



Proposed Residential Subdivision Watersand North Phase II

Watersand Construction Limited

Attn: Mr. Peter Murphy, P.Eng.

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1. Introduction

EXP Services Inc. (EXP) is pleased to present this report detailing the results of the geotechnical investigation carried out for a proposed Watersand North Phase II residential subdivision, to be located at civic address 259 Salem Road in Barrie, Ontario. The work was authorized by Mr. Peter Murphy on behalf of Watersand Construction Limited.

The project involves the design and construction of a residential subdivision, including single-family dwellings and townhouse blocks, a park block, and a stormwater management pond (SWMP). The development will be provided with municipal roads and services including sewers and watermains.

The purpose of the geotechnical investigation was to determine the subsurface soil and groundwater conditions at the site and based on this information, to provide an engineering report with geotechnical recommendations pertaining to the design and construction of the proposed residential subdivision.

A limited assessment of the chemical quality of the site soils was also completed to provide preliminary guidance regarding on-site reuse and off-site disposal options, the laboratory results are presented in Appendix A.

The comments and recommendations given in this report are based on the assumption that the above-described design concept will proceed into construction. If changes are made either in the design phase or during construction, this office must be retained to review these modifications. The result of this review may be a modification of our recommendations, or it may require additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

2. Site Description

The site is located on the south side of Salem Road about 1 km west of Veterans Drive in Barrie, Ontario. The civic address is 259 Salem Road. The site is irregular in shape, with a developable area of approximately 27.2 hectares (~67.2 acres). Much of the site contains undevelopable areas due to the presence of an unevaluated wetland identified by the Ministry of Natural Resources (MNR). The subject lands are currently under agricultural use.

The site is relatively flat, with ground surface elevations at the borehole locations ranging from 310.84 to 312.45 m, representing a relief of approximately 1.6 m over the site.

3. Fieldwork

The fieldwork was carried out between April 12 and 26, 2022 and consisted of the drilling of sixteen (16) sampled boreholes designated Boreholes 101 to 116 at the approximate locations shown on the Borehole Location Plan, Drawing 1, attached. Logs of the boreholes are also attached.

Prior to the commencement of drilling operations, underground services were cleared to minimize the risk of contacting any such services during the drilling operations.

The boreholes were advanced from 6.5 to 15.7 m depth using continuous flight hollow stem auger equipment owned and operated by a specialist drilling contractor. In each borehole, samples were recovered using conventional split spoon equipment in conjunction with the Standard Penetration Test (SPT) method.

Water levels were observed in the open boreholes during the course of the fieldwork. In addition, 50 mm diameter monitoring wells were installed in Boreholes 101, 103, 105, 106, 108, 110, 111, 112 and 115 for subsequent groundwater level measurements and hydrogeological purposed. Monitoring wells were generally installed along the presumptive roadways based on the site concept plan provided. The monitoring well in Borehole 112 was also installed in proximity to the proposed SWMP.

The fieldwork was supervised throughout by an EXP geotechnical technologist who directed the drilling and sampling operations, prepared borehole logs, made groundwater observations during and upon completion of drilling, and processed the recovered samples. In the laboratory, the samples were classified as to their visual and textural characteristics. Natural moisture content tests were carried out for all recovered samples and grain size analysis was carried out on six representative soil samples.

The borehole locations and ground surface elevations were surveyed in the field by EXP. The ground surface elevation at the borehole locations were referenced to geodetic elevations.

4. Laboratory Testing

The laboratory testing program comprised the following:

- Moisture content determination on all recovered soil samples, with results presented on the Log of Borehole sheets.
- Grain size analysis on six (6) soil samples (BH 101 SS7, BH 103 SS12, BH 106 SS12, BH 108 SS7, BH 111 SS6 and BH 115 SS7), with results presented on the Grain Size Analysis Reports.
- O. Reg. 153/04 bulk chemical testing for metals and inorganics, petroleum hydrocarbons (F1 to F4 fractions), Benzene, Toluene, Ethylbenzene and Xylene (BTEX) and Organochlorine Pesticides (OCPs) on eighteen (18) soil samples (includes two duplicates), with results presented in Appendix A.
- O. Reg. 406/19 leachate chemical testing for modified Synthetic Precipitate Leaching Procedure (mSPLP) metals and mSPLP OCPs on four (4) soil samples, with results presented in Appendix A.

5. Subsurface Conditions

5.1 Soil

The detailed profiles encountered in each borehole and the results of laboratory moisture content are indicated on the attached borehole logs. It should be noted that the soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect transition zones, for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The "Notes on Sample Description" (Figure 1) preceding the borehole logs (Figures 2 to 17) are an integral part of, and should be read in conjunction with, this report.

The stratigraphy encountered at the site as revealed in the boreholes typically comprises topsoil overlying local clayey silt or silt, granular soils consisting of sand/silty sand/sand and silt/sandy silt, and glacial till.

A brief description of the soil profiles, in general order of depth, follows.

Topsoil

A layer of topsoil, 80 to 300 mm in thickness, was encountered at the surface of all boreholes.

With respect to topsoil, it should be noted that topsoil measurements were carried out at the borehole locations only and could differ at other locations on the site. Consequently, topsoil quantities should not be established from the information provided at the borehole locations. If required, a more detailed test pit program should be carried out to more accurately quantify the amount of topsoil to be removed for construction purposes.

Clayey Silt

A clayey silt layer was encountered below the topsoil in Boreholes 102 and 104. The layer extended to the 8.1 m depth of drilling in Borehole 104 and was penetrated at 4.0 m depth (Elevation 308.1 m) in Borehole 102. The layer was typically firm to very stiff (N-Values of 11 to 24) and was locally soft at the top of Borehole 102 (N-Value of 3) and hard at the base of Borehole 104 (N-Value of 35). The layer contained trace to some sand and gravel and was noted as about the plastic limit (APL). Moisture contents were recorded at 16 to 31%.

Sand/Silty Sand/Sand and Silt/Sandy Silt

A major granular deposit (sand/silty sand/sand and silt/sandy silt) was encountered in all boreholes with the exception of Boreholes 102 and 104, dominating the site composition with the below noted till layer. Three samples of the granular deposit were submitted for grain size analysis and the results demonstrating the gradation distribution are presented on Figure 18, attached. Trace clay and gravel were observed throughout the unit. Sand and gravel layers and occasional silt seams were also noted locally. The granular layers were particularly dominant at the south end of the site, locally intercepted by the till deposit. At the north end of the property, the till and sand layers were more comparably represented. The layers were typically found in a compact to very dense state (N-Values greater than 10) below 1.5 to 3.0 m depth across the site. The layer was typically wet, with moisture contents recorded between approximately 3 and 25%.

Silt

A localized silt layer was encountered below the topsoil, clayey silt or sand in Boreholes 102 and 106 to 108. A sampling of the material was submitted for gradation and the results are presented on Figure 18, attached. The silt contained trace to some sand, trace clay and trace gravel. The layer was compact in Borehole 102 and 107 (N-Values of 10 to 24), and very dense in Boreholes 106 and 108 (N-Values greater than 50). The silt was moist to wet, with moisture contents of 13 to 29%.

Till

A till layer consisting of sandy silt/silty sand (locally clayey silt) was observed in Boreholes 101, 103, 105, 106, 109, and 114 to 116. The unit was intermixed with layers of the aforementioned granular soils (sand/silty sand/sand and silt/sandy silt). Variable clay and gravel content along with cobbles and boulders were noted. Wet sand seams were observed throughout the deposit. Two samples of the till material were submitted for grain size analysis, with results presented on Figure 19, attached. The till material was compact to very dense (N-Values of 16 to greater than 50) across the site. Moisture contents of the till were recorded at approximately 7 to 21 percent, with the moistures in the clayey silt till being slightly higher than the moisture retained in the sandy silt/silty sand deposits.

5.2 Groundwater

Groundwater conditions were observed in the boreholes during the course of the fieldwork and in fourteen (14) groundwater monitoring wells (at nine locations including five nested locations) installed in Boreholes 101 (shallow and deep), 103 (shallow and deep), 105, 106 (shallow and deep), 108, 110 (shallow and deep), 111, 112 and 115 (shallow and deep) to establish the stabilized short term groundwater conditions at the site. Short-term groundwater measurements are recorded in the attached borehole logs.

Upon completion of drilling, groundwater levels of about 2.4 to 7.0 m below existing grade (Elev. 304.3 to 309.5 m) were measured in fifteen of sixteen boreholes. Borehole 104 was recorded as dry. The observed groundwater levels and subsequent short-term groundwater level readings are presented in Table 1 below.

Table 1: Short-Term Groundwater Levels in Borehole Locations

Borehole No.	Approximate Ground Surface Elevation (m)	Groundwater Level below Existing Grade upon Completion (m)	Groundwater Level below Existing Grade/ Elevation in Groundwater Monitoring Well (m)	
			May 25, 2022	June 8, 2022
BH 101	312.35	5.3 / 307.1	0.69 / 311.66 (Shallow)	0.37 / 311.98 (Shallow)
			0.70 / 311.65 (Deep)	0.56 / 311.79 (Deep)
BH 102	312.11	2.6 / 309.5	--	--
BH 103	311.34	5.6 / 305.7	0.89 / 310.45 (Shallow)	0.86 / 310.48 (Shallow)
			1.10 / 310.24 (Deep)	1.13 / 310.21 (Deep)
BH 104	311.91	No Water	--	--
BH 105	311.98	7.0 / 305.0	1.11 / 310.87	3.76 / 308.22
BH 106	312.39	6.5 / 305.9	0.84 / 311.55 (Shallow)	0.79 / 311.60 (Shallow)
			0.87 / 311.52 (Deep)	0.78 / 311.61 (Deep)
BH 107	312.43	5.2 / 307.2	--	--
BH 108	312.21	3.1 / 309.1	--	1.29 / 310.92
BH 109	312.10	5.6 / 306.5	--	--
BH 110	312.45	3.9 / 308.6	2.43 / 310.02 (Shallow)	2.66 / 309.79 (Shallow)
			2.44 / 310.01 (Deep)	2.59 / 309.86 (Deep)
BH 111	311.90	3.1 / 308.8	1.94 / 309.96	2.18 / 309.72
BH 112	310.94	5.0 / 305.9	1.23 / 309.71	1.33 / 309.61

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Borehole No.	Approximate Ground Surface Elevation (m)	Groundwater Level below Existing Grade upon Completion (m)	Groundwater Level below Existing Grade/ Elevation in Groundwater Monitoring Well (m)	
			May 25, 2022	June 8, 2022
BH 113	311.84	3.0 / 308.8	--	--
BH 114	311.73	2.4 / 309.3	--	--
BH 115	310.84	6.5 / 304.3	2.14 / 308.70 (Shallow)	2.37 / 308.47 (Shallow)
			2.03 / 308.81 (Deep)	2.21 / 308.63 (Deep)
BH 116	311.82	6.4 / 305.4	--	--

The groundwater elevations reflect conditions at the time of the investigation/monitoring period. Seasonal fluctuation of the groundwater levels at the site should be anticipated.

A year-long groundwater level monitoring assignment has been undertaken and will be reported upon its completion.

The monitoring wells were installed in general accordance with the Ontario Water Resources Act-R.R.O. 1990, Regulation 903 – Amended to O. Reg. 128/03 by Skycrest Services Inc., a licensed well contractor. When the use of the monitoring wells is no longer required, they must be decommissioned in accordance with the procedure outlined in the Ontario Water Resources Act – R.R.O. 1990, Regulation 903 – Amended to O. Reg. 128/03.

6. Engineering Discussion and Recommendations

6.1 General

The project involves the design and construction of a residential subdivision, including single-family dwellings and townhouse blocks, a park block, and a stormwater management pond (SWMP). The development will be provided with municipal roads and services including sewers and watermains.

The following subsections provide geotechnical engineering guidelines for the design and construction of the proposed residential subdivision.

6.2 Site Grading

Final site grades have not been established at the time of this investigation. However, based on preliminary sanitary sewer inverts provide, it is anticipated that some minor regrading (cut and fill operations) will be carried out. The following procedures are recommended for the construction of structural fill for building lots and pavement areas, where required.

- All vegetation, topsoil, fill, topsoil-stained and loose native soil should be removed from proposed building and pavement areas. Loose native soils are noted to have extended as deep as 3 m in the boreholes.
- The exposed subgrade surface should be proof-rolled with a heavy roller and examined by a geotechnical engineer from EXP. Any soft or loose spots encountered during the process should be sub-excavated and replaced with approved on-site or imported materials, compacted to 100 percent standard Proctor maximum dry density (SPMDD).
- Low areas can then be brought up to final subgrade level with approved on-site or imported material placed in lifts not exceeding 300 mm and compacted to 100 percent SPMDD within building areas ("engineered fill") and 95 percent SPMDD to within 1.0 m of final subgrade level and 98 percent SPMDD for the upper 1.0 m in pavement areas. The moisture content of the fill to be placed should be at or near its optimum moisture content in order to assure the specified densities can be achieved with reasonable compactive effort. Some of the on-site soils will require partial drying before they can be properly compacted. Any organic or excessively wet or otherwise deleterious material should not be used for backfilling purposes.
- Fill and cut slopes should not be steeper than two horizontal to one vertical and should be protected from surface erosion.

- All imported borrow fill material from local sources should be free from organic material and foreign objects (i.e., trees, roots, debris, etc.) and should be tested geotechnically by EXP prior to transport to the site. In addition, the chemical quality of the borrow fill material should be assessed by EXP for conformance with applicable soil criteria listed in the Ministry of the Environment, Conservation and Parks (MECP) document “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act” dated April 15, 2011 (MECP Standards) in accordance with Ontario Regulation 153/04 as amended and for conformance with applicable MECP requirements under O.Reg. 406/19.
- All excavation, backfilling and compaction operations should be monitored on a full-time basis by qualified geotechnical staff to approve materials and to confirm that the specified degrees of compaction have been obtained.

6.3 Site Servicing

6.3.1 Watermain and Sewer Installation

6.3.1.1 Open Cut Excavation

Preliminary sewer and watermain invert levels were provided. Sanitary sewer inverts (noted on the attached borehole logs on a borehole-by-borehole basis) are currently projected to extend as deep as approximately 3.5 m below existing site grades (locally as high as 1 m above existing grade in a proposed grade raise area), with storm sewer and watermain inverts founded shallower. Based on the results of the investigation, excavation will generally be carried out through the topsoil, local native clayey silt and into the major native sand/silty sand/sandy silt and till layers. Harder digging and the presence of cobbles and boulders should be expected within the till layer.

Subject to groundwater control measures discussed in the following section, excavation may be carried out in open cuts using conventional equipment. Side slopes of temporary excavation must conform to the Occupational Health and Safety Act (OHSA) and local regulations. Within the meaning of OHSA, fill/disturbed soils (where encountered) can be classified as Type 4 soils. Deposits below the water table are also classified as Type 4 soils. Where dewatered, loose native granular soils and soft clayey silt are classified as Type 3 soil. The native deposits of compact to very dense till, sandy silt/silty sand/sand/silt, and firm to hard clayey silt are classified as Type 2 soils. In areas where localized seepage of groundwater is encountered it may be necessary to flatten the side slopes. Locally, due to

spatial restrictions, vertical trenching may be required. It is our opinion that steeper temporary slopes may be permitted if a trench box is utilized, subject to on-site inspection.

6.3.1.2 Groundwater Control

Based on stabilized groundwater level readings to date in conjunction with the anticipated servicing inverts and the mostly sandy site soils, groundwater control efforts are anticipated to be significant where excavations will be carried below the groundwater table. The use of well points for dewatering across the site is anticipated. Shallower excavations, or areas in which a grade raise will be enacted, may require less dewatering effort.

It should be recognized groundwater levels are also influenced by the effects of precipitation as well as seasonal fluctuations.

In general, the groundwater table should be lowered at least 0.5 m below the deepest excavation, prior to excavation.

EXP's hydrogeological assessment report, provided under separate cover, provides detailed groundwater control requirements for site servicing.

6.3.1.3 Pipe Bedding

It is anticipated the sewer and watermain pipes will be founded on competent native soils or on engineered fill. Provided adequate groundwater control measures are implemented, no bearing capacity problems are envisaged.

In general, the pipe bedding may consist of a minimum thickness of 150 mm of compacted OPSS Granular "A" material. Where wet conditions are encountered, the pipe bedding may comprise 150 mm of 19 mm clear stone or HL-6 stone material. However, the clear stone or HL-6 stone bedding must be completely wrapped in a geotextile filter fabric to prevent the migration of fines from the surrounding soils, which may result in settlement of the pipes. The chosen geotextile should be compatible with the existing soils on site. For preliminary guidance, it is anticipated Terrafix 270R or similar should suffice.

The base of the excavations in the competent compact to very dense granular soils or stiff to very stiff cohesive soils should remain stable provided excavations are not left open for extended periods of time, the groundwater is positively controlled, and the work is done in accordance with good construction practice.

The bedding material should be placed in 150 mm lifts and compacted to at least 98 percent SPMDD. Particular attention should be given to ensure material placed beneath the bottom quadrants of the pipe is adequately compacted. Compaction is not required for clear stone or HL-6 stone bedding.

Pipe cover material should consist of fine sand which can be more readily compacted with light equipment to avoid damaging the pipes. The cover material should be placed in 150 mm lifts, compacted to 98 percent SPMDD and extend to 300 mm above the top of the pipe.

6.3.1.4 Backfilling Operations

The existing native soils which do not include organics and other obviously unsuitable material may be reused as trench backfill if the moisture contents are within 2% of their optimum values. Wet soils will require drying for proper compaction.

Excavated topsoil should not be used for trench backfilling purposes and can be used in landscaping areas. Any organic or excessively wet or otherwise deleterious material should not be used for backfill purposes. Any shortfall of suitable on-site excavated material can be made up with imported clean approved fill or granular material, OPSS Granular 'B' or equivalent.

In general, the on-site native soils with the exception of the clean sand are not free draining and therefore should not be used where this characteristic is required, or in confined areas. Imported granular material conforming to OPSS Granular 'B' would also be suitable for these purposes.

In areas where substantial cutting and filling is required, the compaction of the fill should be monitored on a full-time basis by qualified geotechnical personnel.

All backfilling and compaction operations must be closely examined by qualified geotechnical personnel to confirm that uniform compaction to specification requirements is achieved, especially in the vicinity of sewer maintenance holes and catchbasins, near the ends of compaction runs, and in all areas that are not readily accessible to compaction equipment, etc. All backfilling should be placed in maximum 300 mm horizontal lifts and uniformly compacted to 95 percent SPMDD. Within the upper 1.0 m of road subgrade, the fill material should be compacted to at least 98 percent SPMDD. Smaller lifts may be required depending on the size of compaction equipment used by the contractor and the moisture content of fill at the time of construction.

To minimize potential problems, backfilling operations should follow closely after excavation so that only minimal length of trench slope is exposed. This will minimize wetting of the subgrade material. Should construction extend to the winter season, particular attention should be given to ensure that frozen material is not used as backfill.

6.3.2 Pavement Design and Construction

In lieu of grading plans, the pavement subgrade is expected to comprise native granular soils (sandy silt/silty sand/sand/sand and silt), glacial till, localized areas of clayey silt, or compacted engineered fill. The recommended pavement structures provided in Table 2 are based on an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. A functional design life of fifteen (15) years for collector roadways and twenty (20) years for local roadways has been used to establish the pavement recommendations. This represents the number of years to the first rehabilitation (partial depth removal), assuming regular maintenance is carried out.

Table 2: Recommended Pavement Structure Thicknesses

Pavement Layer	Compaction Requirements	Local Roadway	Collector Roadway	Driveway
Asphaltic Concrete (OPSS 310)	92 % MRD	40 mm HL3 70 mm HL8	40 mm HL3 100 mm HL8	65 mm HL3 (2 lifts)
OPSS Granular A Base (19 mm Crusher Run Limestone)	100% SPMDD*	150 mm	150 mm	150 mm
OPSS Granular B Subbase (50 mm Crusher Run Limestone)	100% SPMDD*	450 mm	540 mm	-

* Denotes Maximum Relative Density

The foregoing design assumes construction is carried out during dry periods and the subgrade is stable under the load of construction equipment. If construction is carried out during wet weather and heaving or rolling of the subgrade is experienced, additional thickness of subbase course material may be required.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be over-emphasized. The finished

pavement surface and underlying subgrade should be free of depressions and sloped to provide effective surface drainage toward catchbasins. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas.

Additional comments on the construction of proposed roadways are as follows:

1. As part of the subgrade preparation, proposed roadways should be stripped of topsoil and other obviously unsuitable material. Soft or spongy subgrade areas identified during proofrolling should be subexcavated and replaced with suitable approved backfill. Fill required to raise the grades to design elevations should be organic-free and at a moisture content which will permit compaction to 98 percent SPMDD. The final subgrade surface should be properly shaped and crowned.
2. The location and extent of subdrainage required within the paved areas should be reviewed by this office in conjunction with the proposed site grading. In view of the silty nature of the subgrade soils, we recommend subdrains be installed on both sides of the roadways at least 300 m below the granular subbase. This will ensure no water collects in the granular courses which could result in pre-mature pavement failure during the spring thaw.
3. To minimize problems of differential movement between the pavement and catchbasins/sewer maintenance holes due to frost action, backfill around these structures should consist of free-draining granular material. The granular material should be compacted to 98 percent SPMDD with a small tamper to avoid damaging the structures. In addition, catchbasins should be perforated just above the drain and the holes screened with filter cloth.
4. The most severe loading conditions on light-duty pavement areas and the subgrade may occur during construction. Consequently, special provisions such as restricted lanes, half-loads during paving, etc. may be required, especially if construction is carried out during unfavorable weather.

6.4 Residential Dwellings/Townhouses Construction

6.4.1 Foundation Considerations

Below the soft/loose upper soil layers, the compact to very dense native till/granular soils and firm to hard clayey silt are considered suitable for construction of single-family dwellings and townhouse blocks. Since final site grades have not yet been established, two (2) foundation

schemes are being presented for consideration; namely footings on native soils and footings on engineered fill.

6.4.1.1 Footings on Native Soil

At all borehole locations (Boreholes 101 to 116), the proposed structures may be supported on conventional spread and strip footings founded on the compact till/silt/granular soils (sand/silty sand/sand and silt/sandy silt), or firm clayey silt, below all existing topsoil, fill and soft/loose soils. Footings founded on the compact/firm soils at depths of approximately 1.5 to 3.0 m (~Elevation 307.8 to 311.0 m) may be designed for a Geotechnical Reaction of 150 kPa at Serviceability Limit States (SLS), subject to adequate groundwater control and inspection during construction. The factored Geotechnical Resistance at Ultimate Limit States (ULS) is 225 kPa.

6.4.1.2 Footing on Engineered Fill

The proposed structures may also be supported on footings founded on engineered fill developed over the competent native subgrade and designed for a Geotechnical Reaction of 150 kPa at SLS and a Factored Geotechnical Resistance of 225 kPa at ULS. The engineered fill should be constructed to above the level of the garage footings for the single-family dwellings. In the area of Boreholes 103, 106, 107, 111 and 112, if there is less than 1.0 m of engineered fill over the weaker native soils, the bearing should be reduced to 100 kPa SLS and 150 kPa ULS. Alternatively, the loose soil can be sub-excavated and compacted to 100 percent standard Proctor maximum dry density.

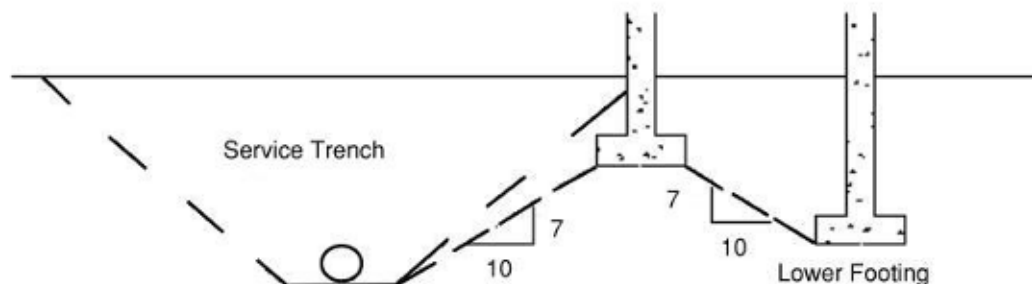
The engineered fill should be constructed by removing all topsoil, topsoil-stained soil and existing fill down to the competent native subgrade. The engineered fill should extend at least 3 m beyond the outside edge of exterior footings. The required extent of engineered fill should be determined based on a known fixed location for the structures and adherence to the conditions outlined in this report. The boundaries of the engineered fill should be laid out by a surveyor in consultation with qualified engineering staff.

As mentioned in the 'Site Grading' subsection, the exposed subgrade surface should be proof-rolled and examined by qualified geotechnical personnel prior to placement of engineered fill. Any loose or soft areas detected during proofrolling should be removed and replaced with approved material compacted to 100 percent SPMDD. The areas can then be brought up to design subgrade level with approved on-site or imported material placed in lifts not exceeding 300 mm and compacted to 100 percent SPMDD. Some of the on-site soils will require partial drying before they can be compacted to 100 percent SMPDD.

The engineered fill construction should be monitored on a full-time basis by qualified geotechnical personnel to examine and approve backfill materials, to evaluate placement operations, and to verify the specified degree of compaction is being achieved uniformly throughout the fill.

6.4.1.3 Foundations General

Footings which are to be placed at different elevations should be located such that the higher footings are set below a line drawn up at 10 horizontal to 7 vertical from the near edge of the lower footing. This concept should also be applied to excavations for new foundations in relation to existing footings or underground services. This concept is illustrated in the following sketch:



FOOTINGS NEAR SERVICE TRENCHES OR AT DIFFERENT ELEVATIONS

All footings exposed to seasonal freezing conditions should be protected from frost action by at least 1.2 m of soil cover or equivalent insulation, depending on the final design requirements.

The total and differential settlements of well designed and constructed footings placed in accordance with the foregoing recommendations, are expected to be less than 25 mm and 20 mm, respectively.

It should be noted that the recommended bearing capacities have been calculated by EXP from the borehole information for the design stage only. The investigation and comments are necessarily ongoing as new information on underground conditions becomes available. For example, it should be appreciated that modifications to bearing levels may be required if unforeseen subsoil conditions are revealed after the excavation is exposed to full view or if final design decisions differ from those assumed in this report. For this reason, this office should be retained to review final foundation drawings and to examine footing conditions.

6.4.2 Excavation and Groundwater Control

Excavation for single family dwellings with a basement will extend to about 1.5 to 2.5 m below finished grade. Excavation should be relatively straightforward and must be carried out in accordance with the latest edition of the OHSA and local regulations. For preliminary guidance, side slopes of one vertical to one horizontal may be used, subject to geotechnical inspection. Where loose soil is encountered, it may be necessary to locally flatten the side slopes. Harder digging and the presence of cobbles and boulders should be expected within the till layer.

As grading plans have not been provided, the degree of groundwater control required to permit foundation construction is currently unknown. It is anticipated that conventional construction dewatering techniques (such as pumping from sumps), may be sufficient in areas with proposed grade raises, while required dewatering efforts are anticipated to be more significant (such as vacuum well points) where excavation is to extend below the groundwater table.

In general, the groundwater table should be lowered at least 0.5 m below the deepest excavation, prior to excavation. Where possible, foundations/basements should be founded above the seasonal high groundwater table.

EXP's hydrogeological assessment report, provided under separate cover, provides detailed groundwater control requirements for foundation construction.

6.4.3 Soil Adfreezing

The native silty soils, if wet, will have high soil adfreezing potential. As such, it is our opinion that these materials should not be used as backfill around and inside the garage foundations. It is recommended that sand or sand and gravel, either sourced from on-site or imported material (Granular 'B'), be used for this purpose.

If the native silty soil is used as backfill around the garage, it is recommended that the exterior walls of the garage foundations be wrapped with a folded polyurethane sheet to eliminate contact between the concrete foundation wall and silty backfill material. In addition, Styrofoam insulation should be installed on the inside face of the garage walls and below the garage floor slab to prevent frost heave.

6.4.4 Floor Slab Construction and Permanent Drainage

The floor slab may be constructed as a slab-on-grade on a properly prepared subgrade (i.e., on native undisturbed soils or engineered fill). In this regard, all topsoil, fill and other obviously unsuitable material should be removed from the entire underfloor area and the exposed subgrade thoroughly proofrolled. Any soft spots detected should be sub-excavated and the area brought up to design grades using approved clean fill in the manner described in the "Site Grading" section of this report.

A 200 mm layer of 19 mm clear stone should be placed between the prepared subgrade and the floor slab to serve as a moisture barrier.

It is recommended that the foundation walls be covered with a bituminous damp-proofing spray and a drainage sheet. In addition, a weeping tile surrounded with 300 mm of 19 mm clear stone and wrapped with a filter cloth should be installed around the perimeter of the basement and be connected to a frost-free outlet.

In areas where the subgrade consists of wet/saturated soil or where persistent groundwater seepage is encountered during excavation, underfloor subdrains should also be installed. The subdrains should consist of 100 mm diameter perforated pipe surrounded by 150 mm of 19 mm clear stone all wrapped in Terrafix 270R or equivalent. The drainage system should lead to frost free sumps or outlets from which the water can be removed. The need for underfloor subdrains should be further assessed upon basement excavation.

6.4.5 Earth Pressure on Subsurface Walls

The lateral earth pressure acting on subsurface walls (i.e., basement walls) may be calculated from the following equation:

$$p = k(\gamma h + q)$$

where: p = the pressure in kPa acting against any subsurface wall at depth, h , below the ground surface;

k = the earth pressure coefficient considered to be appropriate for the subsurface walls, for this case, 0.4;

γ = the bulk unit weight of the backfill, use 22.5 kN/m^3 ;

h = the depth in m below the ground surface at which the pressure, p , is to be computed; and,

q = the value of any adjacent surcharge in kPa which may be acting close to

the wall.

The foregoing expression assumes an effective perimeter tile drain system will be incorporated to prevent the build-up of hydrostatic pressure behind the subsurface wall. All subsurface walls should be damp-proofed. To minimize infiltration of surface water, the upper 600 mm of backfill should comprise compacted relatively impervious material sloped away from the structure.

6.4.6 Earthquake Considerations

The recommendations for the geotechnical aspects to determine the earthquake loading are presented in the following paragraphs.

6.4.6.1 Subsoil Conditions

The subsoil and groundwater information at this site have been examined in relation to Section 4.1.8.4 of OBC 2012.

The subsoil consists of topsoil overlying local clayey silt or silt, granular soils consisting of sand/silty sand/sand and silt/sandy silt, and glacial till. The foundations will be supported on the competent native soils or on engineered fill.

There have been no shear wave velocity measurements carried out at this site and therefore, N-Values will be used to determine the site classification.

6.4.6.2 Depth of Boreholes

Table 4.1.8.4.A. Site Classification for Seismic Site Response in OBC 2012 indicated that to determine the site classification, the average properties in the top 30 m are to be used. The boreholes at this site were advanced to depths of 6.5 to 15.7 m below existing grade. Accordingly, the conditions encountered in the boreholes are assumed to remain constant or improve with depth. Bedrock was not encountered within the investigated depths at this site.

6.4.6.3 Site Classification

Based on the soil conditions, the Site Class for this site is “D” as per Table 4.1.8.4.A, Site Classification for Seismic Site Response, OBC 2012. A corresponding F_s of 1.6 is applicable. Shear wave velocity measurement can be carried out to determine if a higher Site Class can be used at this site.

6.5 Park Block

Parkland is proposed at Block 374 in the area of Boreholes 110 to 112. All three boreholes revealed a topsoil layer overlying granular soils consisting of sandy silt/silty sand/sand to the 7.9 to 15.5 m depth of exploration.

Final site grades have not been established at the time of this investigation, however it is anticipated that some regrading (cut and fill operations) will be carried out at the park block. Site grading in the proposed park block should be conducted using the procedures outlined in Section 6.2 of this report.

Based on the results of this investigation, construction of park infrastructure such as playing fields, playground areas, public washrooms and walkways is generally considered feasible. Topsoil is not suitable for foundation support. Depending on final site grades, Engineered Fill may provide the foundation support.

6.6 Stormwater Management Pond

A stormwater management (SWM) pond is to be constructed at the southeast corner of the site at the approximate location of Borehole 112 which was terminated at approximately 12.5 m depth (Elevation 298.4 m). The area is the relatively the lowest lying area of the site and conveyance of stormwater to this location is not expected to be an issue.

The soil stratigraphy of Boreholes 112 consisted of 300 mm of topsoil over native sandy silt/silty sand to 1.4 m depth (~Elevation 309.5 m), over a major sand layer to the 12.5 m depth of exploration. Stabilized groundwater levels about one month after well installation revealed the water level to be 1.23 m below existing grade (Elevation 309.71 m).

Preliminary design details of the proposed SWM pond show the proposed SWMP bottom to be founded at ~Elevation 309.00, within the compact portion of the sand layer, while the pond is intended to have a permanent pool maintained at ~Elevation 310.5 m. The following subsections provide general geotechnical engineering guidelines for SWMP construction. Variable soil conditions are not anticipated but if construction conditions differ significantly, additional geotechnical guidelines may be required.

6.6.1 Excavation and Groundwater Control

General bulk excavation to the pond bottom should be relatively straightforward using hydraulic equipment and must be carried out in accordance with the Occupational Health and Safety Act and local regulations.

The proposed base of the SWMP is approximately 0.7 m below the to-date high groundwater level recorded in the monitoring well installed in Borehole 112. Accordingly, significant groundwater control measures are anticipated to be required to permit construction. It is anticipated that positive dewatering efforts (well points) will be required.

In general, the groundwater table should be lowered at least 0.5 m below the deepest excavation, prior to excavation. EXP's hydrogeological assessment report, provided under separate cover, provides detailed groundwater control requirements for SWMP construction.

6.6.2 Pond Liner

Based on the proposed SWMP base elevation, the subgrade soil at the base of the pond will consist of sand with trace to some silt and trace clay. Considering the anticipated founding stratum, a low permeability liner will be required to maintain the proposed permanent water levels.

The low permeability liner may be constructed with a minimum 0.6 m thick layer of clayey soils conforming to OPSS.MUNI.1205 requirements. Alternatively, a geosynthetic clay liner such as Bentofix CNSL or a synthetic liner such as Nilex Geomembrane PVC 40 mil or equivalent may be used. If a geosynthetic or synthetic liner is used, a 300 mm layer of river sand and gravel should be placed above the liner as an indicator/protective soil cover. The liner should be installed as per the manufacturer's guidelines and up to a minimum of 1.0 m above the permanent water level in the pond.

As the base of the SWMP will extend below the groundwater table, the pond liner configuration will have to be designed to resist uplift from hydrostatic pressure.

6.6.3 Erosion Control

Without adequate protection, it is expected that overland flow, internal seepage and scouring will cause slope erosion eventually leading to surface instability and failure. Erosion control measures such as sodding or hydroseeding should be provided over the exposed slope surface. Armour stone with filter cloth backing should be placed on the slope face to prevent side sloughing.

6.7 Limited Environmental Testing of Site Soils

It is our understanding that during the proposed development of the Site, excess soils are anticipated to be generated. Soil testing results from EXP's geotechnical boreholes were compared against Site Condition Standards (SCS) established under the MECP "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act," dated April 15, 2011 (hereafter referred to as MECP SCS). In addition, to the results were compared to the MECP Table 1 Full Depth Background Soil Quality Standards (hereafter referred to as MECP Excess Soil Quality Standards) for Residential, Parkland, Institutional (RPI) and Industrial, Commercial, Community (ICC) property use.

The Planning Requirements for the Excess Soil Rules provide guidelines to identify contaminants of concern (COCs) in soil at a property. The Planning Requirements go into effect January 1, 2022. The guidelines are useful for identifying COCs for excess soil testing purposes.

As the property consists of active agricultural lands, the analytical program conducted consisted of the minimum sampling parameters specified in the Excess Soil Rules, plus testing for Organochlorine Pesticides (OCPs). A total of eighteen (18) soil samples (including two duplicate samples) were analyzed for benzene, toluene, ethyl benzene and xylene (BTEX), petroleum hydrocarbons (PHCs) (F1 to F4 fractions), metals, inorganics and OCPs. The Excess Soil Rules also require leachate testing for specific parameters to assess the soil to groundwater pathway (i.e., to assess the potential for COCs to leach from soil to groundwater). To meet this requirement, four (4) of the samples were submitted for leachate analysis using the modified Synthetic Precipitation Leaching Procedure (mSPLP) for metals and OCPs.

The results are included in Appendix A and indicate that all of the soil samples analyzed were found to have met both the Table 1 Site Condition Standards and the Table 1 Excess Soil Quality Standards for RPI/ICC property use. Accordingly all soil can be reused on site (subject to geotechnical requirements) or deposited at any land site.

It should be noted that soil management and off-site export of soil for disposal or reuse are to be conducted under the supervision of a Qualified Person for Environmental Site Assessment (QP_{ESA}) in accordance with O. Reg. 406/19 On-Site and Excess Soil Management, associated Excess Soil Rules and Reg. 347, as amended – General Waste Management.

Additional soil sampling frequencies and parameters will depend on the requirements of the intended receiving facility, the professional opinion of the QP_{ESA} and if applicable, Excess Soil Rules sampling frequency requirements.

7. General Comments

EXP should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, EXP will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. could be greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

More specific information with respect to the conditions between samples, or the lateral and vertical extent of materials may become apparent during excavation operations. The interpretation of the borehole information must, therefore, be validated during excavation operations. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent; should this occur, EXP should be contacted to assess the situation, and additional testing and reporting may be required. EXP has qualified personnel to provide assistance with regards to future geotechnical and environmental issues related to this property.

Yours truly,

EXP Services Inc.



Richard Blair, P.Eng.
Project Manager, Barrie Office
Geotechnical Division

Leigh Knecht, P. Eng.
Branch Manager, Barrie Office
Geotechnical Division

Drawing 1 - Borehole Location Plan

Figure 1 - Notes on Sample Description

Figures 2 to 17 - Borehole Logs

Figures 18 to 19 – Grain Size Analysis Reports



KEY PLAN: BARRIE, ON

LEGEND:

- CURRENT SITE LIMITS
- BH/MW 101
EL. 312.34
BOREHOLE/MONITORING WELL LOCATION
SURFACE ELEVATION
- BH 102
EL. 312.11
BOREHOLE LOCATION
SURFACE ELEVATION

- NOTES:
1. THE BOUNDARIES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT BOREHOLE LOCATIONS. BETWEEN BOREHOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
 2. SOIL SAMPLES WILL BE RETAINED IN STORAGE FOR 1 MONTH AND THEN DESTROYED UNLESS CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
 3. GROUND SURFACE ELEVATIONS AT THE BOREHOLE LOCATIONS WERE DERIVED FROM CAN-NET ELEVATIONS WITH THE USE OF A TRIMBLE TSC3 CONTROLLER AND ARE SHOWN IN METRES ABOVE SEA LEVEL (masl).
 4. BOREHOLE ELEVATIONS SHOULD NOT BE USED TO ESTABLISH SITE GRADES.
 5. THIS DRAWING SHOULD BE REPRODUCED IN COLOUR.

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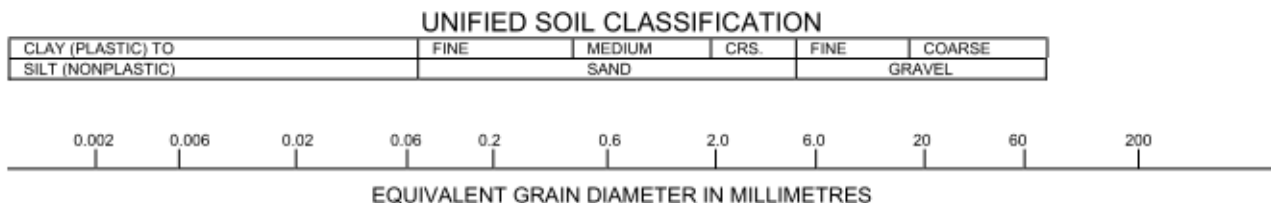
PROJECT TITLE AND LOCATION:
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL SUBDIVISION
WATERSAND NORTH PHASE II
259 SALEM ROAD, BARRIE, ONTARIO

DRAWING TITLE:
BOREHOLE/MONITORING WELL
LOCATION PLAN

PROJECT:	BAR-22008396-A0	DWN.:	RB
SCALE:	NTS	CHKD.:	LK
DATE:	JUNE 2022	DWG. No.:	1

Notes On Sample Descriptions

1. All sample descriptions included in this report follow the Unified Soil Classification System (USCS) as outlined by the Ministry of Transportation. Different classification systems may be used by others; one such system is the International Society for Soil Mechanics and Foundation Engineering (ISSMFE), as outlined in the Canadian Foundation Engineering Manual. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.



ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.
3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (75 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Notes On Sample Descriptions

4. The following table gives a description of the soil based on particle sizes. With the exception of those samples where grain size analyses have been performed, all samples are classified visually. The accuracy of visual examination is not sufficient to differentiate between this classification system or exact grain size.

Soil Classification		Terminology	Proportion
Clay and Silt	<0.075 mm		
Sand	0.075 to 4.75 mm	"trace" (e.g. Trace sand)	0% to 10%
Gravel	4.75 to 75 mm	"some" (e.g. Some sand)	10% to 20%
Cobbles	75 to 200 mm	with (e.g. with sand)	20% to 35%
Boulders	>200 mm	and (e.g. and sand)	35% to 50%

For a given material listed as an adjective (e.g. silty sand) means the predominant grain size is sand sized with 30 to 40% silt sized particles.

The compactness of Cohesionless soils and the consistency of the cohesive soils are defined by the following:

Cohesionless Soil		Cohesive Soil		
Compactness	Standard Penetration Resistance "N" value Blows/ 0.3 m	Consistency	Undrained Shear Strength (kPa)	'N' Values
Very Loose	0 to 4	Very soft	<12	<2
Loose	4 to 10	Soft	12 to 25	2 to 4
Compact	10 to 30	Firm	25 to 50	4 to 8
Dense	30 to 50	Stiff	50 to 100	8 to 15
Very Dense	Over 50	Very Stiff	100 to 200	15 to 30
		Hard	>200	>30

5. ROCK CORING

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of the core covered, counting only those pieces of sound core that are 100 mm or more length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very Poor Quality	<25
Poor Quality	25 to 50
Fair Quality	50 to 75
Good Quality	75 to 90
Excellent Quality	90 to 100

$$\text{Recovery Designation: } \% \text{ Recovery} = \frac{\text{Length of Core Per Run}}{\text{Total Length of Run}} \times 100$$

Figure 1

Log of Borehole 101

Project No. **BAR-22008396-A0**

Figure No. **2**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907662 N 602293 E**

Date Drilled: **April 12, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

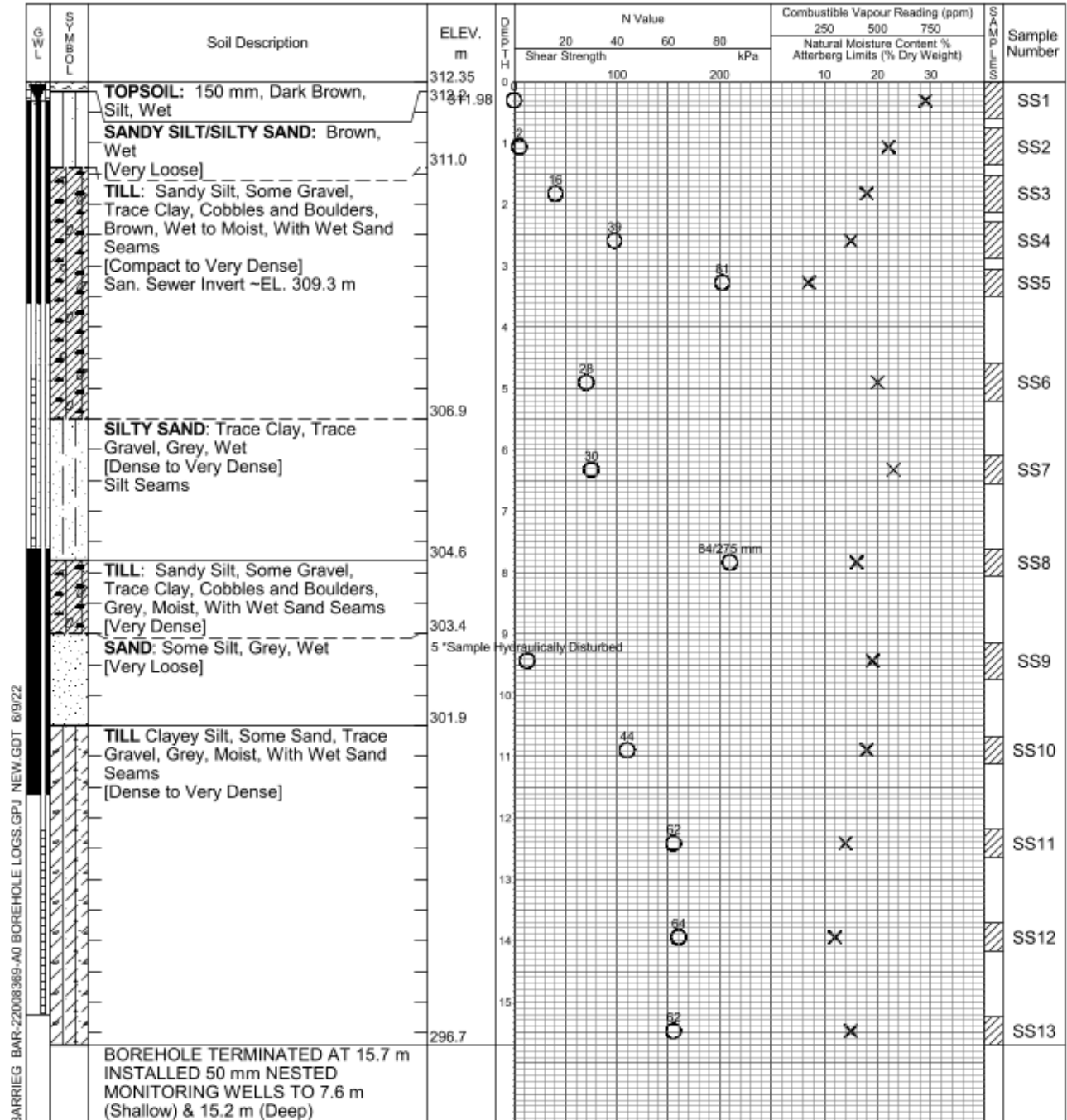
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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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	5.3/307.1	Install
May 25, 2022	0.69/311.66	(Shallow)
May 25, 2022	0.70/311.65	(Deep)
June 8, 2022	0.37/311.98	(Shallow)
June 8, 2022	0.56/311.79	(Deep)

Log of Borehole 102

Project No. **BAR-22008396-A0**

Figure No. **3**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907679 N 602459 E**

Date Drilled: **April 12, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

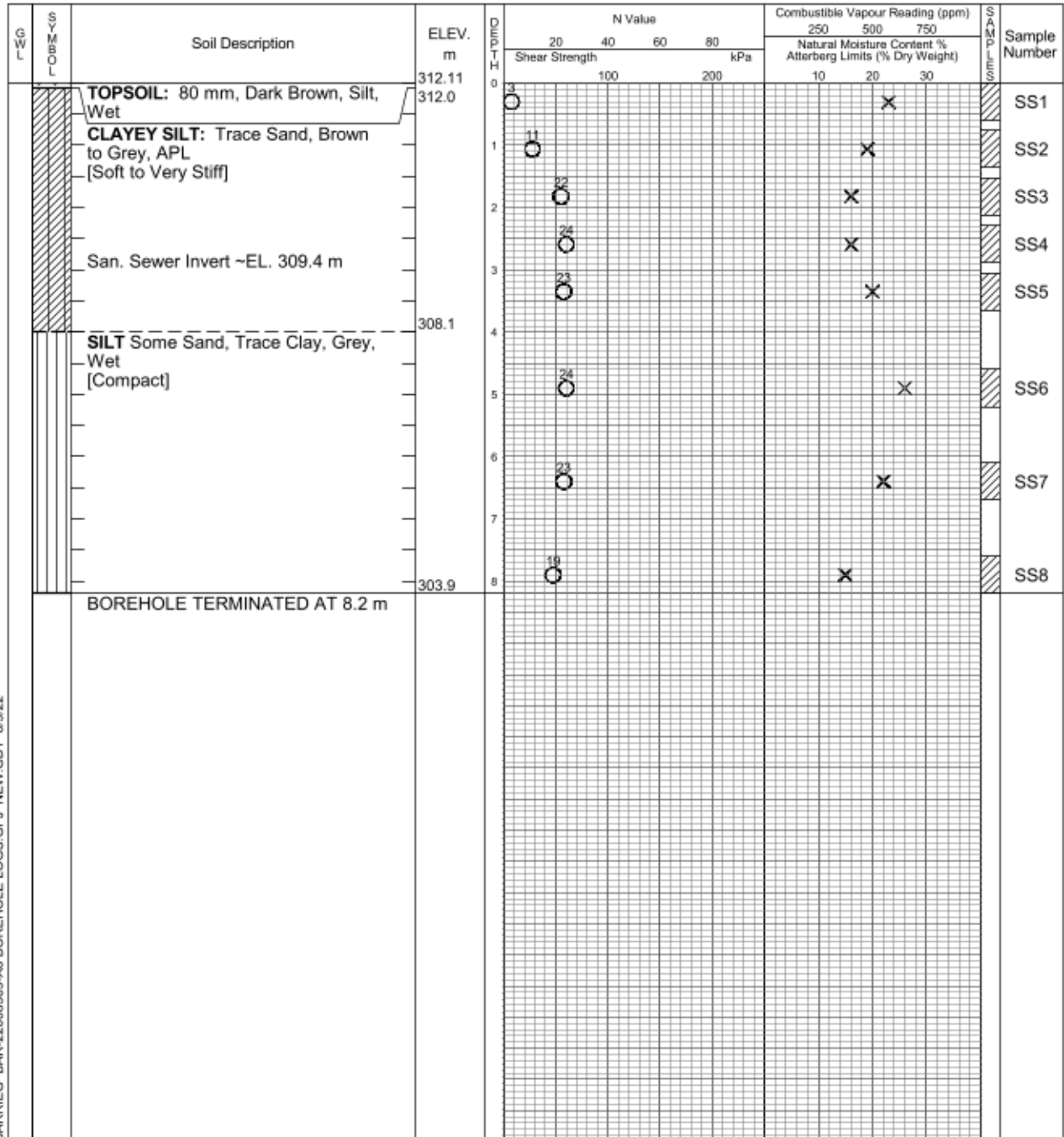
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



BAR-22008396-A0 BOREHOLE LOGS.GPJ NEW.GDT 6/9/22



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

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	2.6/309.5	Open

Log of Borehole 103

Project No. **BAR-22008396-A0**

Figure No. **4**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907853 N 602799 E**

Date Drilled: **April 13, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

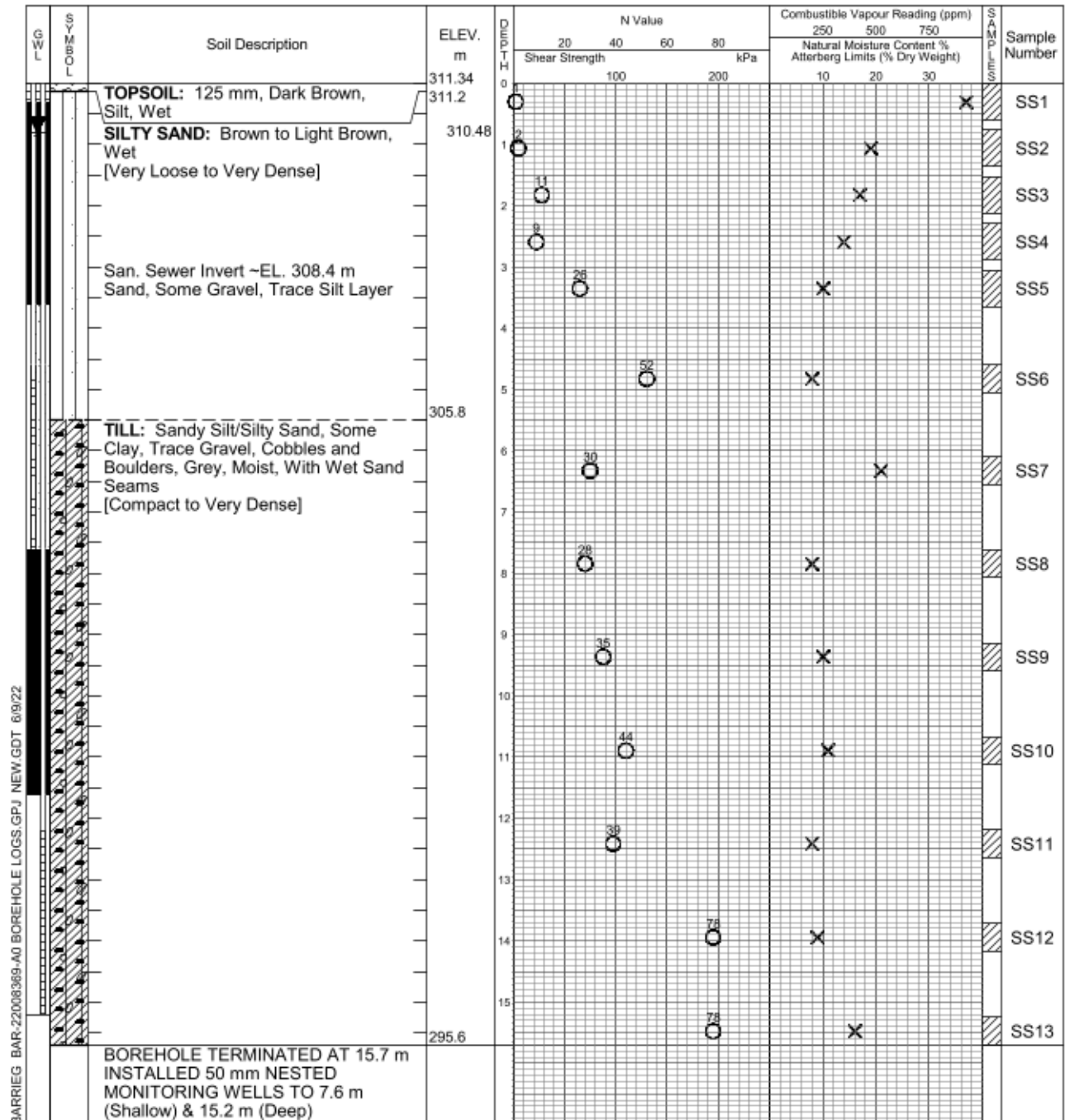
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	5.6/305.7	Install
May 25, 2022	0.89/310.45	(Shallow)
May 25, 2022	1.10/310.24	(Deep)
June 8, 2022	0.86/310.48	(Shallow)
June 8, 2022	1.13/310.21	(Deep)

Log of Borehole 104

Project No. **BAR-22008396-A0**

Figure No. **5**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907771 N 602895 E**

Date Drilled: **April 13, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

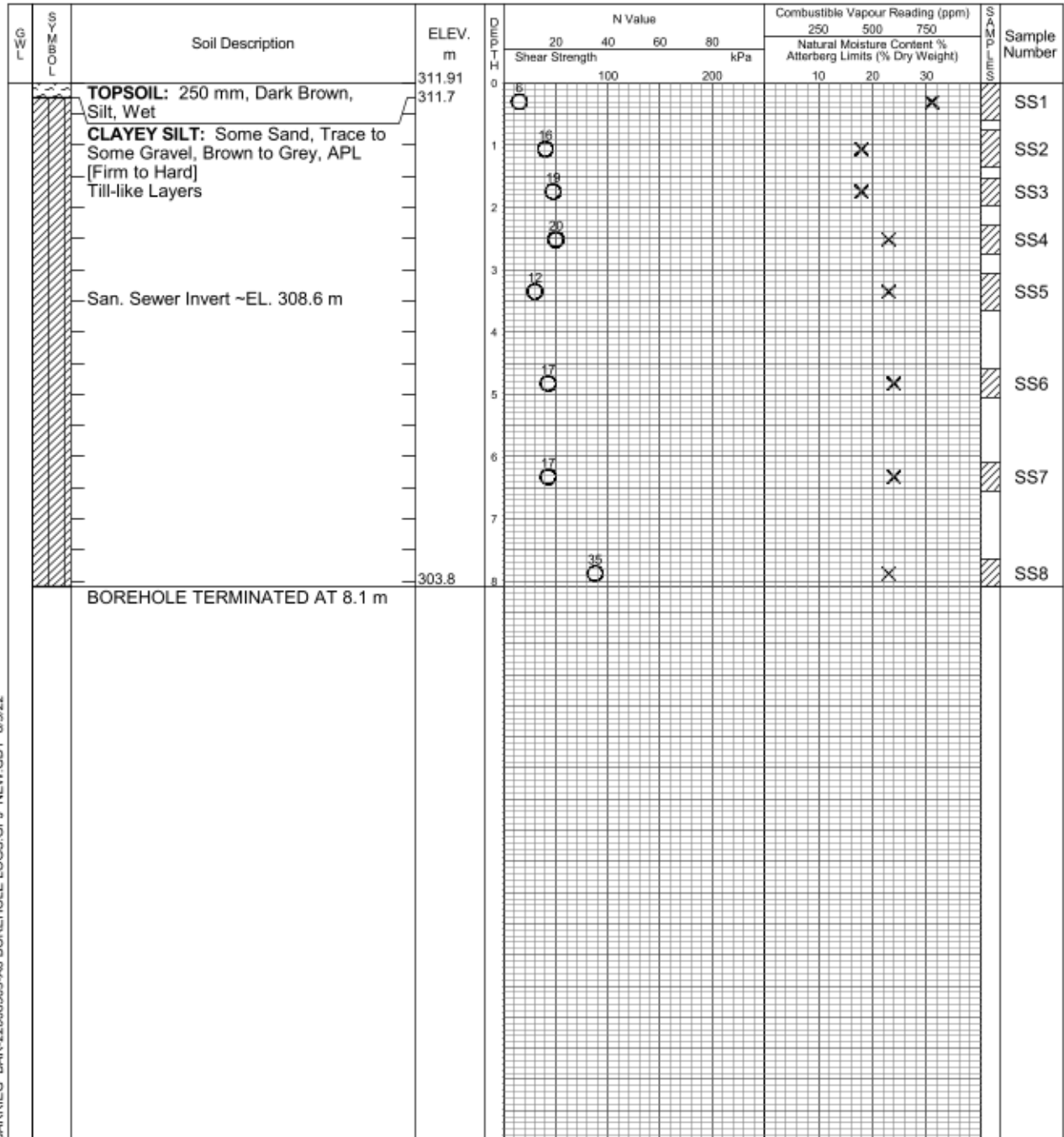
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



BAR-22008396-A0 BOREHOLE LOGS.GPJ NEW.GDT 6/9/22



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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	No Water	Open

Log of Borehole 105

Project No. **BAR-22008396-A0**

Figure No. **6**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907684 N 602815 E**

Date Drilled: **April 13, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

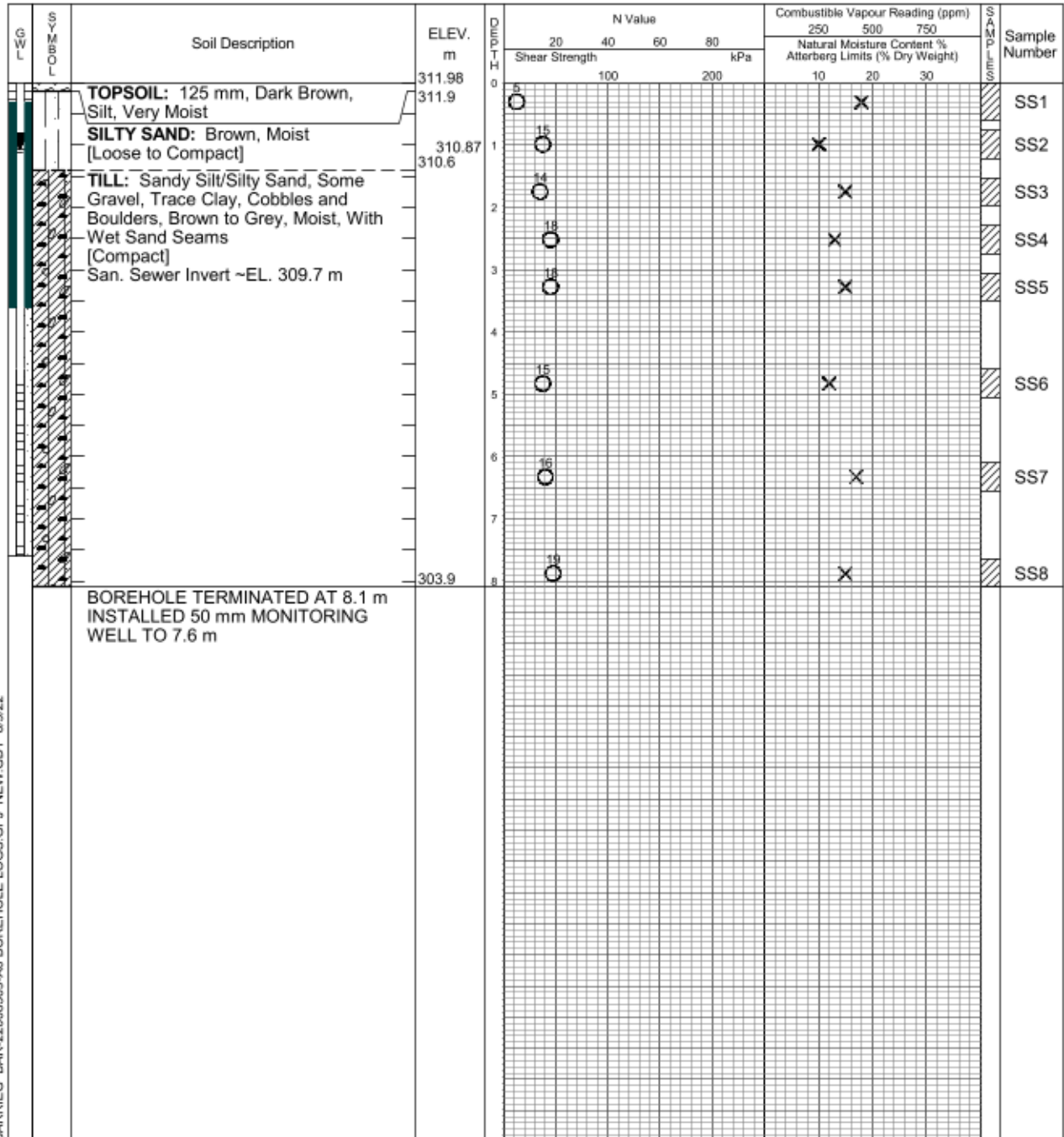
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



BAR-22008396-A0 BOREHOLE LOGS.GPJ NEW.GDT 6/9/22



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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	7.0/305.0	Install
May 25, 2022	1.11/310.87	
June 8, 2022	3.76/308.22	

Log of Borehole 106

Project No. **BAR-22008396-A0**

Figure No. **7**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907533 N 602793 E**

Date Drilled: **April 14, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

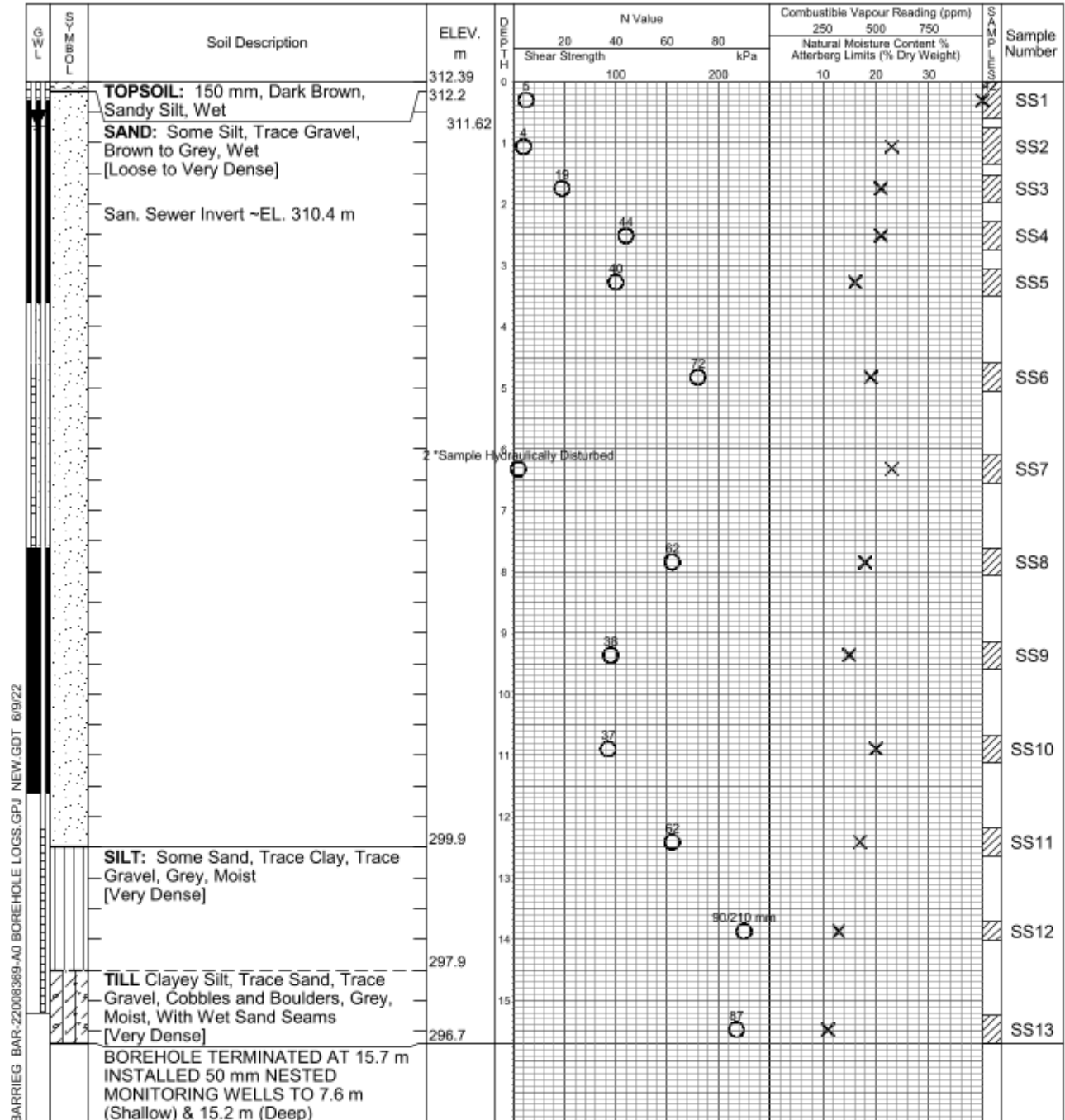
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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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	6.5/305.9	Install
May 25, 2022	0.84/311.55	(Shallow)
May 25, 2022	0.87/311.52	(Deep)
June 8, 2022	0.79/311.60	(Shallow)
June 8, 2022	0.77/311.61	(Deep)

Log of Borehole 107

Project No. **BAR-22008396-A0**

Figure No. **8**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907456 N 602947 E**

Date Drilled: **April 21, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

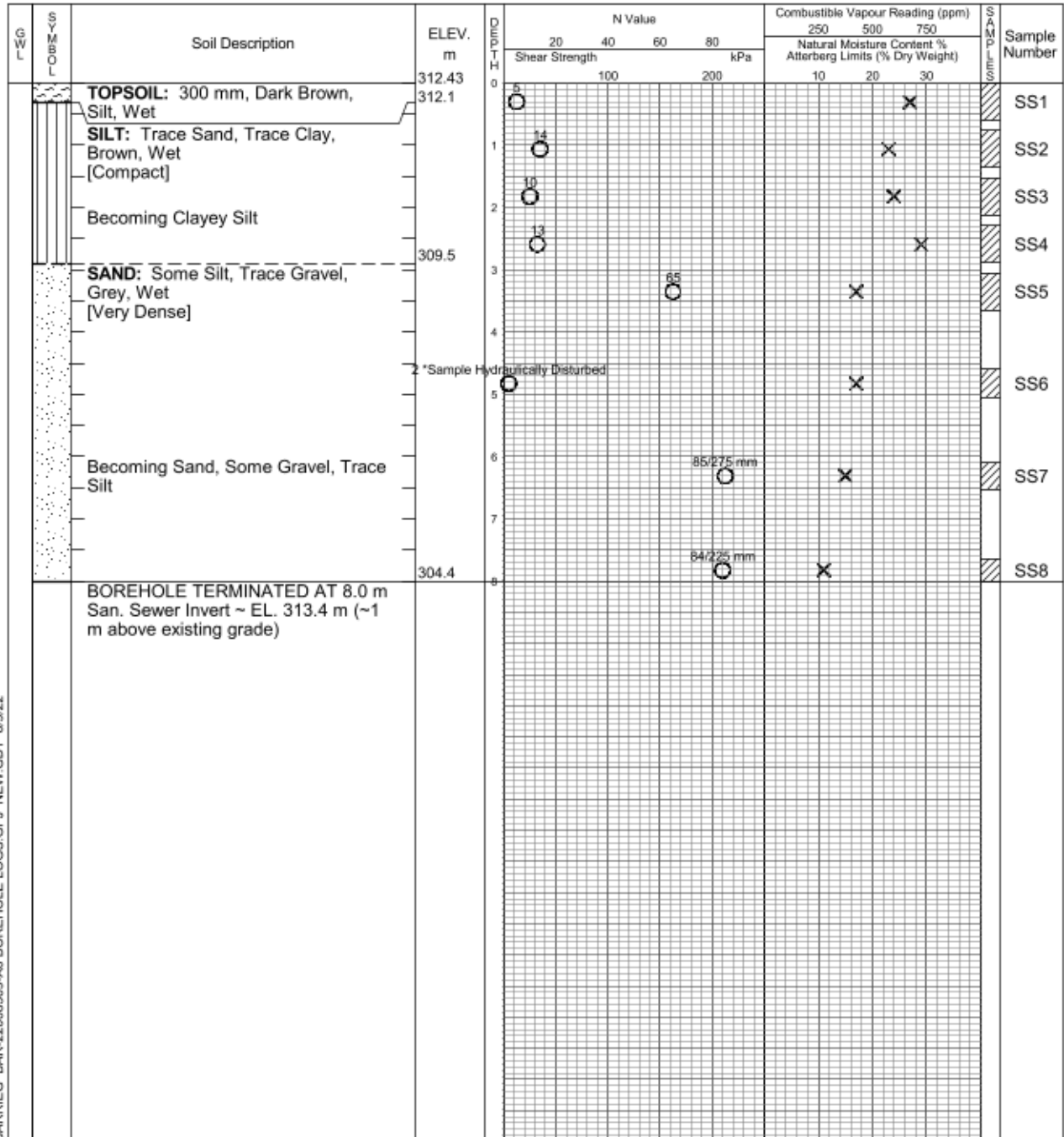
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



EXP Services Inc.
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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	5.2/307.2	7.0

BAR-22008396-A0 BOREHOLE LOGS.GPJ NEW.GDT 6/9/22

Log of Borehole 108

Project No. **BAR-22008396-A0**

Figure No. **9**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907349 N 603085 E**

Date Drilled: **April 21, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

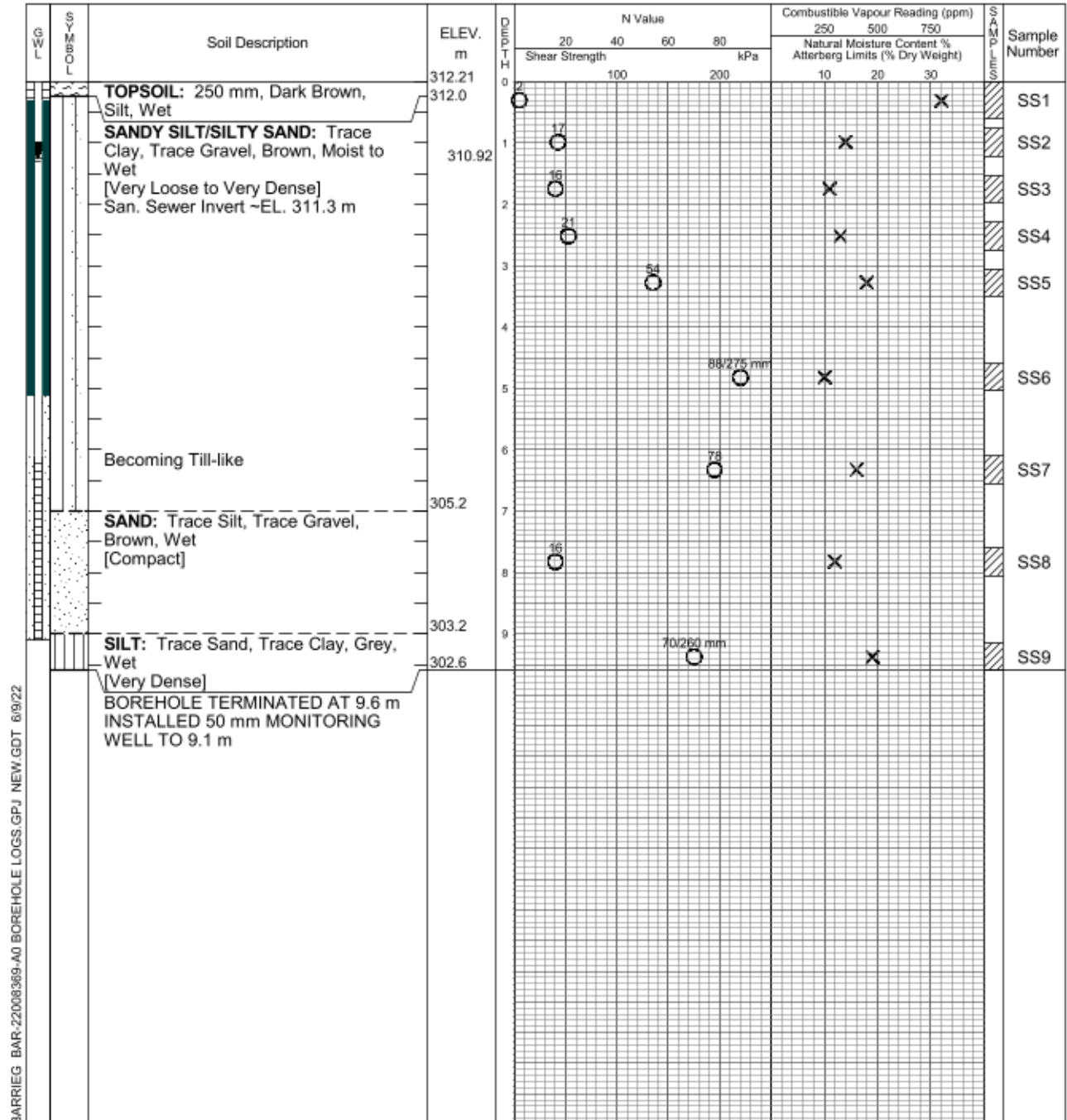
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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 June 8, 2022	3.1/309.1 1.29/310.92	Install

Log of Borehole 109

Project No. **BAR-22008396-A0**

Figure No. **10**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907212 N 603029 E**

Date Drilled: **April 25, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

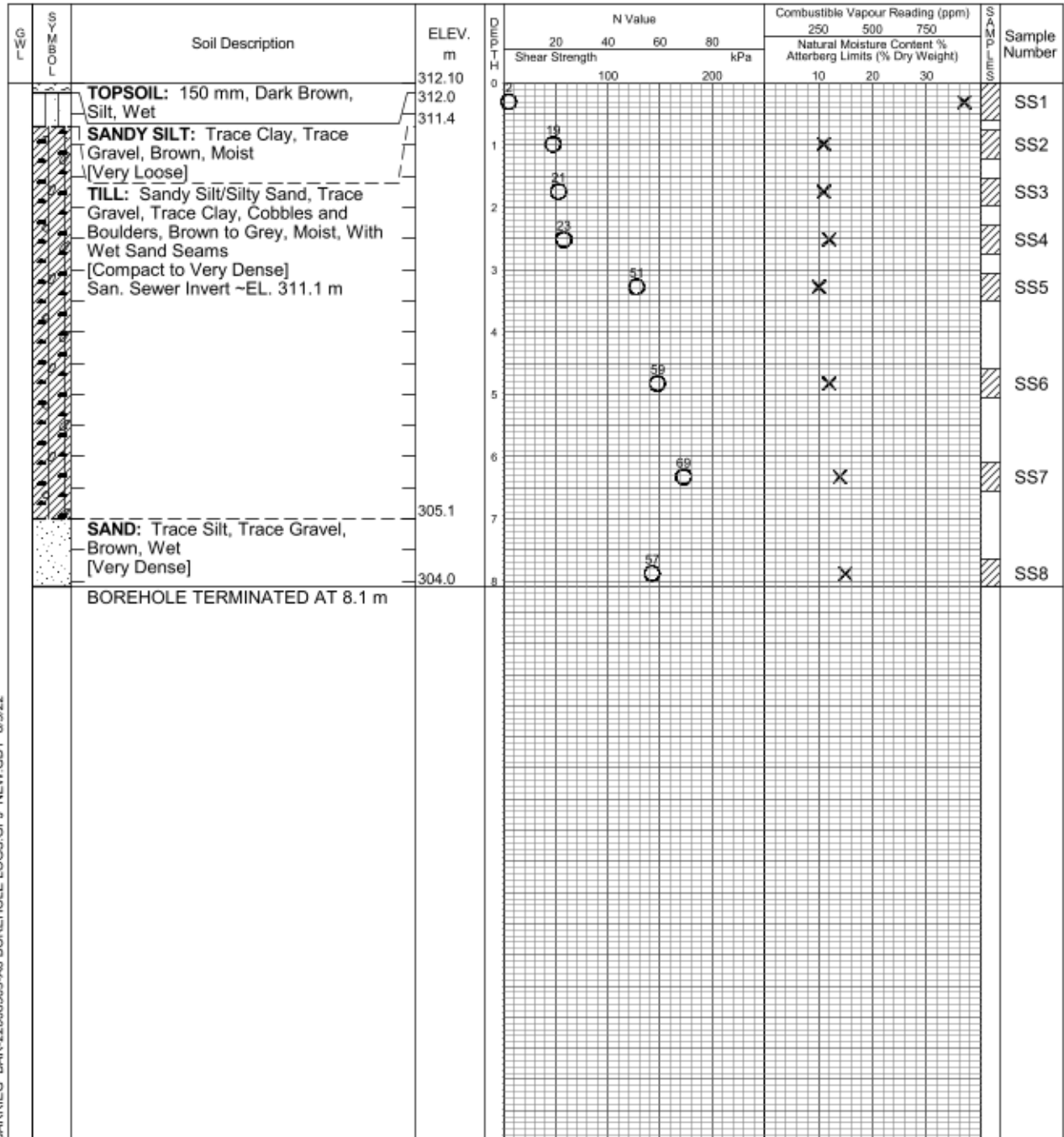
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



BARRIEG BAR-22008396-A0 BOREHOLE LOGS.GPJ NEW.GDT 6/9/22



EXP Services Inc.
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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	5.6/306.5	7.6

Log of Borehole 110

Project No. **BAR-22008396-A0**

Figure No. **11**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907267 N 603200 E**

Date Drilled: **April 26, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

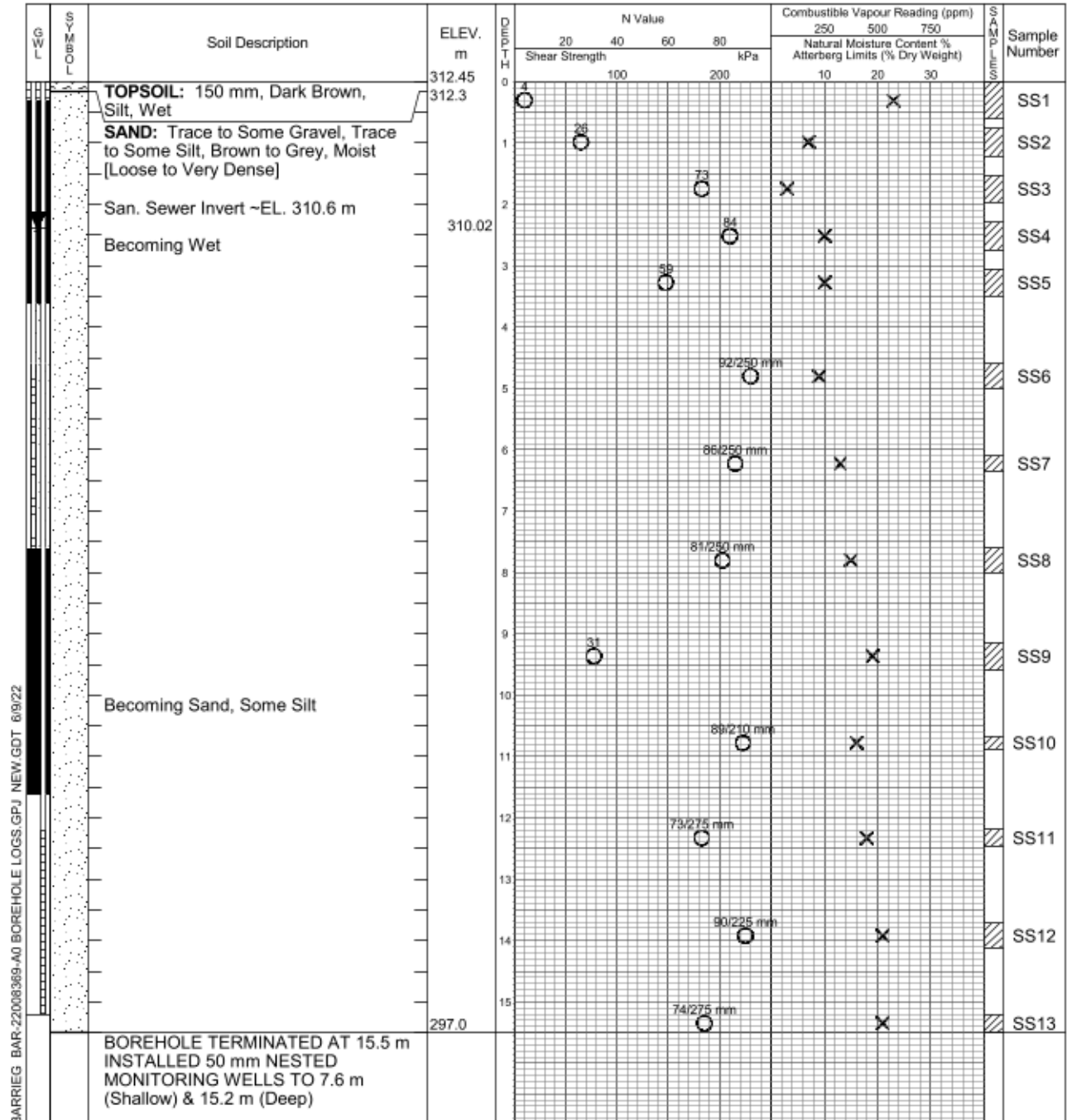
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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14 Cedar Pointe Drive
Barrie, ON L4N 5R7
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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	3.9/308.6	Install
May 25, 2022	2.43/310.02	(Shallow)
May 25, 2022	2.44/310.01	(Deep)
June 8, 2022	2.66/309.79	(Shallow)
June 8, 2022	2.59/309.86	(Deep)

Log of Borehole 111

Project No. **BAR-22008396-A0**

Figure No. **12**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907307 N 603335 E**

Date Drilled: **April 25, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

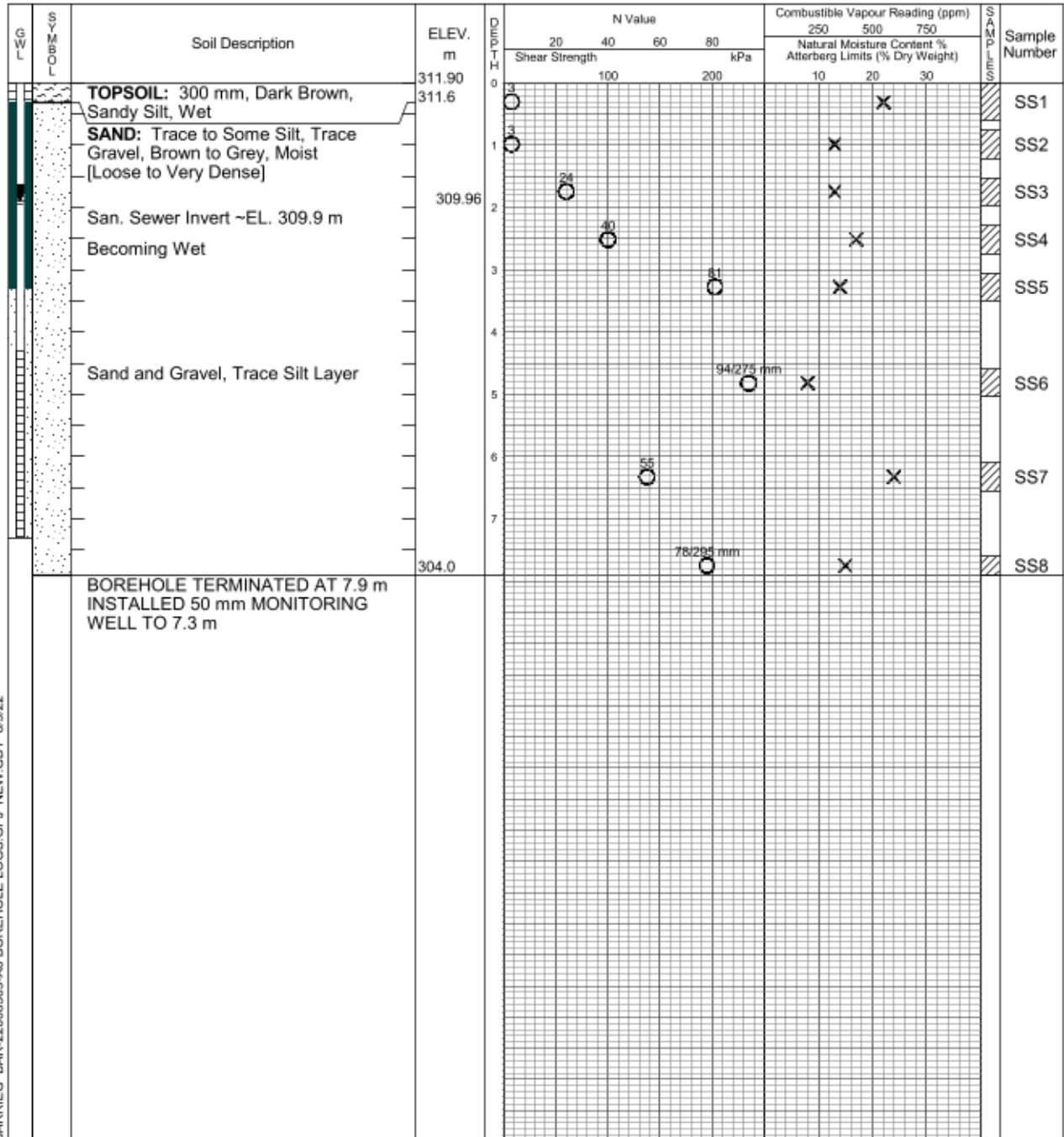
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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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	3.1/308.8	Install
May 25, 2022	1.94/309.96	
June 8, 2022	2.18/309.72	

Log of Borehole 112

Project No. **BAR-22008396-A0**

Figure No. **13**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907106 N 603252 E**

Date Drilled: **April 25, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

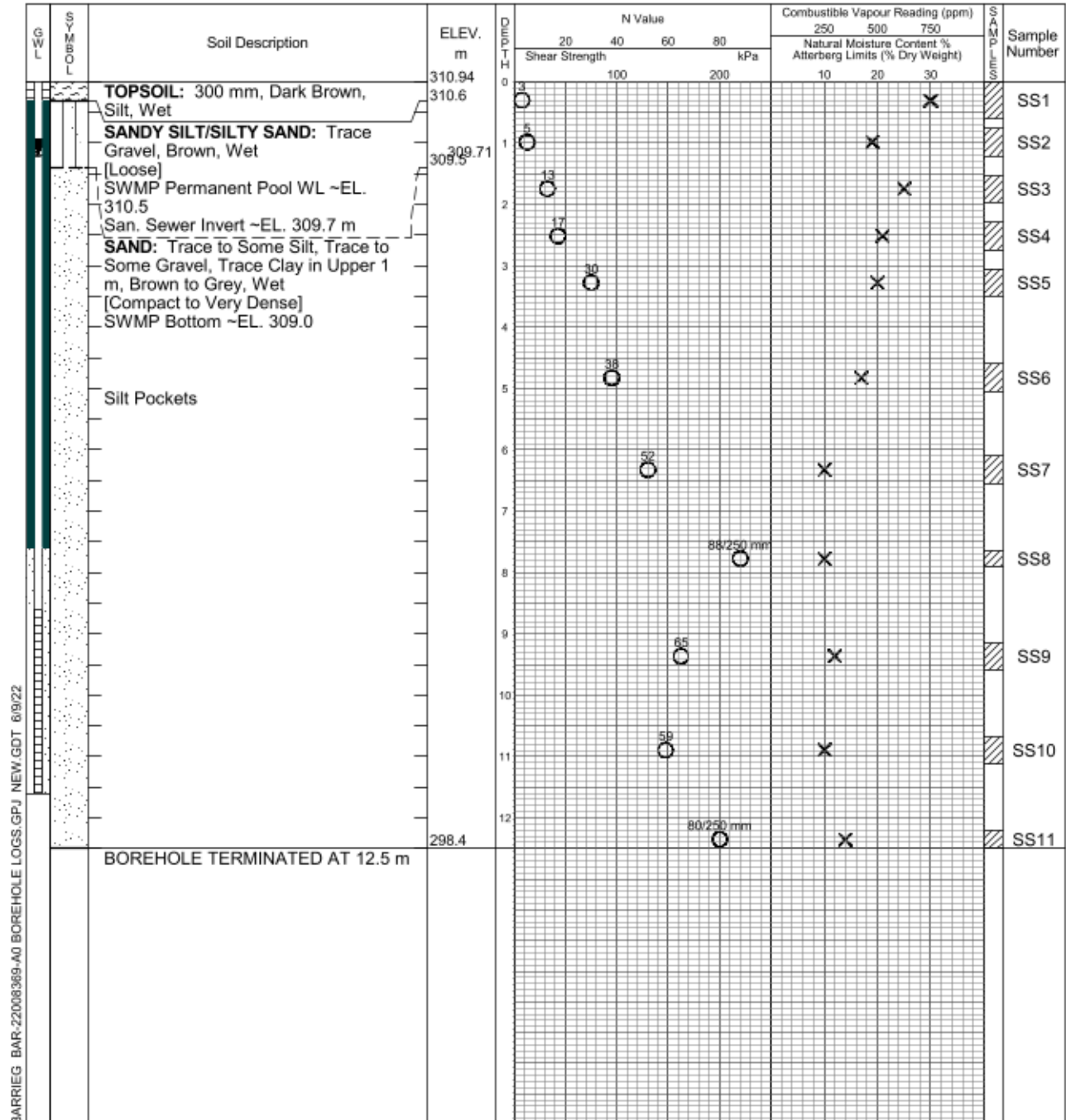
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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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	5.0/305.9	Install
May 25, 2022	1.23/309.71	
June 8, 2022	1.33/309.61	

Log of Borehole 113

Project No. **BAR-22008396-A0**

Figure No. **14**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907135 N 603401 E**

Date Drilled: **April 25, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

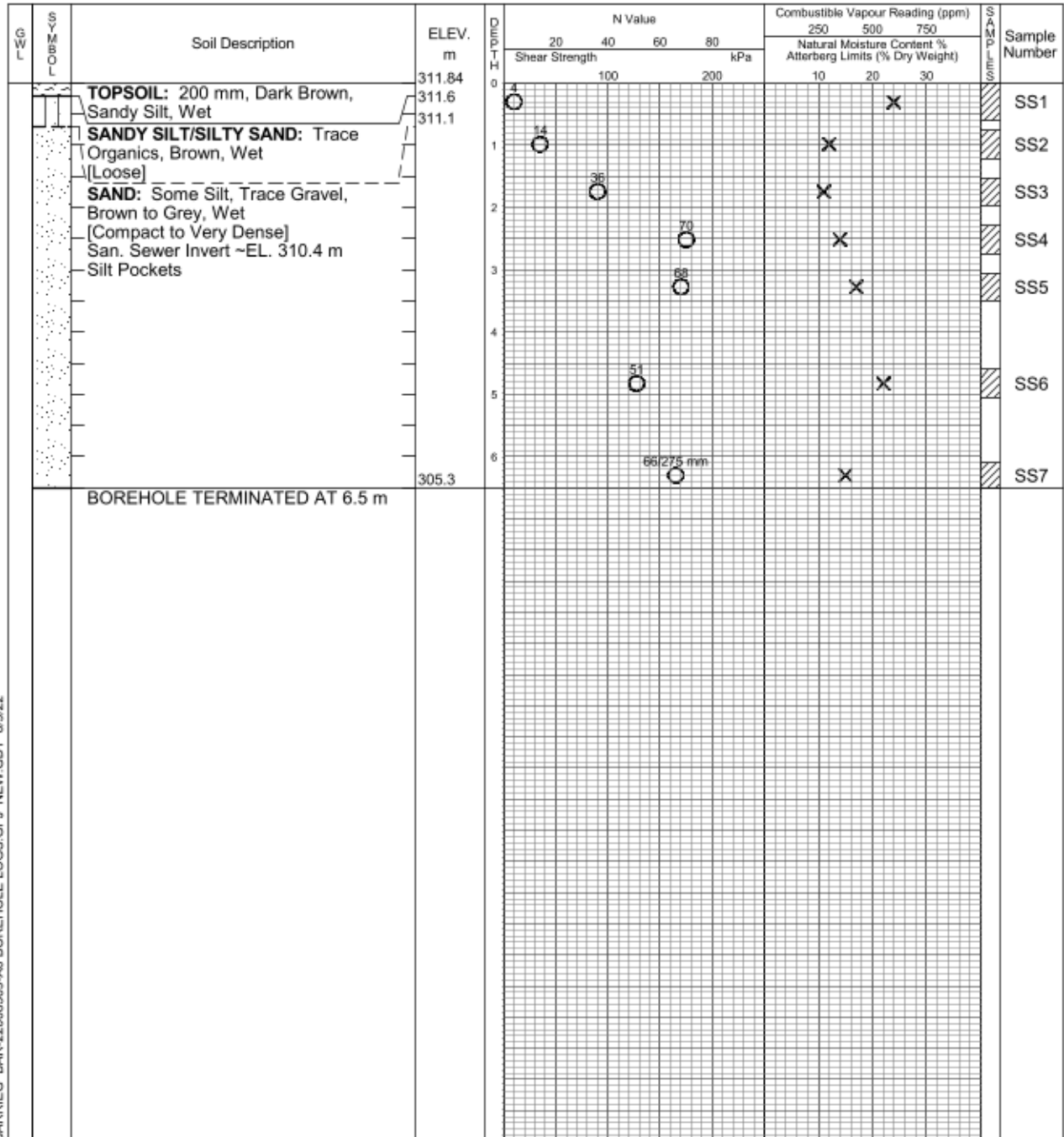
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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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	3.0/308.8	5.2

Log of Borehole 114

Project No. **BAR-22008396-A0**

Figure No. **15**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907217 N 603511 E**

Date Drilled: **April 25, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

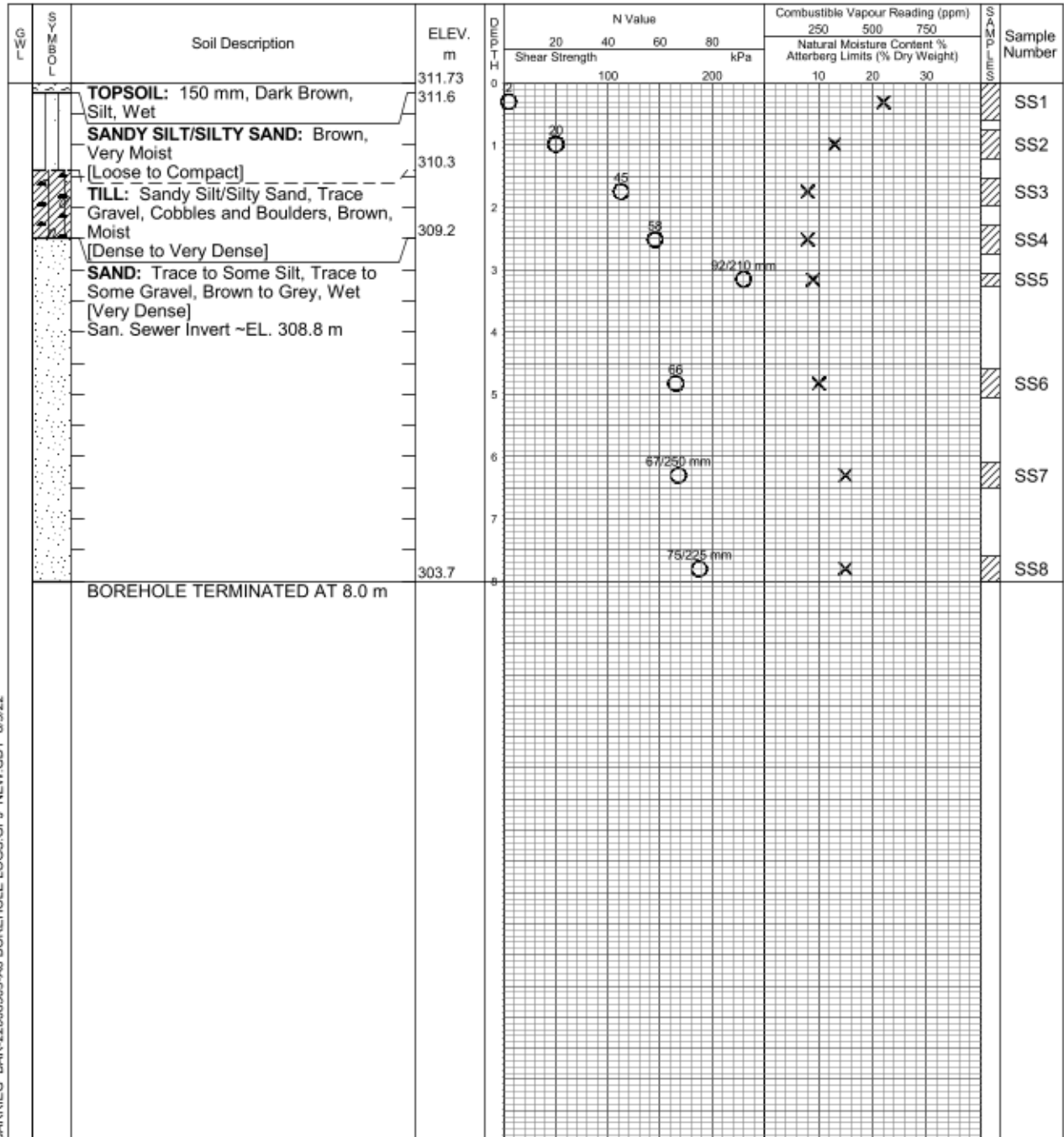
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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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	2.4/309.3	6.4

Log of Borehole 115

Project No. **BAR-22008396-A0**

Figure No. **16**

Project: **Proposed Watersand North Phase II Residential Development**

Sheet No. **1** of **1**

City/
Municipality: **259 Salem Road, Barrie Ontario**

Location: **17T 4907039 N 603441 E**

Date Drilled: **April 22, 2022**

Drill Type: **Track-Mount, Hollow Stem Augers**

Datum: **Geodetic**

Auger Sample

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Combustible Vapour Reading

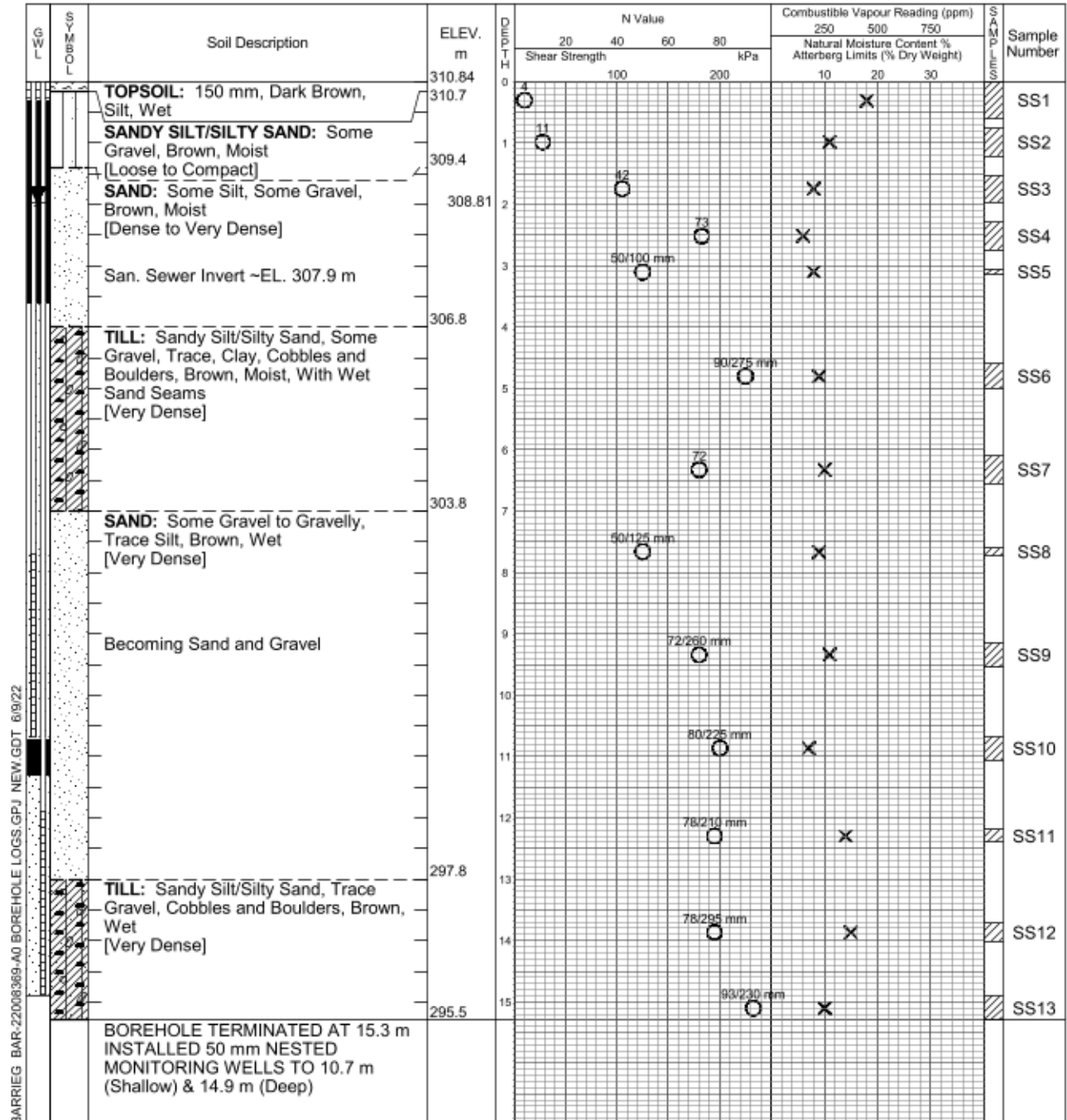
Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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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	6.5/304.3	Install
May 25, 2022	2.14/308.70	(Shallow)
May 25, 2022	2.03/308.81	(Deep)
June 8, 2022	2.37/308.47	(Shallow)
June 8, 2022	2.21/308.63	(Deep)

Log of Borehole 116

Project No. BAR-22008396-A0

Figure No. 17

Project: Proposed Watersand North Phase II Residential Development

Sheet No. 1 of 1

City/
Municipality: 259 Salem Road, Barrie Ontario

Location: 17T 4907074 N 603547 E

Date Drilled: April 21, 2022

Drill Type: Track-Mount, Hollow Stem Augers

Datum: Geodetic

SPT (N) Value

Dynamic Cone Test

Shelby Tube

Field Vane Test

Natural Moisture

Plastic and Liquid Limit

Undrained Triaxial at

% Strain at Failure

Penetrometer



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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	6.4/305.4	7.3



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www.exp.com

Grain Size Analysis Report

Project Name: Watersand North Phase II Residential Development

Figure No.: 18

Project No.: BAR-22008396-A0

Date Tested: May 10, 2022

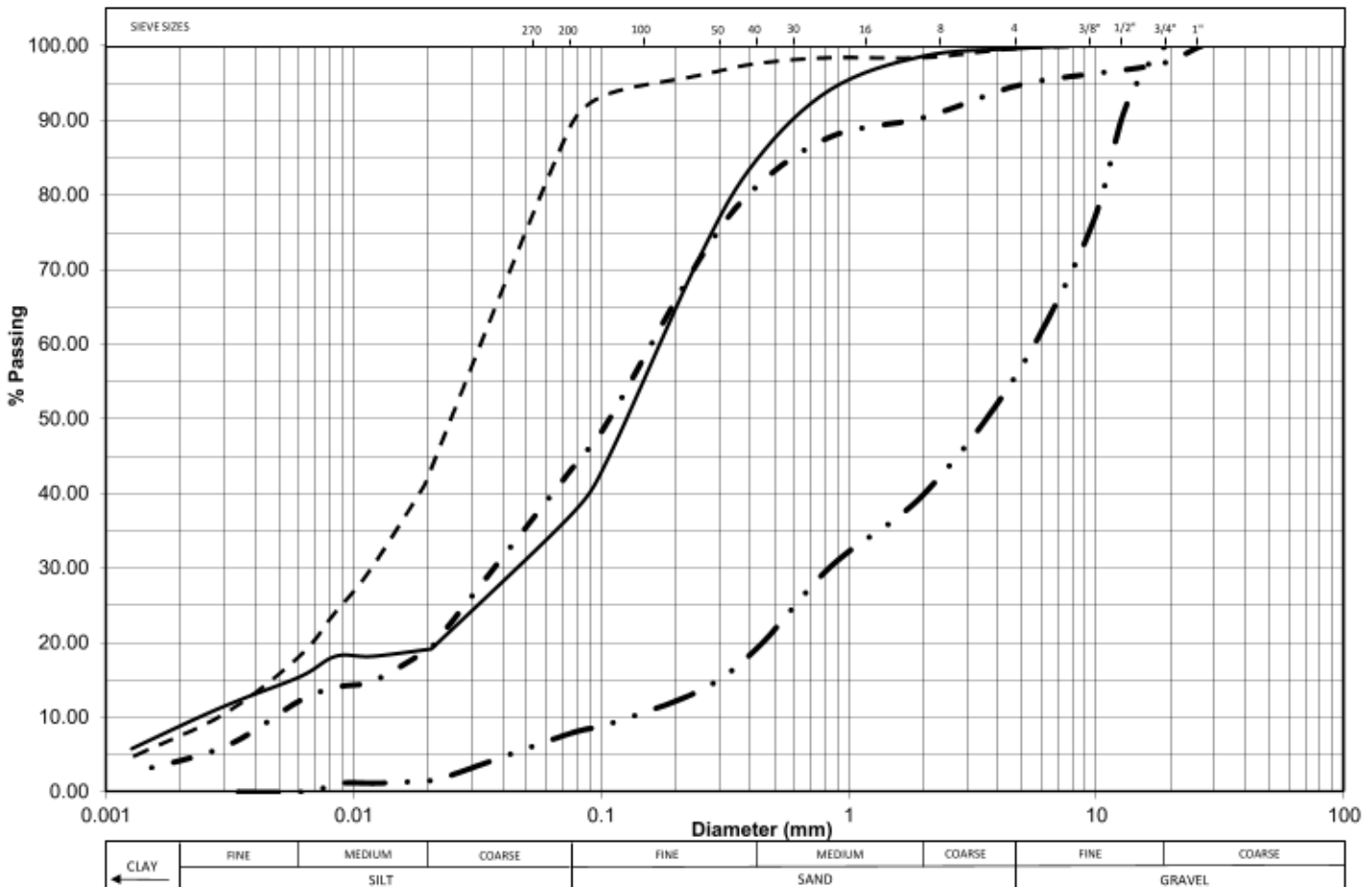
Client: Watersand Construction Ltd.

Date Sampled: Apr. 12 to 25, 2022

SAMPLE INFORMATION

Material	Borehole No. and Sample No.	Sample Depth (m)	Material Description	Graph Line Type
1	BH101 SS7	6.1 - 6.5	SILTY SAND, Trace Clay, Trace Gravel	—————
2	BH106 SS12	13.7 - 14.0	SILT, Some Sand, Trace Clay, Trace Gravel	-----
3	BH108 SS7	6.1 - 6.5	SAND AND SILT, Trace Clay, Trace Gravel	- - - - -
4	BH111 SS6	4.6 - 5.0	SAND AND GRAVEL, Trace Silt	

Sieve & Hydrometer Analysis



DISTRIBUTION:

Watersand Construction Ltd.

Prepared By:

DG

Dan Gilchrist

Checked By:

Richard Blair, P. Eng.



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Fax: +1.705.719.1109
www.exp.com

Grain Size Analysis Report

Project Name: Watersand North Phase II Residential Development

Figure No.: 19

Project No.: BAR-22008396-A0

Date Tested: May 10, 2022

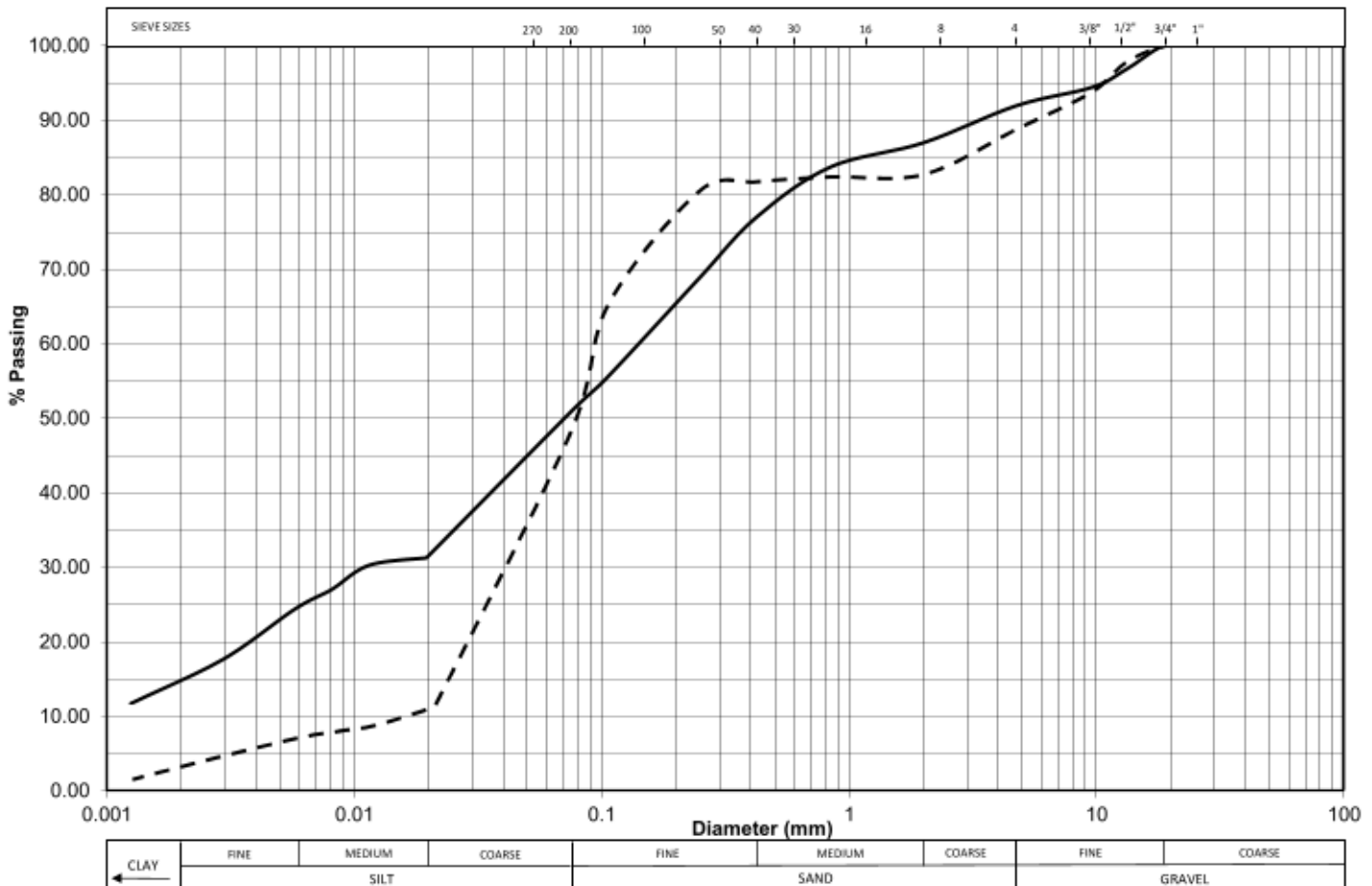
Client: Watersand Construction Ltd.

Date Sampled: Apr. 12 to 25, 2022

SAMPLE INFORMATION

Material	Borehole No. and Sample No.	Sample Depth (m)	Material Description	Graph Line Type
1	BH103 SS12	13.7 - 14.1	TILL: Sand & Silt, Some Clay, Trace Gravel	—————
2	BH115 SS7	6.1 - 6.5	TILL: Silt & Sand, Some Gravel, Trace Clay	- - - - -

Sieve & Hydrometer Analysis



DISTRIBUTION:

Watersand Construction Ltd.

Prepared By:

DG

Dan Gilchrist

Checked By:

Richard Blair, P. Eng.

EXP Services Inc.

Proposed Residential Subdivision, Watersand North Phase II, Geotechnical Investigation – Final Report

Project Number: BAR-22008396-A0

Date: June 16, 2022

Appendix A – Certificates of Chemical Analysis

C.O.C.: G85583/G85585

REPORT No. B22-11876 (i)

Rev. 1

Report To:

EXP Services Inc

14 Cedar Pointe Drive, Unit 1510

Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

SAMPLE MATRIX: Soil

P.O. NUMBER: BAR-22008396-A0

WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
Conductivity	18	Holly Lane	ST	03-May-22	A-COND-01 (o)	SM 2510B
pH	18	Richmond Hill	nka	03-May-22	A-pH-02 (rh)	MOEE3530
Chromium (VI)	18	Holly Lane	LMG	29-Apr-22	D-CRVI-02 (o)	EPA7196A
Mercury	18	Holly Lane	PBK	03-May-22	D-HG-01 (o)	EPA 7471A
Boron - HWS	18	Holly Lane	NHG	03-May-22	D-HWE s	MOE3470
Sodium Adsorption Ratio	18	Holly Lane	NHG	03-May-22	D-ICP-01 SAR (o)	SM 3120
Metals - ICP-OES	18	Holly Lane	NHG	03-May-22	D-ICP-02 (o)	EPA 6010
Metals - ICP-MS	18	Holly Lane	TPR	03-May-22	D-ICPMS-01 (o)	EPA 6020

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg

F1 C6-C10 hydrocarbons in µg/g. (F1-btex if requested)

F2 C10-C16 hydrocarbons in µg/g. (F2-naph if requested)

F3 C16-C34 hydrocarbons in µg/g. (F3-pah if requested)

F4 C34-C50 hydrocarbons in µg/g

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

Any deviations from the method are noted and reported for any particular sample.

nC6 and nC10 response factor is within 30% of response factor for toluene:

nC10, nC16 and nC34 response factors within 10% of each other:

C50 response factors within 70% of nC10+nC16+nC34 average:

Linearity is within 15%:

All results expressed on a dry weight basis.

Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met.

If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC

QC will be made available upon request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G85583/G85585

REPORT No. B22-11876 (i)

Rev. 1

Report To:

EXP Services Inc

14 Cedar Pointe Drive, Unit 1510
Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Parameter	Client I.D.		BH 102 SS 2	BH 101 SS 2/3	DUP #1	BH 103 SS 2	O. Reg. 153 Tbl. 1 - All	
	Sample I.D.	Date Collected	B22-11876-1 12-Apr-22	B22-11876-2 12-Apr-22	B22-11876-3 12-Apr-22	B22-11876-4 13-Apr-22		
	Units	R.L.						
pH @25°C	pH Units		7.91	7.87	7.85	7.72		
Conductivity @25°C	mS/cm	0.001	0.146	0.132	0.137	0.066	0.57	
Sodium Adsorption Ratio	units		0.150	0.155	0.148	0.0789	2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5	1.6	1.1	1.1	1.1	18	
Barium	µg/g	1	135	62	52	25	220	
Beryllium	µg/g	0.2	0.5	0.3	0.3	< 0.2	2.5	
Boron	µg/g	0.5	0.7	< 0.5	< 0.5	< 0.5	36	
Boron (HWS)	µg/g	0.02	0.02	0.02	< 0.02	0.02		
Cadmium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1	21	13	14	12	70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1	9	5	5	2	21	
Copper	µg/g	1	14	9	9	4	92	
Lead	µg/g	5	6	< 5	< 5	< 5	120	
Mercury	µg/g	0.005	0.006	0.005	0.008	0.016	0.27	
Molybdenum	µg/g	1	< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1	16	9	9	6	82	
Selenium	µg/g	0.5	0.7	0.6	0.5	0.5	1.5	
Silver	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1	0.1	< 0.1	< 0.1	< 0.1	1	
Uranium	µg/g	0.1	0.4	0.4	0.4	0.3	2.5	
Vanadium	µg/g	1	33	24	25	27	86	
Zinc	µg/g	3	35	22	25	14	290	

1. Revised report to change guidelines as per client request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

R.L. = Reporting Limit

Test methods may be modified from specified reference method unless indicated by an *

Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: G85583/G85585

REPORT No. B22-11876 (i)

Rev. 1

Report To:

EXP Services Inc

14 Cedar Pointe Drive, Unit 1510

Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D. Sample I.D. Date Collected	BH 104 SS 2 B22-11876-5 13-Apr-22	BH 105 SS 3 B22-11876-6 13-Apr-22	BH 106 SS 2 B22-11876-7 14-Apr-22	BH 107 SS 4 B22-11876-8 21-Apr-22	O. Reg. 153 Tbl. 1 - All	
Parameter	Units	R.L.							
pH @25°C	pH Units			7.84	7.91	7.48	7.83		
Conductivity @25°C	mS/cm	0.001		0.169	0.111	0.093	0.148	0.57	
Sodium Adsorption Ratio	units			0.230	0.122	0.0588	0.125	2.4	
Antimony	µg/g	0.5		< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5		1.7	1.4	0.8	1.4	18	
Barium	µg/g	1		167	71	23	84	220	
Beryllium	µg/g	0.2		0.5	0.3	< 0.2	0.3	2.5	
Boron	µg/g	0.5		1.1	< 0.5	< 0.5	< 0.5	36	
Boron (HWS)	µg/g	0.02		0.03	0.02	0.03	< 0.02		
Cadmium	µg/g	0.5		< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1		27	17	12	20	70	
Chromium (VI)	µg/g	0.2		< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1		10	7	3	9	21	
Copper	µg/g	1		17	11	3	15	92	
Lead	µg/g	5		7	< 5	< 5	< 5	120	
Mercury	µg/g	0.005		0.007	0.005	0.014	< 0.005	0.27	
Molybdenum	µg/g	1		< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1		19	11	5	14	82	
Selenium	µg/g	0.5		0.8	0.7	0.6	0.7	1.5	
Silver	µg/g	0.2		< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1		0.2	< 0.1	< 0.1	0.1	1	
Uranium	µg/g	0.1		0.4	0.4	0.4	0.4	2.5	
Vanadium	µg/g	1		37	29	33	37	86	
Zinc	µg/g	3		44	28	11	34	290	

1. Revised report to change guidelines as per client request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

R.L. = Reporting Limit

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C.O.C.: G85583/G85585

REPORT No. B22-11876 (i)

Rev. 1

Report To:

EXP Services Inc

14 Cedar Pointe Drive, Unit 1510

Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Parameter	Client I.D.		BH 108 SS 2	BH 116 SS 3/4	DUP #2	BH 115 SS 3	O. Reg. 153 Tbl. 1 - All	
	Sample I.D.	Date Collected	B22-11876-9 21-Apr-22	B22-11876-10 21-Apr-22	B22-11876-11 21-Apr-22	B22-11876-12 22-Apr-22		
Units	R.L.							
pH @25°C	pH Units		7.83	8.12	7.99	7.95		
Conductivity @25°C	mS/cm	0.001	0.119	0.08	0.089	0.104	0.57	
Sodium Adsorption Ratio	units		0.0849	0.127	0.122	0.134	2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5	1.2	0.7	0.7	0.9	18	
Barium	µg/g	1	61	35	42	42	220	
Beryllium	µg/g	0.2	0.3	< 0.2	< 0.2	< 0.2	2.5	
Boron	µg/g	0.5	< 0.5	< 0.5	3.2	< 0.5	36	
Boron (HWS)	µg/g	0.02	0.02	0.03	< 0.02	0.03		
Cadmium	µg/g	0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1	16	10	12	13	70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1	6	4	4	4	21	
Copper	µg/g	1	11	6	6	9	92	
Lead	µg/g	5	< 5	< 5	< 5	< 5	120	
Mercury	µg/g	0.005	0.005	< 0.005	< 0.005	< 0.005	0.27	
Molybdenum	µg/g	1	< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1	11	6	7	8	82	
Selenium	µg/g	0.5	0.6	0.5	0.5	0.6	1.5	
Silver	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1	< 0.1	< 0.1	< 0.1	< 0.1	1	
Uranium	µg/g	0.1	0.4	0.3	0.3	0.3	2.5	
Vanadium	µg/g	1	29	24	23	26	86	
Zinc	µg/g	3	24	17	21	22	290	

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O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BH 114 SS 2	BH 113 SS 2	BH 112 SS 2	BH 111 SS 4	O. Reg. 153	
			Sample I.D.	B22-11876-13	B22-11876-14	B22-11876-15	B22-11876-16	Tbl. 1 - All	
			Date Collected	25-Apr-22	25-Apr-22	25-Apr-22	25-Apr-22		
Parameter	Units	R.L.							
pH @25°C	pH Units			7.66	7.56	7.77	7.96		
Conductivity @25°C	mS/cm	0.001		0.168	0.14	0.107	0.073	0.57	
Sodium Adsorption Ratio	units			0.0948	0.0646	0.0992	0.104	2.4	
Antimony	µg/g	0.5		< 0.5	< 0.5	< 0.5	< 0.5	1.3	
Arsenic	µg/g	0.5		1.6	1.6	1.1	0.5	18	
Barium	µg/g	1		90	54	33	16	220	
Beryllium	µg/g	0.2		0.4	0.4	0.2	< 0.2	2.5	
Boron	µg/g	0.5		< 0.5	< 0.5	< 0.5	< 0.5	36	
Boron (HWS)	µg/g	0.02		0.02	0.02	< 0.02	0.03		
Cadmium	µg/g	0.5		< 0.5	< 0.5	< 0.5	< 0.5	1.2	
Chromium	µg/g	1		18	16	12	6	70	
Chromium (VI)	µg/g	0.2		< 0.2	< 0.2	< 0.2	< 0.2	0.66	
Cobalt	µg/g	1		6	5	5	3	21	
Copper	µg/g	1		10	7	9	4	92	
Lead	µg/g	5		< 5	< 5	< 5	< 5	120	
Mercury	µg/g	0.005		0.017	0.028	< 0.005	< 0.005	0.27	
Molybdenum	µg/g	1		< 1	< 1	< 1	< 1	2	
Nickel	µg/g	1		11	10	7	3	82	
Selenium	µg/g	0.5		0.6	0.8	0.7	< 0.5	1.5	
Silver	µg/g	0.2		< 0.2	< 0.2	< 0.2	< 0.2	0.5	
Thallium	µg/g	0.1		< 0.1	< 0.1	< 0.1	< 0.1	1	
Uranium	µg/g	0.1		0.5	0.4	0.4	0.3	2.5	
Vanadium	µg/g	1		33	29	26	20	86	
Zinc	µg/g	3		30	23	17	9	290	

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O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive
Barrie ON L4N 8W8
Tel: 705-252-5743
Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Client I.D.			BH 109 SS 3	BH 110 SS 3/4	O. Reg. 153		
Sample I.D.			B22-11876-17	B22-11876-18	Tbl. 1 - All		
Date Collected			25-Apr-22	26-Apr-22			
Parameter	Units	R.L.					
pH @25°C	pH Units		8.02	8.09			
Conductivity @25°C	mS/cm	0.001	0.099	0.087		0.57	
Sodium Adsorption Ratio	units		0.143	0.203		2.4	
Antimony	µg/g	0.5	< 0.5	< 0.5		1.3	
Arsenic	µg/g	0.5	0.8	0.8		18	
Barium	µg/g	1	45	19		220	
Beryllium	µg/g	0.2	< 0.2	< 0.2		2.5	
Boron	µg/g	0.5	< 0.5	1.8		36	
Boron (HWS)	µg/g	0.02	0.02	0.05			
Cadmium	µg/g	0.5	< 0.5	< 0.5		1.2	
Chromium	µg/g	1	11	9		70	
Chromium (VI)	µg/g	0.2	< 0.2	< 0.2		0.66	
Cobalt	µg/g	1	5	4		21	
Copper	µg/g	1	9	6		92	
Lead	µg/g	5	< 5	< 5		120	
Mercury	µg/g	0.005	< 0.005	< 0.005		0.27	
Molybdenum	µg/g	1	< 1	< 1		2	
Nickel	µg/g	1	7	7		82	
Selenium	µg/g	0.5	0.5	0.7		1.5	
Silver	µg/g	0.2	< 0.2	< 0.2		0.5	
Thallium	µg/g	0.1	< 0.1	< 0.1		1	
Uranium	µg/g	0.1	0.3	0.3		2.5	
Vanadium	µg/g	1	23	14		86	
Zinc	µg/g	3	19	23		290	

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O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

R.L. = Reporting Limit

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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C.O.C.: G85583/G85585

REPORT No. B22-11876 (i)

Rev. 1

Report To:

EXP Services Inc

14 Cedar Pointe Drive, Unit 1510

Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Summary of Exceedances

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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Christine Burke
Lab Manager

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REPORT No. B22-11876 (ii)

Rev. 1

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Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

SAMPLE MATRIX: Soil

P.O. NUMBER: BAR-22008396-A0

WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
% Moisture	18	Richmond Hill	FAL	28-Apr-22	A-% moisture RH	
PHC(F2-F4)	18	Kingston	KPR	02-May-22	C-PHC-S-001 (k)	CWS Tier 1
VOC's	18	Richmond Hill	FAL	28-Apr-22	C-VOC-02 (rh)	EPA 8260
PHC(F1)	18	Richmond Hill	FAL	28-Apr-22	C-VPHS-01 (rh)	CWS Tier 1

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg

F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)

F2 C10-C16 hydrocarbons in µg/g, (F2-naph if requested)

F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)

F4 C34-C50 hydrocarbons in µg/g

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

Any deviations from the method are noted and reported for any particular sample.

nC6 and nC10 response factor is within 30% of response factor for toluene:

nC10, nC16 and nC34 response factors within 10% of each other:

C50 response factors within 70% of nC10+nC16+nC34 average:

Linearity is within 15%:

All results expressed on a dry weight basis.

Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met. If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC QC will be made available upon request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Client I.D.			BH 102 SS 2	BH 101 SS 2/3	DUP #1	BH 103 SS 2	O. Reg. 153	
Sample I.D.			B22-11876-1	B22-11876-2	B22-11876-3	B22-11876-4	Tbl. 1 - All	
Date Collected			12-Apr-22	12-Apr-22	12-Apr-22	13-Apr-22		
Parameter	Units	R.L.						
Benzene	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	
Toluene	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2	
Ethylbenzene	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Xylene, m,p-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03		
Xylene, o-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03		
Xylene, m,p,o-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05	
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5	< 5	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	19	11	12	< 10	240	
PHC F4 (>C34-C50)	µg/g	10	< 10	< 10	< 10	< 10	120	
% moisture	%		15.5	15.5	16.1	13.4		

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O. Reg. 153 - Soil, Ground Water and Sediment Standards
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DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D. Sample I.D. Date Collected	BH 104 SS 2 B22-11876-5 13-Apr-22	BH 105 SS 3 B22-11876-6 13-Apr-22	BH 106 SS 2 B22-11876-7 14-Apr-22	BH 107 SS 4 B22-11876-8 21-Apr-22	O. Reg. 153 Tbl. 1 - All	
Parameter	Units	R.L.							
Benzene	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	
Toluene	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2	
Ethylbenzene	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Xylene, m,p-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
Xylene, o-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
Xylene, m,p,o-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05	
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5	< 5	< 5	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	13	13	< 10	13	13	240	
PHC F4 (>C34-C50)	µg/g	10	< 10	< 10	< 10	< 10	< 10	120	
% moisture	%		15.2	12.7	19.4	19.6			

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DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Client I.D.			BH 108 SS 2	BH 116 SS 3/4	DUP #2	BH 115 SS 3	O. Reg. 153	
Sample I.D.			B22-11876-9	B22-11876-10	B22-11876-11	B22-11876-12	Tbl. 1 - All	
Date Collected			21-Apr-22	21-Apr-22	21-Apr-22	22-Apr-22		
Parameter	Units	R.L.						
Benzene	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	
Toluene	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2	
Ethylbenzene	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Xylene, m,p-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03		
Xylene, o-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03		
Xylene, m,p,o-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05	
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5	< 5	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	12	11	< 10	< 10	240	
PHC F4 (>C34-C50)	µg/g	10	< 10	< 10	< 10	< 10	120	
% moisture	%		13.0	8.4	7.9	7.1		

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JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BH 114 SS 2	BH 113 SS 2	BH 112 SS 2	BH 111 SS 4	O. Reg. 153	
			Sample I.D.	B22-11876-13	B22-11876-14	B22-11876-15	B22-11876-16	Tbl. 1 - All	
			Date Collected	25-Apr-22	25-Apr-22	25-Apr-22	25-Apr-22		
Parameter	Units	R.L.							
Benzene	µg/g	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.02	
Toluene	µg/g	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2	
Ethylbenzene	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Xylene, m,p-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
Xylene, o-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03		
Xylene, m,p,o-	µg/g	0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05	
PHC F1 (C6-C10)	µg/g	10	< 10	< 10	< 10	< 10	< 10	25	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5	< 5	< 5	< 5	10	
PHC F3 (>C16-C34)	µg/g	10	62	12	< 10	< 10	< 10	240	
PHC F4 (>C34-C50)	µg/g	10	< 10	< 10	< 10	< 10	< 10	120	
% moisture	%		8.1	11.6	18.9	15.1			

1 Revised report to change guidelines as per client request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

R.L. = Reporting Limit

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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C.O.C.: G85583/G85585

REPORT No. B22-11876 (ii)

Rev. 1

Report To:

EXP Services Inc

14 Cedar Pointe Drive, Unit 1510

Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Client I.D.			BH 109 SS 3	BH 110 SS 3/4	O. Reg. 153		
Sample I.D.			B22-11876-17	B22-11876-18	Tbl. 1 - All		
Date Collected			25-Apr-22	26-Apr-22			
Parameter	Units	R.L.					
Benzene	µg/g	0.02	< 0.02	< 0.02		0.02	
Toluene	µg/g	0.2	< 0.2	< 0.2		0.2	
Ethylbenzene	µg/g	0.05	< 0.05	< 0.05		0.05	
Xylene, m,p-	µg/g	0.03	< 0.03	< 0.03			
Xylene, o-	µg/g	0.03	< 0.03	< 0.03			
Xylene, m,p,o-	µg/g	0.03	< 0.03	< 0.03		0.05	
PHC F1 (C6-C10)	µg/g	10	< 10	< 10		25	
PHC F2 (>C10-C16)	µg/g	5	< 5	< 5		10	
PHC F3 (>C16-C34)	µg/g	10	< 10	< 10		240	
PHC F4 (>C34-C50)	µg/g	10	< 10	< 10		120	
% moisture	%		8.3	5.5			

1 Revised report to change guidelines as per client request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Summary of Exceedances

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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Christine Burke
Lab Manager

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REPORT No. B22-11876 (iii)

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Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

SAMPLE MATRIX: Soil

P.O. NUMBER: BAR-22008396-A0

WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
OC Pesticides	18	Kingston	CS	03-May-22	C-PESTCL-01 K	EPA 8080

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg

F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)

F2 C10-C16 hydrocarbons in µg/g, (F2-naph if requested)

F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)

F4 C34-C50 hydrocarbons in µg/g

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

Any deviations from the method are noted and reported for any particular sample.

nC6 and nC10 response factor is within 30% of response factor for toluene:

nC10, nC16 and nC34 response factors within 10% of each other:

C50 response factors within 70% of nC10+nC16+nC34 average:

Linearity is within 15%:

All results expressed on a dry weight basis.

Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC

requirements and limits for holding time were met.

If analyzed for F4 and F4G they are not to be summed

but the greater of the two numbers are to be used in

application to the CWS PHC

QC will be made available upon request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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Lab Manager

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DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Parameter	Client I.D.		BH 102 SS 2	BH 101 SS 2/3	DUP #1	BH 103 SS 2	O. Reg. 153 Tbl. 1 - All	
	Sample I.D.	Date Collected	B22-11876-1 12-Apr-22	B22-11876-2 12-Apr-22	B22-11876-3 12-Apr-22	B22-11876-4 13-Apr-22		
Parameter	Units	R.L.						
Aldrin	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Chlordane (alpha)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Chlordane (Gamma)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Chlordane Total (alpha+gamma)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDD, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDD, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDD Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDE, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDE, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDE Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDT, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDT, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDT Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.4	
Dieldrin	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Lindane (Hexachlorocyclohexane, Gamma)	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Endosulfan I	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04		
Endosulfan II	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04		
Endosulfan I/II	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	
Endrin	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	
Heptachlor	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Heptachlor Epoxide	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Hexachlorobenzene	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	

O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

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C.O.C.: G85583/G85585

REPORT No. B22-11876 (iii)

Rev. 1

Report To:

EXP Services Inc

14 Cedar Pointe Drive, Unit 1510

Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BH 102 SS 2	BH 101 SS 2/3	DUP #1	BH 103 SS 2	O. Reg. 153 Tbl. 1 - All	
			Sample I.D.	B22-11876-1	B22-11876-2	B22-11876-3	B22-11876-4		
			Date Collected	12-Apr-22	12-Apr-22	12-Apr-22	13-Apr-22		
Parameter	Units	R.L.							
Hexachlorobutadiene	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Hexachloroethane	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Methoxychlor	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	

1 Revised report to change guidelines as per client request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



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Lab Manager

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DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D. Sample I.D. Date Collected	BH 104 SS 2 B22-11876-5 13-Apr-22	BH 105 SS 3 B22-11876-6 13-Apr-22	BH 106 SS 2 B22-11876-7 14-Apr-22	BH 107 SS 4 B22-11876-8 21-Apr-22	O. Reg. 153 Tbl. 1 - All	
Parameter	Units	R.L.							
Aldrin	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Chlordane (alpha)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Chlordane (Gamma)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Chlordane Total (alpha+gamma)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDD, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDD, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDD Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDE, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDE, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDE Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDT, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDT, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDT Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.4	
Dieldrin	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Lindane (Hexachlorocyclohexane, Gamma)	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Endosulfan I	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04		
Endosulfan II	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04		
Endosulfan I/II	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	
Endrin	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	
Heptachlor	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Heptachlor Epoxide	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Hexachlorobenzene	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	

O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

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C.O.C.: G85583/G85585

REPORT No. B22-11876 (iii)

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14 Cedar Pointe Drive, Unit 1510

Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BH 104 SS 2	BH 105 SS 3	BH 106 SS 2	BH 107 SS 4	O. Reg. 153	
			Sample I.D.	B22-11876-5	B22-11876-6	B22-11876-7	B22-11876-8	Tbl. 1 - All	
			Date Collected	13-Apr-22	13-Apr-22	14-Apr-22	21-Apr-22		
Parameter	Units	R.L.							
Hexachlorobutadiene	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Hexachloroethane	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Methoxychlor	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	

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JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Parameter	Client I.D.		BH 108 SS 2	BH 116 SS 3/4	DUP #2	BH 115 SS 3	O. Reg. 153 Tbl. 1 - All	
	Sample I.D.	Date Collected	B22-11876-9	B22-11876-10	B22-11876-11	B22-11876-12		
	Units	R.L.	21-Apr-22	21-Apr-22	21-Apr-22	22-Apr-22		
Aldrin	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Chlordane (alpha)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Chlordane (Gamma)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Chlordane Total (alpha+gamma)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDD, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDD, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDD Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDE, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDE, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDE Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDT, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDT, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDT Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.4	
Dieldrin	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Lindane (Hexachlorocyclohexane, Gamma)	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Endosulfan I	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04		
Endosulfan II	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04		
Endosulfan I/II	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	
Endrin	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	
Heptachlor	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Heptachlor Epoxide	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Hexachlorobenzene	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	

O. Reg. 153 - Soil, Ground Water and Sediment Standards

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Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Client I.D.			BH 108 SS 2	BH 116 SS 3/4	DUP #2	BH 115 SS 3	O. Reg. 153 Tbl. 1 - All	
Sample I.D.			B22-11876-9	B22-11876-10	B22-11876-11	B22-11876-12		
Date Collected			21-Apr-22	21-Apr-22	21-Apr-22	22-Apr-22		
Parameter	Units	R.L.						
Hexachlorobutadiene	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Hexachloroethane	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Methoxychlor	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	

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O. Reg. 153 - Soil, Ground Water and Sediment Standards
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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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Caduceon Environmental Laboratories.

C.O.C.: G85583/G85585

REPORT No. B22-11876 (iii)

Rev. 1

Report To:

EXP Services Inc

14 Cedar Pointe Drive, Unit 1510

Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BH 114 SS 2	BH 113 SS 2	BH 112 SS 2	BH 111 SS 4	O. Reg. 153	
			Sample I.D.	B22-11876-13	B22-11876-14	B22-11876-15	B22-11876-16	Tbl. 1 - All	
			Date Collected	25-Apr-22	25-Apr-22	25-Apr-22	25-Apr-22		
Parameter	Units	R.L.							
Aldrin	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Chlordane (alpha)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Chlordane (Gamma)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
Chlordane Total (alpha+gamma)	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDD, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDD, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDD Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDE, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDE, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDE Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
DDT, 2,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDT, 4,4-	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		
DDT Total	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.4	
Dieldrin	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Lindane (Hexachlorocyclohexane, Gamma)	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Endosulfan I	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04		
Endosulfan II	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04		
Endosulfan I/II	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	
Endrin	µg/g	0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	0.04	
Heptachlor	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Heptachlor Epoxide	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	
Hexachlorobenzene	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	

O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

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C.O.C.: G85583/G85585

REPORT No. B22-11876 (iii)

Rev. 1

Report To:

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Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BH 114 SS 2	BH 113 SS 2	BH 112 SS 2	BH 111 SS 4	O. Reg. 153	
			Sample I.D.	B22-11876-13	B22-11876-14	B22-11876-15	B22-11876-16	Tbl. 1 - All	
			Date Collected	25-Apr-22	25-Apr-22	25-Apr-22	25-Apr-22		
Parameter	Units	R.L.							
Hexachlorobutadiene	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Hexachloroethane	µg/g	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	
Methoxychlor	µg/g	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.05	

1 Revised report to change guidelines as per client request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

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JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Client I.D.			BH 109 SS 3	BH 110 SS 3/4	O. Reg. 153		
Sample I.D.			B22-11876-17	B22-11876-18	Tbl. 1 - All		
Date Collected			25-Apr-22	26-Apr-22			
Parameter	Units	R.L.					
Aldrin	µg/g	0.05	< 0.05	< 0.05		0.05	
Chlordane (alpha)	µg/g	0.05	< 0.05	< 0.05			
Chlordane (Gamma)	µg/g	0.05	< 0.05	< 0.05			
Chlordane Total (alpha+gamma)	µg/g	0.05	< 0.05	< 0.05		0.05	
DDD, 2,4-	µg/g	0.05	< 0.05	< 0.05			
DDD, 4,4-	µg/g	0.05	< 0.05	< 0.05			
DDD Total	µg/g	0.05	< 0.05	< 0.05		0.05	
DDE, 2,4-	µg/g	0.05	< 0.05	< 0.05			
DDE, 4,4-	µg/g	0.05	< 0.05	< 0.05			
DDE Total	µg/g	0.05	< 0.05	< 0.05		0.05	
DDT, 2,4-	µg/g	0.05	< 0.05	< 0.05			
DDT, 4,4-	µg/g	0.05	< 0.05	< 0.05			
DDT Total	µg/g	0.05	< 0.05	< 0.05		1.4	
Dieldrin	µg/g	0.05	< 0.05	< 0.05		0.05	
Lindane (Hexachlorocyclohexane, Gamma)	µg/g	0.01	< 0.01	< 0.01		0.01	
Endosulfan I	µg/g	0.04	< 0.04	< 0.04			
Endosulfan II	µg/g	0.04	< 0.04	< 0.04			
Endosulfan I/II	µg/g	0.04	< 0.04	< 0.04		0.04	
Endrin	µg/g	0.04	< 0.04	< 0.04		0.04	
Heptachlor	µg/g	0.05	< 0.05	< 0.05		0.05	
Heptachlor Epoxide	µg/g	0.05	< 0.05	< 0.05		0.05	
Hexachlorobenzene	µg/g	0.01	< 0.01	< 0.01		0.01	

O. Reg. 153 - Soil, Ground Water and Sediment Standards

Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

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Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

			Client I.D.	BH 109 SS 3	BH 110 SS 3/4			O. Reg. 153
			Sample I.D.	B22-11876-17	B22-11876-18			Tbl. 1 - All
			Date Collected	25-Apr-22	26-Apr-22			
Parameter	Units	R.L.						
Hexachlorobutadiene	µg/g	0.01	< 0.01	< 0.01			0.01	
Hexachloroethane	µg/g	0.01	< 0.01	< 0.01			0.01	
Methoxychlor	µg/g	0.05	< 0.05	< 0.05			0.05	

1 Revised report to change guidelines as per client request.

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



Christine Burke
Lab Manager

R.L. = Reporting Limit

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil

WATERWORKS NO.

Summary of Exceedances

O. Reg. 153 - Soil, Ground Water and Sediment Standards
Tbl. 1 - All - Table 1 - Res/Park/Institutional/Indus/Com/Commun



R.L. = Reporting Limit

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Christine Burke
Lab Manager

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Are any samples to be submitted intended for Human Consumption under any Drinking Water Regulations? ☐ Yes ☒ No (If yes, submit all Drinking Water Samples on a Drinking Water Chain of Custody)

Indicate Laboratory Samples are submitted to: ☐ Kingston ☐ Ottawa ☐ Richmond Hill ☐ Windsor ☒ Barrie ☐ London

Organization: EXP Services	Address and Invoicing Address (if different) 14 Cedar Pointe Dr., unit 1510 Barrie, ON L4N 5R7		ANALYSES REQUESTED (Print Test in Boxes)										TURNAROUND SERVICE REQUESTED (see back page)		
Contact: Richard Blair			Vitel Sub #2 Inorganic #1 BTEX PHC(F1-F4) OCP												☐ Platinum 200% Surcharge ☐ Gold 100% Surcharge ☐ Silver 50% Surcharge ☐ Bronze 25% Surcharge ☒ Standard 5-7 days ☐ Specific Date: _____
Tel: 705 719 1100				Suspected Highly Contaminated											
Fax:	Quote No.: EXP Barrie Pricing	Project Name:													
Email: Richard.Blair@exp.ca	P.O. No.: BAR 22008396-A0	Additional Info:													

* Sample Matrix Legend: WW=Waste Water, SW=Surface Water, GW=Groundwater, LS=Liquid Sludge, SS=Solid Sludge, S=Soil, Sed=Sediment, PC=Paint Chips, F=Filter, Oil = Oil

Lab No:	Sample Identification	S.P.L.	Sample Matrix *	Date Collected (yy-mm-dd)	Time Collected	Indicate Test For Each Sample By Using A Check Mark In The Box Provided										✓	Field		# Bottles Sample	Field Filtered(Y/N)
																		pH		
1	BH 102 SS2		Soil	22-04-12	8:04	X	X	X	X	X								4		
2	BH 101 SS2/3		↓	↓	9:12															
3	Dup #1			↓	9:12															
4	BH 103 SS2			22-04-13	8:25															
5	BH 104 SS2			↓	1:47															
6	BH 105 SS3			↓	3:00															
7	BH 106 SS2			22-04-14	8:10															
8	BH 107 SS4			22-04-21	8:21															
9	BH 108 SS2			↓	9:30															
10	BH 116 SS3/4			↓	2:20															
11	Dup #2			22-04-21	2:20															
12	BH 115 SS3			↓	22-04-22	8:11	↓	↓	↓	↓	↓								↓	

SAMPLE SUBMISSION INFORMATION			SHIPPING INFORMATION		REPORTING / INVOICING	SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)	
Print:	Sampled by: <i>Dan Gilchrist</i>	Submitted by:	Client's Courier ☐	Invoice ☐	Report by Fax ☐	Received By (print): <i>Neth</i>	Signature: <i>NH</i>
Sign:			Caduceon's Courier ☐		Report by Email ☒	Date Received (yy-mm-dd): <i>22-04-27</i>	Time Received: <i>8:00</i>
			Drop Off <i>AH</i> ☒	# of Pieces <i>1</i>	Invoice by Email ☒	Laboratory Prepared Bottles: ☐ Yes ☐ No	
			Caduceon (Pick-up) ☐		Invoice by Mail ☐	Sample Temperature °C: <i>5.0</i>	Labeled by: <i>JE</i>
Date (yy-mm-dd)/Time:			Date (yy-mm-dd)/Time:		Comments:		
					Page <i>1</i> of <i>2</i> G <i>85583</i>		

Indicate Laboratory Samples are submitted to: ☐ Kingston ☐ Ottawa ☐ Richmond Hill ☐ Windsor ☒ Barrie ☐ London

ANALYSES REQUESTED (Print Test in Boxes)

TURNAROUND SERVICE
REQUESTED (see back page)

☐	Platinum	200% Surcharge
☐	Gold	100% Surcharge
☐	Silver	50% Surcharge
☐	Bronze	25% Surcharge
☒	Standard	5-7 days
☐	Specific Date:	

* Sample Matrix Legend: WW=Waste Water, SW=Surface Water, GW=Groundwater, LS=Liquid Sludge, SS=Solid Sludge, S=Soil, Sed=Sediment, PC=Paint Chips, F=Filter, Oil = Oil

[illegible]

SAMPLE SUBMISSION INFORMATION

SHIPPING INFORMATION

REPORTING / INVOICING

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)							
--	--	--	--	--	--	--	--

	Sampled by:	Submitted by:	Client's Courier	☐
Print:	<i>[Signature]</i>		Caduceon's Courier	☐
Sign:			Drop Off <i>AW</i>	☒
			Caduceon (Pick-up)	☐
	Date (yy-mm-dd)/Time:	Date (yy-mm-dd)/Time:		

Report by Fax	☐
Report by Email	☒
Invoice by Email	☒
Invoice by Mail	☐

Received By (print): <u>Nathalie</u>	Signature: <u>NH</u>
Date Received (yy-mm-dd): <u>22-04-27</u>	Time Received: <u>8:00</u>
Laboratory Prepared Bottles: ☒ Yes ☐ No	
Sample Temperature °C: <u>50</u>	Labeled by: <u>JF</u>

Comments:

Labeled by: JK
Page 2 of 2
G **85585**

C.O.C.: G85584

REPORT No. B22-11883

Report To:

EXP Services Inc

14 Cedar Pointe Drive, Unit 1510

Barrie ON L4N 5R7

Attention: Richard Blair

Caduceon Environmental Laboratories

112 Commerce Park Drive

Barrie ON L4N 8W8

Tel: 705-252-5743

Fax: 705-252-5746

DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

SAMPLE MATRIX: Soil/Leachate

P.O. NUMBER: BAR-22008396-A0

WATERWORKS NO.

Parameter	Qty	Site Analyzed	Analyst Initials	Date Analyzed	Lab Method	Reference Method
OC Pesticides	4	Kingston	CS	04-May-22	C-PESTCL-01 K	EPA 8080
Metals - ICP-MS	4	Holly Lane	TPR	04-May-22	D-ICPMS-01 (o)	EPA 200.8

µg/g = micrograms per gram (parts per million) and is equal to mg/Kg

F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)

F2 C10-C16 hydrocarbons in µg/g, (F2-naph if requested)

F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)

F4 C34-C50 hydrocarbons in µg/g

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

Any deviations from the method are noted and reported for any particular sample.

nC6 and nC10 response factor is within 30% of response factor for toluene:

nC10, nC16 and nC34 response factors within 10% of each other:

C50 response factors within 70% of nC10+nC16+nC34 average:

Linearity is within 15%:

All results expressed on a dry weight basis.

Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.

Unless otherwise noted all extraction, analysis, QC requirements and limits for holding time were met. If analyzed for F4 and F4G they are not to be summed but the greater of the two numbers are to be used in application to the CWS PHC QC will be made available upon request.

O. Reg 406/19 - mSPLP - Ontario Regulation 406/19 - mSPLP

Tbl 1 -mSPLP - RPI - mSPLP - Residential/Parkland/Institutional

Tbl 1 -mSPLP- Agri/Other - mSPLP - Agricultural and Other Property Use



Christine Burke
Lab Manager

R.L. = Reporting Limit

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DATE RECEIVED: 27-Apr-22

JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil/Leachate

WATERWORKS NO.

	Client I.D. Sample I.D. Date Collected		SPLP #1 B22-11883-1 13-Apr-22	SPLP #2 B22-11883-2 14-Apr-22	SPLP #3 B22-11883-3 22-Apr-22	SPLP #4 B22-11883-4 26-Apr-22	O. Reg 406/19 - mSPLP Tbl 1 - mSPLP - RPI		Tbl 1 - mSPLP- Agri/Other
Parameter	Units	R.L.							
Antimony	µg/L	0.1	0.5	0.2	0.2	0.5			6
Molybdenum	µg/L	0.1	0.4	0.8	0.1	1.7	15		15
Silver	µg/L	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.3		0.3
Thallium	µg/L	0.05	< 0.05	< 0.05	< 0.05	< 0.05	2		
Dieldrin	µg/L	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.095		0.095
Endrin	µg/L	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.061		0.061
Heptachlor	µg/L	0.004	< 0.004	< 0.004	< 0.004	< 0.004	0.01		0.01
Heptachlor Epoxide	µg/L	0.006	< 0.006	< 0.006	< 0.006	< 0.006	0.01		0.01

O. Reg 406/19 - mSPLP - Ontario Regulation 406/19 - mSPLP
Tbl 1 -mSPLP - RPI - mSPLP - Residential/Parkland/Institutional
Tbl 1 -mSPLP- Agri/Other - mSPLP - Agricultural and Other Property Use



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JOB/PROJECT NO.: Phase BAR-100

DATE REPORTED: 05-May-22

P.O. NUMBER: BAR-22008396-A0

SAMPLE MATRIX: Soil/Leachate

WATERWORKS NO.

Summary of Exceedances

O. Reg 406/19 - mSPLP - Ontario Regulation 406/19 - mSPLP
Tbl 1 -mSPLP - RPI - mSPLP - Residential/Parkland/Institutional
Tbl 1 -mSPLP- Agri/Other - mSPLP - Agricultural and Other Property Use



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Indicate Laboratory Samples are submitted to: ☐ Kingston ☐ Ottawa ☐ Richmond Hill ☐ Windsor ☒ Barrie ☐ London

Organization:	EXP Services
Contact:	Richard Blair
Tel:	705 719 1109
Fax:	
E-mail:	Richard.Blair@exp.com

Address and Invoicing Address (if different)
14 Cedar Point Dr. Unit 1510
Barrie, ON
L4N 5R7

Quote No.: Barre Exp Pricing	Project Name: BAR-2200 8346-AO
P.O. No.:	Additional Info: phase BAR-100 7 as per chart email

ANALYSES REQUESTED (Print Test in Boxes)

TURNAROUND SERVICE
REQUESTED (see back page)

☐	Platinum	200% Surcharge
☐	Gold	100% Surcharge
☐	Silver	50% Surcharge
☐	Bronze	25% Surcharge
☐	Standard	5-7 days
☐	Specific Date:	

* Sample Matrix Legend: WW=Waste Water, SW=Surface Water, GW=Groundwater, LS=Liquid Sludge, SS=Solid Sludge, S=Soil, Sed=Sediment, PC=Paint Chips, F=Filter, Oil = Oil

[illegible]

small $\sigma \rightarrow 0$
large $\sigma \rightarrow k$

SAMPLE SUBMISSION INFORMATION

SHIPPING INFORMATION

REPORTING / INVOICING

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)									
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Sampled by: <i>Paula L. Lutz</i>		Submitted by:		Client's Courier ☐	Invoice ☐	Report by Fax ☐	Received By (print): <i>Nathaniel</i>	Signature: <i>NL</i>
Print: <i>Paula L. Lutz</i>			Caduceon's Courier ☐	☐	Report by Email ☒	Date Received (yy-mm-dd): <i>27-04-27</i>	Time Received: <i>8:00</i>	
Sign:			Drop Off <i>AL</i> ☒	# of Pieces	Invoice by Email ☒	Laboratory Prepared Bottles: ☒ Yes ☐ No		
			Caduceon (Pick-up) ☐	<i>1</i>	Invoice by Mail ☐	Sample Temperature °C: <i>5.2</i>	Labeled by: <i>ES</i>	
	Date (yy-mm-dd)/Time:	Date (yy-mm-dd)/Time:						

Comments:

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