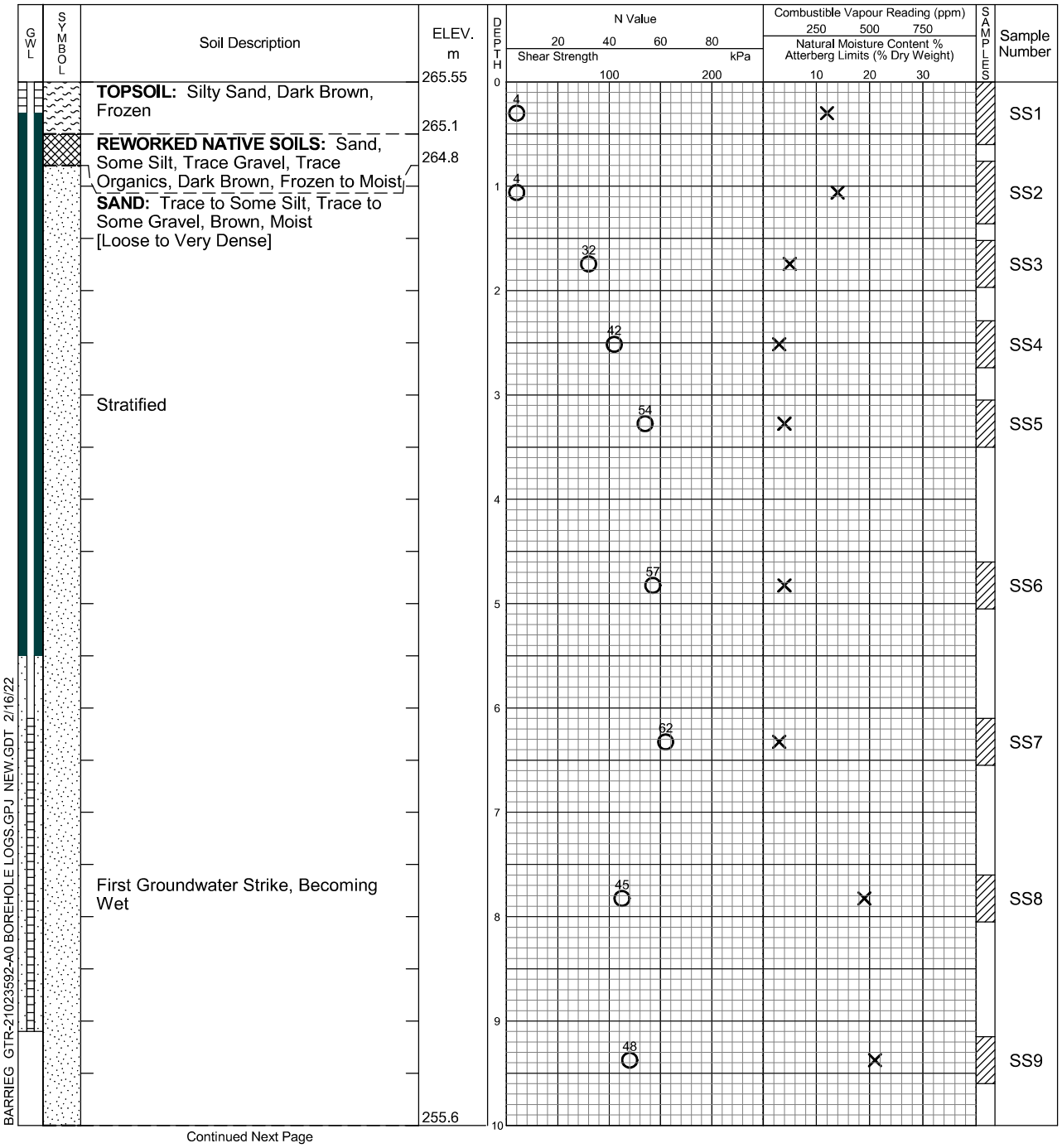
Date Drilled: January 21, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

Continued Next Page

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

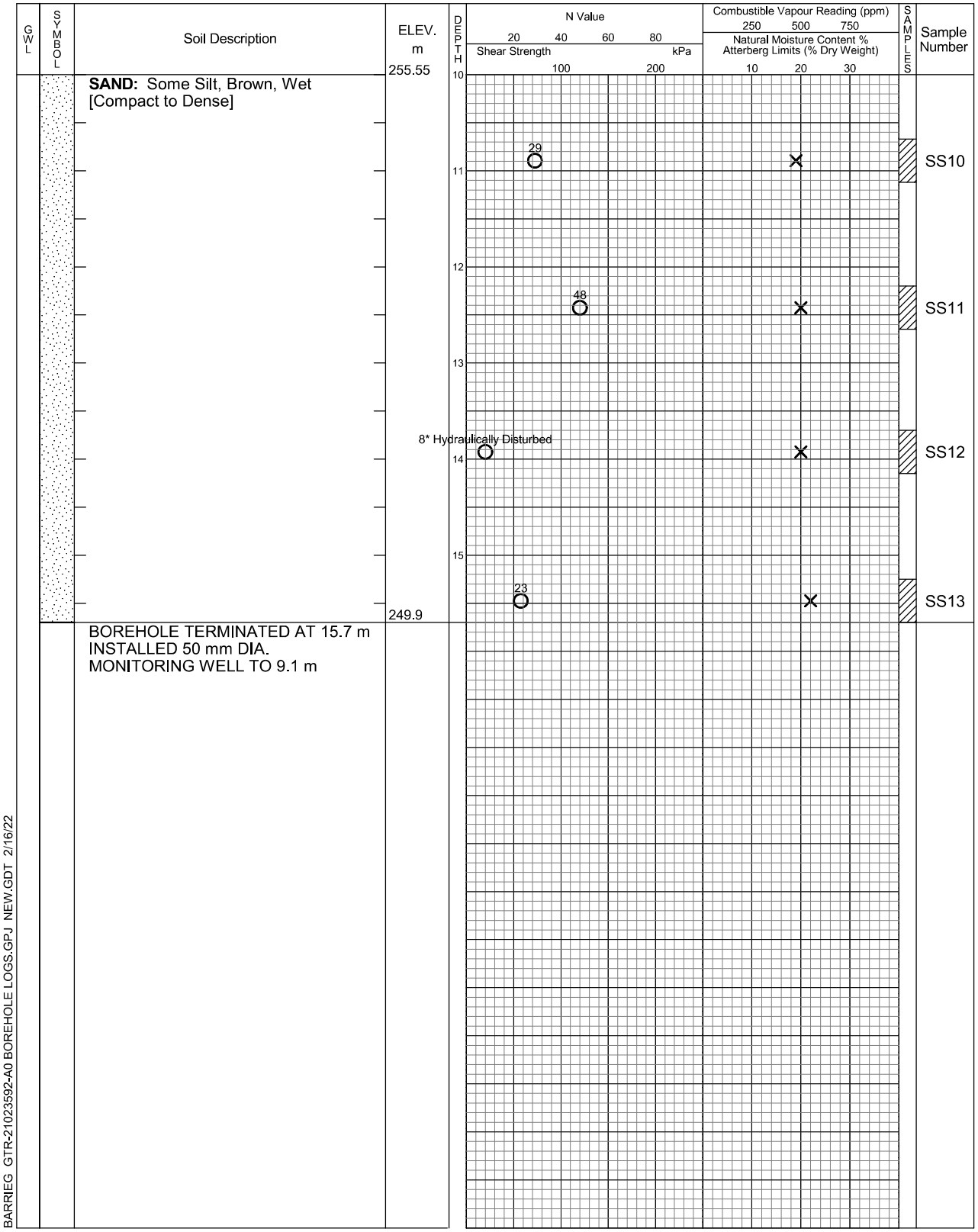
See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	Install
Feb. 10, 2022	6.83 / 258.72	

Log of Borehole 18

Project No. GTR-21023592-A0 Figure No. 19

Project: Proposed Long Term Care Facility & Retirement Homes Sheet No. 2 of 2



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	7.6	Install
Feb. 10, 2022	6.83 / 258.72	

Log of Borehole 19

Project No. GTR-21023592-A0 | Figure No. 20

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 1

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911776 N 608938 E

Date Drilled: January 19, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Sample Number
		TOPSOIL: Silty Sand, Dark Brown, Frozen	261.98 261.9	0	10			SS1
		REWORKED NATIVE SOILS: Sand, Trace Silt, Trace Gravel, Trace Organics, Dark Brown, Frozen to Moist	260.9	1	16			SS2
		SAND: Trace to Some Silt, Trace to Some Gravel, Brown, Moist [Compact to Very Dense]		2	40 37			SS3 SS4
				3	54			SS5
		BOREHOLE TERMINATED AT 3.5 m	258.5					

N Value: 20 40 60 80
Shear Strength: 100 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

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Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	No Water	Open

Log of Borehole 20

Project No. GTR-21023592-A0 | Figure No. 21

Project: Proposed Long Term Care Facility & Retirement Homes | Sheet No. 1 of 1

City/ Municipality: 800 Yonge Street, Barrie, ON

Location: 17T 4911749 N 608924 E

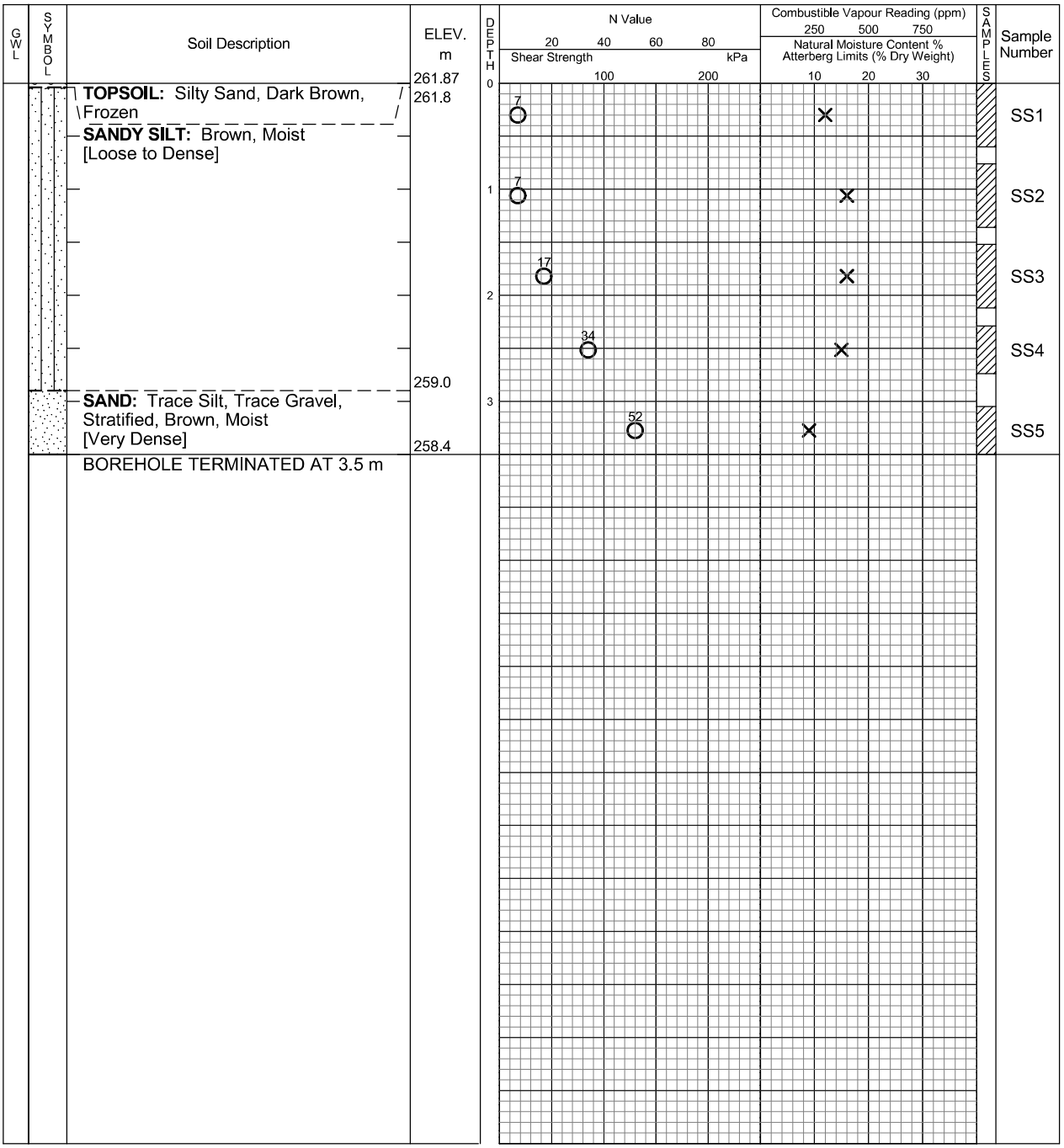
Date Drilled: January 19, 2022

Drill Type: Rubber Tire, Hollow Stem Augers

Datum: Geodetic

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

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



BARRIEG GTR-21023592-A0 BOREHOLE LOGS.GPJ NEW.GDT 2/16/22

EXP Services Inc.
14 Cedar Pointe Drive
Barrie, ON L4N 5R7
t: +1.705.719.1100
f: +1.705.719.1109

Borehole data requires interpretation assistance from EXP before use by others.

See Figures 1A and 1B for Notes on Sample Descriptions.

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	No Water	Open

EXP Services Inc.
14 Cedar Pointe Drive, Unit 1510
Barrie, Ontario, Canada
L4N 5R7
Tel.: +1.705.719.1100
Fax: +1.705.719.1109
www.exp.com

Grain Size Analysis Report

Project Name: Proposed Long Term Care Facility & Retirement Homes **Figure No.:** 22

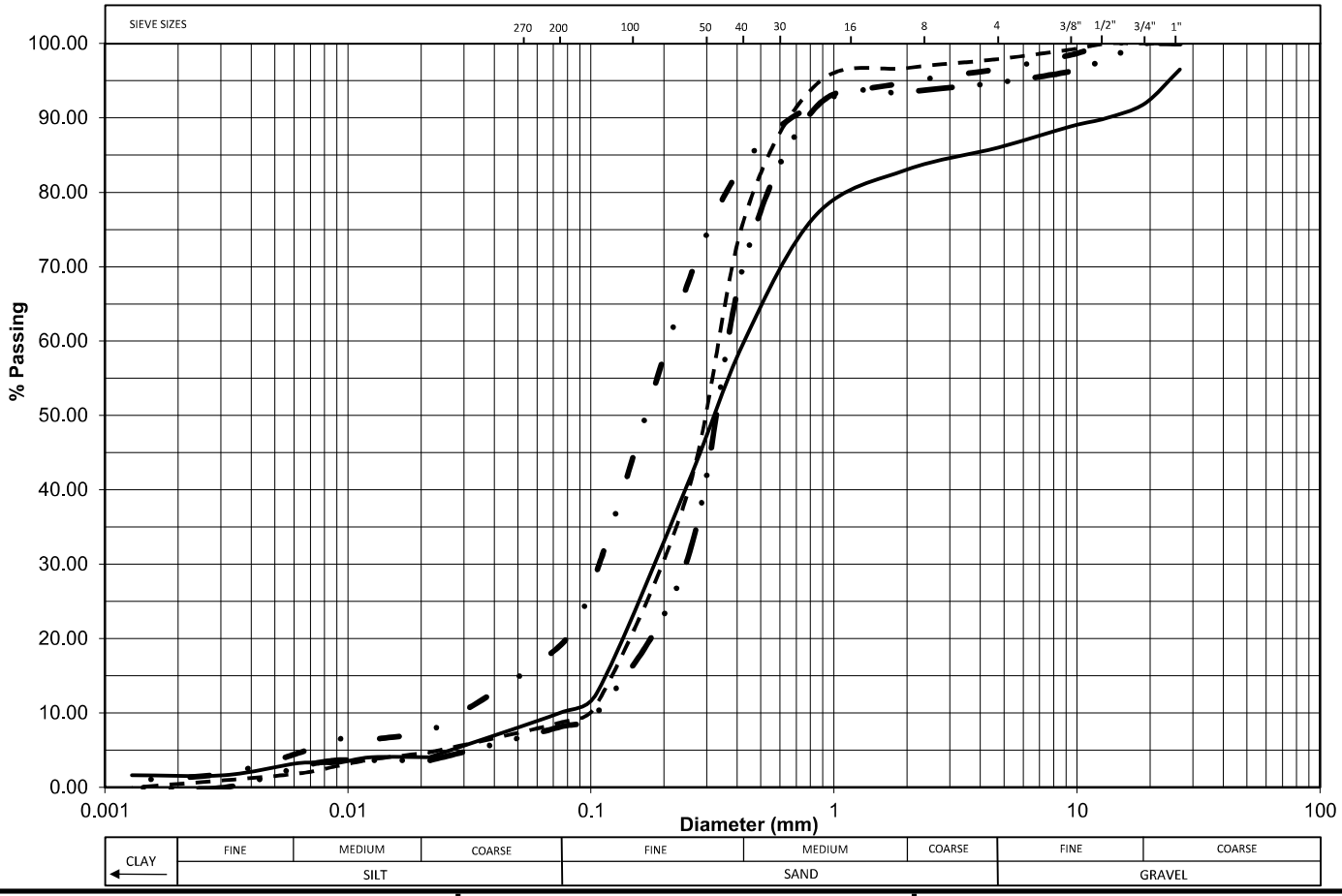
Project No.: GTR-21023592-A0 **Date Tested:** Feb. 9, 2022

Client: Schlegel Villages Inc. **Date Sampled:** Jan. 17 to 28, 2022

SAMPLE INFORMATION

Material	Borehole No. and Sample No.	Sample Depth (m)	Material Description	Graph Line Type
1	BH1 SS7	6.1 - 6.5	SAND, Some Gravel, Trace Silt, Trace Clay	
2	BH3 SS6	4.6 - 5.0	SAND, Trace Silt, Trace Gravel	
3	BH13 SS9	9.1 - 9.5	SAND, Some Silt, Trace Gravel, Trace Clay	
4	BH15 SS7	6.1 - 6.5	SAND, Trace Silt, Trace Gravel	

Sieve & Hydrometer Analysis



DISTRIBUTION:

Schlegel Villages Inc.

Prepared By:

DG

Dan Gilchrist

Checked By:

Richard Blair, P. Eng.

Appendix C – Groundwater Elevation Summary

Appendix C: Groundwater Elevation Summary

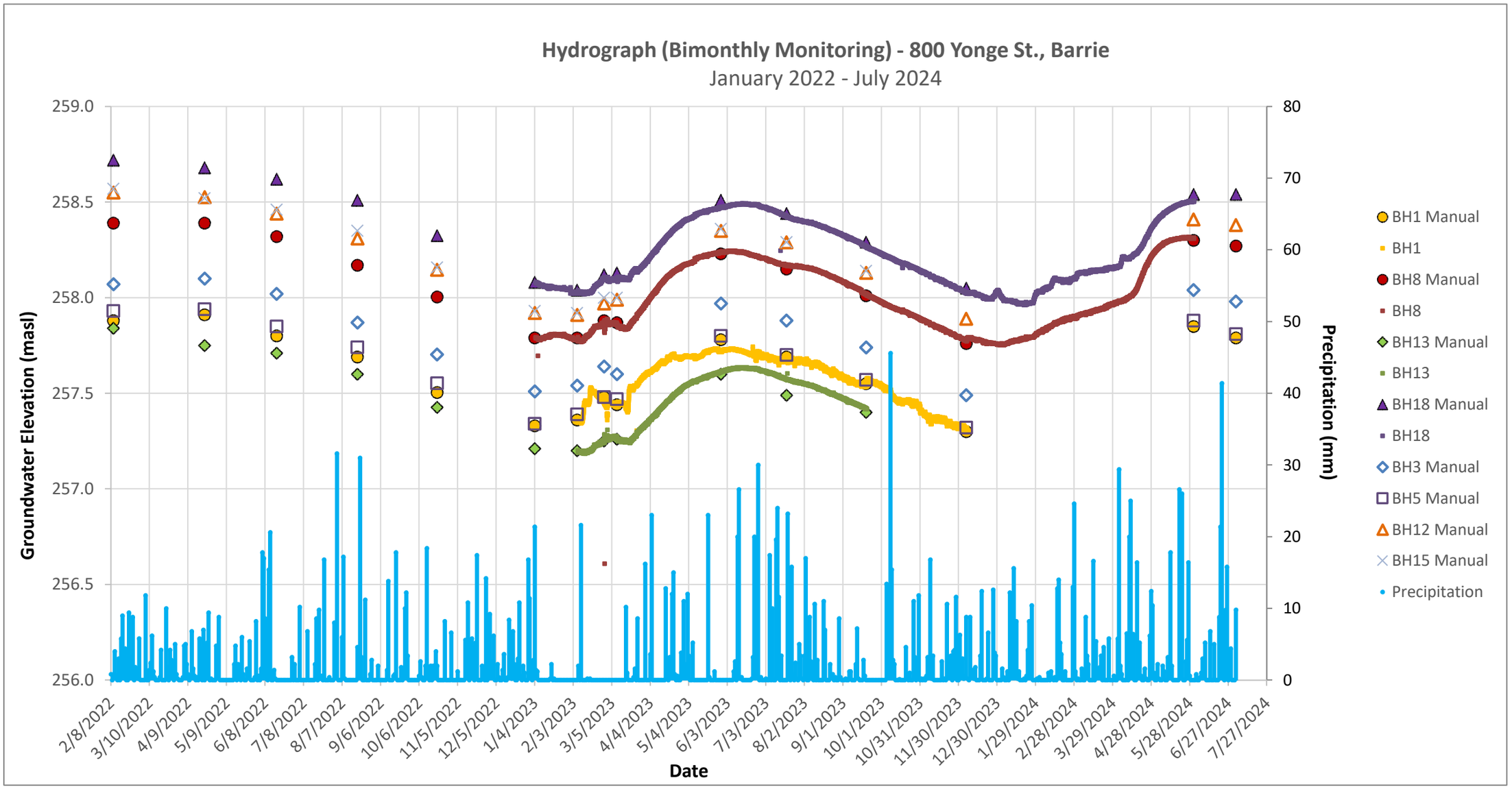
800 Yonge Street, Barrie, ON
GTR-21023592-A0

Monitoring Well ID	Ground Surface Elevation (masl)	Stick Up (m)	Approximate Full Well Depth (mbTOP)	Approximate Full Well Depth (mbgs)	Minimum GW Elevation (masl)	Maximum GW Elevation (masl)	Depth	7-Feb-22	10-Feb-22	22-Apr-22	17-Jun-22	19-Aug-22	20-Oct-22	4-Jan-23	6-Feb-23	27-Feb-23	9-Mar-23	29-May-23	19-Jul-23	19-Sep-23	6-Dec-23	31-May-24	3-Jul-24
BH 1	**261.99**	**0.73**	**8.29**	**7.56**	**257.30**	**257.91**	mbTOP	4.82	4.84	4.81	4.92	5.03	5.22	5.39	5.36	5.24	5.28	4.94	5.03	5.17	5.42	4.87	4.93
							mbgs	4.09	4.11	4.08	4.19	4.30	4.49	4.66	4.63	4.51	4.55	4.21	4.30	4.44	4.69	4.14	4.20
							masl	257.90	257.88	257.91	257.80	257.69	257.50	257.33	257.36	257.48	257.44	257.78	257.69	257.55	257.30	257.85	257.79
BH 3	**261.97**	**0.77**	**8.45**	**7.68**	**257.49**	**258.10**	mbTOP	4.66	4.67	4.64	4.72	4.87	5.04	5.23	5.20	5.10	5.14	4.77	4.86	5.00	5.25	4.70	4.76
							mbgs	3.89	3.90	3.87	3.95	4.10	4.27	4.46	4.43	4.33	4.37	4.00	4.09	4.23	4.48	3.93	3.99
							masl	258.09	258.07	258.10	258.02	257.87	257.70	257.51	257.54	257.64	257.60	257.97	257.88	257.74	257.49	258.04	257.98
BH 5	**263.04**	**0.80**	**9.92**	**9.12**	**257.32**	**257.95**	mbTOP	5.90	5.91	5.90	5.99	6.10	6.29	6.50	6.45	6.36	6.37	6.04	6.14	6.27	6.52	5.96	6.03
							mbgs	5.10	5.11	5.10	5.19	5.30	5.49	5.70	5.65	5.56	5.57	5.24	5.34	5.47	5.72	5.16	5.23
							masl	257.95	257.93	257.94	257.85	257.74	257.55	257.34	257.39	257.48	257.47	257.80	257.70	257.57	257.32	257.88	257.81
BH 8	**263.75**	**0.79**	**10.13**	**9.34**	**257.76**	**258.40**	mbTOP	6.14	6.15	6.15	6.22	6.37	6.54	6.75	6.75	6.66	6.67	6.31	6.39	6.53	6.78	6.24	6.27
							mbgs	5.35	5.36	5.36	5.43	5.58	5.75	5.96	5.96	5.87	5.88	5.52	5.60	5.74	5.99	5.45	5.48
							masl	258.40	258.39	258.39	258.32	258.17	258.00	257.79	257.79	257.88	257.87	258.23	258.15	258.01	257.76	258.30	258.27
BH 12	**265.32**	**0.86**	**10.14**	**9.28**	**257.89**	**258.57**	mbTOP	7.62	7.63	7.65	7.74	7.87	8.03	8.26	8.27	8.21	8.19	7.83	7.89	8.05	8.29	7.77	7.80
							mbgs	6.76	6.77	6.79	6.88	7.01	7.17	7.40	7.41	7.35	7.33	6.97	7.03	7.19	7.43	6.91	6.94
							masl	258.57	258.55	258.53	258.44	258.31	258.15	257.92	257.91	257.97	257.99	258.35	258.29	258.13	257.89	258.41	258.38
BH 13	**265.56**	**0.79**	**10.86**	**10.07**	**257.20**	**257.85**	mbTOP	8.50	8.51	8.60	8.64	8.75	8.92	9.14	9.15	9.10	9.09	8.75	8.86	8.95	-	-	-
							mbgs	7.71	7.72	7.81	7.85	7.96	8.13	8.35	8.36	8.31	8.30	7.96	8.07	8.16	-	-	-
							masl	257.85	257.84	257.75	257.71	257.60	257.43	257.21	257.20	257.25	257.26	257.60	257.49	257.40	-	-	-
BH 15	**265.85**	**0.85**	**9.90**	**9.05**	**257.92**	**258.59**	mbTOP	8.11	8.13	8.18	8.24	8.35	8.54	8.77	8.78	8.70	8.70	8.34	8.41	8.56	-	-	-
							mbgs	7.26	7.28	7.33	7.39	7.50	7.69	7.92	7.93	7.85	7.85	7.49	7.56	7.71	-	-	-
							masl	258.59	258.57	258.52	258.46	258.35	258.16	257.93	257.92	258.00	258.00	258.36	258.29	258.14	-	-	-
BH 18	**265.55**	**0.98**	**9.91**	**8.93**	**258.04**	**258.73**	mbTOP	7.80	7.81	7.85	7.91	8.02	8.21	8.45	8.49	8.41	8.40	8.02	8.09	8.24	8.48	7.99	7.99
							mbgs	6.82	6.83	6.87	6.93	7.04	7.23	7.47	7.51	7.43	7.42	7.04	7.11	7.26	7.50	7.01	7.01
							masl	258.73	258.72	258.68	258.62	258.51	258.33	258.08	258.04	258.12	258.13	258.51	258.44	258.29	258.05	258.54	258.54

Notes:
mbTOP - meters below top of the pipe
mbgs - meters below ground surface
masl - meters above mean sea level

Seasonal Low/High WLs

Min	Max
257.20	**258.73**


Hydrograph (Bimonthly Monitoring) - 800 Yonge St., Barrie
January 2022 - July 2024
Groundwater Elevation (masl)
Precipitation (mm)
Date
259.0
258.5
258.0
257.5
257.0
256.5
256.0
80
70
60
50
40
30
20
10
0
2/8/2022
3/10/2022
4/9/2022
5/9/2022
6/8/2022
7/8/2022
8/7/2022
9/6/2022
10/6/2022
11/5/2022
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1/4/2023
2/3/2023
3/5/2023
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12/30/2023
1/29/2024
2/28/2024
3/29/2024
4/28/2024
5/28/2024
6/27/2024
7/27/2024
BH1 Manual
BH1
BH8 Manual
BH8
BH13 Manual
BH13
BH18 Manual
BH18
BH3 Manual
BH5 Manual
BH12 Manual
BH15 Manual
Precipitation

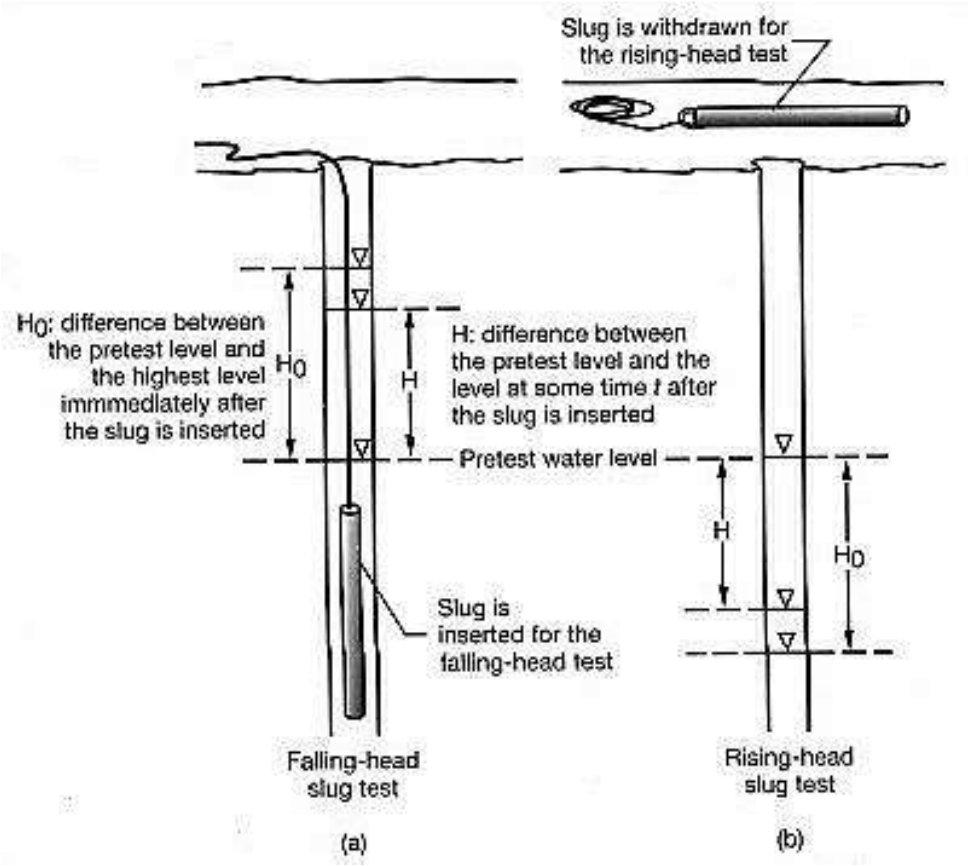
Appendix D – SWRT Procedures and Results

Single Well Response Test Procedure

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

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

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



Initials ___

Slug Test Procedure

Equipment Required

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

Testing Procedure

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

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

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

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

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

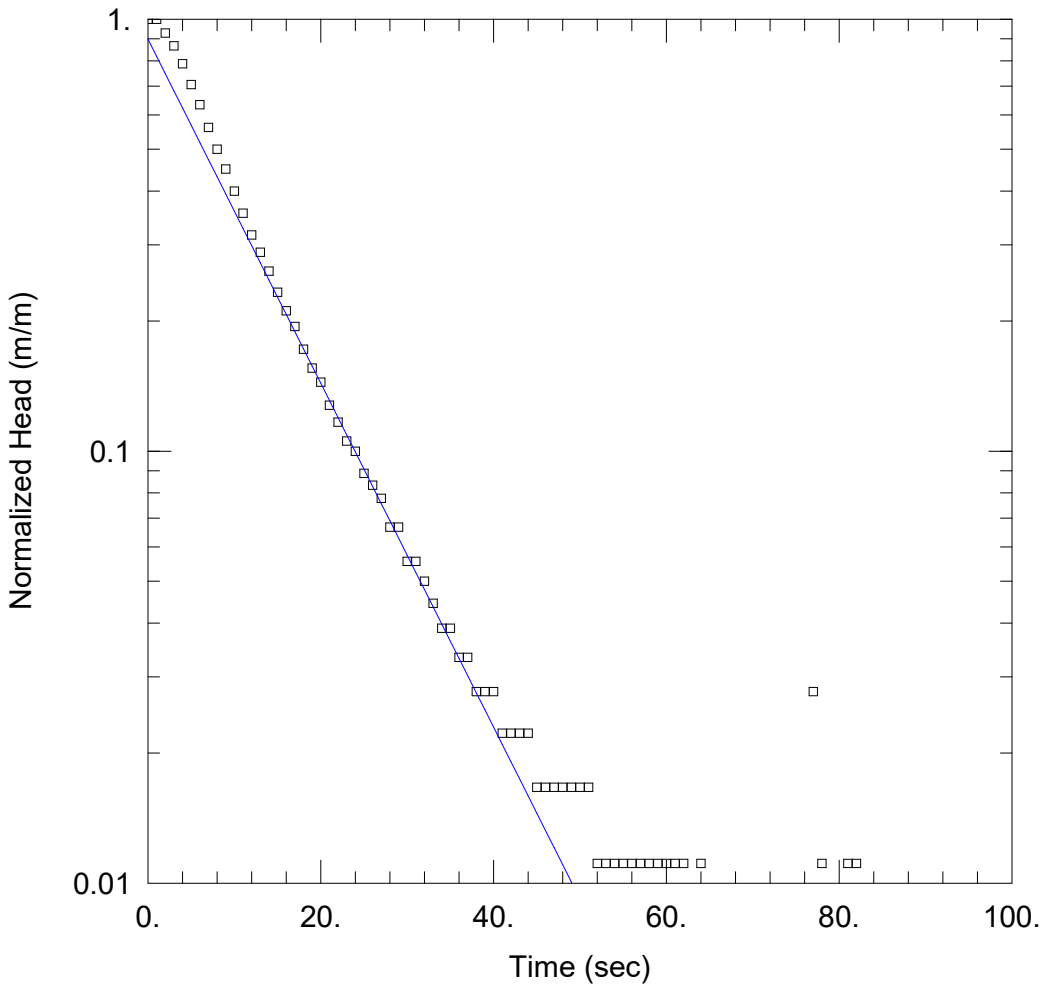
Bail Test Procedure

Equipment Required

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

Procedure

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



BH 1_FALLING HEAD SWRT

Data Set: E:\BRM\GTR-21023592-A0\50 Input\51 Field Notes\HYDROG\SWRT\Working File\BH 1.aqt
Date: 02/28/22 Time: 12:53:38

PROJECT INFORMATION

Company: EXP
Client: Schlegel Villages Inc.
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie, Ontario
Test Date: 10 February 2022

AQUIFER DATA

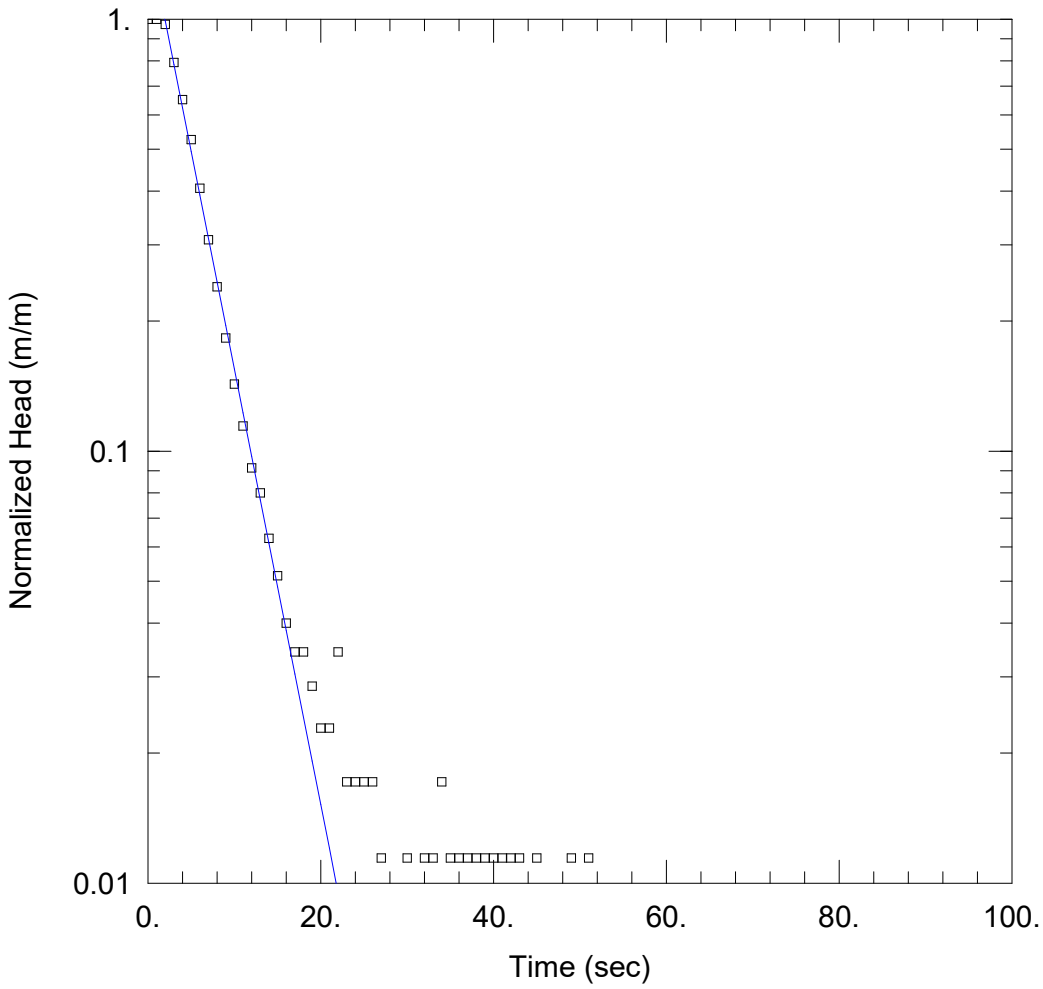
Saturated Thickness: 3.45 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 1)

Initial Displacement: 0.54 m
Total Well Penetration Depth: 3.45 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.45 m
Screen Length: 3. m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 4.304E-5 m/sec
y0 = 0.485 m



BH 3_FALLING HEAD SWRT

Data Set: E:\BRM\GTR-21023592-A0\50 Input\51 Field Notes\HYDROG\SWRT\Working File\BH 3.aqt
Date: 02/28/22 Time: 12:54:24

PROJECT INFORMATION

Company: EXP
Client: Schlegel Villages Inc.
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie, Ontario
Test Date: 10 February 2022

AQUIFER DATA

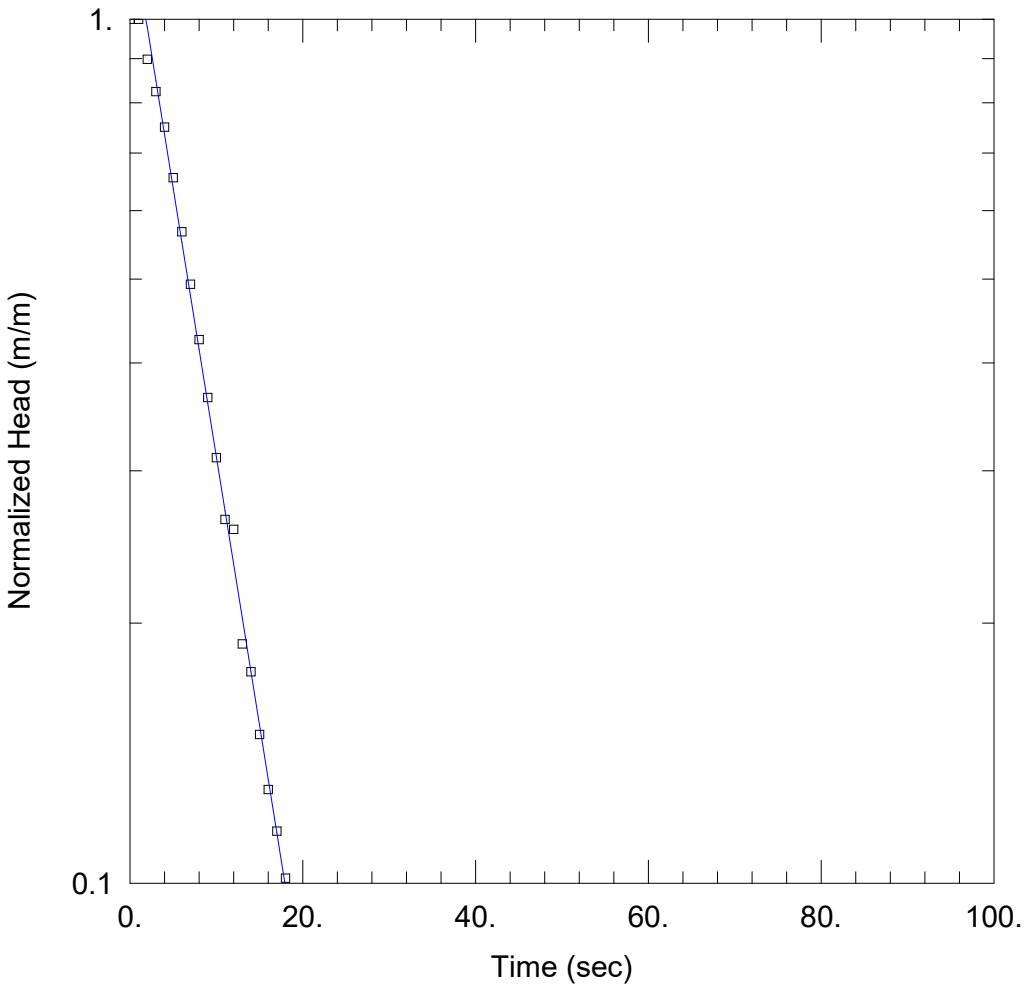
Saturated Thickness: 3.78 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 3)

Initial Displacement: 0.525 m
Total Well Penetration Depth: 3.78 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.78 m
Screen Length: 3. m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.000109 m/sec
y0 = 0.8277 m



BH 5_FALLING HEAD SWRT

Data Set: E:\BRM\GTR-21023592-A0\50 Input\51 Field Notes\HYDROG\SWRT\Working File\BH 5.aqt
Date: 02/28/22 Time: 12:54:59

PROJECT INFORMATION

Company: EXP
Client: Schlegel Villages Inc.
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie, Ontario
Test Date: 10 February 2022

AQUIFER DATA

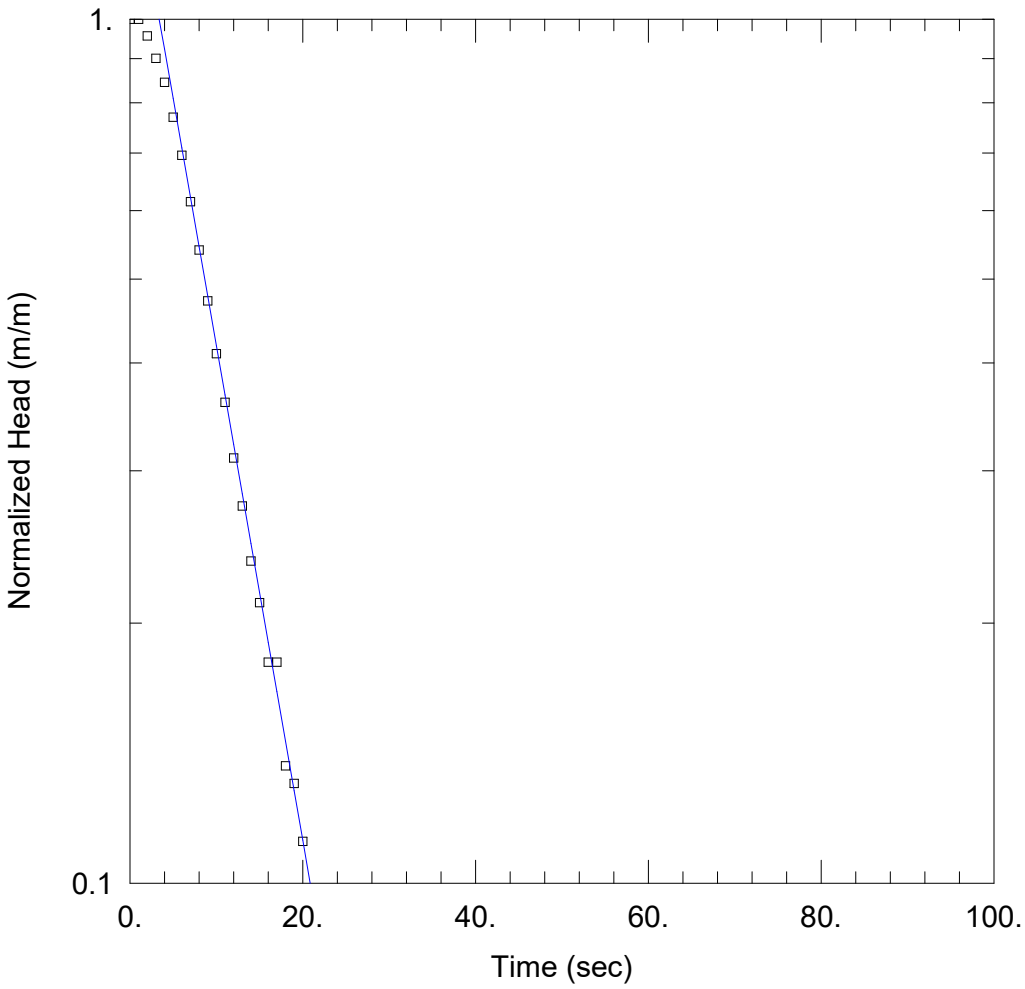
Saturated Thickness: 4. m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 5)

Initial Displacement: 0.444 m
Total Well Penetration Depth: 4. m
Casing Radius: 0.0254 m
Static Water Column Height: 4. m
Screen Length: 3. m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 6.723E-5 m/sec
y0 = 0.5788 m



BH 8_FALLING HEAD SWRT

Data Set: E:\BRM\GTR-21023592-A0\50 Input\51 Field Notes\HYDROG\SWRT\Working File\BH 8.aqt
Date: 02/28/22 Time: 12:55:47

PROJECT INFORMATION

Company: EXP
Client: Schlegel Villages Inc.
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie, Ontario
Test Date: 10 February 2022

AQUIFER DATA

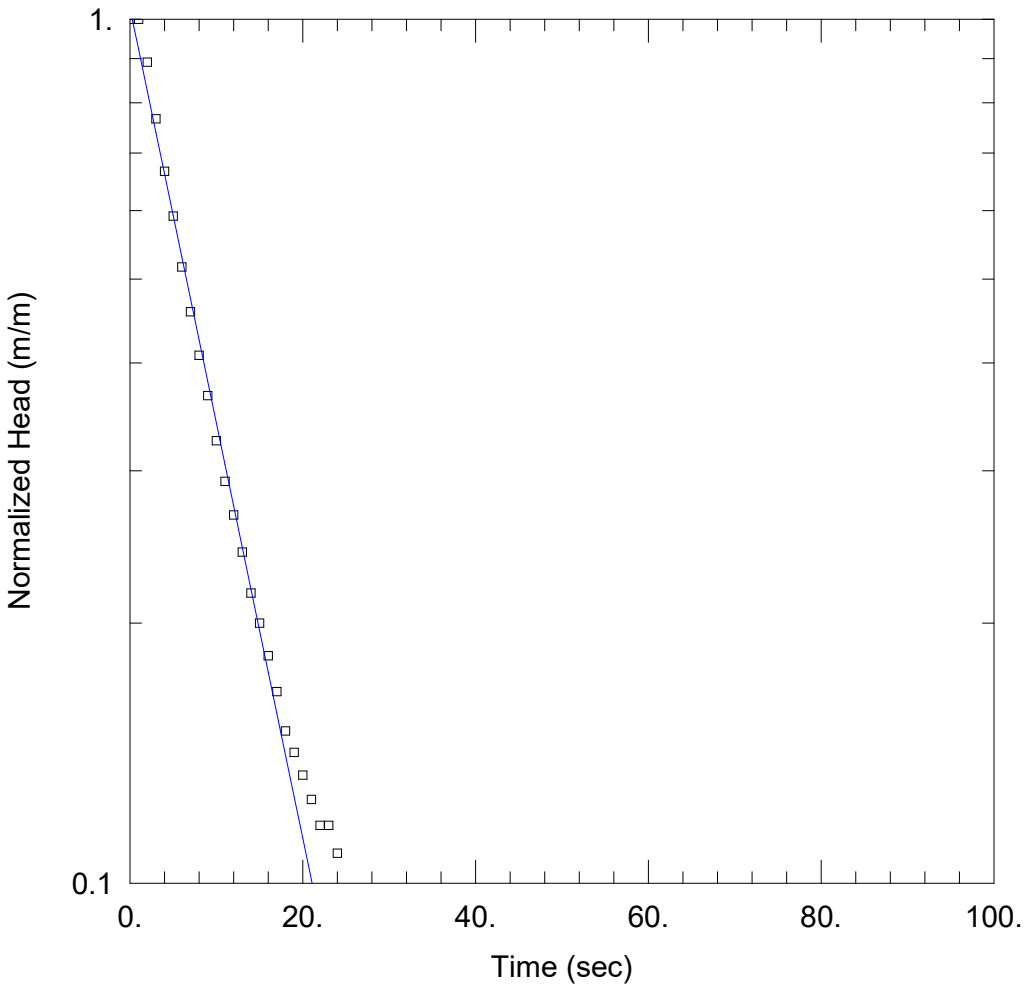
Saturated Thickness: 3.98 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 8)

Initial Displacement: 0.483 m
Total Well Penetration Depth: 3.98 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.98 m
Screen Length: 3. m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 6.187E-5 m/sec
y0 = 0.7558 m



BH 12_FALLING HEAD SWRT

Data Set: E:\BRM\GTR-21023592-A0\50 Input\51 Field Notes\HYDROG\SWRT\Working File\BH 12.aqt
Date: 02/28/22 Time: 12:56:23

PROJECT INFORMATION

Company: EXP
Client: Schlegel Villages Inc.
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie, Ontario
Test Date: 10 February 2022

AQUIFER DATA

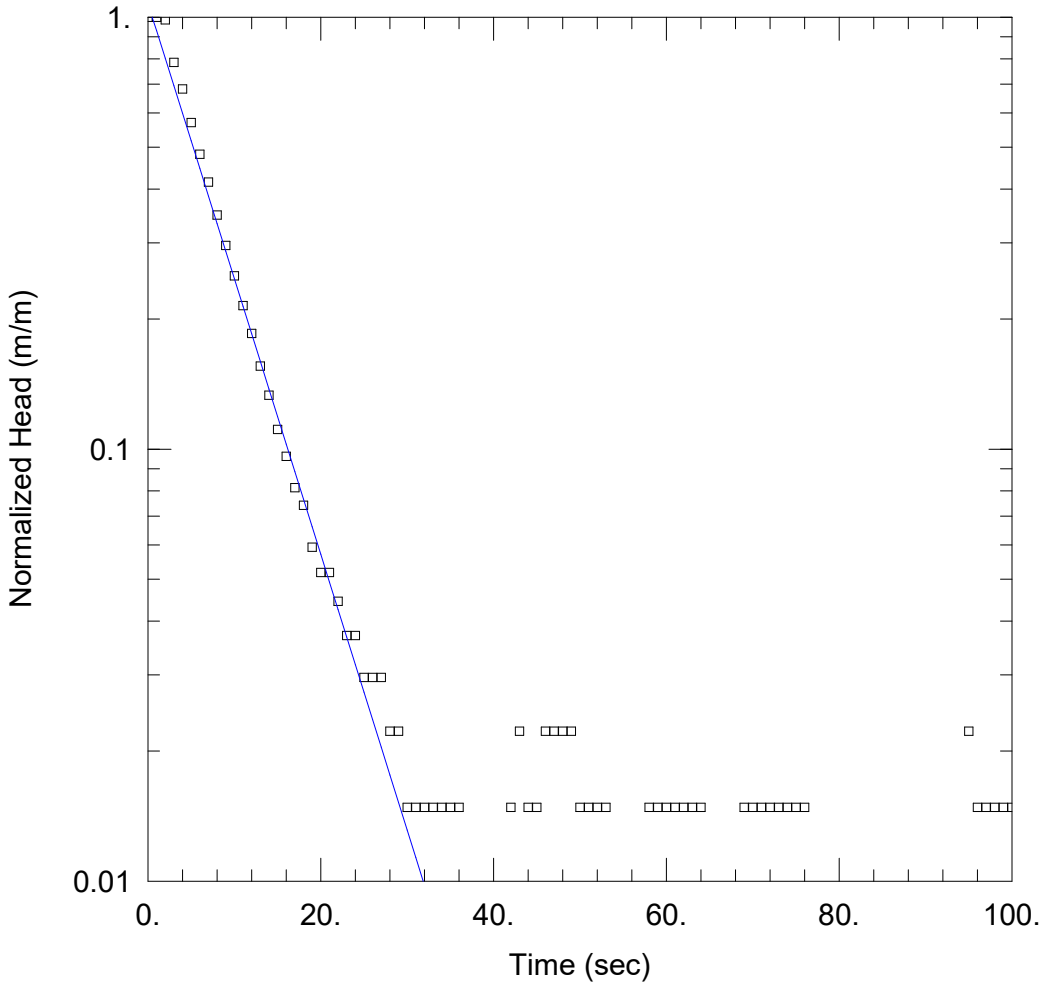
Saturated Thickness: 2.51 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 12)

Initial Displacement: 0.36 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.0254 m
Static Water Column Height: 2.51 m
Screen Length: 3. m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 7.534E-5 m/sec
y0 = 0.3709 m



BH 13_RISING HEAD SWRT

Data Set: E:\BRM\GTR-21023592-A0\50 Input\51 Field Notes\HYDROG\SWRT\Working File\BH 13.aqt
Date: 02/28/22 Time: 12:57:15

PROJECT INFORMATION

Company: EXP
Client: Schlegel Villages Inc.
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie, Ontario
Test Date: 10 February 2022

AQUIFER DATA

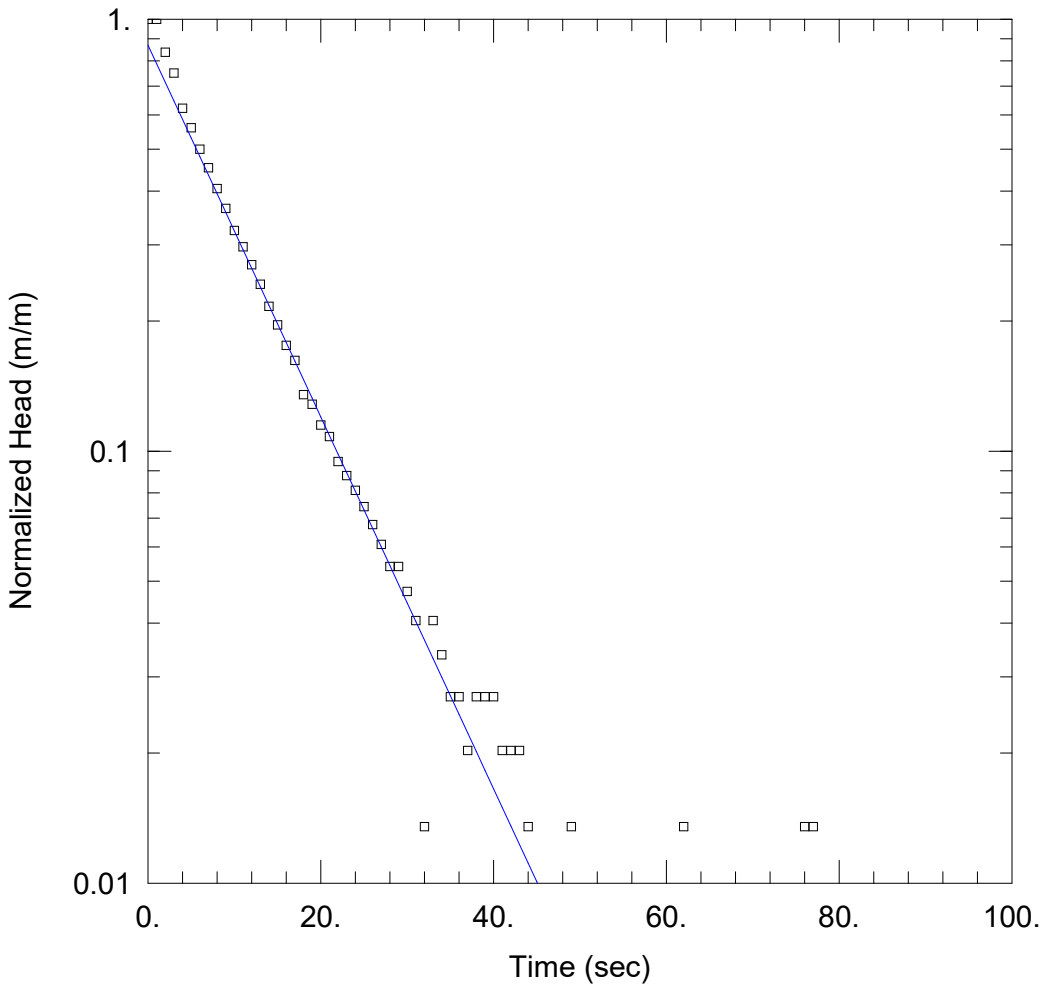
Saturated Thickness: 2.35 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 13)

Initial Displacement: 0.405 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.0254 m
Static Water Column Height: 2.35 m
Screen Length: 3. m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0001069 m/sec
y0 = 0.4366 m



BH 15_RISING HEAD SWRT

Data Set: E:\BRM\GTR-21023592-A0\50 Input\51 Field Notes\HYDROG\SWRT\Working File\BH 15.aqt
Date: 02/28/22 Time: 12:57:44

PROJECT INFORMATION

Company: EXP
Client: Schlegel Villages Inc.
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie, Ontario
Test Date: 10 February 2022

AQUIFER DATA

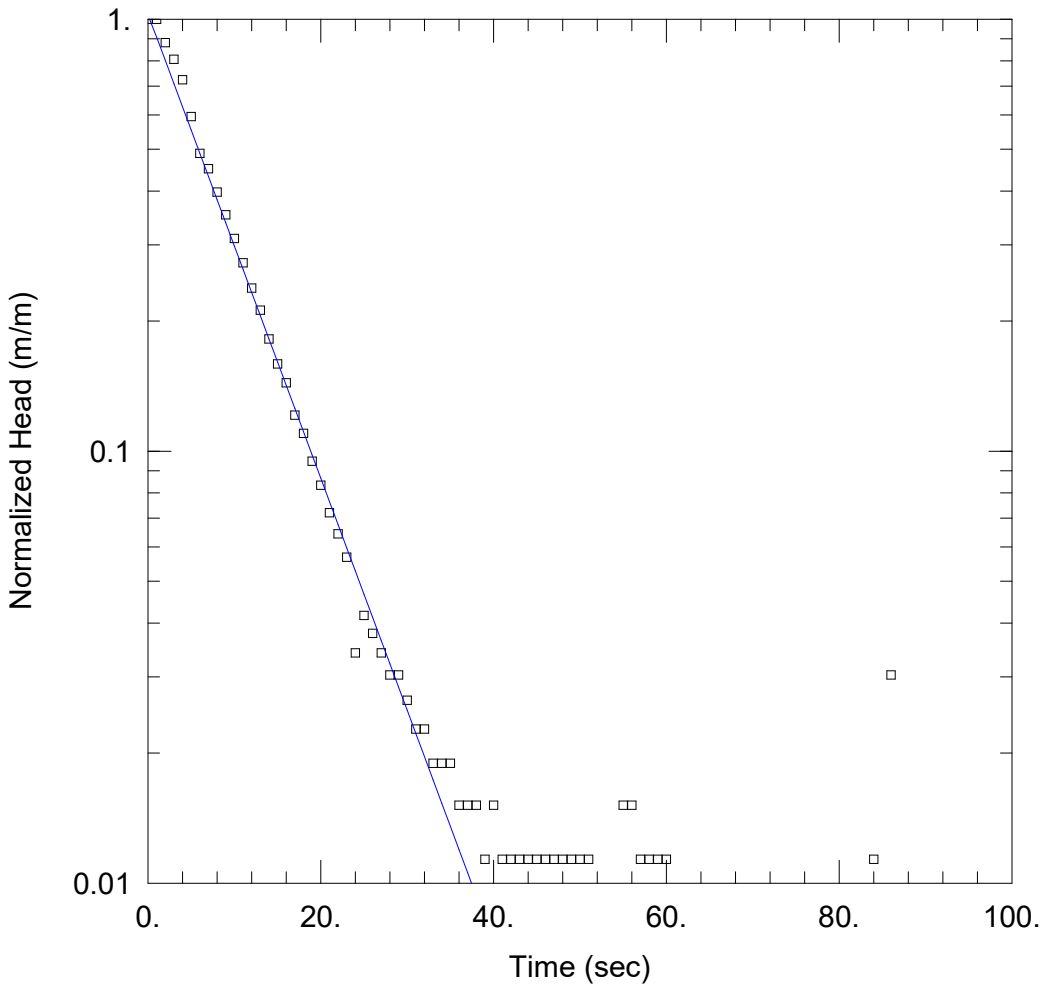
Saturated Thickness: 1.77 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 15)

Initial Displacement: 0.444 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.0254 m
Static Water Column Height: 1.77 m
Screen Length: 3. m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 9.569E-5 m/sec
y0 = 0.3867 m



BH 18_RISING HEAD SWRT

Data Set: E:\BRM\GTR-21023592-A0\50 Input\51 Field Notes\HYDROG\SWRT\Working File\BH 18.aqt
Date: 02/28/22 Time: 12:58:30

PROJECT INFORMATION

Company: EXP
Client: Schlegel Villages Inc.
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie, Ontario
Test Date: 10 February 2022

AQUIFER DATA

Saturated Thickness: 2.1 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH 18)

Initial Displacement: 0.792 m
Total Well Penetration Depth: 3. m
Casing Radius: 0.0254 m
Static Water Column Height: 2.1 m
Screen Length: 3. m
Well Radius: 0.0762 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 0.0001007 m/sec
y0 = 0.8141 m

Appendix E – Laboratory's Certificates of Analysis

Your P.O. #: ENV-BRM
Your Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, ON
Your C.O.C. #: 865341-01-01

Attention: Francois Chartier

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

Report Date: 2022/03/01
Report #: R7023931
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C236559
Received: 2022/02/10, 18:19

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Biochemical Oxygen Demand (BOD)	1	2022/02/12	2022/02/17	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	1	N/A	2022/02/14	CAM SOP-00463	SM 23 4500-Cl E m
Chemical Oxygen Demand	1	N/A	2022/02/14	CAM SOP-00416	SM 23 5220 D m
Total Cyanide	1	2022/02/14	2022/02/15	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2022/02/11	2022/02/11	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2022/02/11	2022/02/11	CAM SOP-00453	EPA 7470A m
Total Extractable Elements by ICP-MS (1, 3)	1	2022/02/28	2022/02/28	STL SOP-00071	MA.200–Mét. 1.2 R5 m
Elements by ICPMS Low Level (total) (2)	1	2022/02/16	2022/02/17	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Animal and Vegetable Oil and Grease	1	N/A	2022/02/16	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2022/02/15	2022/02/16	CAM SOP-00326	EPA1664B m,SM5520B m
OC Pesticides (Selected) & PCB (4)	1	2022/02/14	2022/02/15	CAM SOP-00307	EPA 8081A/8082B m
PAH Compounds in Water by GC/MS (SIM)	1	2022/02/15	2022/02/16	CAM SOP-00318	EPA 8270D m
pH	1	2022/02/11	2022/02/11	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2022/02/11	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	1	N/A	2022/02/14	CAM SOP-00464	EPA 375.4 m
Sulphide	1	N/A	2022/02/11	CAM SOP-00455	SM 23 4500-S G m
Total Kjeldahl Nitrogen in Water	1	2022/02/11	2022/02/14	CAM SOP-00938	OMOE E3516 m
Total PAHs (Barrie Sewer By-law) (5)	1	N/A	2022/02/17	CAM SOP - 00301	
Mineral/Synthetic O & G (TPH Heavy Oil) (6)	1	2022/02/15	2022/02/15	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2022/02/12	2022/02/14	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2022/02/14	CAM SOP-00228	EPA 8260C m

Remarks:

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

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

Your P.O. #: ENV-BRM
Your Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, ON
Your C.O.C. #: 865341-01-01

Attention: Francois Chartier

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

Report Date: 2022/03/01
Report #: R7023931
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C236559
Received: 2022/02/10, 18:19

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Montreal, 889 Montée de Liesse , Ville St-Laurent, QC, H4T 1P5
(2) This test was performed by Bureau Veritas Burnaby, 4606 Canada Way , Burnaby, BC, V5G 1K5
(3) Non-accredited test method
(4) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane
(5) Total PAHs include only those PAHs specified in the sewer use by-by-law.
(6) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Bureau Veritas
01 Mar 2022 15:32:27

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799
==========
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Job #: C236559
Report Date: 2022/03/01

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, ON
Your P.O. #: ENV-BRM
Sampler Initials: TM

BARRIE SAN. SEWER INCL. RH (2021-002)

Bureau Veritas ID				RVF908			RVF908		
Sampling Date				2022/02/10 10:30			2022/02/10 10:30		
COC Number				865341-01-01			865341-01-01		
	UNITS	Criteria	Criteria-2	BH5	RDL	QC Batch	BH5 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Total Animal/Vegetable Oil and Grease	mg/L	-	150	0.60	0.50	7826824			
Inorganics									
Total BOD	mg/L	15	300	ND	2	7830878			
Total Chemical Oxygen Demand (COD)	mg/L	-	600	13	4.0	7829647	11	4.0	7829647
Fluoride (F-)	mg/L	-	10	ND	0.10	7829373			
Total Kjeldahl Nitrogen (TKN)	mg/L	-	100	ND (1)	0.20	7829278			
pH	pH	6.0:9.5	6.0:9.5	7.80		7829374			
Phenols-4AAP	mg/L	-	0.1	ND	0.0010	7829580			
Total Suspended Solids	mg/L	15	350	**25**	10	7831000			
Dissolved Sulphate (SO4)	mg/L	-	1500	28	1.0	7830090	28	1.0	7830090
Sulphide	mg/L	-	1	ND	0.020	7829025			
Total Cyanide (CN)	mg/L	-	1.2	ND	0.0050	7833194			
Dissolved Chloride (Cl-)	mg/L	-	1500	75	1.0	7830071	72	1.0	7830071
Metals									
Total Aluminum (Al)	ug/L	-	50000	235 (2)	3.0	7842643	246	3.0	7842643
Total Antimony (Sb)	ug/L	-	5000	0.024	0.020	7842643	0.030	0.020	7842643
Total Arsenic (As)	ug/L	-	1000	0.098	0.020	7842643	0.108	0.020	7842643
Total Barium (Ba)	ug/L	-	5000	29.5	0.050	7842643	30.3	0.050	7842643
Total Bismuth (Bi)	ug/L	-	5000	ND	0.010	7842643	ND	0.010	7842643
Total Cadmium (Cd)	ug/L	1	700	0.0067	0.0050	7842643	ND	0.0050	7842643
Total Chromium (Cr)	ug/L	80	2000	1.12	0.10	7842643	1.14	0.10	7842643
Total Cobalt (Co)	ug/L	-	5000	0.581	0.010	7842643	0.583	0.010	7842643
Total Copper (Cu)	ug/L	10	2000	1.52	0.10	7842643	1.50	0.10	7842643
Total Iron (Fe)	ug/L	-	50000	491	5.0	7842643	490	5.0	7842643

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The City of Barrie Discharges to Storm Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Due to a high concentration of NOx, the sample required dilution. The detection limit was adjusted accordingly.
(2) Matrix spike exceeds acceptance limits due to probable matrix interference.

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

Bureau Veritas Job #: C236559
Report Date: 2022/03/01

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, ON
Your P.O. #: ENV-BRM
Sampler Initials: TM

BARRIE SAN. SEWER INCL. RH (2021-002)

Bureau Veritas ID				RVF908			RVF908		
Sampling Date				2022/02/10 10:30			2022/02/10 10:30		
COC Number				865341-01-01			865341-01-01		
	UNITS	Criteria	Criteria-2	BH5	RDL	QC Batch	BH5 Lab-Dup	RDL	QC Batch
Total Lead (Pb)	ug/L	50	700	0.354	0.020	7842643	0.353	0.020	7842643
Total Manganese (Mn)	ug/L	-	5000	41.2	0.10	7842643	41.4	0.10	7842643
Total Molybdenum (Mo)	ug/L	-	5000	0.277	0.050	7842643	0.281	0.050	7842643
Total Nickel (Ni)	ug/L	50	2000	1.13	0.10	7842643	1.21	0.10	7842643
Total Phosphorus (P)	ug/L	-	10000	17.2	5.0	7842643	16.6	5.0	7842643
Total Selenium (Se)	ug/L	-	1000	0.217	0.040	7842643	0.209	0.040	7842643
Total Silver (Ag)	ug/L	-	400	ND	0.010	7842643	ND	0.010	7842643
Total Tin (Sn)	ug/L	-	5000	ND	0.20	7842643	0.20	0.20	7842643
Total Vanadium (V)	ug/L	-	5000	1.00	0.20	7842643	1.03	0.20	7842643
Total Zinc (Zn)	ug/L	40	2000	2.1	1.0	7842643	2.1	1.0	7842643
Total Rhodium (Rh)	ug/L	-	5000	ND	0.50	7858192			
Total Gold (Au)	ug/L	-	5000	ND (1)	0.10	7842643	ND	0.10	7842643
Total Platinum (Pt)	ug/L	-	5000	ND	0.10	7842643	ND	0.10	7842643
Petroleum Hydrocarbons									
Total Oil & Grease	mg/L	-	-	0.60	0.50	7834956			
Total Oil & Grease Mineral/Synthetic	mg/L	-	15	ND	0.50	7835021			
Metals									
Mercury (Hg)	mg/L	-	0.01	ND	0.00010	7828759			
Calculated Parameters									
Total PAHs	ug/L	-	5	ND	0.20	7828346			
Polyaromatic Hydrocarbons									
Acenaphthene	ug/L	-	-	ND	0.050	7834883			
Acenaphthylene	ug/L	-	-	ND	0.050	7834883			
Anthracene	ug/L	-	-	ND	0.050	7834883			
Benzo(a)anthracene	ug/L	-	-	ND	0.050	7834883			
Benzo(a)pyrene	ug/L	-	-	ND	0.0090	7834883			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The City of Barrie Discharges to Storm Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Matrix spike outside acceptance criteria due to digestion limitation.

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

Bureau Veritas Job #: C236559
Report Date: 2022/03/01

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, ON
Your P.O. #: ENV-BRM
Sampler Initials: TM

BARRIE SAN. SEWER INCL. RH (2021-002)

Bureau Veritas ID				RVF908			RVF908		
Sampling Date				2022/02/10 10:30			2022/02/10 10:30		
COC Number				865341-01-01			865341-01-01		
	UNITS	Criteria	Criteria-2	BH5	RDL	QC Batch	BH5 Lab-Dup	RDL	QC Batch
Benzo(b/j)fluoranthene	ug/L	-	-	ND	0.050	7834883			
Benzo(g,h,i)perylene	ug/L	-	-	ND	0.050	7834883			
Benzo(k)fluoranthene	ug/L	-	-	ND	0.050	7834883			
Chrysene	ug/L	-	-	ND	0.050	7834883			
Dibenzo(a,h)anthracene	ug/L	-	-	ND	0.050	7834883			
Fluoranthene	ug/L	-	-	ND	0.050	7834883			
Fluorene	ug/L	-	-	ND	0.050	7834883			
Indeno(1,2,3-cd)pyrene	ug/L	-	-	ND	0.050	7834883			
1-Methylnaphthalene	ug/L	-	-	ND	0.050	7834883			
2-Methylnaphthalene	ug/L	-	-	ND	0.050	7834883			
Naphthalene	ug/L	-	-	ND	0.050	7834883			
Phenanthrene	ug/L	-	-	ND	0.030	7834883			
Pyrene	ug/L	-	-	ND	0.050	7834883			
Volatile Organics									
Benzene	ug/L	-	10	ND	0.40	7828736			
1,2-Dichlorobenzene	ug/L	-	50	ND	0.80	7828736			
1,4-Dichlorobenzene	ug/L	-	80	ND	0.80	7828736			
Ethylbenzene	ug/L	-	60	ND	0.40	7828736			
Methylene Chloride(Dichloromethane)	ug/L	-	90	ND	4.0	7828736			
1,1,2,2-Tetrachloroethane	ug/L	-	60	ND	0.80	7828736			
Tetrachloroethylene	ug/L	-	60	ND	0.40	7828736			
Toluene	ug/L	-	20	ND	0.40	7828736			
Trichloroethylene	ug/L	-	50	ND	0.40	7828736			
p+m-Xylene	ug/L	-	-	ND	0.40	7828736			
o-Xylene	ug/L	-	-	ND	0.40	7828736			
Total Xylenes	ug/L	-	300	ND	0.40	7828736			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The City of Barrie Discharges to Storm Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C236559
Report Date: 2022/03/01

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, ON
Your P.O. #: ENV-BRM
Sampler Initials: TM

BARRIE SAN. SEWER INCL. RH (2021-002)

Bureau Veritas ID				RVF908			RVF908		
Sampling Date				2022/02/10 10:30			2022/02/10 10:30		
COC Number				865341-01-01			865341-01-01		
	UNITS	Criteria	Criteria-2	BH5	RDL	QC Batch	BH5 Lab-Dup	RDL	QC Batch
Pesticides & Herbicides									
Hexachlorobenzene	ug/L	-	0.1	ND	0.005	7833678			
Surrogate Recovery (%)									
2,4,5,6-Tetrachloro-m-xylene	%	-	-	35 (1)		7833678			
Decachlorobiphenyl	%	-	-	100		7833678			
D10-Anthracene	%	-	-	100		7834883			
D14-Terphenyl (FS)	%	-	-	99		7834883			
D8-Acenaphthylene	%	-	-	85		7834883			
4-Bromofluorobenzene	%	-	-	94		7828736			
D4-1,2-Dichloroethane	%	-	-	93		7828736			
D8-Toluene	%	-	-	95		7828736			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The City of Barrie Discharges to Storm Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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Bureau Veritas Job #: C236559
Report Date: 2022/03/01

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, ON
Your P.O. #: ENV-BRM
Sampler Initials: TM

TEST SUMMARY

Bureau Veritas ID: RVF908
Sample ID: BH5
Matrix: Water

Collected: 2022/02/10
Shipped:
Received: 2022/02/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Biochemical Oxygen Demand (BOD)	DO	7830878	2022/02/12	2022/02/17	Surleen Kaur Romana
Chloride by Automated Colourimetry	KONE	7830071	N/A	2022/02/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7829647	N/A	2022/02/14	Neil Dassanayake
Total Cyanide	SKAL/CN	7833194	2022/02/14	2022/02/15	Nimarta Singh
Fluoride	ISE	7829373	2022/02/11	2022/02/11	Neil Dassanayake
Mercury in Water by CVAA	CV/AA	7828759	2022/02/11	2022/02/11	Gagandeep Rai
Total Extractable Elements by ICP-MS	ICP/MSMS	7858192	2022/02/28	2022/02/28	Alex Thibert
Elements by ICPMS Low Level (total)	ICP/MS	7842643	2022/02/16	2022/02/17	Sahar Omar Al-Abdalla
Animal and Vegetable Oil and Grease	BAL	7826824	N/A	2022/02/16	Automated Statchk
Total Oil and Grease	BAL	7834956	2022/02/15	2022/02/16	Himanshu Patel
OC Pesticides (Selected) & PCB	GC/ECD	7833678	2022/02/14	2022/02/15	Joy Zhang
PAH Compounds in Water by GC/MS (SIM)	GC/MS	7834883	2022/02/15	2022/02/16	Jonghan Yoon
pH	AT	7829374	2022/02/11	2022/02/11	Neil Dassanayake
Phenols (4AAP)	TECH/PHEN	7829580	N/A	2022/02/11	Louise Harding
Sulphate by Automated Colourimetry	KONE	7830090	N/A	2022/02/14	Avneet Kour Sudan
Sulphide	ISE/S	7829025	N/A	2022/02/11	Taslima Aktar
Total Kjeldahl Nitrogen in Water	SKAL	7829278	2022/02/11	2022/02/14	Rajni Tyagi
Total PAHs (Barrie Sewer By-law)	CALC	7828346	N/A	2022/02/17	Automated Statchk
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	7835021	2022/02/15	2022/02/15	Himanshu Patel
Total Suspended Solids	BAL	7831000	2022/02/12	2022/02/14	Shaneil Hall
Volatile Organic Compounds in Water	GC/MS	7828736	N/A	2022/02/14	Narayan Ghimire

Bureau Veritas ID: RVF908 Dup
Sample ID: BH5
Matrix: Water

Collected: 2022/02/10
Shipped:
Received: 2022/02/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	7830071	N/A	2022/02/14	Alina Dobreanu
Chemical Oxygen Demand	SPEC	7829647	N/A	2022/02/14	Neil Dassanayake
Elements by ICPMS Low Level (total)	ICP/MS	7842643	2022/02/16	2022/02/17	Sahar Omar Al-Abdalla
Sulphate by Automated Colourimetry	KONE	7830090	N/A	2022/02/14	Avneet Kour Sudan

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GENERAL COMMENTS

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

Package 1	0.7°C

Sample RVF908 [BH5] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

OC Pesticide Analysis: Due to matrix interference, the Surrogate recovery was below the control limit as stipulated by Ontario Regulation 153, however, this recovery is still within Bureau Veritas Laboratories's performance based limits. Results reported with surrogate recoveries within this range are still valid but may have an associated low bias.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7828736	4-Bromofluorobenzene	2022/02/14	99	70 - 130	100	70 - 130	102	%				
7828736	D4-1,2-Dichloroethane	2022/02/14	102	70 - 130	99	70 - 130	91	%				
7828736	D8-Toluene	2022/02/14	100	70 - 130	104	70 - 130	98	%				
7833678	2,4,5,6-Tetrachloro-m-xylene	2022/02/15	51	50 - 130	64	50 - 130	62	%				
7833678	Decachlorobiphenyl	2022/02/15	90	50 - 130	110	50 - 130	98	%				
7834883	D10-Anthracene	2022/02/16	99	50 - 130	109	50 - 130	112	%				
7834883	D14-Terphenyl (FS)	2022/02/16	104	50 - 130	114	50 - 130	114	%				
7834883	D8-Acenaphthylene	2022/02/16	89	50 - 130	98	50 - 130	97	%				
7828736	1,1,2,2-Tetrachloroethane	2022/02/14	95	70 - 130	98	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7828736	1,2-Dichlorobenzene	2022/02/14	97	70 - 130	102	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7828736	1,4-Dichlorobenzene	2022/02/14	121	70 - 130	128	70 - 130	ND, RDL=0.40	ug/L	NC	30		
7828736	Benzene	2022/02/14	96	70 - 130	98	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7828736	Ethylbenzene	2022/02/14	93	70 - 130	101	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7828736	Methylene Chloride(Dichloromethane)	2022/02/14	104	70 - 130	104	70 - 130	ND, RDL=2.0	ug/L	NC	30		
7828736	o-Xylene	2022/02/14	90	70 - 130	100	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7828736	p+m-Xylene	2022/02/14	100	70 - 130	108	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7828736	Tetrachloroethylene	2022/02/14	96	70 - 130	103	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7828736	Toluene	2022/02/14	94	70 - 130	102	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7828736	Total Xylenes	2022/02/14					ND, RDL=0.20	ug/L	NC	30		
7828736	Trichloroethylene	2022/02/14	107	70 - 130	111	70 - 130	ND, RDL=0.20	ug/L	NC	30		
7828759	Mercury (Hg)	2022/02/11	90	75 - 125	93	80 - 120	ND, RDL=0.00010	mg/L	NC	20		
7829025	Sulphide	2022/02/11	101	80 - 120	97	80 - 120	ND, RDL=0.020	mg/L	NC	20		
7829278	Total Kjeldahl Nitrogen (TKN)	2022/02/14	99	80 - 120	102	80 - 120	ND, RDL=0.10	mg/L	6.7	20	99	80 - 120
7829373	Fluoride (F-)	2022/02/11	98	80 - 120	102	80 - 120	ND, RDL=0.10	mg/L	0.46	20		
7829374	pH	2022/02/11			102	98 - 103			0.81	N/A		
7829580	Phenols-4AAP	2022/02/11	100	80 - 120	101	80 - 120	ND, RDL=0.0010	mg/L	NC	20		
7829647	Total Chemical Oxygen Demand (COD)	2022/02/14	103	80 - 120	104	80 - 120	ND, RDL=4.0	mg/L	12	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7830071	Dissolved Chloride (Cl-)	2022/02/14	NC	80 - 120	107	80 - 120	ND, RDL=1.0	mg/L	4.0	20		
7830090	Dissolved Sulphate (SO4)	2022/02/14	NC	75 - 125	99	80 - 120	ND, RDL=1.0	mg/L	0.060	20		
7830878	Total BOD	2022/02/17					ND,RDL=2	mg/L	11	30	97	80 - 120
7831000	Total Suspended Solids	2022/02/14					ND, RDL=10	mg/L	0.95	25	95	85 - 115
7833194	Total Cyanide (CN)	2022/02/15	99	80 - 120	95	80 - 120	ND, RDL=0.0050	mg/L	NC	20		
7833678	Hexachlorobenzene	2022/02/15	85	50 - 130	103	50 - 130	ND, RDL=0.005	ug/L	8.6	30		
7834883	1-Methylnaphthalene	2022/02/16	109	50 - 130	103	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	2-Methylnaphthalene	2022/02/16	108	50 - 130	102	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Acenaphthene	2022/02/16	97	50 - 130	91	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Acenaphthylene	2022/02/16	93	50 - 130	88	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Anthracene	2022/02/16	99	50 - 130	96	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Benzo(a)anthracene	2022/02/16	86	50 - 130	86	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Benzo(a)pyrene	2022/02/16	84	50 - 130	85	50 - 130	ND, RDL=0.0090	ug/L	NC	30		
7834883	Benzo(b/j)fluoranthene	2022/02/16	88	50 - 130	88	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Benzo(g,h,i)perylene	2022/02/16	83	50 - 130	83	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Benzo(k)fluoranthene	2022/02/16	85	50 - 130	84	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Chrysene	2022/02/16	92	50 - 130	91	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Dibenzo(a,h)anthracene	2022/02/16	76	50 - 130	78	50 - 130	ND, RDL=0.050	ug/L	NC	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7834883	Fluoranthene	2022/02/16	111	50 - 130	109	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Fluorene	2022/02/16	102	50 - 130	99	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Indeno(1,2,3-cd)pyrene	2022/02/16	88	50 - 130	89	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Naphthalene	2022/02/16	95	50 - 130	90	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834883	Phenanthrene	2022/02/16	100	50 - 130	97	50 - 130	ND, RDL=0.030	ug/L	NC	30		
7834883	Pyrene	2022/02/16	108	50 - 130	106	50 - 130	ND, RDL=0.050	ug/L	NC	30		
7834956	Total Oil & Grease	2022/02/16			99	85 - 115	ND, RDL=0.50	mg/L	0.50	25		
7835021	Total Oil & Grease Mineral/Synthetic	2022/02/15			91	85 - 115	ND, RDL=0.50	mg/L	2.2	25		
7842643	Total Aluminum (Al)	2022/02/17	122 (1)	80 - 120	104	80 - 120	ND, RDL=3.0	ug/L	4.7	20		
7842643	Total Antimony (Sb)	2022/02/17	106	80 - 120	105	80 - 120	ND, RDL=0.020	ug/L	NC	20		
7842643	Total Arsenic (As)	2022/02/17	107	80 - 120	103	80 - 120	ND, RDL=0.020	ug/L	9.8	20		
7842643	Total Barium (Ba)	2022/02/17	104	80 - 120	102	80 - 120	ND, RDL=0.050	ug/L	2.5	20		
7842643	Total Bismuth (Bi)	2022/02/17	99	80 - 120	103	80 - 120	ND, RDL=0.010	ug/L	NC	20		
7842643	Total Cadmium (Cd)	2022/02/17	102	80 - 120	103	80 - 120	ND, RDL=0.0050	ug/L	NC	20		
7842643	Total Chromium (Cr)	2022/02/17	102	80 - 120	104	80 - 120	ND, RDL=0.10	ug/L	1.6	20		
7842643	Total Cobalt (Co)	2022/02/17	98	80 - 120	102	80 - 120	ND, RDL=0.010	ug/L	0.33	20		
7842643	Total Copper (Cu)	2022/02/17	95	80 - 120	103	80 - 120	ND, RDL=0.10	ug/L	1.1	20		
7842643	Total Gold (Au)	2022/02/17	53 (1)	80 - 120			ND, RDL=0.10	ug/L	NC	20		
7842643	Total Iron (Fe)	2022/02/17	102	80 - 120	105	80 - 120	ND, RDL=5.0	ug/L	0.37	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
7842643	Total Lead (Pb)	2022/02/17	102	80 - 120	104	80 - 120	ND, RDL=0.020	ug/L	0.46	20		
7842643	Total Manganese (Mn)	2022/02/17	100	80 - 120	104	80 - 120	ND, RDL=0.10	ug/L	0.50	20		
7842643	Total Molybdenum (Mo)	2022/02/17	117	80 - 120	107	80 - 120	ND, RDL=0.050	ug/L	1.4	20		
7842643	Total Nickel (Ni)	2022/02/17	97	80 - 120	103	80 - 120	ND, RDL=0.10	ug/L	6.7	20		
7842643	Total Phosphorus (P)	2022/02/17	111	80 - 120	107	80 - 120	ND, RDL=5.0	ug/L	3.5	20		
7842643	Total Platinum (Pt)	2022/02/17	102	80 - 120	103	80 - 120	ND, RDL=0.10	ug/L	NC	20		
7842643	Total Selenium (Se)	2022/02/17	103	80 - 120	103	80 - 120	ND, RDL=0.040	ug/L	3.7	20		
7842643	Total Silver (Ag)	2022/02/17	100	80 - 120	101	80 - 120	ND, RDL=0.010	ug/L	NC	20		
7842643	Total Tin (Sn)	2022/02/17	104	80 - 120	105	80 - 120	ND, RDL=0.20	ug/L	1.3	20		
7842643	Total Vanadium (V)	2022/02/17	106	80 - 120	105	80 - 120	ND, RDL=0.20	ug/L	3.2	20		
7842643	Total Zinc (Zn)	2022/02/17	97	80 - 120	105	80 - 120	ND, RDL=1.0	ug/L	0.55	20		
7858192	Total Rhodium (Rh)	2022/02/28			85	70 - 130	ND, RDL=0.50	ug/L				

N/A = Not Applicable

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

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

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

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

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

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

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

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

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

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Bureau Veritas Job #: C236559
Report Date: 2022/03/01

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, ON
Your P.O. #: ENV-BRM
Sampler Initials: TM

VALIDATION SIGNATURE PAGE

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

Alex Thibert
Membre OCQ #2020-05

Alex Thibert, Analyste I

David Huang, BBY Scientific Specialist

Eva Pranjic
CHARTERED
CHEMIST

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

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

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Page of

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#30554 exp Services Inc	Company Name:	EXP Services Inc	Quotation #:	B91717 STREAM 2	Bureau Veritas Job #:	Bottle Order #:
Attention:	Accounts Payable	Attention:	Francois Chartier, Thabiso Modise	P.O. #:	ENV-BRM		865341
Address:	1595 Clark Blvd	Address:		Project:	GTR-21023592-A0	COC #:	Project Manager:
	Brampton ON L6T 4V1		Thabiso.Modise@exp.com	Project Name:	800 Yonge St	C#865341-01-01	Patricia Legette
Tel:	(905) 793-9800 Fax: (905) 793-0641	Tel:	Jeffrey.Leon@exp.com	Site #:			
Email:	AP@exp.com; Karen.Burke@exp.com	Email:	Francois.Chartier@exp.com	Sampled By:	Thabiso Modise		

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

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine	☐ CCME ☑ Sanitary Sewer Bylaw	
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ Reg 558 ☑ Storm Sewer Bylaw	
☐ Table 3 ☐ Agri/Other ☐ For RSC	☐ MISA Municipality Barrie	
☐ Table ___	☐ PWQO ☐ Reg 406 Table	
	☐ Other	

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	Barrie San. Sewer incl. Rh (2021-002)	Barrie Storm Sewer Bylaw (2021-002)	# of Bottles	Comments
1		BH 5	10/Feb/2022	10:30	GW		✓	✓	17	PLEASE MEET 5 DAY TAT
2										
3										PLEASE INCLUDE COC
4										IN CERTIFICATE OF ANALYSIS
5										
6										
7										
8										
9										
10										

10-Feb-22 18:19
Patricia Legette
C236559
ATM ENV-1089

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

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

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

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Thabiso Modise	2022/02/10	18:20	Nirali NIRAL PATEL	2022/02/09	18:19	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Rece:	Custody Seal Present	Yes	No
	1/0/1	Intact		

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

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

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

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

White: Bureau Veritas Yellow: Client

ON ICE

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Job #: C236559
Report Date: 2022/03/01

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, ON
Your P.O. #: ENV-BRM
Sampler Initials: TM

Exceedance Summary Table – Barrie Storm Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
BH5	RVF908-04	Total Suspended Solids	15	25	10	mg/L

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

Exceedance Summary Table – Barrie Sanitary Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						

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

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

Your Project #: Campobello job# C236559

Attention: Patricia Legette

BUREAU VERITAS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2022/02/18
Report #: R3136869
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C208557
Received: 2022/02/10, 19:56

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Elements by ICPMS Digested LL (total)	1	2022/02/16	2022/02/17	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m

Remarks:

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

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

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: Campobello job# C236559

Attention: Patricia Legette

BUREAU VERITAS
CAMPOBELLO
6740 CAMPOBELLO ROAD
MISSISSAUGA, ON
CANADA L5N 2L8

Report Date: 2022/02/18
Report #: R3136869
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C208557
Received: 2022/02/10, 19:56

Encryption Key

AUTHORIZED REPORT
RAPPORT AUTORISÉ

Bureau Veritas
18 Feb 2022 17:13:45

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Customer Solutions, Western Canada Customer Experience Team
Email: customersolutionswest@bureauveritas.com
Phone# (604) 734 7276
==========
This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		AOK192	AOK192		
Sampling Date		2022/02/10 10:30	2022/02/10 10:30		
	UNITS	BH5	BH5 Lab-Dup	RDL	QC Batch
Total Metals by ICPMS					
Total Aluminum (Al)	ug/L	235 (1)	246	3.0	A501599
Total Antimony (Sb)	ug/L	0.024	0.030	0.020	A501599
Total Arsenic (As)	ug/L	0.098	0.108	0.020	A501599
Total Barium (Ba)	ug/L	29.5	30.3	0.050	A501599
Total Bismuth (Bi)	ug/L	<0.010	<0.010	0.010	A501599
Total Cadmium (Cd)	ug/L	0.0067	<0.0050	0.0050	A501599
Total Chromium (Cr)	ug/L	1.12	1.14	0.10	A501599
Total Cobalt (Co)	ug/L	0.581	0.583	0.010	A501599
Total Copper (Cu)	ug/L	1.52	1.50	0.10	A501599
Total Iron (Fe)	ug/L	491	490	5.0	A501599
Total Lead (Pb)	ug/L	0.354	0.353	0.020	A501599
Total Manganese (Mn)	ug/L	41.2	41.4	0.10	A501599
Total Molybdenum (Mo)	ug/L	0.277	0.281	0.050	A501599
Total Nickel (Ni)	ug/L	1.13	1.21	0.10	A501599
Total Phosphorus (P)	ug/L	17.2	16.6	5.0	A501599
Total Selenium (Se)	ug/L	0.217	0.209	0.040	A501599
Total Silver (Ag)	ug/L	<0.010	<0.010	0.010	A501599
Total Tin (Sn)	ug/L	<0.20	0.20	0.20	A501599
Total Vanadium (V)	ug/L	1.00	1.03	0.20	A501599
Total Zinc (Zn)	ug/L	2.1	2.1	1.0	A501599
Total Gold (Au)	ug/L	<0.10 (2)	<0.10	0.10	A501599
Total Platinum (Pt)	ug/L	<0.10	<0.10	0.10	A501599

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
(1) Matrix spike exceeds acceptance limits due to probable matrix interference.

(2) Matrix spike outside acceptance criteria due to digestion limitation.

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C208557
Report Date: 2022/02/18

BUREAU VERITAS
Client Project #: Campobello job# C236559
Sampler Initials: TM

TEST SUMMARY

Bureau Veritas ID: AOK192
Sample ID: BH5
Matrix: Water

Collected: 2022/02/10
Shipped:
Received: 2022/02/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Elements by ICPMS Digested LL (total)	ICP/CRCM	A501599	2022/02/16	2022/02/17	Sahar Omar Al-Abdalla

Bureau Veritas ID: AOK192 Dup
Sample ID: BH5
Matrix: Water

Collected: 2022/02/10
Shipped:
Received: 2022/02/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Elements by ICPMS Digested LL (total)	ICP/CRCM	A501599	2022/02/16	2022/02/17	Sahar Omar Al-Abdalla

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

GENERAL COMMENTS

Results relate only to the items tested.

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Bureau Veritas Job #: C208557
Report Date: 2022/02/18

QUALITY ASSURANCE REPORT

BUREAU VERITAS
Client Project #: Campobello job# C236559
Sampler Initials: TM

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
A501599	Total Aluminum (Al)	2022/02/17	122 (1)	80 - 120	104	80 - 120	<3.0	ug/L	4.7	20
A501599	Total Antimony (Sb)	2022/02/17	106	80 - 120	105	80 - 120	<0.020	ug/L	NC	20
A501599	Total Arsenic (As)	2022/02/17	107	80 - 120	103	80 - 120	<0.020	ug/L	9.8	20
A501599	Total Barium (Ba)	2022/02/17	104	80 - 120	102	80 - 120	<0.050	ug/L	2.5	20
A501599	Total Bismuth (Bi)	2022/02/17	99	80 - 120	103	80 - 120	<0.010	ug/L	NC	20
A501599	Total Cadmium (Cd)	2022/02/17	102	80 - 120	103	80 - 120	<0.0050	ug/L	NC	20
A501599	Total Chromium (Cr)	2022/02/17	102	80 - 120	104	80 - 120	<0.10	ug/L	1.6	20
A501599	Total Cobalt (Co)	2022/02/17	98	80 - 120	102	80 - 120	<0.010	ug/L	0.33	20
A501599	Total Copper (Cu)	2022/02/17	95	80 - 120	103	80 - 120	<0.10	ug/L	1.1	20
A501599	Total Gold (Au)	2022/02/17	53 (1)	80 - 120			<0.10	ug/L	NC	20
A501599	Total Iron (Fe)	2022/02/17	102	80 - 120	105	80 - 120	<5.0	ug/L	0.37	20
A501599	Total Lead (Pb)	2022/02/17	102	80 - 120	104	80 - 120	<0.020	ug/L	0.46	20
A501599	Total Manganese (Mn)	2022/02/17	100	80 - 120	104	80 - 120	<0.10	ug/L	0.50	20
A501599	Total Molybdenum (Mo)	2022/02/17	117	80 - 120	107	80 - 120	<0.050	ug/L	1.4	20
A501599	Total Nickel (Ni)	2022/02/17	97	80 - 120	103	80 - 120	<0.10	ug/L	6.7	20
A501599	Total Phosphorus (P)	2022/02/17	111	80 - 120	107	80 - 120	<5.0	ug/L	3.5	20
A501599	Total Platinum (Pt)	2022/02/17	102	80 - 120	103	80 - 120	<0.10	ug/L	NC	20
A501599	Total Selenium (Se)	2022/02/17	103	80 - 120	103	80 - 120	<0.040	ug/L	3.7	20
A501599	Total Silver (Ag)	2022/02/17	100	80 - 120	101	80 - 120	<0.010	ug/L	NC	20
A501599	Total Tin (Sn)	2022/02/17	104	80 - 120	105	80 - 120	<0.20	ug/L	1.3	20
A501599	Total Vanadium (V)	2022/02/17	106	80 - 120	105	80 - 120	<0.20	ug/L	3.2	20
A501599	Total Zinc (Zn)	2022/02/17	97	80 - 120	105	80 - 120	<1.0	ug/L	0.55	20

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

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

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

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

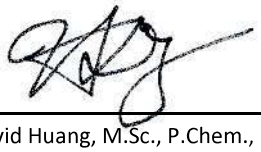
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

VALIDATION SIGNATURE PAGE

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



David Huang, M.Sc., P.Chem., QP, Scientific Services Manager

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

Bureau Veritas Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Sent to: **Bureau Veritas Burnaby**
4606 Canada Way
Burnaby, BC, V5G 1K5
Tel: (604) 734-7276

BUREAU VERITAS INTERLAB CHAIN OF CUSTODY RECORD

COC # C236559-MVNO-01-01

REPORT INFORMATION	
Company:	Bureau Veritas
Address:	6740 Campobello Road, Mississauga, Ontario, L5N 2L8
Contact Name:	Patricia Legette
Email:	Patricia.Legette@bureauveritas.com, Sub.Contractor@bvlabs.com
Phone:	(905) 817-5799
Bureau Veritas Project #:	C236559
Client Invoice To:	exp Services Inc (30554)
Client Report To:	exp Services Inc (30554)

Incl. on Report? Yes / No

#	SAMPLE ID	MATRIX	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	SAMPLER INITIALS	# CONT.	Elements by ICPMS Low Level (total)										ADDITIONAL SAMPLE INFORMATION
1	RVF908-BH5	GW	2022/02/10	10:30	TM	1	X										(P: 07)
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Job Barcode Label
Offsite Job
C236559

C208557_COC

SITE LOCATION:	REGULATORY CRITERIA	SPECIAL INSTRUCTIONS	REQUIRED EDDs	TURNAROUND TIME
800 YONGE ST	Barrie Storm Sewer Barrie Sanitary Sewer	Please inform Bureau Veritas immediately if you are not accredited for the requested test(s). **Please return a copy of this form with the report.** **Client Name: exp Services Inc**	National Excel (N001) OEC Excel (O036)	☐ Rush Required 2022/02/23 Date Required *Please inform us if rush charges will be incurred.*
SITE #:				
PROJECT #: GTR-21023592-A0				
PO/AFE, TASK ORDER/SERVICE ORDER, LINE ITEM: ENV-BRM				

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present	/					
Custody Seal Intact	/					
Cooling Media Present	/					

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present	/					
Custody Seal Intact	/					
Cooling Media Present	/					
				9	13	9

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present						
Custody Seal Intact						
Cooling Media Present						

RECEIVING LAB USE ONLY
Bureau Veritas Job #
C208557

RELINQUISHED BY: (SIGN & PRINT)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (SIGN & PRINT)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	Samples Labelled By:	Labels Verified By:
1. JOHN MATHEW	2022/02/11	10:33	1. SALLY SEY	2022/02/15	10:00	RMT	
2.			2.				

Sent to: **Bureau Veritas Burnaby**
4606 Canada Way
Burnaby, BC, V5G 1K5
Tel: (604) 734-7276

BUREAU VERITAS INTERLAB CHAIN OF CUSTODY RECORD

COC # C236559-MVNO-01-01

REPORT INFORMATION	
Company:	Bureau Veritas
Address:	6740 Campobello Road, Mississauga, Ontario, L5N 2L8
Contact Name:	Patricia Legette
Email:	Patricia.Legette@bureauveritas.com, Sub.Contractor@bvlabs.com
Phone:	(905) 817-5799
Bureau Veritas Project #:	C236559
Client Invoice To:	exp Services Inc (30554)
Client Report To:	exp Services Inc (30554)

Incl. on Report? Yes / No

#	SAMPLE ID	MATRIX	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	SAMPLER INITIALS	# CONT.	ANALYSIS REQUESTED: Elements by ICPMS Low Level (total)
1	RVF908-BH5	GW	2022/02/10	10:30	TM	1	X
2							
3							
4							
5							
6							
7							
8							
9							
10							

Job Barcode Label

Offsite Job

C236559

ADDITIONAL SAMPLE INFORMATION

(P: 07)

C208557_COC

SITE LOCATION:
800 YONGE ST

SITE #:

PROJECT #:
GTR-21023592-A0

PO/AFE, TASK ORDER/SERVICE ORDER, LINE ITEM:
ENV-BRM

REGULATORY CRITERIA
Barrie Storm Sewer
Barrie Sanitary Sewer

SPECIAL INSTRUCTIONS
Please inform Bureau Veritas immediately if you are not accredited for the requested test(s).
Please return a copy of this form with the report.
Client Name: exp Services Inc

REQUIRED EDDs
National Excel (N001)
OEC Excel (O036)

TURNAROUND TIME
☐ Rush Required
2022/02/23
Date Required
Please inform us if rush charges will be incurred.

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present	/					
Custody Seal Intact	/					
Cooling Media Present	/					

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present	/					
Custody Seal Intact	/					
Cooling Media Present	/					
				9	13	9

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present						
Custody Seal Intact						
Cooling Media Present						

RECEIVING LAB USE ONLY
Bureau Veritas Job #
C208557

RELINQUISHED BY: (SIGN & PRINT)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (SIGN & PRINT)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	Samples Labelled By:	Labels Verified By:
1. ROBIN MATTHEW	2022/02/11	10:33	1. SALLY SEY	2022/02/15	10:00	RMT	AT
2.			2.				

Your Project #: Campobello job# C236559
Your C.O.C. #: N/ A

Attention: Patricia Legette

Bureau Veritas Laboratories
MISSISSAUGA CAMPO
6740 Campobello Rd
MISSISSAUGA, ON
Canada L5N 2L8

Report Date: 2022/03/01
Report #: R2737521
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C205584
Received: 2022/02/10, 19:56

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Extractable Elements by ICP-MS	1	2022/02/28	2022/02/28	STL SOP-00071	MA.200–Mét. 1.2 R5 m

Remarks:

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

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

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Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
Note: RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Note: All parameters included in the present certificate are accredited by the MELCC unless stated otherwise.

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

Your Project #: Campobello job# C236559
Your C.O.C. #: N/ A

Attention: Patricia Legette

Bureau Veritas Laboratories
MISSISSAUGA CAMPO
6740 Campobello Rd
MISSISSAUGA, ON
Canada L5N 2L8

Report Date: 2022/03/01
Report #: R2737521
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C205584
Received: 2022/02/10, 19:56

Encryption Key

Laboratoires Bureau Veritas
01 Mar 2022 14:38:54

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ramona Dascal, Project Manager
Email: Ramona-Rodica.Dascal@bureauveritas.com
Phone# (514)448-9001 Ext:7066250
==========
This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

TOTAL EXTRACTABLE METALS (WATER)

Bureau Veritas ID		KD0996		
Sampling Date		2022/02/10 10:30		
COC Number		N/ A		
	Units	**BH5**	**RDL**	**QC Batch**
METALS ICP-MS				
Rhodium (Rh) †	ug/L	<0.50	0.50	2273992

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
† Parameter is not accreditable

889 Montée de Liesse, Ville St-Laurent, Québec, Canada H4T 1P5 Tel: (514) 448-9001 Fax: (514) 448-9199 Ligne sans frais : 1-877-462-9926

GENERAL COMMENTS

Results relate only to the items tested.

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Bureau Veritas Job #: C205584
Report Date: 2022/03/01

Bureau Veritas
Client Project #: Campobello job# C236559
Sampler Initials: TM

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	Units	QC Limits
2273992	AT7	Spiked Blank	Rhodium (Rh)	2022/02/28		85	%	70 - 130
2273992	AT7	Method Blank	Rhodium (Rh)	2022/02/28	<0.50		ug/L	

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

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

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VALIDATION SIGNATURE PAGE

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

Alex Thibert
Membre OCQ #2020-05

Alex Thibert, B.Sc., Chemist, Montréal, Analyst II, Chemist in Training

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

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Sent to: **Bureau Veritas Montreal**
889 Montée de Liesse
Ville St-Laurent, QC, H4T 1P5
Tel: (514) 448-9001

BUREAU VERITAS INTERLAB CHAIN OF CUSTODY RECORD

COC # C236559-MMTO-01-01

REPORT INFORMATION	
Company:	Bureau Veritas
Address:	6740 Campobello Road, Mississauga, Ontario, L5N 2L8
Contact Name:	Patricia Legette
Email:	Patricia.Legette@bureauveritas.com, Sub.Contractor@bvlabs.com
Phone:	(905) 817-5799
Bureau Veritas Project #:	C236559
Client Invoice To:	exp Services Inc (30554)
Client Report To:	exp Services Inc (30554)

Incl. on Report? Yes / No

#	SAMPLE ID	MATRIX	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	SAMPLER INITIALS	# CONT.	Total Extractable Elements by ICP-MS	ADDITIONAL SAMPLE INFORMATION
1	RVF908-BH5	GW	2022/02/10	10:30	TM	1	X	(P: 06)
2								
3								
4								
5								
6								
7								
8								
9								
10								

10-Feb-22 19:56
Ramona Dascal
C205584

C205584_COC

ANALYSIS REQUESTED

Job Barcode Label
Offsite Job
C236559

SITE LOCATION:	REGULATORY CRITERIA	SPECIAL INSTRUCTIONS	REQUIRED EDDs	TURNAROUND TIME
800 YONGE ST	Barrie Storm Sewer Barrie Sanitary Sewer	Please inform Bureau Veritas immediately if you are not accredited for the requested test(s). **Please return a copy of this form with the report.** **Client Name: exp Services Inc**	National Excel (N001) OEC Excel (O036)	☐ Rush Required **2022/03/02** Date Required *Please inform us if rush charges will be incurred.*
SITE #:				
PROJECT #: GTR-21023592-A0				
PO/AFE, TASK ORDER/SERVICE ORDER, LINE ITEM: ENV-BRM				

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present	✓			3	3	3
Custody Seal Intact	✓					
Cooling Media Present	✓					

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present						
Custody Seal Intact						
Cooling Media Present						

COOLER ID:	YES	NO	Temp: (°C)	1	2	3
Custody Seal Present						
Custody Seal Intact						
Cooling Media Present						

RECEIVING LAB USE ONLY
Bureau Veritas Job #
C205584

RELINQUISHED BY: (SIGN & PRINT)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (SIGN & PRINT)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	Samples Labelled By:	Labels Verified By:
1. ROHIN MATHEW	2022/02/14	12:32	1. Sandi Cook	2022/02/15	10:10	RMT	
2.			2.				

courier
UT736.

Your P.O. #: ENV-BRM
Your Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your C.O.C. #: 904770-08-01

Attention: Francois Chartier

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

Report Date: 2023/03/09
Report #: R7539602
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C360581
Received: 2023/03/02, 19:05

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Chloride by Automated Colourimetry	1	N/A	2023/03/08	CAM SOP-00463	SM 23 4500-Cl E m
Fluoride	1	2023/03/05	2023/03/06	CAM SOP-00449	SM 23 4500-F C m
Dissolved Metals by ICPMS	1	N/A	2023/03/06	CAM SOP-00447	EPA 6020B m
pH	1	2023/03/05	2023/03/06	CAM SOP-00413	SM 4500H+ B m
Sulphate by Automated Turbidimetry	1	N/A	2023/03/08	CAM SOP-00464	SM 23 4500-SO42- E m

Remarks:

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

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

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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

Your P.O. #: ENV-BRM
Your Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your C.O.C. #: 904770-08-01

Attention: Francois Chartier

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

Report Date: 2023/03/09
Report #: R7539602
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C360581
Received: 2023/03/02, 19:05

Encryption Key

Bureau Veritas
09 Mar 2023 11:56:59

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

==========

This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

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Bureau Veritas Job #: C360581
Report Date: 2023/03/09

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID				VEQ571		
Sampling Date				2023/03/01 12:00		
COC Number				904770-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch
Inorganics						
Fluoride (F-)	mg/L	10	-	ND	0.10	8535371
pH	pH	6.0:9.5	6.0:9.5	7.88		8535381
Dissolved Sulphate (SO4)	mg/L	1500	-	35	1.0	8536042
Dissolved Chloride (Cl-)	mg/L	1500	-	4.6	1.0	8536032

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C360581
Report Date: 2023/03/09

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				VEQ571		
Sampling Date				2023/03/01 12:00		
COC Number				904770-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch
Metals						
Dissolved Aluminum (Al)	ug/L	50000	-	ND	4.9	8535814
Dissolved Antimony (Sb)	ug/L	5000	-	ND	0.50	8535814
Dissolved Arsenic (As)	ug/L	1000	-	ND	1.0	8535814
Dissolved Barium (Ba)	ug/L	5000	-	160	2.0	8535814
Dissolved Beryllium (Be)	ug/L	-	-	ND	0.40	8535814
Dissolved Bismuth (Bi)	ug/L	5000	-	ND	1.0	8535814
Dissolved Boron (B)	ug/L	-	-	ND	10	8535814
Dissolved Cadmium (Cd)	ug/L	700	1	ND	0.090	8535814
Dissolved Calcium (Ca)	ug/L	-	-	91000	200	8535814
Dissolved Chromium (Cr)	ug/L	2000	80	ND	5.0	8535814
Dissolved Cobalt (Co)	ug/L	5000	-	ND	0.50	8535814
Dissolved Copper (Cu)	ug/L	2000	10	1.1	0.90	8535814
Dissolved Iron (Fe)	ug/L	50000	-	ND	100	8535814
Dissolved Lead (Pb)	ug/L	700	50	ND	0.50	8535814
Dissolved Lithium (Li)	ug/L	-	-	ND	5.0	8535814
Dissolved Magnesium (Mg)	ug/L	-	-	12000	50	8535814
Dissolved Manganese (Mn)	ug/L	5000	-	40	2.0	8535814
Dissolved Molybdenum (Mo	ug/L	5000	-	0.79	0.50	8535814
Dissolved Nickel (Ni)	ug/L	2000	50	ND	1.0	8535814
Dissolved Phosphorus (P)	ug/L	10000	-	ND	100	8535814
Dissolved Potassium (K)	ug/L	-	-	2100	200	8535814
Dissolved Selenium (Se)	ug/L	1000	-	ND	2.0	8535814
Dissolved Silicon (Si)	ug/L	-	-	6200	50	8535814
Dissolved Silver (Ag)	ug/L	400	-	ND	0.090	8535814
Dissolved Sodium (Na)	ug/L	-	-	3700	100	8535814
Dissolved Strontium (Sr)	ug/L	-	-	160	1.0	8535814

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C360581
Report Date: 2023/03/09

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				VEQ571		
Sampling Date				2023/03/01 12:00		
COC Number				904770-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch
Dissolved Tellurium (Te)	ug/L	-	-	ND	1.0	8535814
Dissolved Thallium (Tl)	ug/L	-	-	ND	0.050	8535814
Dissolved Tin (Sn)	ug/L	5000	-	2.8	1.0	8535814
Dissolved Titanium (Ti)	ug/L	-	-	ND	5.0	8535814
Dissolved Tungsten (W)	ug/L	-	-	ND	1.0	8535814
Dissolved Uranium (U)	ug/L	-	-	2.4	0.10	8535814
Dissolved Vanadium (V)	ug/L	5000	-	ND	0.50	8535814
Dissolved Zinc (Zn)	ug/L	2000	40	ND	5.0	8535814
Dissolved Zirconium (Zr)	ug/L	-	-	ND	1.0	8535814

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C360581
Report Date: 2023/03/09

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

TEST SUMMARY

Bureau Veritas ID: VEQ571
Sample ID: PW1
Matrix: Water

Collected: 2023/03/01
Shipped:
Received: 2023/03/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	8536032	N/A	2023/03/08	Massarat Jan
Fluoride	ISE	8535371	2023/03/05	2023/03/06	Kien Tran
Dissolved Metals by ICPMS	ICP/MS	8535814	N/A	2023/03/06	Arefa Dabhad
pH	AT	8535381	2023/03/05	2023/03/06	Kien Tran
Sulphate by Automated Turbidimetry	KONE	8536042	N/A	2023/03/08	Massarat Jan

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Bureau Veritas Job #: C360581
Report Date: 2023/03/09

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

GENERAL COMMENTS

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

Package 1	6.0°C

Results relate only to the items tested.

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Bureau Veritas Job #: C360581
Report Date: 2023/03/09

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8535371	Fluoride (F-)	2023/03/06	98	80 - 120	101	80 - 120	ND, RDL=0.10	mg/L	1.9	20
8535381	pH	2023/03/06			102	98 - 103			0.21	N/A
8535814	Dissolved Aluminum (Al)	2023/03/06	107	80 - 120	99	80 - 120	ND, RDL=4.9	ug/L	4.4	20
8535814	Dissolved Antimony (Sb)	2023/03/06	108	80 - 120	103	80 - 120	ND, RDL=0.50	ug/L	NC	20
8535814	Dissolved Arsenic (As)	2023/03/06	106	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L	NC	20
8535814	Dissolved Barium (Ba)	2023/03/06	107	80 - 120	102	80 - 120	ND, RDL=2.0	ug/L	4.0	20
8535814	Dissolved Beryllium (Be)	2023/03/06	103	80 - 120	95	80 - 120	ND, RDL=0.40	ug/L	NC	20
8535814	Dissolved Bismuth (Bi)	2023/03/06	95	80 - 120	97	80 - 120	ND, RDL=1.0	ug/L	NC	20
8535814	Dissolved Boron (B)	2023/03/06	100	80 - 120	93	80 - 120	ND, RDL=10	ug/L	2.5	20
8535814	Dissolved Cadmium (Cd)	2023/03/06	103	80 - 120	100	80 - 120	ND, RDL=0.090	ug/L	NC	20
8535814	Dissolved Calcium (Ca)	2023/03/06	NC	80 - 120	99	80 - 120	ND, RDL=200	ug/L	1.8	20
8535814	Dissolved Chromium (Cr)	2023/03/06	105	80 - 120	96	80 - 120	ND, RDL=5.0	ug/L	NC	20
8535814	Dissolved Cobalt (Co)	2023/03/06	107	80 - 120	96	80 - 120	ND, RDL=0.50	ug/L	NC	20
8535814	Dissolved Copper (Cu)	2023/03/06	109	80 - 120	100	80 - 120	ND, RDL=0.90	ug/L	NC	20
8535814	Dissolved Iron (Fe)	2023/03/06	106	80 - 120	96	80 - 120	ND, RDL=100	ug/L	NC	20
8535814	Dissolved Lead (Pb)	2023/03/06	100	80 - 120	101	80 - 120	ND, RDL=0.50	ug/L	NC	20
8535814	Dissolved Lithium (Li)	2023/03/06	112	80 - 120	109	80 - 120	ND, RDL=5.0	ug/L	NC	20
8535814	Dissolved Magnesium (Mg)	2023/03/06	105	80 - 120	94	80 - 120	ND, RDL=50	ug/L	3.3	20
8535814	Dissolved Manganese (Mn)	2023/03/06	104	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L	0.93	20
8535814	Dissolved Molybdenum (Mo)	2023/03/06	115	80 - 120	104	80 - 120	ND, RDL=0.50	ug/L	0.22	20
8535814	Dissolved Nickel (Ni)	2023/03/06	99	80 - 120	92	80 - 120	ND, RDL=1.0	ug/L	1.5	20
8535814	Dissolved Phosphorus (P)	2023/03/06	117	80 - 120	110	80 - 120	ND, RDL=100	ug/L	NC	20
8535814	Dissolved Potassium (K)	2023/03/06	NC	80 - 120	101	80 - 120	ND, RDL=200	ug/L	1.1	20
8535814	Dissolved Selenium (Se)	2023/03/06	102	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L	NC	20
8535814	Dissolved Silicon (Si)	2023/03/06	112	80 - 120	101	80 - 120	ND, RDL=50	ug/L	2.4	20
8535814	Dissolved Silver (Ag)	2023/03/06	97	80 - 120	97	80 - 120	ND, RDL=0.090	ug/L	NC	20
8535814	Dissolved Sodium (Na)	2023/03/06	NC	80 - 120	96	80 - 120	ND, RDL=100	ug/L	3.0	20
8535814	Dissolved Strontium (Sr)	2023/03/06	NC	80 - 120	97	80 - 120	ND, RDL=1.0	ug/L	0.29	20
8535814	Dissolved Tellurium (Te)	2023/03/06	103	80 - 120	107	80 - 120	ND, RDL=1.0	ug/L	NC	20
8535814	Dissolved Thallium (Tl)	2023/03/06	99	80 - 120	104	80 - 120	ND, RDL=0.050	ug/L	NC	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
8535814	Dissolved Tin (Sn)	2023/03/06	109	80 - 120	105	80 - 120	ND, RDL=1.0	ug/L	NC	20
8535814	Dissolved Titanium (Ti)	2023/03/06	107	80 - 120	101	80 - 120	ND, RDL=5.0	ug/L	NC	20
8535814	Dissolved Tungsten (W)	2023/03/06	109	80 - 120	105	80 - 120	ND, RDL=1.0	ug/L	NC	20
8535814	Dissolved Uranium (U)	2023/03/06	105	80 - 120	98	80 - 120	ND, RDL=0.10	ug/L	NC	20
8535814	Dissolved Vanadium (V)	2023/03/06	105	80 - 120	96	80 - 120	ND, RDL=0.50	ug/L	NC	20
8535814	Dissolved Zinc (Zn)	2023/03/06	101	80 - 120	98	80 - 120	ND, RDL=5.0	ug/L	NC	20
8535814	Dissolved Zirconium (Zr)	2023/03/06	110	80 - 120	102	80 - 120	ND, RDL=1.0	ug/L	NC	20
8536032	Dissolved Chloride (Cl-)	2023/03/08	NC	80 - 120	100	80 - 120	ND, RDL=1.0	mg/L	0.94	20
8536042	Dissolved Sulphate (SO4)	2023/03/08	NC	75 - 125	98	80 - 120	ND, RDL=1.0	mg/L	0.069	20

N/A = Not Applicable

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

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

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

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

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

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

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Bureau Veritas Job #: C360581
Report Date: 2023/03/09

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

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

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CHAIN OF

Page 1 of 1

02-Mar-23 19:05
Patricia Legette
C360581
IDK ENV-1207
C#904770-08-01
Patricia Legette

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#30554 exp Services Inc	Company Name:	EXP	Quotation #:	C20374
Attention:	Accounts Payable	Attention:	Francois Chartier	P.O. #:	ENV-BRM STREAM 2
Address:	1595 Clark Blvd	Address:	Jeffrey.leon@exp.com	Project:	GTR-21023592-A0
	Brampton ON L6T 4V1			Project Name:	800 YONGE ST
Tel:	(905) 793-9800 Fax: (905) 793-0641	Tel:	(905) 793-9800 Ext: 2523 Fax:	Site #:	BARRIE
Email:	AP@exp.com; Karen.Burke@exp.com	Email:	Francois.Chartier@exp.com	Sampled By:	EDWIN CHESSELL

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

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☐ Res/Park ☐ Medium/Fine	☐ CCME ☒ Sanitary Sewer Bylaw	
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ Reg 558 ☒ Storm Sewer Bylaw	
☐ Table 3 ☐ Agri/Other ☐ For RSC	☐ MISA Municipality BARRIE	
☐ Table ___	☐ PWQO ☐ Reg 406 Table ___	
	☐ Other ___	

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): (Metals) / Hg / Cr VI	~~Toronto Sanitary&Storm Sewer (100-2016)~~	Metals dissolved	General Chemistry								# of Bottles	Comments
1		PW 1	23/03/01	12PM	GW	Y		✓	✓								2	
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

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

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

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

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Jeffrey Leon	23/03/02	7:02PM	JAGDEEP KAUR	2023/03/02	19:05	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	5/7/6	Present	✓	
		Intact	✓	

ICE

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

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

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

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

White: Bureau Veritas Yellow: Client

Bureau Veritas Job #: C360581
Report Date: 2023/03/09

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

Exceedance Summary Table – Barrie Sanitary Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						
The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.						

Exceedance Summary Table – Barrie Storm Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						
The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.						

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Your P.O. #: ENV-BRM
Your Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your C.O.C. #: 909961-08-01

Attention: Francois Chartier

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

Report Date: 2023/03/27
Report #: R7563383
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C360587
Received: 2023/03/02, 19:05

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Biochemical Oxygen Demand (BOD)	1	2023/03/03	2023/03/08	CAM SOP-00427	SM 23 5210B m
Chloride by Automated Colourimetry	1	N/A	2023/03/08	CAM SOP-00463	SM 23 4500-Cl E m
Chemical Oxygen Demand	1	N/A	2023/03/06	CAM SOP-00416	SM 23 5220 D m
Total Cyanide	1	2023/03/06	2023/03/06	CAM SOP-00457	OMOE E3015 5 m
Fluoride	1	2023/03/07	2023/03/07	CAM SOP-00449	SM 23 4500-F C m
Mercury in Water by CVAA	1	2023/03/06	2023/03/06	CAM SOP-00453	EPA 7470A m
Lab Filtered Metals by ICPMS	1	2023/03/06	2023/03/07	CAM SOP-00447	EPA 6020B m
Total Metals Analysis by ICPMS	1	2023/03/03	2023/03/03	CAM SOP-00447	EPA 6020B m
Total Extractable Lanthanides-soils (1, 3)	1	2023/03/20	2023/03/24	STL SOP-00071	MA.200–Mét. 1.2 R5 m
Elements by ICPMS Low Level (total) (2)	1	2023/03/08	2023/03/09	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
Animal and Vegetable Oil and Grease	1	N/A	2023/03/06	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2023/03/06	2023/03/06	CAM SOP-00326	EPA1664B m,SM5520B m
OC Pesticides (Selected) & PCB (4)	1	2023/03/06	2023/03/07	CAM SOP-00307	EPA 8081B/ 8082A
PAH Compounds in Water by GC/MS (SIM)	1	2023/03/07	2023/03/08	CAM SOP-00318	EPA 8270E
pH	1	2023/03/07	2023/03/07	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2023/03/07	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Turbidimetry	1	N/A	2023/03/08	CAM SOP-00464	SM 23 4500-SO42- E m
Sulphide	1	N/A	2023/03/07	CAM SOP-00455	SM 23 4500-S G m
Total Kjeldahl Nitrogen in Water	1	2023/03/06	2023/03/09	CAM SOP-00938	OMOE E3516 m
Total PAHs: Barrie/Mississauga Sewer Use (5)	1	N/A	2023/03/08	CAM SOP - 00301	
Mineral/Synthetic O & G (TPH Heavy Oil) (6)	1	2023/03/06	2023/03/06	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2023/03/07	2023/03/08	CAM SOP-00428	SM 23 2540D m
Volatile Organic Compounds in Water	1	N/A	2023/03/05	CAM SOP-00228	EPA 8260D

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are

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Your P.O. #: ENV-BRM
Your Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your C.O.C. #: 909961-08-01

Attention: Francois Chartier

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

Report Date: 2023/03/27
Report #: R7563383
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C360587
Received: 2023/03/02, 19:05

reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Montreal., 889 Montée de Liesse , Ville St-Laurent, QC, H4T 1P5
(2) This test was performed by Bureau Veritas Burnaby, 4606 Canada Way , Burnaby, BC, V5G 1K5
(3) Non-accredited test method
(4) Chlordane (Total) = Alpha Chlordane + Gamma Chlordane
(5) Total PAHs include only those PAHs specified in the sewer use by-by-law.
(6) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Bureau Veritas
27 Mar 2023 16:37:55

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

==========

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Bureau Veritas Job #: C360587
Report Date: 2023/03/27

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

BARRIE SAN. SEWER INCL. RH (2021-002)

Bureau Veritas ID				VEQ578			VEQ578		
Sampling Date				2023/03/01 12:00			2023/03/01 12:00		
COC Number				909961-08-01			909961-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch	PW1 Lab-Dup	RDL	QC Batch
Calculated Parameters									
Total Animal/Vegetable Oil and Greas	mg/L	150	-	ND	0.50	8531099			
Inorganics									
Total Chemical Oxygen Demand (COD)	mg/L	600	-	ND	4.0	8537059	ND	4.0	8537059
Fluoride (F-)	mg/L	10	-	ND	0.10	8538476			
Total Kjeldahl Nitrogen (TKN)	mg/L	100	-	1.9	0.10	8536630			
Phenols-4AAP	mg/L	0.1	-	ND	0.0010	8539234			
Dissolved Sulphate (SO4)	mg/L	1500	-	28	1.0	8538226			
Sulphide	mg/L	1	-	ND	0.020	8536511			
Total Cyanide (CN)	mg/L	1.2	-	ND	0.0050	8535572			
Dissolved Chloride (Cl-)	mg/L	1500	-	2.7	1.0	8538225			
Metals									
Total Aluminum (Al)	ug/L	50000	-	82.2	3.0	8547243			
Total Antimony (Sb)	ug/L	5000	-	0.027	0.020	8547243			
Total Arsenic (As)	ug/L	1000	-	0.156	0.020	8547243			
Total Barium (Ba)	ug/L	5000	-	145	0.050	8547243			
Total Bismuth (Bi)	ug/L	5000	-	ND	0.010	8547243			
Total Cadmium (Cd)	ug/L	700	1	ND	0.0050	8547243			
Total Chromium (Cr)	ug/L	2000	80	0.63	0.10	8547243			
Total Cobalt (Co)	ug/L	5000	-	0.129	0.010	8547243			
Total Copper (Cu)	ug/L	2000	10	0.37	0.10	8547243			
Total Iron (Fe)	ug/L	50000	-	490	5.0	8547243			
Total Lead (Pb)	ug/L	700	50	0.302	0.020	8547243			
Total Manganese (Mn)	ug/L	5000	-	41.5	0.10	8547243			
Total Molybdenum (Mo)	ug/L	5000	-	0.763	0.050	8547243			
Total Nickel (Ni)	ug/L	2000	50	0.83	0.10	8547243			
Total Phosphorus (P)	ug/L	10000	-	23.7	5.0	8547243			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C360587
Report Date: 2023/03/27

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

BARRIE SAN. SEWER INCL. RH (2021-002)

Bureau Veritas ID				VEQ578			VEQ578		
Sampling Date				2023/03/01 12:00			2023/03/01 12:00		
COC Number				909961-08-01			909961-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch	PW1 Lab-Dup	RDL	QC Batch
Total Selenium (Se)	ug/L	1000	-	ND	0.040	8547243			
Total Silver (Ag)	ug/L	400	-	0.064	0.010	8547243			
Total Tin (Sn)	ug/L	5000	-	0.28	0.20	8547243			
Total Vanadium (V)	ug/L	5000	-	0.37	0.20	8547243			
Total Zinc (Zn)	ug/L	2000	40	2.0	1.0	8547243			
Total Rhodium (Rh)	ug/L	5000	-	ND	0.50	8575482			
Total Gold (Au)	ug/L	5000	-	ND	0.10	8547243			
Total Platinum (Pt)	ug/L	5000	-	ND	0.10	8547243			
Petroleum Hydrocarbons									
Total Oil & Grease	mg/L	-	-	ND	0.50	8536246			
Total Oil & Grease Mineral/Synthetic	mg/L	15	-	ND	0.50	8536253			
Metals									
Mercury (Hg)	mg/L	0.01	-	ND	0.00010	8535637			
Calculated Parameters									
Total PAHs	ug/L	5	-	ND	0.20	8532272			
Polyaromatic Hydrocarbons									
Acenaphthene	ug/L	-	-	ND	0.050	8538370			
Acenaphthylene	ug/L	-	-	ND	0.050	8538370			
Anthracene	ug/L	-	-	ND	0.050	8538370			
Benzo(a)anthracene	ug/L	-	-	ND	0.050	8538370			
Benzo(a)pyrene	ug/L	-	-	ND	0.0090	8538370			
Benzo(b/j)fluoranthene	ug/L	-	-	ND	0.050	8538370			
Benzo(g,h,i)perylene	ug/L	-	-	ND	0.050	8538370			
Benzo(k)fluoranthene	ug/L	-	-	ND	0.050	8538370			
Chrysene	ug/L	-	-	ND	0.050	8538370			
Dibenzo(a,h)anthracene	ug/L	-	-	ND	0.050	8538370			
Fluoranthene	ug/L	-	-	ND	0.050	8538370			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C360587
Report Date: 2023/03/27

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

BARRIE SAN. SEWER INCL. RH (2021-002)

Bureau Veritas ID				VEQ578			VEQ578		
Sampling Date				2023/03/01 12:00			2023/03/01 12:00		
COC Number				909961-08-01			909961-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch	PW1 Lab-Dup	RDL	QC Batch
Fluorene	ug/L	-	-	ND	0.050	8538370			
Indeno(1,2,3-cd)pyrene	ug/L	-	-	ND	0.050	8538370			
1-Methylnaphthalene	ug/L	-	-	ND	0.050	8538370			
2-Methylnaphthalene	ug/L	-	-	ND	0.050	8538370			
Naphthalene	ug/L	-	-	ND	0.050	8538370			
Phenanthrene	ug/L	-	-	ND	0.030	8538370			
Pyrene	ug/L	-	-	ND	0.050	8538370			
Volatile Organics									
Benzene	ug/L	10	-	0.50	0.40	8533587			
1,2-Dichlorobenzene	ug/L	50	-	ND	0.80	8533587			
1,4-Dichlorobenzene	ug/L	80	-	ND	0.80	8533587			
Ethylbenzene	ug/L	60	-	ND	0.40	8533587			
Methylene Chloride(Dichloromethane	ug/L	90	-	ND	4.0	8533587			
1,1,2,2-Tetrachloroethane	ug/L	60	-	ND	0.80	8533587			
Tetrachloroethylene	ug/L	60	-	ND	0.40	8533587			
Toluene	ug/L	20	-	0.58	0.40	8533587			
Trichloroethylene	ug/L	50	-	0.52	0.40	8533587			
p+m-Xylene	ug/L	-	-	ND	0.40	8533587			
o-Xylene	ug/L	-	-	ND	0.40	8533587			
Total Xylenes	ug/L	300	-	ND	0.40	8533587			
Pesticides & Herbicides									
Hexachlorobenzene	ug/L	0.1	-	ND	0.005	8535649			
Surrogate Recovery (%)									
2,4,5,6-Tetrachloro-m-xylene	%	-	-	63		8535649			
Decachlorobiphenyl	%	-	-	93		8535649			
D10-Anthracene	%	-	-	108		8538370			
D14-Terphenyl (FS)	%	-	-	102		8538370			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C360587
Report Date: 2023/03/27

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

BARRIE SAN. SEWER INCL. RH (2021-002)

Bureau Veritas ID				VEQ578			VEQ578		
Sampling Date				2023/03/01 12:00			2023/03/01 12:00		
COC Number				909961-08-01			909961-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch	PW1 Lab-Dup	RDL	QC Batch
D8-Acenaphthylene	%	-	-	89		8538370			
4-Bromofluorobenzene	%	-	-	90		8533587			
D4-1,2-Dichloroethane	%	-	-	115		8533587			
D8-Toluene	%	-	-	95		8533587			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002

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Bureau Veritas Job #: C360587
Report Date: 2023/03/27

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

BARRIE STORM SEWER BYLAW (2021-002)

Bureau Veritas ID				VEQ578			VEQ578		
Sampling Date				2023/03/01 12:00			2023/03/01 12:00		
COC Number				909961-08-01			909961-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch	PW1 Lab-Dup	RDL	QC Batch
Inorganics									
Total BOD	mg/L	300	15	ND	2	8532376	ND	2	8532376
pH	pH	6.0:9.5	6.0:9.5	8.07		8538482			
Total Suspended Solids	mg/L	350	15	10	10	8536912			
Metals									
Total Cadmium (Cd)	ug/L	700	1	ND	0.090	8533770			
Total Chromium (Cr)	ug/L	2000	80	ND	5.0	8533770			
Total Copper (Cu)	ug/L	2000	10	ND	0.90	8533770			
Total Lead (Pb)	ug/L	700	50	ND	0.50	8533770			
Total Nickel (Ni)	ug/L	2000	50	ND	1.0	8533770			
Total Zinc (Zn)	ug/L	2000	40	ND	5.0	8533770			

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C360587
Report Date: 2023/03/27

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				VEQ578		
Sampling Date				2023/03/01 12:00		
COC Number				909961-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch
Metals						
Dissolved Aluminum (Al)	ug/L	50000	-	ND	4.9	8536862
Dissolved Antimony (Sb)	ug/L	5000	-	ND	0.50	8536862
Dissolved Arsenic (As)	ug/L	1000	-	ND	1.0	8536862
Dissolved Barium (Ba)	ug/L	5000	-	150	2.0	8536862
Dissolved Beryllium (Be)	ug/L	-	-	ND	0.40	8536862
Dissolved Bismuth (Bi)	ug/L	5000	-	ND	1.0	8536862
Dissolved Boron (B)	ug/L	-	-	ND	10	8536862
Dissolved Cadmium (Cd)	ug/L	700	1	ND	0.090	8536862
Dissolved Calcium (Ca)	ug/L	-	-	88000	200	8536862
Dissolved Chromium (Cr)	ug/L	2000	80	ND	5.0	8536862
Dissolved Cobalt (Co)	ug/L	5000	-	ND	0.50	8536862
Dissolved Copper (Cu)	ug/L	2000	10	ND	0.90	8536862
Dissolved Iron (Fe)	ug/L	50000	-	ND	100	8536862
Dissolved Lead (Pb)	ug/L	700	50	ND	0.50	8536862
Dissolved Lithium (Li)	ug/L	-	-	ND	5.0	8536862
Dissolved Magnesium (Mg)	ug/L	-	-	12000	50	8536862
Dissolved Manganese (Mn)	ug/L	5000	-	39	2.0	8536862
Dissolved Molybdenum (Mo	ug/L	5000	-	0.81	0.50	8536862
Dissolved Nickel (Ni)	ug/L	2000	50	ND	1.0	8536862
Dissolved Phosphorus (P)	ug/L	10000	-	ND	100	8536862
Dissolved Potassium (K)	ug/L	-	-	2000	200	8536862
Dissolved Selenium (Se)	ug/L	1000	-	ND	2.0	8536862
Dissolved Silicon (Si)	ug/L	-	-	5800	50	8536862
Dissolved Silver (Ag)	ug/L	400	-	ND	0.090	8536862
Dissolved Sodium (Na)	ug/L	-	-	3400	100	8536862
Dissolved Strontium (Sr)	ug/L	-	-	160	1.0	8536862

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID				VEQ578		
Sampling Date				2023/03/01 12:00		
COC Number				909961-08-01		
	UNITS	Criteria	Criteria-2	PW1	RDL	QC Batch
Dissolved Tellurium (Te)	ug/L	-	-	ND	1.0	8536862
Dissolved Thallium (Tl)	ug/L	-	-	ND	0.050	8536862
Dissolved Tin (Sn)	ug/L	5000	-	ND	1.0	8536862
Dissolved Titanium (Ti)	ug/L	-	-	ND	5.0	8536862
Dissolved Tungsten (W)	ug/L	-	-	ND	1.0	8536862
Dissolved Uranium (U)	ug/L	-	-	2.5	0.10	8536862
Dissolved Vanadium (V)	ug/L	5000	-	ND	0.50	8536862
Dissolved Zinc (Zn)	ug/L	2000	40	ND	5.0	8536862
Dissolved Zirconium (Zr)	ug/L	-	-	ND	1.0	8536862

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

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: The City of Barrie Discharges to Sanitary Sewers By Law 2021-002
Criteria-2: The City of Barrie Discharges to Storm Sewers By Law 2021-002
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas Job #: C360587
Report Date: 2023/03/27

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

TEST SUMMARY

Bureau Veritas ID: VEQ578
Sample ID: PW1
Matrix: Water

Collected: 2023/03/01
Shipped:
Received: 2023/03/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Biochemical Oxygen Demand (BOD)	DO	8532376	2023/03/03	2023/03/08	Gurjot Kaur
Chloride by Automated Colourimetry	KONE	8538225	N/A	2023/03/08	Massarat Jan
Chemical Oxygen Demand	SPEC	8537059	N/A	2023/03/06	Nimarta Singh
Total Cyanide	SKAL/CN	8535572	2023/03/06	2023/03/06	Kruti Jitesh Patel
Fluoride	ISE	8538476	2023/03/07	2023/03/07	Kien Tran
Mercury in Water by CVAA	CV/AA	8535637	2023/03/06	2023/03/06	Japneet Gill
Lab Filtered Metals by ICPMS	ICP/MS	8536862	2023/03/06	2023/03/07	Nan Raykha
Total Metals Analysis by ICPMS	ICP/MS	8533770	2023/03/03	2023/03/03	Azita Fazaeli
Total Extractable Lanthanides-soils	ICP/MSMS	8575482	2023/03/20	2023/03/24	Darya Mitrofanova
Elements by ICPMS Low Level (total)	ICP/MS	8547243	2023/03/08	2023/03/09	Michelle Young
Animal and Vegetable Oil and Grease	BAL	8531099	N/A	2023/03/06	Automated Statchk
Total Oil and Grease	BAL	8536246	2023/03/06	2023/03/06	Rutvik Patel
OC Pesticides (Selected) & PCB	GC/ECD	8535649	2023/03/06	2023/03/07	Joy Zhang
PAH Compounds in Water by GC/MS (SIM)	GC/MS	8538370	2023/03/07	2023/03/08	Jonghan Yoon
pH	AT	8538482	2023/03/07	2023/03/07	Kien Tran
Phenols (4AAP)	TECH/PHEN	8539234	N/A	2023/03/07	Mandeep Kaur
Sulphate by Automated Turbidimetry	KONE	8538226	N/A	2023/03/08	Massarat Jan
Sulphide	ISE/S	8536511	N/A	2023/03/07	Taslima Aktar
Total Kjeldahl Nitrogen in Water	SKAL	8536630	2023/03/06	2023/03/09	Jency Sara Johnson
Total PAHs: Barrie/Mississauga Sewer Use	CALC	8532272	N/A	2023/03/08	Automated Statchk
Mineral/Synthetic O & G (TPH Heavy Oil)	BAL	8536253	2023/03/06	2023/03/06	Rutvik Patel
Total Suspended Solids	BAL	8536912	2023/03/07	2023/03/08	Shaneil Hall
Volatile Organic Compounds in Water	GC/MS	8533587	N/A	2023/03/05	Gladys Guerrero

Bureau Veritas ID: VEQ578 Dup
Sample ID: PW1
Matrix: Water

Collected: 2023/03/01
Shipped:
Received: 2023/03/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Biochemical Oxygen Demand (BOD)	DO	8532376	2023/03/03	2023/03/08	Gurjot Kaur
Chemical Oxygen Demand	SPEC	8537059	N/A	2023/03/06	Nimarta Singh

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GENERAL COMMENTS

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

Package 1	6.0°C

Lab filtered metals analysis added to sample PW1 as per Francois Chartier's request.

Sample VEQ578 [PW1] : VOC Analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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Bureau Veritas Job #: C360587
Report Date: 2023/03/27

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8533587	4-Bromofluorobenzene	2023/03/05	98	70 - 130	97	70 - 130	94	%				
8533587	D4-1,2-Dichloroethane	2023/03/05	112	70 - 130	106	70 - 130	108	%				
8533587	D8-Toluene	2023/03/05	99	70 - 130	102	70 - 130	98	%				
8535649	2,4,5,6-Tetrachloro-m-xylene	2023/03/07	82	50 - 130	67	50 - 130	73	%				
8535649	Decachlorobiphenyl	2023/03/07	104	50 - 130	96	50 - 130	90	%				
8538370	D10-Anthracene	2023/03/07	100	50 - 130	102	50 - 130	108	%				
8538370	D14-Terphenyl (FS)	2023/03/07	97	50 - 130	100	50 - 130	102	%				
8538370	D8-Acenaphthylene	2023/03/07	89	50 - 130	90	50 - 130	90	%				
8532376	Total BOD	2023/03/08					ND,RDL=2	mg/L	NC	30	88	80 - 120
8533587	1,1,2,2-Tetrachloroethane	2023/03/05	109	70 - 130	103	70 - 130	ND, RDL=0.40	ug/L	NC	30		
8533587	1,2-Dichlorobenzene	2023/03/05	94	70 - 130	94	70 - 130	ND, RDL=0.40	ug/L	NC	30		
8533587	1,4-Dichlorobenzene	2023/03/05	103	70 - 130	106	70 - 130	ND, RDL=0.40	ug/L	NC	30		
8533587	Benzene	2023/03/05	92	70 - 130	92	70 - 130	ND, RDL=0.20	ug/L	NC	30		
8533587	Ethylbenzene	2023/03/05	86	70 - 130	89	70 - 130	ND, RDL=0.20	ug/L	NC	30		
8533587	Methylene Chloride(Dichloromethane)	2023/03/05	103	70 - 130	101	70 - 130	ND, RDL=2.0	ug/L	NC	30		
8533587	o-Xylene	2023/03/05	86	70 - 130	90	70 - 130	ND, RDL=0.20	ug/L	NC	30		
8533587	p+m-Xylene	2023/03/05	89	70 - 130	93	70 - 130	ND, RDL=0.20	ug/L	NC	30		
8533587	Tetrachloroethylene	2023/03/05	85	70 - 130	88	70 - 130	ND, RDL=0.20	ug/L	NC	30		
8533587	Toluene	2023/03/05	92	70 - 130	95	70 - 130	ND, RDL=0.20	ug/L	NC	30		
8533587	Total Xylenes	2023/03/05					ND, RDL=0.20	ug/L	NC	30		
8533587	Trichloroethylene	2023/03/05	97	70 - 130	98	70 - 130	ND, RDL=0.20	ug/L	4.2	30		
8533770	Total Cadmium (Cd)	2023/03/03	105	80 - 120	102	80 - 120	ND, RDL=0.090	ug/L				
8533770	Total Chromium (Cr)	2023/03/03	101	80 - 120	100	80 - 120	ND, RDL=5.0	ug/L				
8533770	Total Copper (Cu)	2023/03/03	102	80 - 120	99	80 - 120	ND, RDL=0.90	ug/L				
8533770	Total Lead (Pb)	2023/03/03	98	80 - 120	95	80 - 120	ND, RDL=0.50	ug/L				
8533770	Total Nickel (Ni)	2023/03/03	102	80 - 120	100	80 - 120	ND, RDL=1.0	ug/L				
8533770	Total Zinc (Zn)	2023/03/03	108	80 - 120	108	80 - 120	ND, RDL=5.0	ug/L				
8535572	Total Cyanide (CN)	2023/03/06	94	80 - 120	99	80 - 120	ND, RDL=0.0050	mg/L	NC	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8535637	Mercury (Hg)	2023/03/06	99	75 - 125	104	80 - 120	ND, RDL=0.00010	mg/L	NC	20		
8535649	Hexachlorobenzene	2023/03/07	95	50 - 130	87	50 - 130	ND, RDL=0.005	ug/L	NC	30		
8536246	Total Oil & Grease	2023/03/06			99	85 - 115	ND, RDL=0.50	mg/L	0.76	25		
8536253	Total Oil & Grease Mineral/Synthetic	2023/03/06			98	85 - 115	ND, RDL=0.50	mg/L	1.5	25		
8536511	Sulphide	2023/03/07	92	80 - 120	92	80 - 120	ND, RDL=0.020	mg/L	NC	20		
8536630	Total Kjeldahl Nitrogen (TKN)	2023/03/09	100	80 - 120	99	80 - 120	ND, RDL=0.10	mg/L	7.2	20	98	80 - 120
8536862	Dissolved Aluminum (Al)	2023/03/07	101	80 - 120	97	80 - 120	ND, RDL=4.9	ug/L	4.1	20		
8536862	Dissolved Antimony (Sb)	2023/03/07	113	80 - 120	104	80 - 120	ND, RDL=0.50	ug/L	NC	20		
8536862	Dissolved Arsenic (As)	2023/03/07	106	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L	NC	20		
8536862	Dissolved Barium (Ba)	2023/03/07	106	80 - 120	101	80 - 120	ND, RDL=2.0	ug/L	1.5	20		
8536862	Dissolved Beryllium (Be)	2023/03/07	110	80 - 120	101	80 - 120	ND, RDL=0.40	ug/L	NC	20		
8536862	Dissolved Bismuth (Bi)	2023/03/07	106	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L	NC	20		
8536862	Dissolved Boron (B)	2023/03/07	109	80 - 120	101	80 - 120	ND, RDL=10	ug/L	3.2	20		
8536862	Dissolved Cadmium (Cd)	2023/03/07	106	80 - 120	98	80 - 120	ND, RDL=0.090	ug/L	NC	20		
8536862	Dissolved Calcium (Ca)	2023/03/07	NC	80 - 120	97	80 - 120	ND, RDL=200	ug/L	1.3	20		
8536862	Dissolved Chromium (Cr)	2023/03/07	102	80 - 120	95	80 - 120	ND, RDL=5.0	ug/L	NC	20		
8536862	Dissolved Cobalt (Co)	2023/03/07	101	80 - 120	95	80 - 120	ND, RDL=0.50	ug/L	NC	20		
8536862	Dissolved Copper (Cu)	2023/03/07	106	80 - 120	99	80 - 120	ND, RDL=0.90	ug/L	NC	20		
8536862	Dissolved Iron (Fe)	2023/03/07	105	80 - 120	98	80 - 120	ND, RDL=100	ug/L	NC	20		
8536862	Dissolved Lead (Pb)	2023/03/07	106	80 - 120	98	80 - 120	ND, RDL=0.50	ug/L	NC	20		
8536862	Dissolved Lithium (Li)	2023/03/07	110	80 - 120	106	80 - 120	ND, RDL=5.0	ug/L	NC	20		
8536862	Dissolved Magnesium (Mg)	2023/03/07	101	80 - 120	96	80 - 120	ND, RDL=50	ug/L	0.38	20		
8536862	Dissolved Manganese (Mn)	2023/03/07	103	80 - 120	96	80 - 120	ND, RDL=2.0	ug/L	0.19	20		
8536862	Dissolved Molybdenum (Mo)	2023/03/07	113	80 - 120	104	80 - 120	ND, RDL=0.50	ug/L	NC	20		
8536862	Dissolved Nickel (Ni)	2023/03/07	99	80 - 120	94	80 - 120	ND, RDL=1.0	ug/L	NC	20		
8536862	Dissolved Phosphorus (P)	2023/03/07	111	80 - 120	105	80 - 120	ND, RDL=100	ug/L	NC	20		
8536862	Dissolved Potassium (K)	2023/03/07	107	80 - 120	100	80 - 120	ND, RDL=200	ug/L	1.1	20		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8536862	Dissolved Selenium (Se)	2023/03/07	102	80 - 120	98	80 - 120	ND, RDL=2.0	ug/L	NC	20		
8536862	Dissolved Silicon (Si)	2023/03/07	105	80 - 120	100	80 - 120	ND, RDL=50	ug/L	0.67	20		
8536862	Dissolved Silver (Ag)	2023/03/07	110	80 - 120	103	80 - 120	ND, RDL=0.090	ug/L	NC	20		
8536862	Dissolved Sodium (Na)	2023/03/07	100	80 - 120	94	80 - 120	ND, RDL=100	ug/L	0.22	20		
8536862	Dissolved Strontium (Sr)	2023/03/07	107	80 - 120	99	80 - 120	ND, RDL=1.0	ug/L	0.20	20		
8536862	Dissolved Tellurium (Te)	2023/03/07	110	80 - 120	100	80 - 120	ND, RDL=1.0	ug/L	NC	20		
8536862	Dissolved Thallium (Tl)	2023/03/07	109	80 - 120	101	80 - 120	ND, RDL=0.050	ug/L	NC	20		
8536862	Dissolved Tin (Sn)	2023/03/07	109	80 - 120	101	80 - 120	ND, RDL=1.0	ug/L	NC	20		
8536862	Dissolved Titanium (Ti)	2023/03/07	105	80 - 120	99	80 - 120	ND, RDL=5.0	ug/L	NC	20		
8536862	Dissolved Tungsten (W)	2023/03/07	109	80 - 120	100	80 - 120	ND, RDL=1.0	ug/L	NC	20		
8536862	Dissolved Uranium (U)	2023/03/07	109	80 - 120	100	80 - 120	ND, RDL=0.10	ug/L	0.31	20		
8536862	Dissolved Vanadium (V)	2023/03/07	102	80 - 120	95	80 - 120	ND, RDL=0.50	ug/L	NC	20		
8536862	Dissolved Zinc (Zn)	2023/03/07	106	80 - 120	95	80 - 120	ND, RDL=5.0	ug/L	NC	20		
8536862	Dissolved Zirconium (Zr)	2023/03/07	111	80 - 120	102	80 - 120	ND, RDL=1.0	ug/L	NC	20		
8536912	Total Suspended Solids	2023/03/08					ND, RDL=10	mg/L	0	20	95	85 - 115
8537059	Total Chemical Oxygen Demand (COD)	2023/03/06	96	80 - 120	96	80 - 120	ND, RDL=4.0	mg/L	NC	20		
8538225	Dissolved Chloride (Cl-)	2023/03/08	86	80 - 120	94	80 - 120	ND, RDL=1.0	mg/L	1.9	20		
8538226	Dissolved Sulphate (SO4)	2023/03/08	NC	75 - 125	96	80 - 120	ND, RDL=1.0	mg/L	1.7	20		
8538370	1-Methylnaphthalene	2023/03/07	104	50 - 130	101	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	2-Methylnaphthalene	2023/03/07	95	50 - 130	92	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Acenaphthene	2023/03/07	109	50 - 130	105	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Acenaphthylene	2023/03/07	106	50 - 130	103	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Anthracene	2023/03/07	113	50 - 130	110	50 - 130	ND, RDL=0.050	ug/L	NC	30		

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8538370	Benzo(a)anthracene	2023/03/07	105	50 - 130	102	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Benzo(a)pyrene	2023/03/07	97	50 - 130	96	50 - 130	ND, RDL=0.0090	ug/L	NC	30		
8538370	Benzo(b/j)fluoranthene	2023/03/07	104	50 - 130	104	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Benzo(g,h,i)perylene	2023/03/07	111	50 - 130	109	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Benzo(k)fluoranthene	2023/03/07	101	50 - 130	99	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Chrysene	2023/03/07	105	50 - 130	103	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Dibenzo(a,h)anthracene	2023/03/07	98	50 - 130	94	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Fluoranthene	2023/03/07	120	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Fluorene	2023/03/07	106	50 - 130	103	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Indeno(1,2,3-cd)pyrene	2023/03/07	108	50 - 130	106	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Naphthalene	2023/03/07	103	50 - 130	100	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538370	Phenanthrene	2023/03/07	109	50 - 130	105	50 - 130	ND, RDL=0.030	ug/L	NC	30		
8538370	Pyrene	2023/03/07	119	50 - 130	117	50 - 130	ND, RDL=0.050	ug/L	NC	30		
8538476	Fluoride (F-)	2023/03/07	113	80 - 120	105	80 - 120	ND, RDL=0.10	mg/L	9.0	20		
8538482	pH	2023/03/07			102	98 - 103			0.75	N/A		
8539234	Phenols-4AAP	2023/03/07	102	80 - 120	101	80 - 120	ND, RDL=0.0010	mg/L	NC	20		
8547243	Total Aluminum (Al)	2023/03/10			103	80 - 120	ND, RDL=3.0	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8547243	Total Antimony (Sb)	2023/03/10			103	80 - 120	ND, RDL=0.020	ug/L				
8547243	Total Arsenic (As)	2023/03/10			99	80 - 120	ND, RDL=0.020	ug/L				
8547243	Total Barium (Ba)	2023/03/10			98	80 - 120	ND, RDL=0.050	ug/L				
8547243	Total Bismuth (Bi)	2023/03/10			97	80 - 120	ND, RDL=0.010	ug/L				
8547243	Total Cadmium (Cd)	2023/03/10			99	80 - 120	ND, RDL=0.0050	ug/L				
8547243	Total Chromium (Cr)	2023/03/10			97	80 - 120	ND, RDL=0.10	ug/L				
8547243	Total Cobalt (Co)	2023/03/10			94	80 - 120	ND, RDL=0.010	ug/L				
8547243	Total Copper (Cu)	2023/03/10			94	80 - 120	ND, RDL=0.10	ug/L				
8547243	Total Gold (Au)	2023/03/10			95	80 - 120	ND, RDL=0.10	ug/L				
8547243	Total Iron (Fe)	2023/03/10			98	80 - 120	ND, RDL=5.0	ug/L				
8547243	Total Lead (Pb)	2023/03/10			99	80 - 120	ND, RDL=0.020	ug/L				
8547243	Total Manganese (Mn)	2023/03/10			96	80 - 120	ND, RDL=0.10	ug/L				
8547243	Total Molybdenum (Mo)	2023/03/10			101	80 - 120	ND, RDL=0.050	ug/L				
8547243	Total Nickel (Ni)	2023/03/10			94	80 - 120	ND, RDL=0.10	ug/L				
8547243	Total Phosphorus (P)	2023/03/10			100	80 - 120	5.2, RDL=5.0 (1)	ug/L				
8547243	Total Platinum (Pt)	2023/03/10			100	80 - 120	ND, RDL=0.10	ug/L				
8547243	Total Selenium (Se)	2023/03/10			97	80 - 120	ND, RDL=0.040	ug/L				
8547243	Total Silver (Ag)	2023/03/10			98	80 - 120	ND, RDL=0.010	ug/L				
8547243	Total Tin (Sn)	2023/03/10			100	80 - 120	ND, RDL=0.20	ug/L				
8547243	Total Vanadium (V)	2023/03/10			96	80 - 120	ND, RDL=0.20	ug/L				
8547243	Total Zinc (Zn)	2023/03/10			97	80 - 120	ND, RDL=1.0	ug/L				

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
8575482	Total Rhodium (Rh)	2023/03/24			99	80 - 120	ND, RDL=0.50	ug/L				

N/A = Not Applicable

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

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

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

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

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

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

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

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

(1) Method Blank exceeds acceptance limits - 2X RDL acceptable for low level metals determination.

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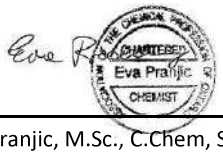
Bureau Veritas Job #: C360587
Report Date: 2023/03/27

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

VALIDATION SIGNATURE PAGE

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

Mira El Masri, M.Sc. Chemist, Montréal, Analyst II



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

Mauro Oselin, Technician

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by {0}, {1} responsible for {2} {3} laboratory operations.

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Page 1 of 1

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#30554 exp Services Inc	Company Name:	EXP	Quotation #:	C20374	Bureau Veritas Job #:	Bottle Order #:
Attention:	Accounts Payable	Attention:	Francois Chartier	P.O. #:	ENV-BRM STREAM 2		909961
Address:	1595 Clark Blvd	Address:	Jeffrey.leon@exp.com	Project:	GTR-21023592-A0	COC #:	Project Manager:
	Brampton ON L6T 4V1			Project Name:	800 YONGE ST BARRIE	C#909961-08-01	Patricia Legotte
Tel:	(905) 793-9800 Fax: (905) 793-0641	Tel:	(905) 793-9800 Ext: 2523 Fax:	Site #:			
Email:	AP@exp.com; Karen.Burke@exp.com	Email:	Francois.Chartier@exp.com	Sampled By:	EDWIN CHESSELL		

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

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

Other Regulations
- ☐ CCME ☒ Sanitary Sewer Bylaw
- ☐ Reg 558 ☒ Storm Sewer Bylaw
- ☐ MISA Municipality BARRIE
- ☐ PWQO ☐ Reg 406 Table ___
- ☐ Other ___

Special Instructions

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	~~Toronto Sanitary & Storm Sewer by-law 2047~~	City of Barrie STORM and SAN By-law	# of Bottles	Comments
1		PW 1	23/03/01	12 PM	GW	N		✓	1	
2										
3										
4										
5										
6										
7										
8										
9										
10										

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

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

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

02-Mar-23 19:05
Patricia Legette
C360587
TDK ENV-1207

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Jeffrey Leon	23/03/02	7:02 PM	Jagdeep Kaur JK/DEEP KAUR	2023/03/02	19:05	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal Present	Yes	No
	5/7/6	Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

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

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

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

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Job #: C360587
Report Date: 2023/03/27

exp Services Inc
Client Project #: GTR-21023592-A0
Site Location: 800 YONGE ST, BARRIE, ON
Your P.O. #: ENV-BRM
Sampler Initials: EC

Exceedance Summary Table – Barrie Sanitary Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						
The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.						

Exceedance Summary Table – Barrie Storm Sewer

Result Exceedances

Sample ID	Bureau Veritas ID	Parameter	Criteria	Result	DL	UNITS
No Exceedances						
The exceedance summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.						

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Appendix F – Infiltration Test Results

800 Yonge St, Barrie
GTR-21023592-A0
Low Impact Design (LID) Calculations for Infiltration Gallery

Test Location	Hydraulic Conductivity (K_{fs}) (cm/s)	Infiltration Rate (IR) (mm/hr)	Discrete Design Infiltration Rate(DIR) (mm/hr)	Percolation Time (min/cm)
INF 1	2.0E-04	56	22	27
INF 8	4.5E-05	37	15	40
INF 13	3.9E-05	36	14	42
INF 18	2.3E-05	31	12	48

Geology Units	Geometric Mean of K_{fs} (cm/s)	Infiltration Rate (I) (mm/hr)*	Ratio of Mean Measured Infiltration Rates	Safety Correction Factor (SCF)
Overlying Geology Unit	5.33E-05	39	1.0	2.5
Underlying Geology Unit (1.5 m below the bottom of trench)	5.33E-05	39		

Design Infiltration Rate(DIR) (mm/hr)	Minimum	12	**Percolation Time (min/cm)**	27
	Maximum	22		48
	Geometric Mean	**16**		**38**

Note:
Analytical Solutions (CVC and TRCA 2010)

$$Infiltration\ Rate\ (IR) = \left(\frac{K_{fs}}{6x10^{-11}}\right)^{\frac{1}{3.7363}}$$
$$Design\ Infiltration\ Rate\ (DIR) = \frac{IR}{SCF}$$

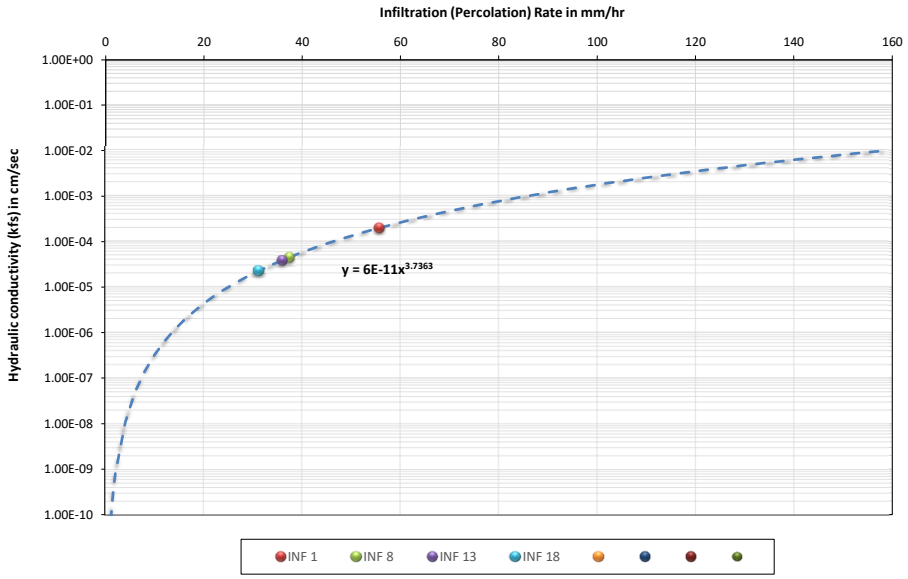
Kfs: hydraulic conductivity (cm/sec)

IR: infiltration rate (mm/hr)

DIR: design infiltration rate (mm/hr)

SCF: Safety Correction Factor (based on the chart recommended by CVC and TRCA, 2010)

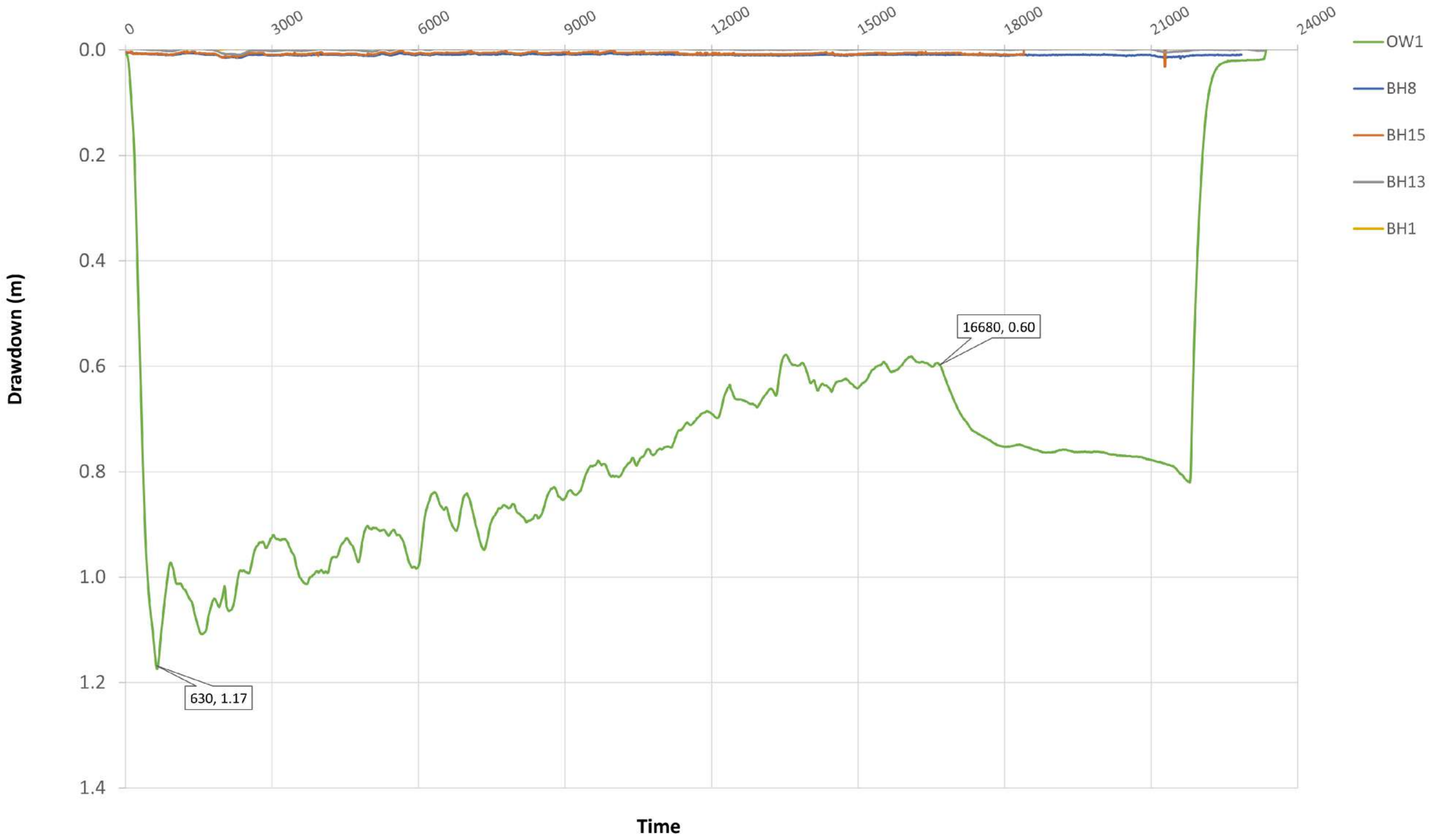
Figure : Approximate relationship between infiltration rate and hydraulic conductivity (LID SWM planning and Design Guide, Appendix C1)

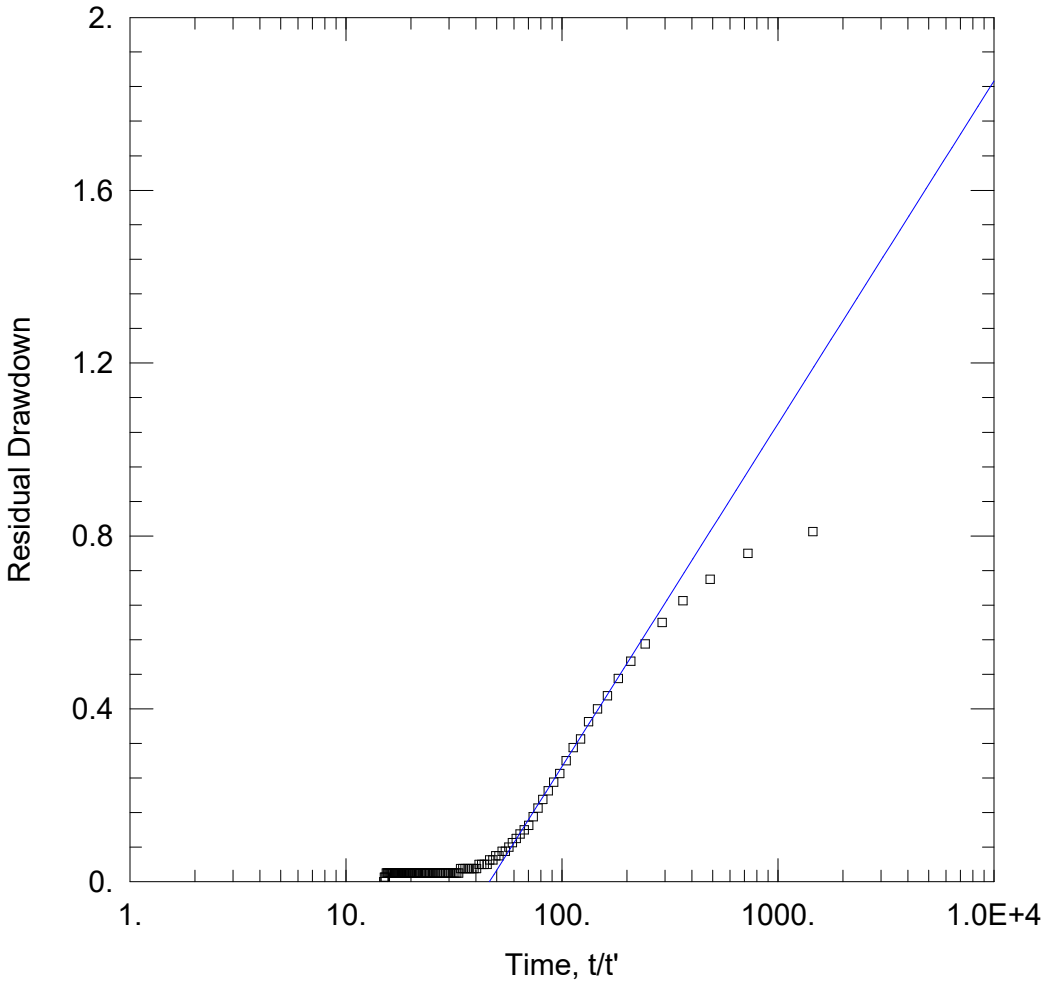


Appendix G – Pumping Test Data

800 Yonge St Pump Test - Drawdown vs Time

March 1, 2023





OW1 THEIS SOLUTION - PUMP TEST - 800 YONGE, BARRIE

Data Set: E:\...\PT-OW1_Theis.aqt
Date: 03/06/23 Time: 11:43:57

PROJECT INFORMATION

Company: EXP Services Inc
Client: Schlegel Villages Inc.
Project: GTR-21023592-C0
Location: 800 Yonge St, Barrie
Test Well: PW1
Test Date: March 1, 2023

AQUIFER DATA

Saturated Thickness: 18. m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW1	0.05	0

Observation Wells

Well Name	X (m)	Y (m)
▫ OW1	3.5	0

SOLUTION

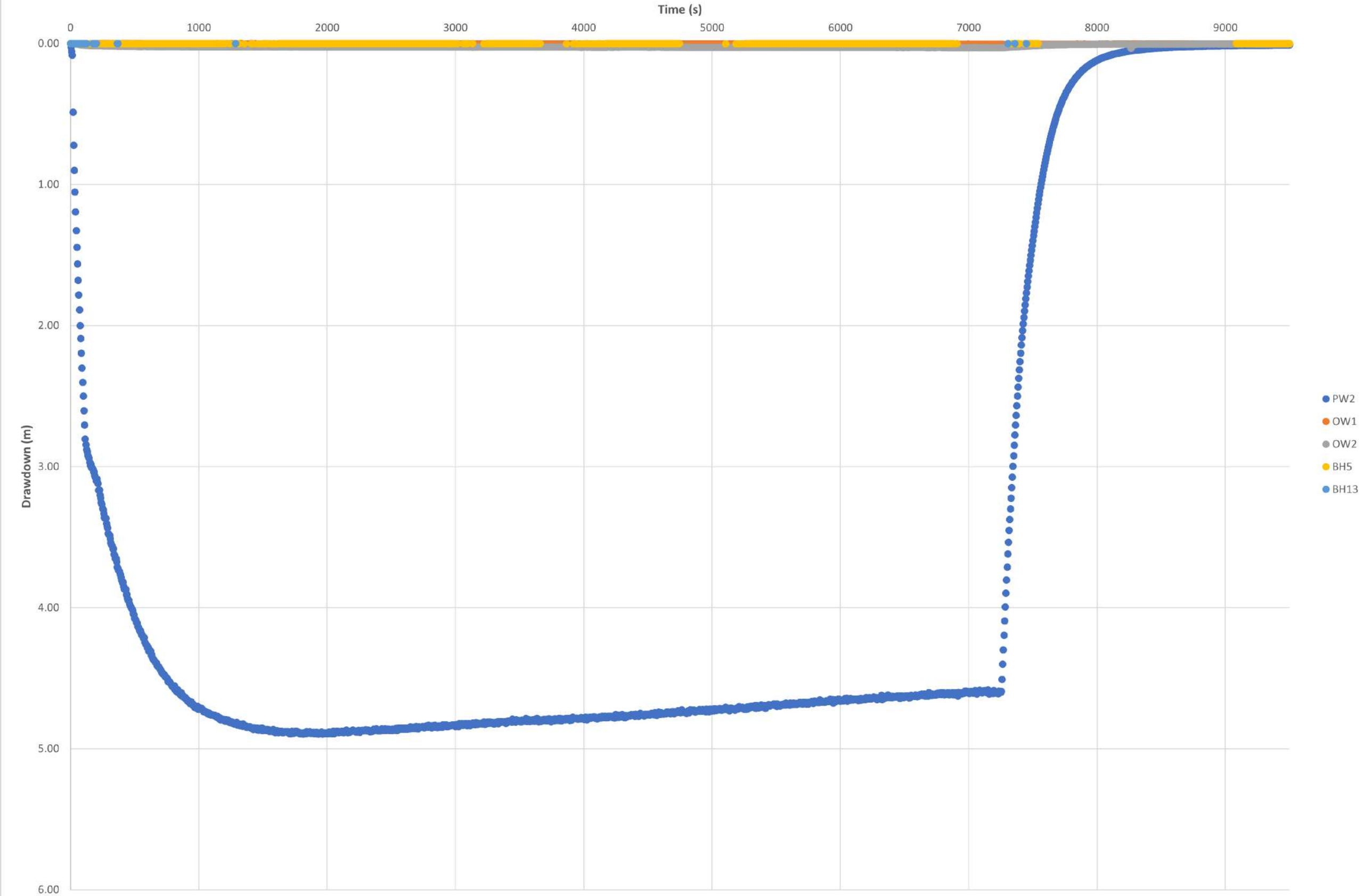
Aquifer Model: Confined Solution Method: Theis (Recovery)

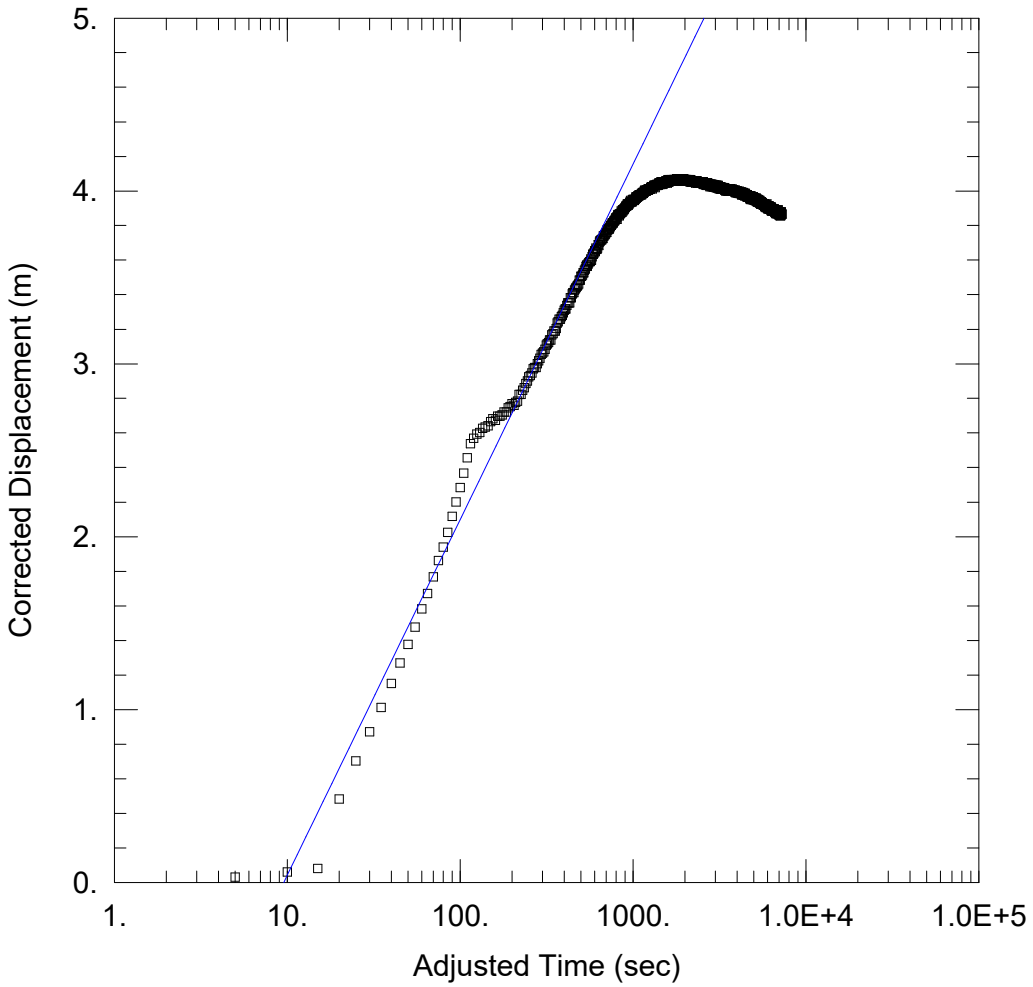
T = 0.0001247 m^2/sec S/S' = 46.24

Pump Test Hydrograph - Drawdown vs Time

PW2 - 800 Yonge St

March 9 2023





PUMPING TEST - MARCH 9 2023 - 800 YONGE ST, BARRIE

Data Set: E:\...\PW2_March9_CJ.aqt
Date: 12/15/23 Time: 14:15:42

PROJECT INFORMATION

Company: EXP Services Inc.
Client: Schlegel Villages Inc
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie, Ontario
Test Well: PW2
Test Date: March 9 2023

AQUIFER DATA

Saturated Thickness: 14.5 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW2	0	0

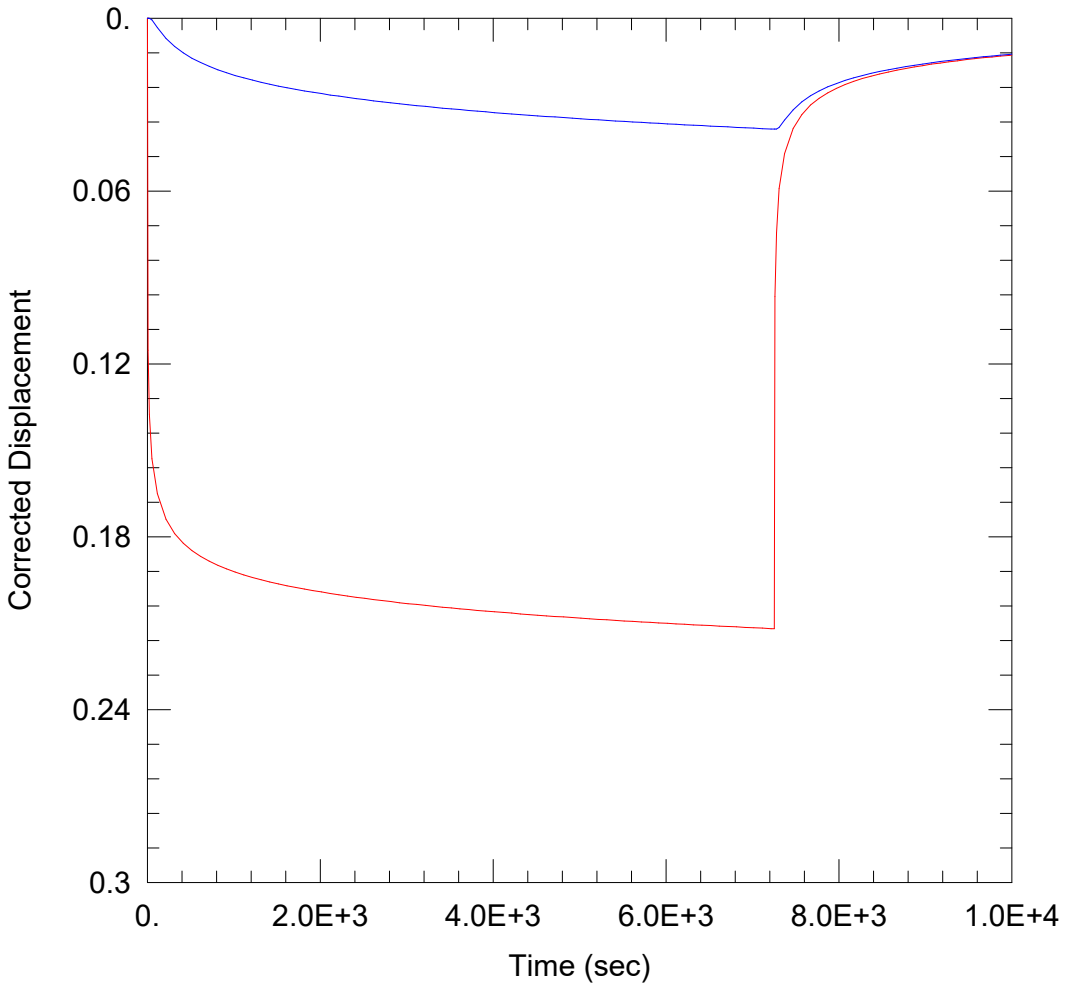
Observation Wells

Well Name	X (m)	Y (m)
▫ PW2	0	0

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 1.118E-5 m^2/sec S = 0.04128



PUMP TEST 2 SIMULATION - 800 YONGE ST, BARRIE

Data Set: E:\...\Fwd-Sim_PT2_OW2 dd match.aqt
Date: 12/18/23 Time: 14:52:25

PROJECT INFORMATION

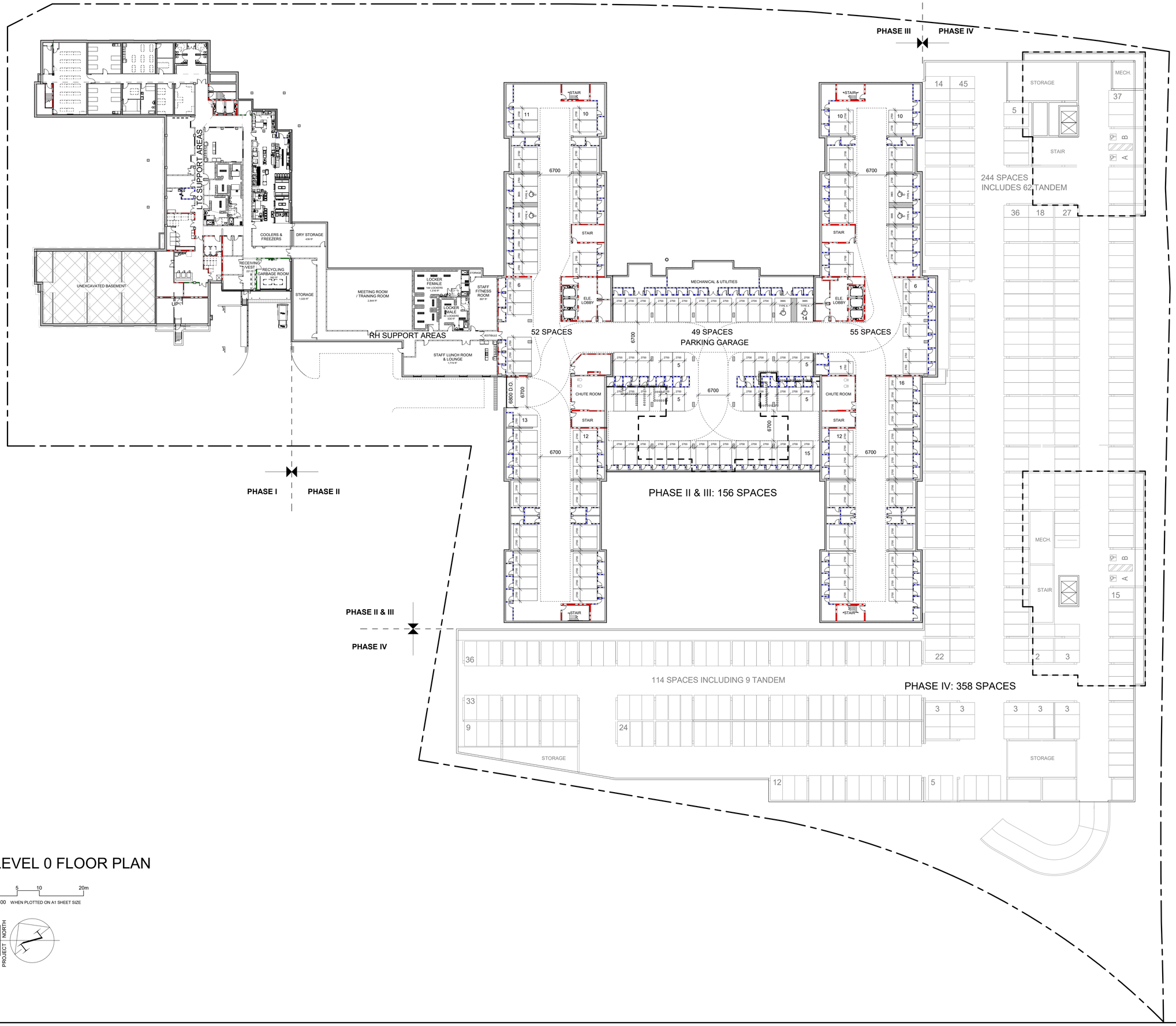
Company: EXP
Client: Schlegel Villages Inc.
Project: GTR-21023592-A0
Location: 800 Yonge St, Barrie
Test Well: PW2
Obs. Well: OW2
Test Date: March 9, 2023

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.001006 m^2/sec
S = 0.02
Kz/Kr = 1.
b = 14.5 m

Appendix H – Architectural Drawings



LEVEL 0 FLOOR PLAN

0 5 10 20m

1:400 WHEN PLOTTED ON A1 SHEET SIZE

PROJECT NORTH

REVISIONS

ISSUED

ANDERSON WELLSMAN ARCHITECTS INCORPORATED
1090 DON MILLS ROAD SUITE 612 TORONTO ONTARIO M3C 3R6
T 416 391 3699

SCHLEGEL VILLAGES BARRIE LTC

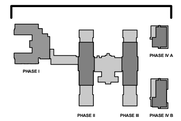
800 YONGE ST, BARRIE, ON

Drawing Title: PHASE I - IV LEVEL 0 FLOOR PLAN

Checked By: RA | Project No.: 2116

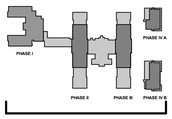
Drawn By: PC | Plot Date: 2/10/2024 MM/DD/YYYY

SP1.1



0 5 10 20m
1:400 WHEN PLOTTED ON A1 SHEET SIZE

OVERALL EXTERIOR ELEVATION - EAST



0 5 10 20m
1:400 WHEN PLOTTED ON A1 SHEET SIZE

OVERALL EXTERIOR ELEVATION - WEST

SCHLEGEL VILLAGES

REVISIONS

ISSUED

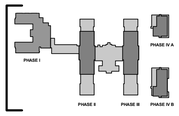
ANDERSON WELLSMAN ARCHITECTS INCORPORATED
1090 DON MILLS ROAD
SUITE 612
TORONTO ONTARIO
M3C 3R6
T 416 391 3699

SCHLEGEL VILLAGES BARRIE LTC
800 YONGE ST, BARRIE, ON

Drawing Title:
OVERALL ELEVATIONS

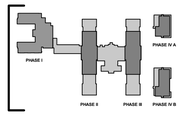
Checked By: **RA**
Drawn By: **PC**
Project No.: **2116**
Plot Date: **5/22/2024** MM/DD/YYYY

SP2.1



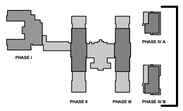
OVERALL EXTERIOR ELEVATION - NORTH

0 5 10 20m
1:400 WHEN PLOTTED ON A1 SHEET SIZE



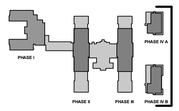
PHASE I OVERALL EXTERIOR ELEVATION - NORTH

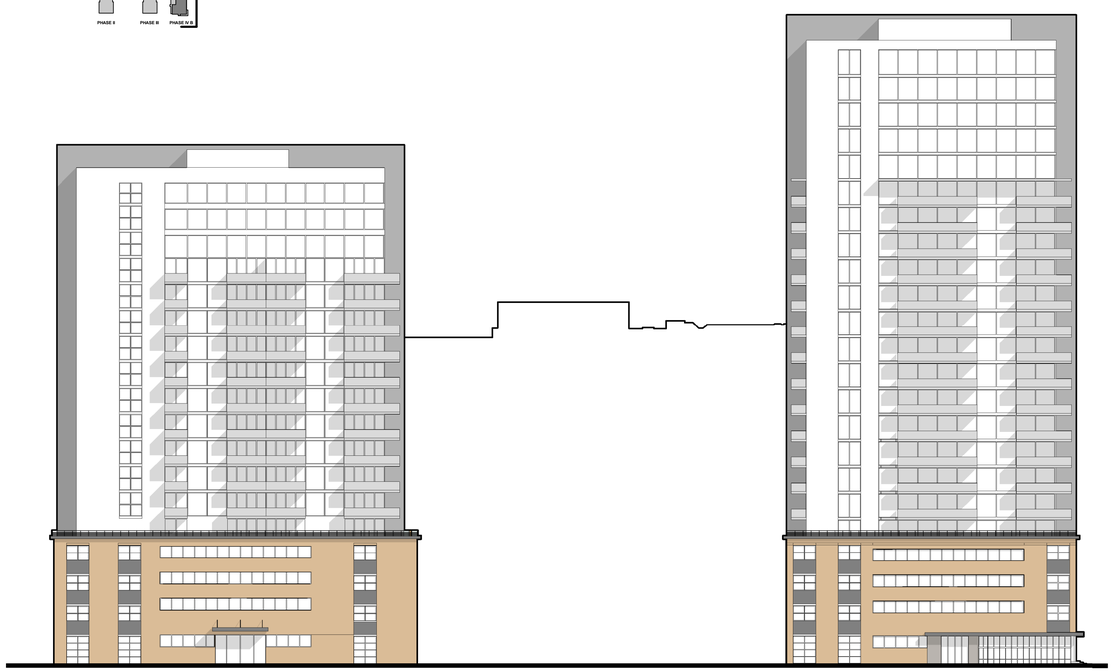
0 5 10 20m
1:400 WHEN PLOTTED ON A1 SHEET SIZE



OVERALL EXTERIOR ELEVATION - SOUTH

0 5 10 20m
1:400 WHEN PLOTTED ON A1 SHEET SIZE





PHASE IV OVERALL EXTERIOR ELEVATION - SOUTH

0 5 10 20m
1:400 WHEN PLOTTED ON A1 SHEET SIZE

SCHLEGEL VILLAGES

REVISIONS

ISSUED

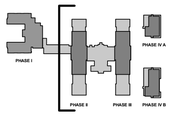
ANDERSON WELLSMAN ARCHITECTS INCORPORATED
1090 DON MILLS ROAD
SUITE 612
TORONTO ONTARIO
M3C 3R6
T 416 391 3699

SCHLEGEL VILLAGES BARRIE LTC
800 YONGE ST, BARRIE, ON

Drawing Title:
OVERALL ELEVATIONS

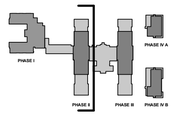
Checked By: RA
Drawn By: PC
Project No.: 2116
Plot Date: 5/22/2024 MM/DD/YYYY

SP2.2



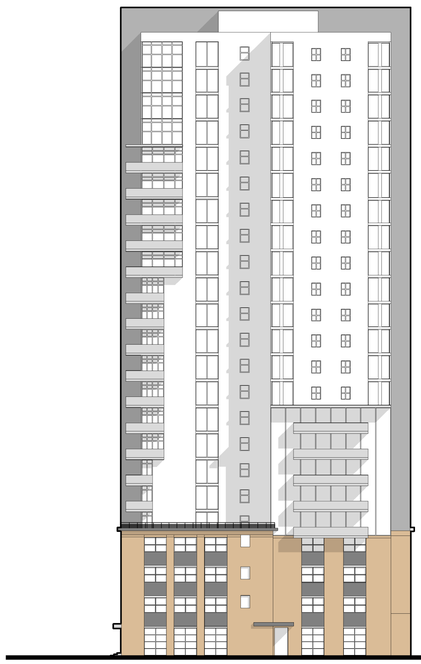
PHASE II OVERALL EXTERIOR ELEVATION - NORTH

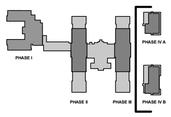
0 5 10 20m
1:400 WHEN PLOTTED ON A1 SHEET SIZE

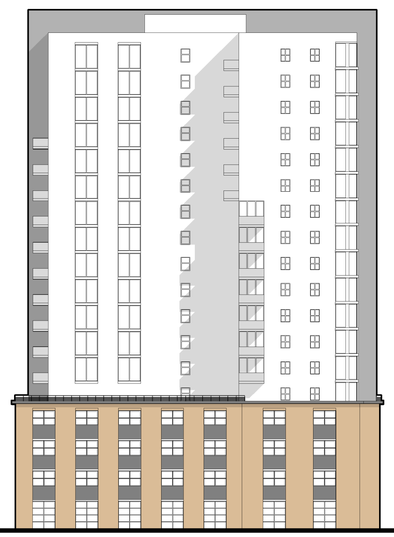


PHASE III OVERALL EXTERIOR ELEVATION - SOUTH

0 5 10 20m
1:400 WHEN PLOTTED ON A1 SHEET SIZE







PHASE IV OVERALL EXTERIOR ELEVATION - NORTH

0 5 10 20m
1:400 WHEN PLOTTED ON A1 SHEET SIZE

SCHLEGEL VILLAGES

REVISIONS

ISSUED

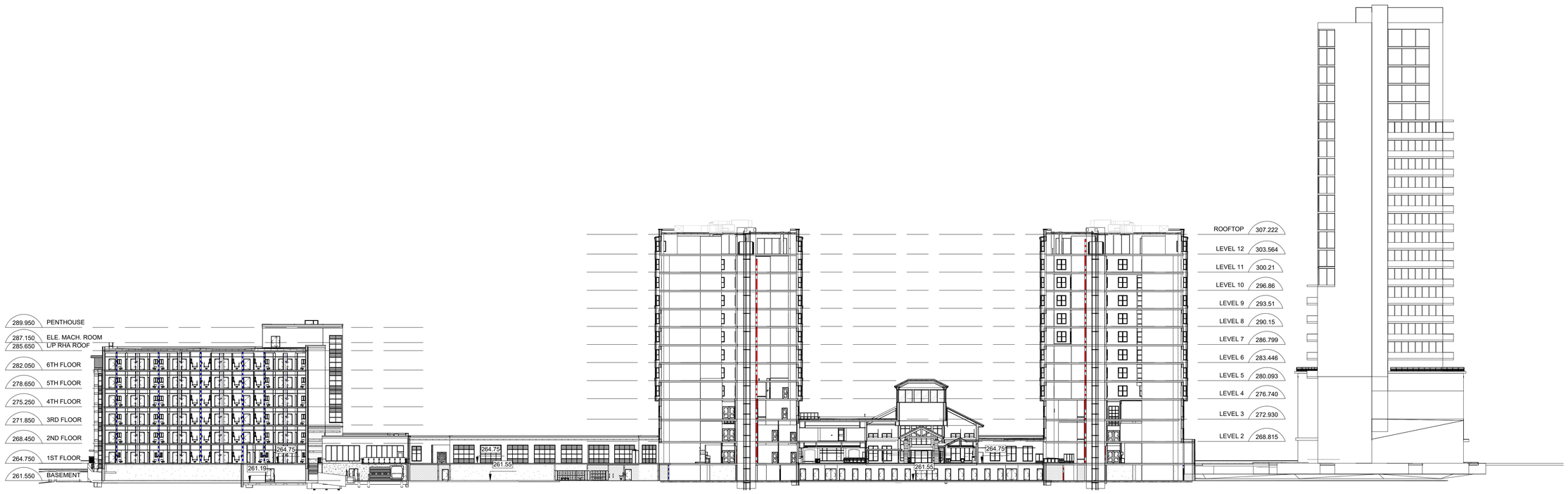
ANDERSON WELLSMAN ARCHITECTS INCORPORATED
1090 DON MILLS ROAD
SUITE 612
TORONTO ONTARIO
M3C 3R6
T 416 391 3699

SCHLEGEL VILLAGES BARRIE LTC
800 YONGE ST., BARRIE, ON

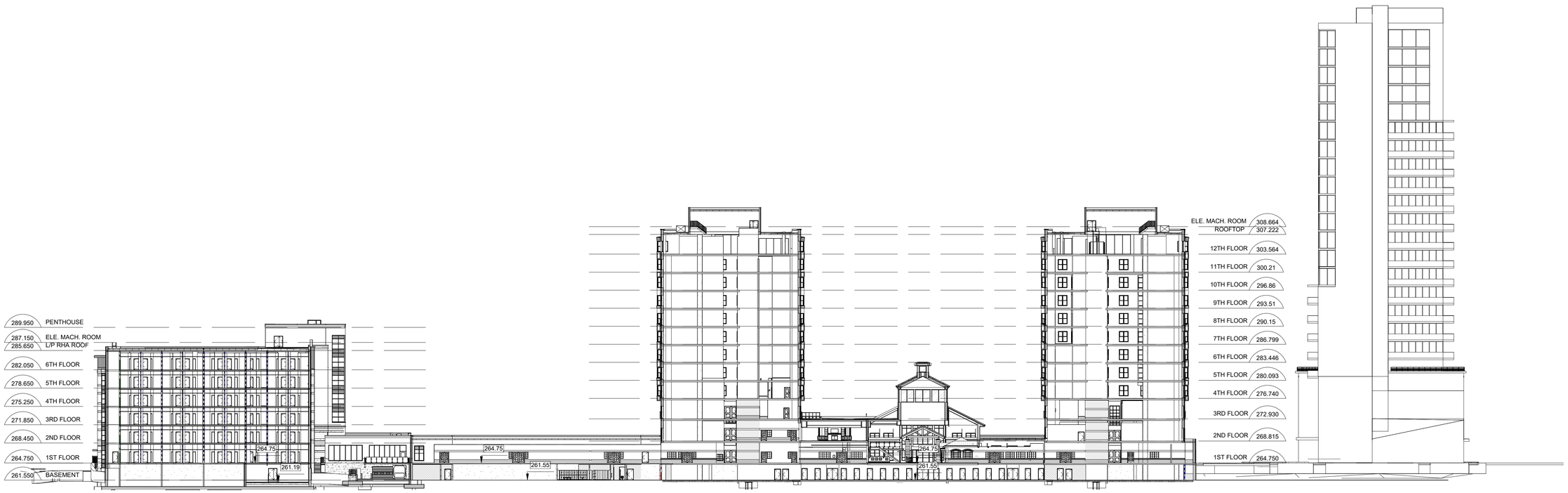
Drawing Title:
OVERALL ELEVATIONS

Checked By: RA
Drawn By: PC
Project No.: 2116
Plot Date: 5/22/2024 MM/DD/YYYY

SP2.3



CROSS SECTION



CROSS SECTION

SCHLEGEL VILLAGES

REVISIONS

ISSUED

ANDERSON WELLSMAN ARCHITECTS INCORPORATED
1090 DON MILLS ROAD
SUITE 612
TORONTO ONTARIO
M3C 3R6
T 416 391 3699

SCHLEGEL VILLAGES BARRIE LTC
800 YONGE ST, BARRIE, ON

Drawing Title:
PHASE I - IV CROSS SECTION

Checked By: RA
Drawn By: PC
Project No.: 2116
Plot Date: 6/13/2024 MM/DD/YYYY

SP2.4

EXTERIOR ELEVATION - EAST

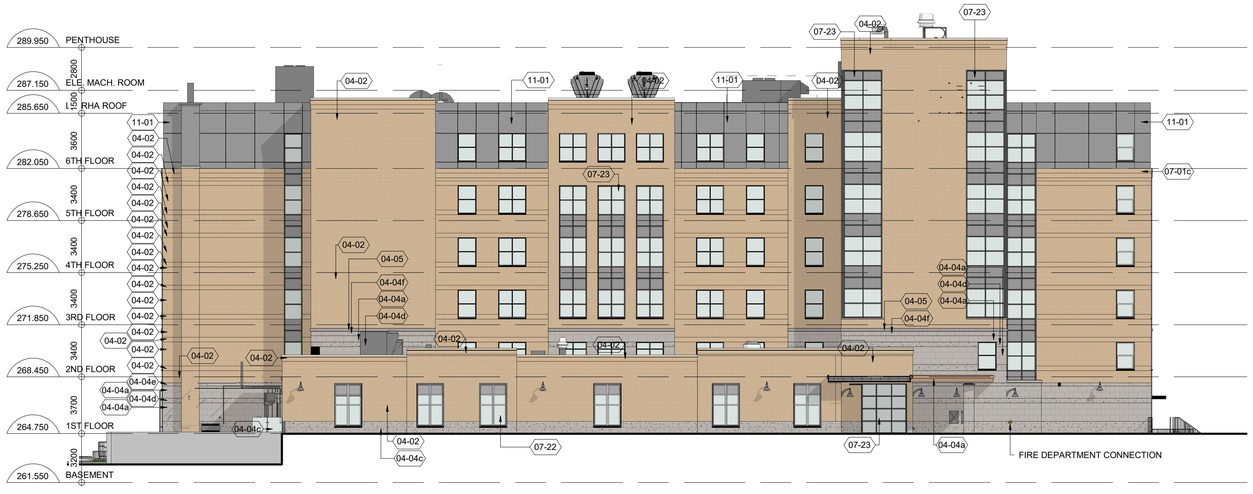
0 2.5 5 7.5m
1:175 WHEN PLOTTED ON A1 SHEET SIZE

EXTERIOR ELEVATION - WEST

0 2.5 5 7.5m
1:175 WHEN PLOTTED ON A1 SHEET SIZE

EXTERIOR ELEVATION - NORTH

0 2.5 5 7.5m
1:175 WHEN PLOTTED ON A1 SHEET SIZE



EXTERIOR ELEVATION - SOUTH

0 2.5 5 7.5m
1:175 WHEN PLOTTED ON A1 SHEET SIZE

EXTERIOR ELEVATION - MATERIAL SCHEDULE

MATERIAL	DESCRIPTION
04-01	BRICK VENEER TYPE 1
04-02	BRICK VENEER TYPE 2
04-04a	ARCHITECTURAL BLOCK TYPE 1 - SMOOTH (400x600)
04-04b	ARCHITECTURAL BLOCK TYPE 1 - SMOOTH (300x600)
04-04c	ARCHITECTURAL BLOCK TYPE 2 - ROCK-STONE (400x600)
04-04d	ARCHITECTURAL BLOCK TYPE 2 - ROCK-STONE (300x600)
04-04e	ARCHITECTURAL BLOCK TYPE 2 - ROCK-STONE (200x600)
04-04f	ARCHITECTURAL BLOCK TYPE 3 - TEX-STONE (300x600)
04-05	ARCH. STONE BANDING - 824 WATER TABLE SILL
07-22	VINYL WINDOW + DOORS
07-23	ALUMINUM CURTAIN WALL FRAMING
09-01	EXTERIOR HM DOORS
11-01	ALUMINUM PANEL SYSTEM

SCHLEGEL VILLAGES

REVISIONS

ISSUED

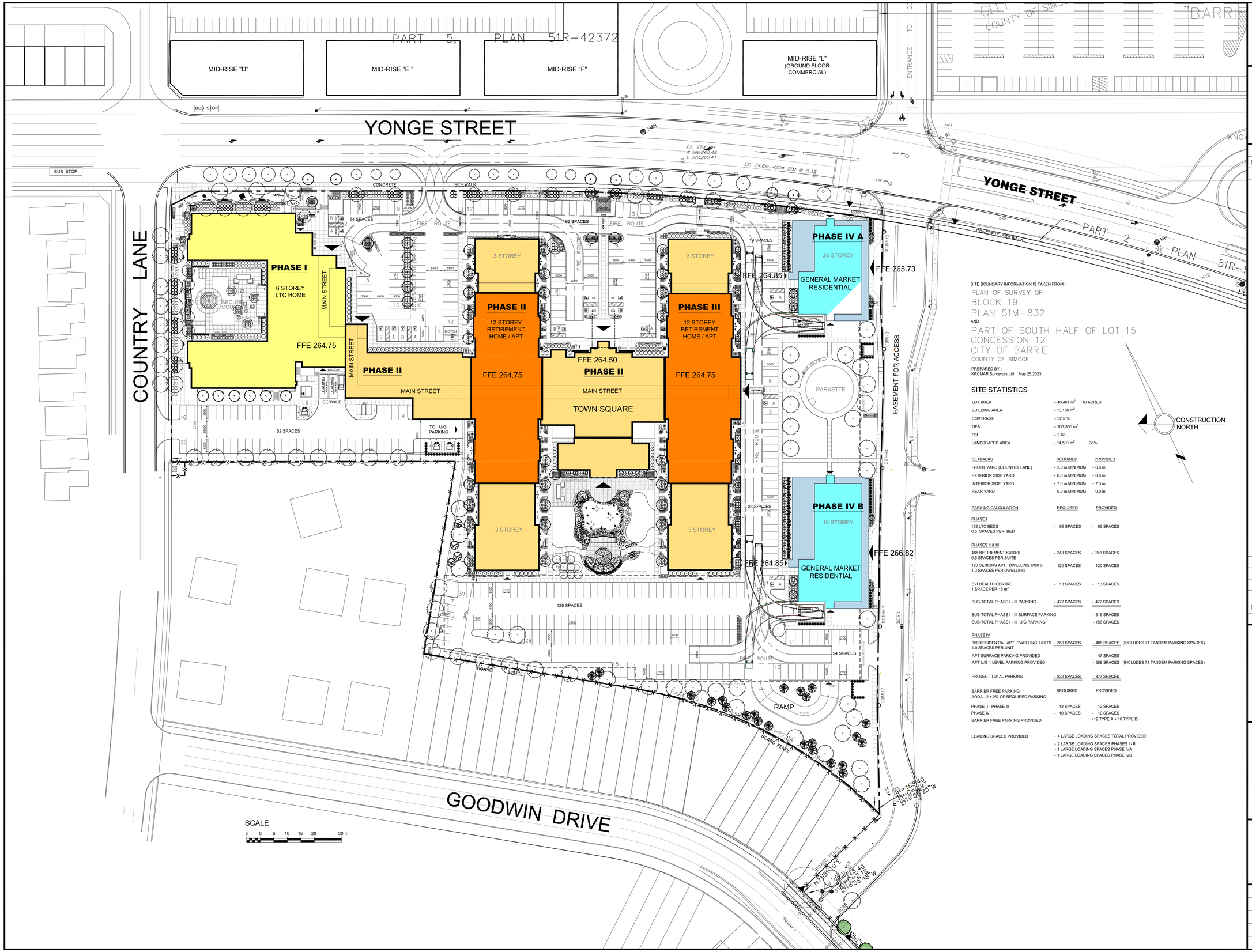
ANDERSON WELLSMAN ARCHITECTS INCORPORATED
1090 DON MILLS ROAD
SUITE 612
TORONTO ONTARIO
M3C 3R6
T 416 391 3699

SCHLEGEL VILLAGES BARRIE LTC
800 YONGE ST, BARRIE, ON

Drawing Title:
PHASE I ELEVATIONS

Checked By: RA
Drawn By: PC
Project No.: 2116
Plot Date: 5/10/2024 MM/DD/YYYY

SP3.6



CONSTRUCTION NORTH

REVISIONS

No.	DATE	DESCRIPTION
1		

SITE BOUNDARY INFORMATION IS TAKEN FROM :

PLAN OF SURVEY OF
BLOCK 19
PLAN 51M-832
AND
PART OF SOUTH HALF OF LOT 15
CONCESSION 12
CITY OF BARRIE
COUNTY OF SIMCOE

PREPARED BY :
KRCMAR Surveyors Ltd May 25 2023

SITE STATISTICS

LOT AREA	- 40,461 m^2	10 ACRES
BUILDING AREA	- 13,150 m^2	
COVERAGE	- 32.5 %	
GFA	- 108,350 m^2	
FSI	- 2.68	
LANDSCAPED AREA	- 14,501 m^2	36%

SETBACKS	REQUIRED	PROVIDED
FRONT YARD (COUNTRY LANE)	- 2.0 m MINIMUM	- 6.0 m
EXTERIOR SIDE YARD	- 0.0 m MINIMUM	- 0.0 m
INTERIOR SIDE YARD	- 7.0 m MINIMUM	- 7.3 m
REAR YARD	- 0.0 m MINIMUM	- 0.0 m

PARKING CALCULATION	REQUIRED	PROVIDED
PHASE I		
192 LTC BEDS 0.5 SPACES PER BED	- 96 SPACES	- 96 SPACES
PHASES II & III		
485 RETIREMENT SUITES 0.5 SPACES PER SUITE	- 243 SPACES	- 243 SPACES
120 SENIORS APT. DWELLING UNITS 1.0 SPACES PER DWELLING	- 120 SPACES	- 120 SPACES
SVI HEALTH CENTRE 1 SPACE PER 15 m^2	- 13 SPACES	- 13 SPACES
SUB-TOTAL PHASE I - III PARKING	- 472 SPACES	- 472 SPACES
SUB-TOTAL PHASE I - III SURFACE PARKING		- 316 SPACES
SUB-TOTAL PHASE I - III U/G PARKING		- 156 SPACES
PHASE IV		
360 RESIDENTIAL APT. DWELLING UNITS 1.0 SPACES PER UNIT	- 360 SPACES	- 405 SPACES (INCLUDES 71 TANDEM PARKING SPACES)
APT SURFACE PARKING PROVIDED		- 47 SPACES
APT U/G 1 LEVEL PARKING PROVIDED		- 358 SPACES (INCLUDES 71 TANDEM PARKING SPACES)
PROJECT TOTAL PARKING	- 832 SPACES	- 877 SPACES

BARRIER FREE PARKING AODA - 2 + 2% OF REQUIRED PARKING	REQUIRED	PROVIDED
PHASE I - PHASE III	- 12 SPACES	- 12 SPACES
PHASE IV	- 10 SPACES	- 10 SPACES
BARRIER FREE PARKING PROVIDED		(12 TYPE A + 10 TYPE B)

LOADING SPACES PROVIDED
- 4 LARGE LOADING SPACES TOTAL PROVIDED
- 2 LARGE LOADING SPACES PHASES I - III
- 1 LARGE LOADING SPACES PHASE IVA
- 1 LARGE LOADING SPACES PHASE IVB

No.	Date	Description
Issued		

ANDERSON WELLSMAN ARCHITECTS INCORPORATED
1090 DON MILLS ROAD
SUITE 612
TORONTO, ONTARIO
M3C 3R6
TEL: 416.391.3699
FAX: 416.510.2629

Project:
SCHLEGEL VILLAGES
BARRIE

800 YONGE STREET
BARRIE, ON

Drawing Title
MASTER SITE PLAN

Scale:	1:600
Date:	JUL 12 2022
Input by:	G.V.
Checked by:	R.A.
Job No.	2116

Sheet No.
SP 10.1

FILE NAME: VERSION 8.2

Jeffrey Leon

From: Robert Anderson <rob@andersonwellsmanarchitects.ca>
Sent: Friday, December 15, 2023 4:48 PM
To: Jeffrey Leon
Cc: Kevin Bushell; Bryan Stanton; Lisa Cowan
Subject: Schlegel Villages Barrie - Hydrogeological Assessment Finish Floor Elevations

Hi Jeffery,

Thanks for the call. I'm glad to hear that you are wrapping up the report.

Our working elevation for the main floor throughout Phases I, II & III is **264.75.**
Due to the reported level of the groundwater we have now assumed that a single basement level is all that is practically available Throughout the project . The proposed elevation of the basement level is 3.2m below the main floor, or **261.55**

The basement level under the Phase IV area and behind Phase II & III will be approximately 300mm lower to accommodate the exterior parking and drive aisles. You can assume **261.35**.

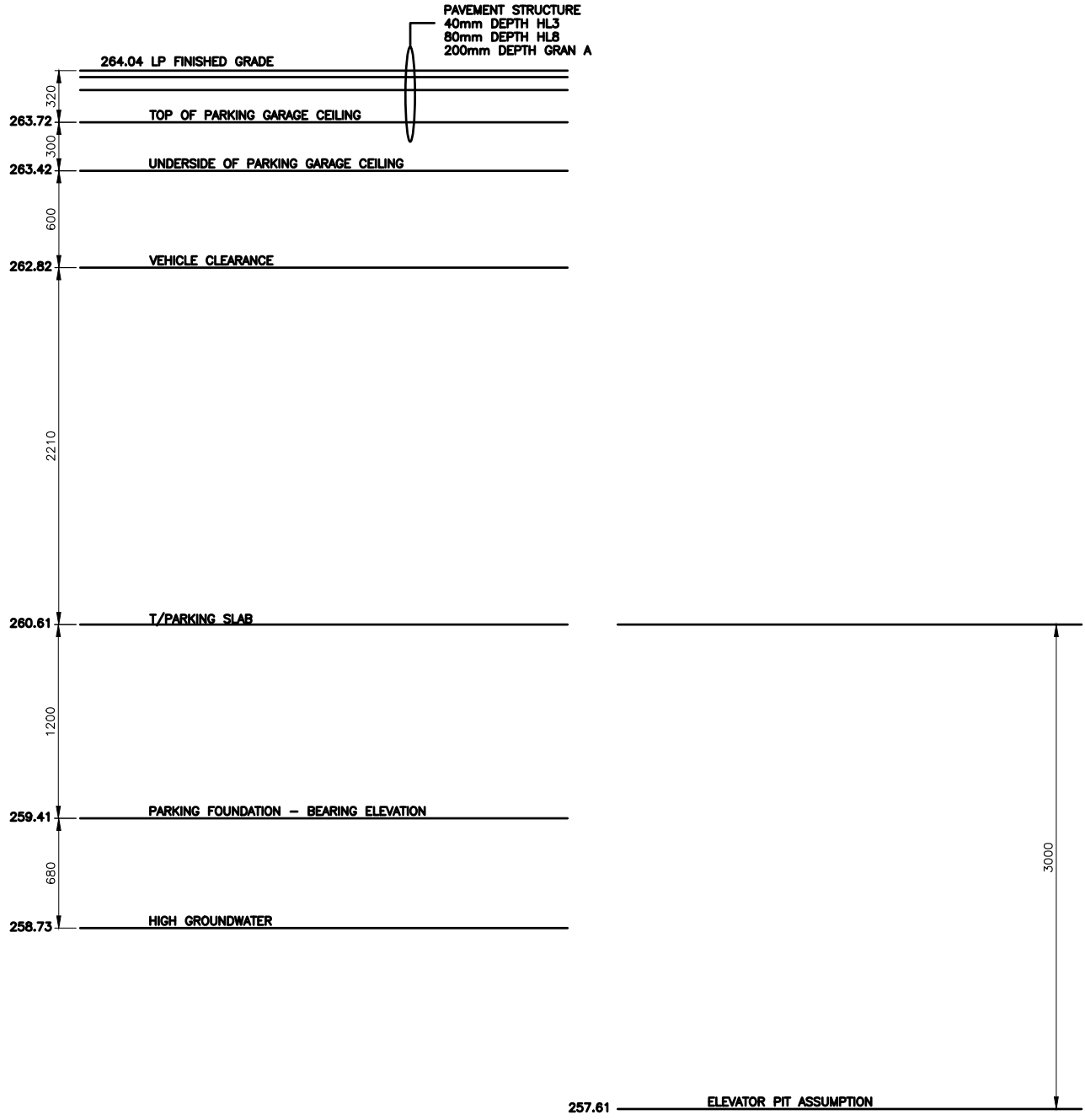
Please provide a draft for review by Thatham before finalizing the report. Thank you.

Best Regards,

Robert Anderson OAA B.Arch. B.E.S.
President

Anderson Wellsman Architects Incorporated
1090 Don Mills Road Suite 612 Toronto Ontario M3C 3R6
t: 416-391-3699 119 f: 416-510-2629 Rob@AndersonWellsmanArchitects.ca

PHASE IV - Underground Parking and Excavation Elevations



Jeffrey Leon

From: Martin Mihov <mMihov@co-elevate.ca>
Sent: Tuesday, July 16, 2024 5:02 PM
To: Jeffrey Leon
Subject: RE: Structural SPA

Hi Jeffrey,

Hope□ully this in□o can save a little bit, but your estimate o□15m x 10m at the elevators would certainly be on the conservative side (and maybe beneficial at this stage) □or phase 2, 3, and 4. At least knowing phases 1, 2, and 3 are essentially unchanged should reduce some rework on your end.

Let me know i□you have any other questions I can help with. I□you can't get me at my desk phone you can reach out to me on my cell: 226-374-8682

Regards,

Martin Mihov, P.Eng.
T: 519-681-6475 x130 | co-elevate.ca

From: Jeffrey Leon <Jeffrey.Leon@exp.com>
Sent: Tuesday, July 16, 2024 4:57 PM
To: Martin Mihov <mMihov@co-elevate.ca>
Subject: RE: Structural SPA

Hi Martin,

Thanks □or this in□ormation. We can use this in□o to finish our dewatering estimates now.

Much appreciated,

Jeffrey Leon, M.Sc.
EXP | Project Manager, Hydrogeology
t : +1.905.793.9800, 62485 | m : +1.289.339.5942 | e : jeffrey.leon@exp.com
exp.com | legal disclaimer
keep it green, read from the screen

From: Martin Mihov <mMihov@co-elevate.ca>
Sent: Tuesday, July 16, 2024 4:37 PM
To: Jeffrey Leon <Jeffrey.Leon@exp.com>
Subject: RE: Structural SPA

Good A□ternoon Jeffrey,

Just talked to Paul. Phases 1, 2, and 3 are unaffected by the parking garage basement slab being lowered. In reviewing the basement layout and phase 4 buildings, it doesn't seem □easible to bring the buildings up with ramps, their basement slab will need to match the parking. The typical bearing elevation □or most □oundations we show as 260.0m will drop by the 300mm needed down to 259.70m.

I've attached a very quick rough markup to give you sizes and thicknesses o□the phase 2, 3, and 4 elevator □oundations. Standard 1.5m pit depth to top o□□oundations should be adequate (although it is possible phase 4 towers due to height may need a 1.8m pit depth, but we do not have this in□ormation at this time that I'm aware o□).

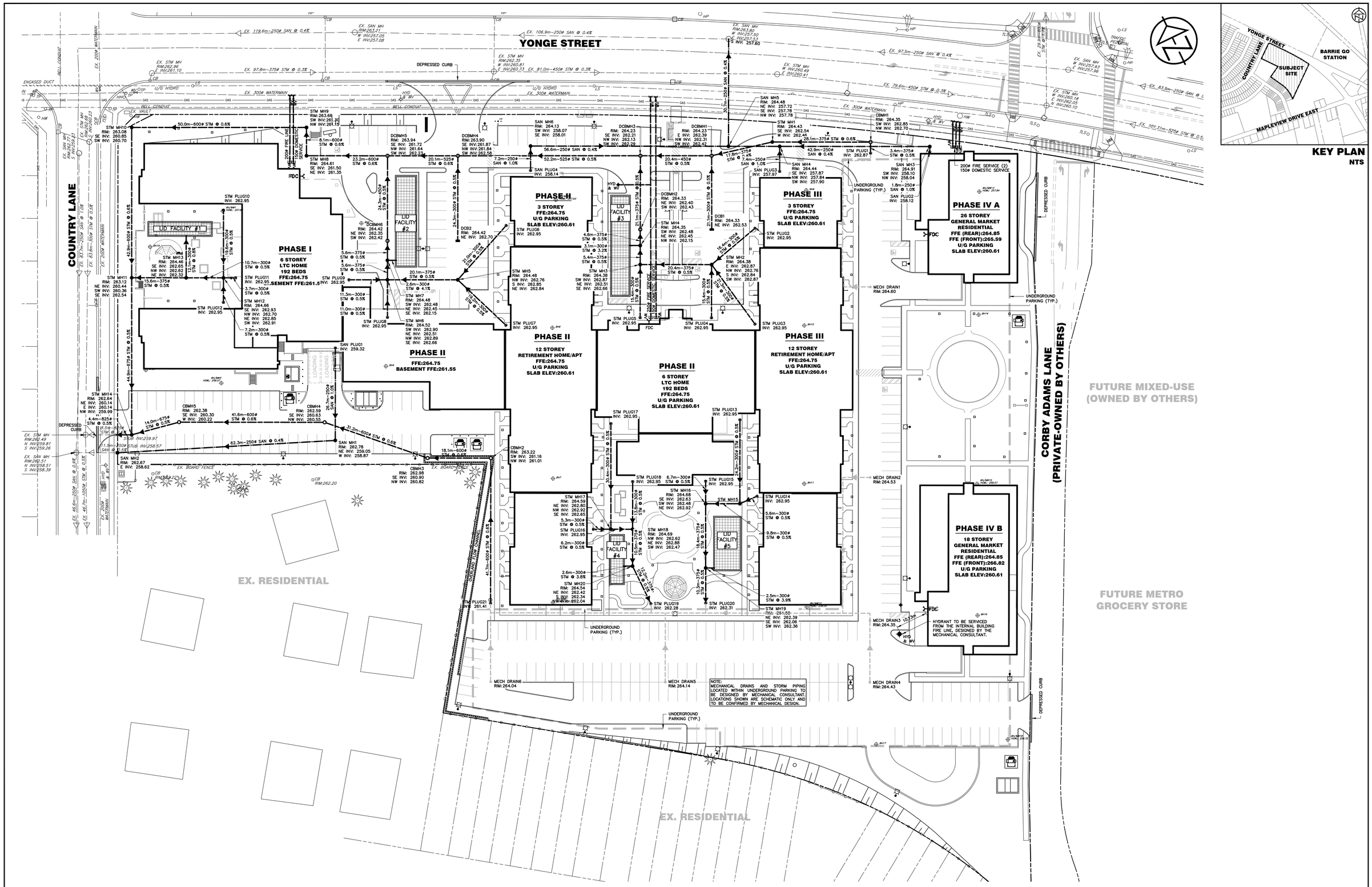
Regards,

Martin Mihov, P.Eng.
T: 519-681-6475 x130 | co-elevate.ca

From: Martin Mihov
Sent: Tuesday, July 16, 2024 4:03 PM
To: Jeffrey Leon <Jeffrey.Leon@exp.com>
Subject: Structural SPA

Regards,

Martin Mihov, P.Eng.
T: 519-681-6475 x130 | co-elevate.ca



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SITE PLAN INFORMATION SHOWN ON THIS PLAN BASED ON DRAWING SP1.0, PREPARED BY ANDERSON WELLSMAN ARCHITECTS INCORPORATED DATED JULY 18, 2024.

BENCHMARK

TBM#1 ELEV. 263.48 m

MNR No. 001193IU460S – SOUTHWEST CORNER OF ST. PAUL'S CRESCENT AND YONGE STREET, TABLET SET HORIZONTALLY IN NORTH FACE OF CONCRETE FOUNDATION OF ST. PAUL'S ANGLICAN CHURCH, AT NORTH–EAST CORNER (TOWER) 15.2 m WEST OF BEL POLE AND 9.2 m SOUTH–EAST OF "V" IN TWIN BIRCH TREES 15 cm BELOW BRICK.

No.	REVISION DESCRIPTION	DATE
1.	SITE PLAN APPROVAL – FIRST SUBMISSION	JULY 17/24

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
N.A. MILLINGTON
100190121
July 17/24
PROVINCE OF ONTARIO

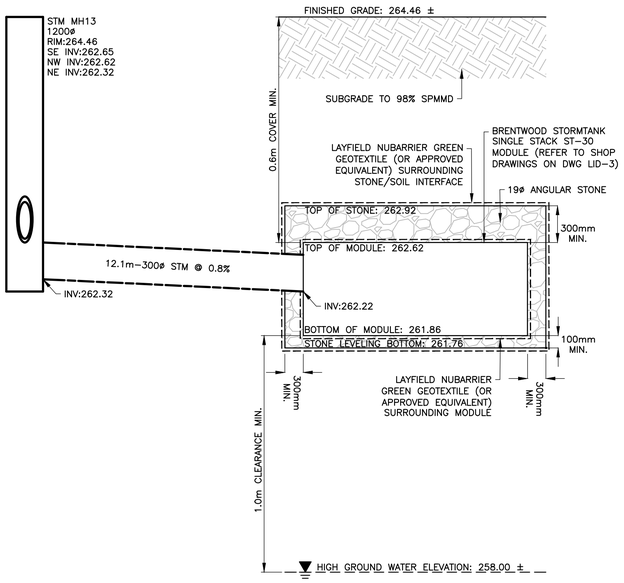
THE VILLAGE OF INNIS LANDING
800 YONGE STREET
CITY OF BARRIE

TATHAM ENGINEERING

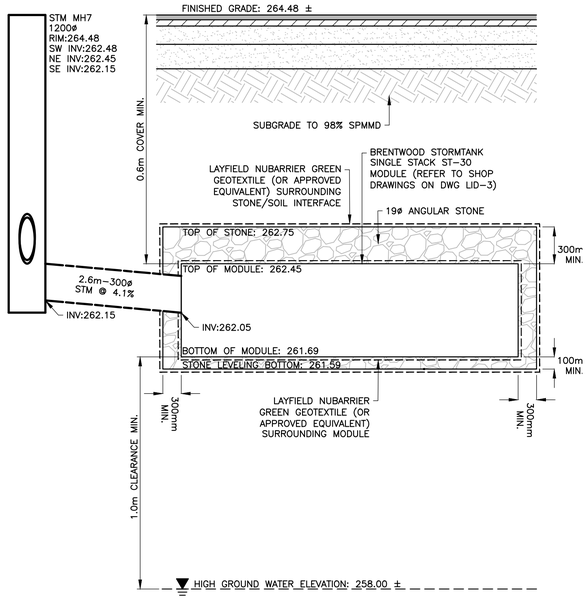
MASTER SERVICING PLAN

DESIGN: LC	FILE: 422426	DWG: MSP-1
DRAWN: LQ/JLM	DATE: APRIL 2024	
CHECK: BFS/NM	SCALE: 1:500	

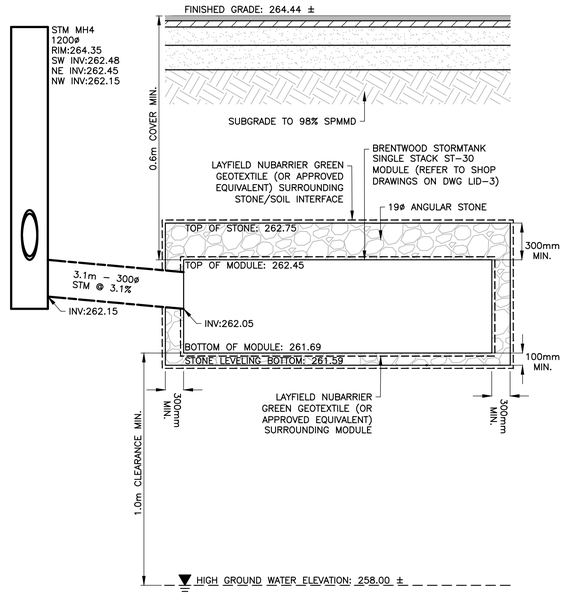
Drawing Name: 422426–MSP01.dwg, Plotted: Jul 17, 2024



A LID-2 LOW IMPACT DEVELOPMENT FACILITY #1
NTS



B LID-2 LOW IMPACT DEVELOPMENT FACILITY #2
NTS



C LID-2 LOW IMPACT DEVELOPMENT FACILITY #3
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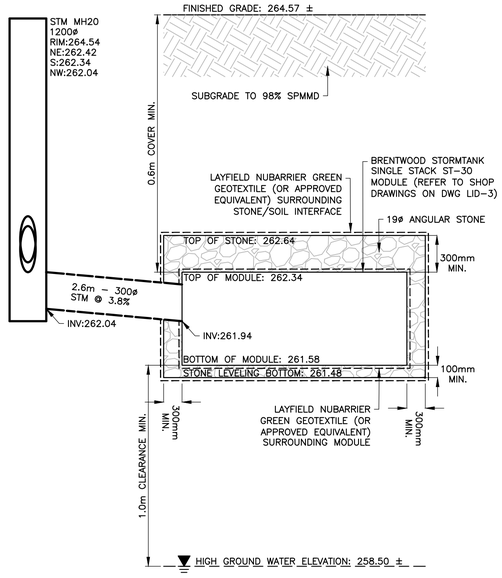

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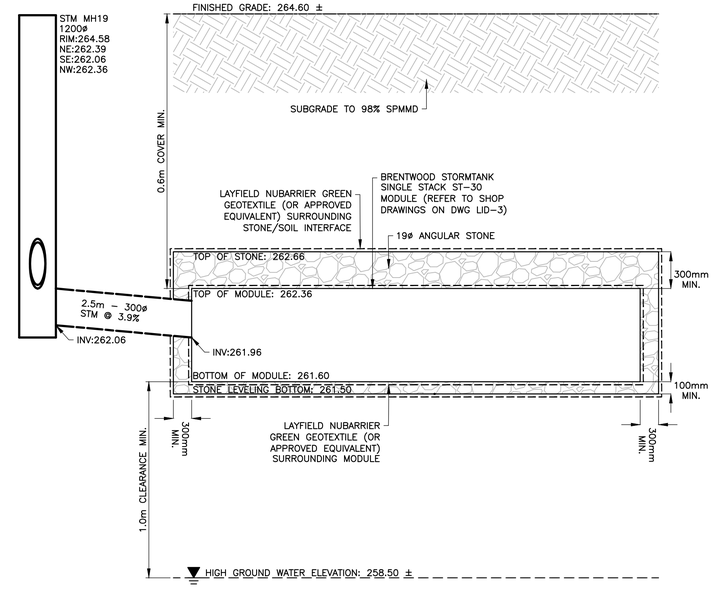
NTS



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SITE PLAN INFORMATION SHOWN ON THIS PLAN BASED ON DRAWING SP1.0, PREPARED BY ANDERSON WELLSMAN ARCHITECTS INCORPORATED DATED JULY 18, 2024.

BENCHMARK

TBM#1 ELEV. 263.48 m
MNR No. 001193IU460S – SOUTHWEST CORNER OF ST. PAUL'S CRESCENT AND YONGE STREET, TABLET SET HORIZONTALLY IN NORTH FACE OF CONCRETE FOUNDATION OF ST. PAUL'S ANGLICAN CHURCH, AT NORTH-EAST CORNER (TOWER) 15.2 m WEST OF BEL POLE AND 9.2 m SOUTH-EAST OF "V" IN TWIN BIRCH TREES 15 cm BELOW BRICK.

No.	REVISION DESCRIPTION	DATE
1.	SITE PLAN APPROVAL – FIRST SUBMISSION	JULY 17/24

ENGINEER STAMP

LICENSED PROFESSIONAL ENGINEER
N. A. BELLINGTON
100190121
July 17/24
PROVINCE OF ONTARIO

THE VILLAGE OF INNIS LANDING
800 YONGE STREET
CITY OF BARRIE

LOW IMPACT DEVELOPMENT FACILITY
CROSS-SECTIONS

TATHAM ENGINEERING

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DRAWN: LQ/JLM	DATE: APRIL 2024	LID-2	
CHECK: BFS/NM	SCALE: –		

Drawing Name: 422426-LID02.dwg, Plotted: Jul 17, 2024

Appendix I – Construction Dewatering Calculations

APPENDIX I: Short-Term Flow Rate

800 Yonge Street, Barrie, ON
GTR-21023592-A0

Table F-1: Flow from All Sides of Excavation

			P1								
Parameters	**Symbols**	**Unit**	**Phase 1**	**Elevator Pit (Ph 1)**	**Phase 2**	**Elevator Pit (Ph 2)**	**Phase 3**	**Elevator Pit (Ph 3)**	**Phase 4**	**Elevator Pit (Ph 4)**	**Underground Services**
Geological Formation	-	-	Glacial Deposit	-	Glacial Deposit	-	Glacial Deposit		Glacial Deposit	-	Glacial Deposit
Ground Elevation	-	mASL	264.75	264.75	264.75	264.75	264.75	264.75	264.04	264.04	264.00
Lowest Top Slab Elevation	-	mASL	261.55	258.55	261.25	258.25	261.25	258.25	260.61	257.61	-
Highest Groundwater Elevation	-	mASL	259.10	258.70	259.40	258.70	259.57	258.70	259.73	258.41	260.23
Lowest Excavation Elevation	-	mASL	259.70	255.55	259.70	255.25	259.70	255.25	259.41	254.61	260.75
Base of the Water-Bearing Zone	-	mASL	244.00	244.00	244.00	244.00	244.00	244.00	244.00	244.00	244.00
Height of Static Water Table Above the Base of the Water-Bearing Zo	**H**	m	15.10	14.70	15.40	14.70	15.57	14.70	15.73	14.41	16.23
Dewatering Target Elevation	-	mASL	258.70	257.55	258.70	257.25	258.70	257.25	258.41	256.61	259.75
Height of Target Water Level Above the Base of Water-Bearing Zone	**h_w**	m	14.70	13.55	14.70	13.25	14.70	13.25	14.41	12.61	15.75
Hydraulic Conductivity	**K**	m/s	6.9E-05	6.9E-05	6.9E-05	6.9E-05	6.9E-05	6.9E-05	6.9E-05	6.9E-05	6.9E-05
Length of Excavation	-	m	65.00	15.00	124.00	15.00	124.00	15.00	167.00	15.00	30.00
Width of Excavation	-	m	56.00	10.00	43.00	10.00	24.00	10.00	50.00	10.00	2.00
Equivalent Radius (equivalent perimeter)	**r_e**	m	38.52	7.96	53.16	7.96	47.11	7.96	69.07	7.96	10.19
Method to Calculate Radius of Influence	-	-	**Cooper-Jacob**	**Cooper-Jacob**	**Cooper-Jacob**	**Cooper-Jacob**	**Cooper-Jacob**	**Cooper-Jacob**	**Cooper-Jacob**	**Cooper-Jacob**	**Cooper-Jacob**
Time (30 days)	**t**	s	2592000	2592000	2592000	2592000	2592000	2592000	2592000	2592000	2592000
Specific Yield	**Sy**		0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Cooper-Jacob's Radius of Influence from Sides of Excavation	**Rcj**	m	175	172	177	172	178	172	178	171	181
Radius of Influence	**Ro**	m	213	180	230	180	225	180	247	179	191
Dewatering Flow Rate (unconfined radial flow component)	**Q**	m^3/day	131	196	271	245	318	245	587	294	99
Factor of Safety	**fs**	-	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Dewatering Flow Rate (multiplied by factor of safety)	**Q.fs**	m^3/day	262	392	542	489	635	489	1174	589	197
Precipitation Event	-	mm/day	25	0	25	0	25	0	25	0	25
Volume from Precipitation	-	m^3/day	91	0	133	0	74	0	209	0	2
Dewatering Flow Rate **Without Safety Factor** (including stormwater collection)	-	m^3/day	222	196	405	245	392	245	796	294	100
Dewatering Flow Rate **With Safety Factor** (including stormwater collection)	-	m^3/day	353	392	676	489	710	489	1383	589	199
Dewatering Flow Rate, Total with Safety Factor and Stormwater, inclusive of Elevator Pit	-	m^3/day	745		1165		1199		1972		

Notes:
mASL - meters above sea level

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

$$Q_w = \frac{\pi K (H^2 - h^2)}{Ln\,[\frac{R_o}{r_e}]}$$ (Based on the Dupuit-Forcheimer Equation)

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

Where:

Q_w = Flow rate per unit length of excavation (m^3/s)
K = Hydraulic conductivity (m/s)
H = Height of static water table above base of water-bearing zone (m)
h_w = Height of target water level above the base of water-bearing zone (m)
Rcj=Cooper Jacob Radius of Influence (m)
R_o=Radius of influence (m)
re=Equivalent perimeter (m)

Appendix J – Water Balance Assessment

Appendix J-1: Model Input

800 Yonge St, Barrie
GTR-21023592-A0

Period	Month	Average Temperature (^{0}C)	Average Precipitation (mm)
1978-2006	1	-7.8	91.9
1978-2006	2	-7.0	59.5
1978-2006	3	-1.8	55.4
1978-2006	4	5.5	63.4
1978-2006	5	12.3	80.2
1978-2006	6	17.8	84.0
1978-2006	7	20.7	76.9
1978-2006	8	19.8	88.7
1978-2006	9	15.3	91.3
1978-2006	10	8.6	80.2
1978-2006	11	2.7	84.7
1978-2006	12	-3.6	76.8

Note:

Station Name	BARRIE WPCC	
Station ID	ONTARIO	
Longitude	44.38	
Latitude	-79.69	
Elevation	164.0	masl

Appendix J-2: Model Output

800 Yonge St, Barrie
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Month	PET	P	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus
January	7.8	91.9	13.3	196.5	7.8	0.0	105.2	13.8
February	9.3	59.5	21.4	196.3	9.2	0.1	133.3	21.7
March	18.4	55.4	58.9	200.0	18.4	0.0	109.7	55.2
April	35.8	63.4	79.2	200.0	35.8	0.0	55.0	79.2
May	68.3	80.2	35.4	196.8	68.3	0.0	27.5	38.6
June	101.3	84.0	-7.6	179.6	101.2	0.2	13.6	9.7
July	120.4	76.9	-39.2	142.4	116.3	4.1	5.4	2.1
August	96.4	88.7	-7.9	136.5	91.0	5.3	1.3	3.3
September	55.7	91.3	32.3	156.6	55.0	0.7	0.0	13.0
October	29.1	80.2	47.1	180.5	29.1	0.0	0.0	23.2
November	15.1	84.7	63.7	197.0	15.1	0.0	1.9	47.3
December	9.2	76.8	32.5	198.7	9.2	0.0	35.2	30.7
Annual Rate (mm/yr)	**566.7**	**933.0**			**556.3**		**488.2**	**376.7**

Note:	Year 1978-2006	
Station Name	BARRIE WPCC	
Station ID	ONTARIO	
Longitude	44.38	
Latitude	-79.69	
Elevation	352.0	masl

APPENDIX J-3
Average Infiltration Factors

800 Yonge St, Barrie
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F-3-1. Average Infiltration Factor – Pre Development Conditions

Un-Mitigated

Category	Weighted Infiltration Factor
Topography/Slope	0.14
Soil Type Glaciolacustrine deposits (Silty to Clayey Till)	0.30
Cover Landscaped Areas	0.10
Total weighted Infiltration factor	**0.54**

F-3-2. Average Infilteration Factor – Post Development Conditions

Un-Mitigated

Category	Weighted IInfiltration Factor
Topography/Slope	0.14
Soil Type Glaciolacustrine deposits (Silty to Clayey Till)	0.30
Cover Landscaped areas	0.10
Total weighted Infiltration factor	**0.54**

Notes:
Landscaped area considered equivalent to Cultivated Cover
Assumed existing and proposed slopes are similar

Appendix J-4

Summary of Pre and Post-Development Water Balance

800 Yonge St, Barrie

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J-4-1. Climate Data

Item	Pre-Development mm/a		Post-Development mm/a
Precipitation	933.02		933.02
Evapotranspiration	556.35		556.35
Water Surplus	376.67		376.67
Infiltration Rate	202.65		202.65
Runoff	174.02		174.02

J-4-2. Pre-Developed Area Statistics

Open spaces/Landscaped	40,461	sq.m.	100%
Paved Surfaces	0	sq.m.	0%
Existing Buildings	0	sq.m.	0%
TOTAL	40,461	sq.m.	100%

J-4 Post Development Area Statistics

Industrial Development

Building Roofs, Parkette Area (Underlying Parking)	13,150	sq.m.	32.5%
ROW (Roads, Sidewalks, Parking) - Paved	20,028	sq.m.	49.5%
Open Areas/Landscaped Areas not Overlying Built Underground	7,283	sq.m.	18.0%
TOTAL	40,461	sq.m.	

J-4-4-1. Annual Pre-Development Water Balance

Land Use	Area (sq.m.)	Precipitation (cu.m.)	Actual Evapotranspiration (cu.m.)	Infiltration Rate (cu.m.)	Run-off (cu.m.)
Total Impervious (Buildings and Paved Surfaces)	0	0	0	0	0
Open Spaces	40,461	37,751	22,510	8,199	7,041
TOTAL	40,461	37,751	22,510	8,199	7,041
	Pre-development Infiltration Rate		**556.348**	**202.650**	**174.023**
		100	59.6	21.7	18.7

J-4-5-1. Annual Post-Development Water Balance

Land Use	Area (sq.m.)	Precipitation (cu.m.)	Actual Evapotranspiration (cu.m.)	Infiltration Rate (cu.m.)	Run-off (cu.m.)
Building Roofs	13,150	12,269	0	0	12,269
ROW (Roads, Sidewalks, Parking) - Paved	20,028	18,687	0	0	18,687
Landscaped Areas	7,283	6,795	4,052	1,476	1,267
TOTAL	40,461	37,751	4,052	1,476	32,223
	Post-development Infiltration Rate		**100.143**	**36.48**	**796.40**
		100.0	10.7	3.9	85.4

J-4-6-1. Comparison of Pre-Development and Post-Development

Item	Precipitation (cu.m.)	Actual Evapotranspiration (cu.m.)	Run-off (cu.m.)	Infiltration Rate for Areas (cu.m.)
Pre-Development	37,751	22,510	7,041	8,199
Post Development	37,751	4,052	32,223	1,476
			Pre-development Infiltration Rate	**202.6**
			Post-development Infiltration Rate	**36.5**
			Deficit Post Development	**6,724**

APPENDIX J-5

800 Yonge St, Barrie

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Estimate of Area for Infiltration System

1. Design Infiltration Rate

Item	Value	Unit
Geometric mean of design infiltration rates	16	mm/h
	384	mm/day
	0.38	m/day/m^2
	0.77	m/48 hrs/m^2

2. Climate Data

Total precipitation based on weather station records	933.02	mm/yr
Total rain in an eight (8) month precipitation period	622.01	mm/8 months
Based on a 16-week precipitation period	38.88	mm/2 week
Based on a 16-week precipitation period	0.039	m/2 week

3. Roof and Resulted Runoff Volume

Total building area (Building Roofs, Underground Parking below Parkette)	13,150	m^2
Rooftop runoff volume in an eight (8) month precipitation period	8,179	m^3/year
Total rooftop runoff volume per 2 weeks	511	m^3/2 weeks

4. Estimated Deficit Volume

Estimated deficit based on water balance calculations	6,724	m^3/yr
Deficit over available water (roof runoff) for infiltration	82%	-
Min. Storage to infiltrate to meet deficit	420.2	m^3/2 week
mm Retention	10.4	mm

Area of infiltration system required to mitigate infiltrate deficit (rounded)	**545**	m^2
% of total site area	**1%**	

Note: only roof water to be infiltrated (clean water)