Hydrogeological Assessment, 8 Easy Street, Port Perry, Ontario

June 9, 2023

Prepared for:
0507 Industries Ltd.

Cambium Reference: 14273-001

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1.0 Introduction

Cambium Inc. (Cambium) was retained by 0507 Industries Ltd. (the Client) to complete a hydrogeological assessment of 8 Easy Street, Port Perry, Ontario (Site) in support of proposed industrial development on that property. The Site is currently undeveloped. It is understood that the proposed development consists of a two storey structure with a total footprint of approximately 1,249 m² (which includes the initial phase of the development, and a future addition). Also included in the development is an internal roadway, sideways and parking lots. The proposed development will be provided water and wastewater servicing from private on-site systems.

A previous hydrogeological assessment of the Site was conducted by Cambium (Cambium, 2022). The initial assessment reviewed background information available and characterized the soils and hydrogeological conditions in the area of the Site. The assessment outlined herein was conducted based off the recommendations in the initial assessment report.

As Cambium understands, the daily water demand rate of the proposed development will be 9,050 L/day. The work program outlined herein included the installation of a new supply well and hydraulically testing the new well to determine if it could provide the anticipated daily water demand on a sustainable basis. The water quality of the new well was reviewed and potential impacts of water withdrawal to adjacent groundwater users was assessed. A conceptual water balance is also included herein.

1.1 Site Description

The Site is irregular in shape with a total area of approximately 10,178 m^2 (1.02 ha). The Site is currently zoned as Prestige Industrial (M1) Zone. The Site is surrounded by land zoned as General Industrial (M2) to the north, M1 Holding Zone to the west, M1 Zone to the south, and Easy Street to the east.

At the time of report preparation, Site was vacant with grass and sporadic tree cover. Topography at the Site is generally flat with a slight slope down to the north-northeast. A Site plan is included as Figure 1 and the proposed development plan is included as Appendix A.

2.0 Methodology

This section outlines the methodology followed to complete the hydrogeological assessment.

2.1 Background Information Review

A review of available relevant background information was undertaken for this study, which included the following resources:

- Chapman, L.J. and Putnam, D.F., 2007. Physiography of Southern Ontario; Ontario Geological Survey, Miscellaneous Release – Data 228. Scale: 1:50,000.
- Ontario Geological Survey, 1991. Bedrock Geology of Ontario; Ontario Geological Survey. Scale: 1:250,000.
- Ontario Geological Survey, 2010. Surficial Geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release – Data 128-REV. Scale: 1:50,000.
- Ontario Geological Survey, 2000. Quaternary geology, seamless coverage of the Province of Ontario; Ontario Geological Survey, Data 14-REV. Scale: 1:1,000,000.
- Source Protection Area Mapping provided by the Ministry of Environment, Conservation and Parks (MECP).
- Water Well Information System provided by the MECP.

2.2 Review of Previous Reports

A geotechnical investigation (Cambium, 2022a) was completed at the Site by Cambium in March of 2022. As part of the geotechnical investigation, five boreholes were advanced at the Site. Three boreholes were completed as monitoring wells (MW101-22, MW102-22, and MW105-22). Well installation locations are outlined on Figure 1 and borehole logs are included in this report as Appendix B.

2.3 Physical Laboratory Testing

As part of the geotechnical investigation physical laboratory testing, including sieve and hydrometer analyses, was completed on three soil samples to confirm textural classification (Cambium, 2022a). Results are presented in Appendix C and discussed in Section 3.5.1.

2.4 Hydrogeological Field Tasks

On November 8, 2022, Cambium staff visited the Site to complete Single Well Hydraulic Tests (SWHTs) on monitoring wells MW101-22, MW102-22, and MW105-22. The SWHTs were completed by inducing an instantaneous change in groundwater head in the well and monitoring water level recovery. Water level recovery was monitored using an automated water level logging device and validated with manual measurements. The hydraulic conductivity of water bearing units screened in each well were estimated using AquiferTest Pro™ software, the results of which are attached in Appendix D and are discussed further in Section 4.0.

2.5 Test Well Installation

The supply well installed at the Site for the proposed industrial development was installed by Wilson's Water Wells Ltd. on December 21, 2022. The location of the supply well (herein referred to as TW101-22) is illustrated in Figure 1. A well record for the test well is included in Appendix E.

Test well TW101-22 was installed on December 21, 2022, and assigned ID # A310974 (see Appendix E for well record). Soils were described as topsoil to 0.6 m, underlain by native overburden. Overburden was described as brown fine sand with stone and clay to 1.8 mbgs, brown clay to 4.6 mbgs, grey clay to 21.3 mbgs, and grey fine sand to 23.2 mbgs. Water fine sand was encountered from 21.3 mbgs to 23.2 mbgs. The well was screened from 21.3 mbgs to 23.2 mbgs. Bedrock was not encountered during advancement of TW101-22. The static water level after well drilling was flowing over the top of the casing (0.46 m high) so the static level recorded as 0.46 m above the ground surface. The recommended pumping rate, based

on a 1-hour pumping test conducted by the driller, was 19 L/min (5 US gallons per minute (gpm)).

2.6 TW101-22 Pumping Test

The static water level in TW101-22 was above ground surface and flowing overtop of the casing (0.46 m above grade) on February 7, 2023, prior to commencing the pumping test. The pump was installed at a depth of approximately 18 mbgs by Wilson's Water Wells Ltd. The available drawdown in the well was therefore approximately 18.5 m (height of static water level above pump).

The hydraulic testing began at 8:57 am and continued for a duration of 12 hours 30 minutes. The water withdrawal was altered between 8 L/min to 18 L/min within the first two hours of the pumping test (approximately) in order to establish a sustainable discharge rate. Specifically, the water level lowered from static (0.46 m above grade, or 0 metres below top of pipe (mtop)) to 16.13 mtop by 10:07 AM. At 10:07 AM the water withdrawal rate was reduced to 8 L/min in order to stop the water level from drawing down to the pump intake.

The water withdrawal rate was maintained at 8 L/min from 10:07 AM to 10:51 AM. During this time the water level recovered from 16.13 mtop to 10.71 mtop. At 10:51 AM the water withdrawal rate was increased to 12 L/min and was maintained at this rate until the end of the pumping test (at 9:27 PM). Between 10:51 AM and 9:27 PM the water level lowered from 10.71 mtop to between 13.02 mtop and 13.45 mtop, where equilibrium conditions developed. At the end of the pumping test the water level was 13.18 mtop.

The pump was shut off at 9:27 PM and recovery was monitored until 10:12 PM (a recovery period of 45 minutes). During the recovery period the water level recovered from 13.18 mtop to 0.22 mtop (a recovery depth of 12.96 m, or a recovery percentage of 98%).

Results of the pumping test are discussed further in Section 6.0.

2.6.1 On and Off-site Monitoring Wells

A well survey was completed of several adjacent properties. Contact was only made with the owners of 1, 12 and 27 Easy Street. All of these properties were provided water from private supply wells. The private supply wells of 1 and 12 Easy Street are flowing artesian wells which had historically been sealed and connected to the water distribution system at these properties. Cambium did not attempt to access these wells for monitoring purposes due to owner hesitancy and the possibility that access attempts would cause issues re-sealing the wells (and potentially interrupting water supply).

The well at 27 East Street was drilled, but readily accessible (and not flowing). As such the water level of this well was monitored during the pumping test to determined off-site impacts with a Solinst pressure transducer Levelogger (logger).

Water levels of the on-site monitoring wells were monitored throughout the duration of the pumping test to review and on-site influences.

Further details pertaining to the pumping test are outlined in Section 6.0.

2.7 Groundwater Quality

A groundwater sample was collected from the discharge of TW101-22 at 11:02 pm on February 7, 2023, at the end of the pumping test, and sent to SGS Canada Inc. in Lakefield (SGS) for analysis. The groundwater sample was analyzed for general organic and inorganic chemistry (including duplicate bacterial analyses) and compared against the parameters outlined in the Ontario Drinking Water Quality Standards (ODWQS; MOE (2006)). A sample was also collected from well MW101-22 after the completing of the pumping test. Three well bore volumes were purged from the well before the sample was collected. The sample was collected using polyethylene tubing with an inertial lift foot valve. The sample was sent to SGS for analysis of nitrate and nitrite. The Certificates of Analysis are attached in Appendix F.

It is noted that well TW101-22 was chlorinated immediately after installation by the driller. However, chlorination was not possible prior to the February 7, 2023, pumping test since the well flowed continuously after it was installed.

3.0 Geological and Hydrogeological Setting

3.1 Topography and Drainage

According to the site-specific topographic survey conducted by D.G. Biddle & Associates Limited (D.G. Biddle) in June of 2021, topography at the Site is generally flat with a slight slope to the north-northeast. The highest point of elevation is along the southwestern boundary at approximately 261.5 metres above sea level (masl), and the topographic low is in the northeast corner of the Site at approximately 259.0 masl.

The Site is located within the Lake Scugog watershed. Surface water drainage flows northwards where it is routed into a tributary of the Nonquon River (approximately 300 m north of the Site). The Nonquon River discharges directly to Lake Scugog.

3.2 Physiographic Region

The Site is within the Schomberg Clay Plains physiographic region. The Schomberg Clay Plains are comprised of several topographic basins along the northern slopes of the Oak Ridges Moraine that contain deep deposits of stratified clay and silt. The area of the Site is characterized by flat till plains with a normal lake plain appearance; however, there are a few drumlins within this area. The Schomberg Clay Plains sediments are typically varved clays with annual layers of two to four inches of thickness usually (Chapman, L.J. and D.F. Putnam, 1984).

3.3 Overburden Geology

According to Ontario Geological Survey (OGS) Miscellaneous Release – Data 128 (Ontario Geological Survey, 2010), the main type of overburden and soils located in the in the area of the Site are coarse-grained glaciolacustrine deposits that are comprised primarily of sand, gravel, minor silt and clay. These sediments are interpreted as being deposited within foreshore and basinal environments (Figure 2).

3.4 Bedrock Geology

According to Miscellaneous Release – Data 219 from the Ontario Geological Survey (Ontario Geological Survey, 2007), the bedrock in the area of the Site consists of Middle Ordovician rocks from the Simcoe Group. The Site is composed of nodular and black laminated limestone of the Lindsay Formation.

3.5 Results of Subsurface Investigation

Subsurface conditions at the Site generally consist of a topsoil layer that ranges in thickness from 100 to 406 mm. The topsoil was overlying a native sandy silt/silty sand or sand and silt layer which ranges in thickness from 0.7 to 2.4 m and was light brown to orange and grey in colour. This layer contains varying matrices of clay and gravel and also had small inclusions of organics in the upper portions.

Underneath the sandy silt/silty sand or sand and silt layers of BH101-22, BH103-22 and BH105-22, a layer of grey clayey sandy silt was observed with a thickness range of 0.8 m to 2.3 m.

Beneath the sandy silt/silty sand, sand and silt observed in BH102-22 and BH104-22 and the clayey sandy silt observed in BH101-22, BH103-22 and BH105-22, was a silt and clay, silty clay or clay layer that extended to the termination depth in all boreholes. The soil was observed to be grey in colour (Cambium, 2022a).

Bedrock was not encountered during the subsurface investigation.

3.5.1 Grain Size Analyses

Laboratory particle size distribution analyses were completed on three samples of the native soil taken from the boreholes and depths shown in Table 1. The grain size distribution results are provided in Appendix C.

Table 1 Grain Size Analysis

Borehole	Depth	Soil	% Gravel	% Sand	% Silt	% Clay
BH102-22 SS5	3.0 – 3.5	Silt and Clay trace Sand	0	7	55	38
BH104-22 SS2	0.8 – 1.2	Sand and Silt some Clay trace Gravel	1	45	35	19
BH105-22 SS4	2.3 – 2.7	Clayey Sandy Silt	0	23	48	29

3.6 Water Well Records

The MECP Water Well Information System (WWIS) was accessed to review water well records in the area of the Site. There were 20 water well records located within approximately 500 m of the Site (Appendix G; Figure 3). The following water well record well types were identified:

- Five (5) well records for supply wells installed in bedrock.
- Eleven (11) well records for supply wells installed in overburden.
- Three (3) well records for abandoned overburden supply wells.
- One (1) well records for a monitoring well.

As per the MECP records, the soil profile has a layer of topsoil with an average depth of 0.8 m (where observed), underlain predominantly by brown to grey clay or silt with interbedded horizons of sand. Some well records also have isolated horizons of gravel. Five wells were extended into the underlying bedrock that was described as grey limestone or black shale; the bedrock contact was found between 75.3 and 82.3 metres below ground surface (mbgs), average of 77.2 mbgs. Bedrock wells were on average 77.2 m deep, whereas overburden wells were 32.1 m deep, on average.

Water bearing sediments were identified within overburden between 9.1 to 44.0 mbgs, average of 26.1 mbgs. Water bearing fractures were identified in bedrock between 73.2 and 81.7 mbgs, and at an average depth of 76.0 mbgs. Generally, water bearing fractures were encountered a few metres below the overburden/bedrock interface; no well records explored deeper into the bedrock.

The average static water level of the wells installed in overburden was -0.2 mbgs and the average static water level of the wells installed in bedrock was -0.6 mbgs. These data indicate that both the local overburden and bedrock supply wells generally exhibit flowing artesian conditions.

The recommended pumping rate for the bedrock supply wells ranged from 23 litres per minute (L/min) to 59 L/min, with an average recommended pumping rate of 41 L/min. The recommended pumping rate for the overburden supply wells ranged from 14 L/min to 57 L/min, with an average recommended pumping rate of 30 L/min. Further information summarized from the water well records are listed below in Table 2.

Table 2 Water Well Record Information

		Total Depth (mbgs)	Depth Water Encountered (m)	Static Water Level (mbgs)	Recommended Pumping Rate (L/min)
Bedrock Supply Wells Count: 5	Min	75.3	73.2	-1.4	23
	Max	82.3	81.7	0.0	59
	Avg	77.2	76.0	-0.6	41
Overburden Supply Wells Count: 11	Min	12.8	9.1	-2.0	14
	Max	68.3	44.0	1.0	57
	Avg	32.1	26.1	-0.2	30
Monitoring Well Count: 1		4.3	2.1	-	-

3.7 Vulnerable and Regulated Areas

As per the MECP Source Water Protection Information Atlas (SPIA) the Site is partially located with a highly vulnerable aquifer (HVA).

The Site is not located within regulated areas, as per Kawartha Conservation Authority (KCA) information. The SPIA and KCA mapping is attached in Appendix A.

3.8 Hydrogeological Conditions

3.8.1 Shallow Overburden

Shallow surficial soils at the Site generally consist of sandy silt to silty sand which overlies predominantly silt and clay to clay sediments. Groundwater was encountered within the shallow overburden sediments.

Groundwater levels and elevations were measured on in monitoring wells installed in the shallow overburden on April 6, 2022, November 8, 2022, and February 7, 2023. During these measurement events the water levels ranged from 0.58 mbgs to 1.70 mbgs. Groundwater elevations ranged from 258.90 masl to 260.60 masl. Groundwater flow within the shallow overburden aquifer was directed to the north/northeast (see Figure 4). See Table 3 for a summary of water levels and elevations.

It should be noted that groundwater levels at the Site will fluctuate seasonally and in response to weather events. Grey soils are an indicator of the presence of groundwater at least some times of the year. As per the borehole logs, grey soils were encountered between approximately 0.5 and 2.6 mbgs.

3.8.2 Deep Overburden/Bedrock

There are deeper overburden and bedrock aquifers in the area of the Site which are drawn upon for local groundwater supplies. Finer grained sediments were also identified regionally and likely provide hydraulic separation between shallow groundwater/surface water systems and deeper supply aquifers. The MECP WWIS data indicate that the average static water level of the deeper aquifers ranges from -0.2 mbgs to -0.6 mbgs. The supply well installed on-site (TW101-22) is considered to be installed in a confined overburden aquifer. The direction of groundwater flow within the confined supply aquifers was not confirmed as part of this assessment. Presumably, groundwater flow within the confined supply aquifers is towards the north, following topography (and towards the tributary of the Nonquon River).

Table 3 Groundwater Levels

Well		MW101-22	MW102-22	MW105-22
Ground Surface Elevation (masl) (1)		259.60	260.90	261.73
Top of Pipe Elevation (masl) (1)		260.33	261.70	262.44
Stick-up (m)		0.73	0.80	0.71
April 6, 2022	Water Level (mbgs) (2)	0.58	1.44	1.13
	Groundwater Elev.(masl) (1)	259.02	259.46	260.60
November 8, 2022	Water Level (mbgs) (2)	0.70	1.69	1.70
	Groundwater Elev.(masl) (1)	258.90	259.21	260.03
February 7, 2023	Water Level (mbgs) (2)	0.61	1.50	1.36
	Groundwater Elev.(masl) (1)	258.99	259.40	260.37

1. *metres above sea level*
2. *metres below ground surface*

4.0 Results of Field Investigations

The hydraulic conductivity (K-value) of the shallow overburden soils were estimated based on the results obtained from the SWHTs conducted on November 8, 2022. Either falling head test or rising head tests were performed in monitoring wells MW101-22, MW102-22, and MW105-22. Results of hydraulic conductivity tests are presented below in Table 4 and analytical data is included in Appendix D.

Table 4 Results of Estimated Hydraulic Conductivity as per Slug Test

Test #	Soil Type	Test 1	Test 2	Test 3
MW101-22	Silt and Clay	2.78×10^{-6}	2.32×10^{-6}	2.05×10^{-6}
MW102-22	Silt and Clay, trace Sand	5.37×10^{-6}	9.26×10^{-6}	-
MW105-22	Silty Clay	7.53×10^{-8}	-	-

3. *Hydraulic conductivity reported in m/sec.*

The hydraulic conductivity was estimated utilizing AquiferTest Pro slug test software using the Hvorslev interpretation method. The estimated hydraulic conductivities ranged between 7.53×10^{-8} m/sec and 9.26×10^{-6} m/sec. The geometric mean of tested hydraulic conductivities was 1.92×10^{-6} m/sec. The estimated hydraulic conductivity for MW105-22 is consistent with published values for silty clay. The estimated hydraulic conductivities for MW101-22 and MW102-22 were slightly higher that expected based on published values silt and clay; however, the estimates were consistent between multiple tests at each location and are therefore determined to be accurate for the soils encountered at each location.

5.0 Water Balance Assessment

Based on the Thornthwaite and Mather methodology (Thornthwaite & Mather, 1957), the water balance is an accounting of water in the hydrologic cycle. Precipitation (P) falls as rain and snow. It can run off towards lakes and streams (R), infiltrate to the groundwater table (I), or evaporate from ground or evapotranspiration by vegetation (ET). When long-term average values of P, R, I, and ET are used, there is minimal or no net change to groundwater storage (ΔS).

The annual water budget can be expressed as:

$$P = ET + R + I + \Delta S$$

Where:

P = Precipitation (mm/year)

ET = Evapotranspiration (mm/year)

R = Run-off (mm/year)

I = Infiltration (mm/year)

ΔS = Change in groundwater storage (taken as zero) (mm/year)

It is noted that the water balance described herein does not account for catchment areas that extend off-site. The calculations compare the pre- and post-development water balance changes within the Site boundaries.

The property is currently undeveloped grassland. It is understood that the proposed development consists of a structure with a total buildout footprint of potentially 1,249 m² (approximate) structure and associated infrastructure, including but not limited to, an internal roadway, sideways, parking lots, etc.

Based on the available design information, the development areas at the Site can be generally categorized into three types: paved areas, roof areas, and landscape areas. A summary of the surface areas of the development is listed in Table 5:

Table 5 Pre- and Post-Development Statistics

Type of Land Coverage	Pre-Developments Areas (m^2)	Post Development Areas (m^2)
Paved Area	0	1,800(1)
Building Roof Area	0	1,249
Landscape/Vegetated Area	10,178	7,129
Total	**10,178**	**10,178**

1) Includes refuse area of 35 m².

Supporting information referenced herein (including detailed water balance calculations) is attached in Appendix H.

5.1 Water Surplus

Water surplus is calculated by determining the difference between precipitation and evapotranspiration (changes in soil water storage was assumed to be negligible over the course of a year). The volume of water surplus is further sub-divided into portions that infiltrate the on-site soils and that are directed off-site as runoff. The climatic data including monthly average temperature and precipitation were obtained from Environment Canada for the Burketon McLaughlin Weather Station (Climate ID: 6151042), located about 16 km distance from the Site. Accordingly, the average annual evapotranspiration was estimated to be about 531 mm/year using the USGS Thornthwaite Monthly Water Balance methodology (Appendix H), and the average annual precipitation was recorded to be 921 mm/year. The water surplus of the Site was calculated to be 390 mm/yr.

Transpiration does not occur from structures, paved areas, or gravel surfaces. It was assumed that 10% of precipitation falling on these surfaces is lost directly to evaporation. The remaining depth (i.e., 90% of precipitation) was considered surplus and converted to infiltration and/or runoff.

5.2 Infiltration Rates

The volume of surplus water that infiltrates through pervious surfaces on-site was determined by applying an infiltration factor to the surplus depth. The surplus water that does not infiltrate into pervious surfaces will leave the Site as surface water runoff. The infiltration factor varies

from 0 to 1 and is estimated based on topography, soils, and vegetation cover as per the *Stormwater Management Planning and Design Manual* (Ministry of the Environment, 2003).

The rate of infiltration at a site is expected to vary, based on a number of factors to be considered in any infiltration model. To partition the available water surpluses into infiltration and surface run-off, the MECP infiltration factor was used. The MECP *Stormwater Management Planning and Design Manual* (Ministry of the Environment, 2003) methodology for calculating total infiltration is based on topography, soil type and land cover was used, and a corresponding run-off component was calculated for the soil moisture storage conditions.

The topography at the Site is a gentle slope to the north-northeast and based on the results of the borehole investigation and the grain size analysis, the shallow subsurface conditions at the Site are described as predominantly sandy silt to sand and silt, and the land in predominantly open grassy cultivated land. Therefore, an infiltration factor of 0.5 was considered appropriate for the Site.

5.2.1 Pre-Development Water Balance

The water balance for the existing conditions of the Site is summarized in Table 6. The pre-development infiltration rate was calculated to be 1,985 m³/yr and the runoff rate was 1,985 m³/yr.

Table 6 Pre-Development Water Balance

Land Use		Area (m²)	Precipitation (m³)	Evapo-transpiration (m³)	Infiltration (m³)	Run-off (m³)
Impervious Areas	Paved Area	0	-	-	-	-
	Roof Area	0	-	-	-	-
Pervious Areas	Landscape Area	10,178	9,374	5,405	1,985	1,985
Total		**10,178**	**9,374**	**5,405**	**1,985**	**1,985**

Assuming no infiltration occurring in paved and roof areas, and 10% of precipitation to be evaporated from paved and roof areas.

5.2.2 Post-Development Water Balance

The post-development water balance is summarized in Table 7. The post-development infiltration rate was calculated to be 1,390 m³/yr and the runoff volume was 3,917 m³/yr.

Table 7 Post-Development Water Balance

Land Use		Area (m²)	Precipitation (m³)	Evapo-transpiration (m³)	Infiltration (m³)	Run-off (m³)
Impervious Areas	Paved Area	1,800	1,658	166	-	1,492
	Roof Area	1,249	1,150	115	-	1,035
Pervious Areas	Landscape Area	7,129	6,566	3,785	1,390	1,390
Total		**10,178**	**9,374**	**4,066**	**1,390**	**3,917**

Assuming no infiltration occurring in paved and roof areas, and 10% of precipitation to be evaporated from paved and roof areas.

5.2.3 Water Balance Comparison

The water balances of the pre-development and post-development scenarios are summarized below in Table 8.

Table 8 Water Balance Comparison

	Precipitation (m³)	Evapotranspiration (m³)	Infiltration (m³)	Run-off (m³)
Pre-Development	9,374	5,405	1,985	1,985
Post-Development	9,374	4,066	1,390	3,917
Change in Volume			**- 595**	**1,933**
Change in %			**- 30**	**97**

Based on the above, there is an expected net infiltration deficit of about 595 m³/year compared to the pre-development infiltration, while the runoff rate upon development of the Site will increase by 1,933 m³/year.

Based on the above calculations, a summary of the water balance could be provided as follows:

1. There would be a net increase in run-off at the Site of about 1,933 m^3/year (from 1,985 m^3/year to 3,917 m^3/year). This increase is a result of the development of the Site with more impervious areas such as roof and paved areas and a decrease in pervious areas.
2. Post-development landscape area would be decreased by about 3,049 m^2 when compared to the pre-development landscape, decreasing infiltration across the Site.
3. Without implementing any mitigation measures, there would be a net deficit of about 595 m^3/year in the post-development infiltration on a yearly basis.

5.3 Discussions on LID Measures

D.G. Biddle developed a design for an infiltration trench in the northern area of the Site (just north of the proposed parking area) (included in Appendix A). The infiltration trench is designed to re-infiltrate the first 5 mm of rain from a 1,740 m² capture area (see Appendix I). The infiltration trench design is a best efforts approach to maintain the pre-development infiltration rate and is considered to be the most feasible option in consideration of existing Site conditions.

The long-term climate station data from the Burketon McLaughlin Weather Station (Climate ID: 6151042) indicates that rainfall events between 0 and 5 mm account for approximately 330 mm (i.e., calculating the definite integral from 0 to 5 mm, as per the logarithmic trendline plotted for rainfall return frequencies).

Evapotranspiration was calculated to be 531 mm/year, which accounts for approximately 58% of all precipitation that falls on the Site. If it assumed that the same percentage of evapotranspiration losses occur from the total rainfall accounted for by the 0 to 5 mm rainfall events then the water surplus available for infiltration/runoff is 142 mm/year. If the infiltration factor is assumed to be 0.5, then the runoff volume available for reinfiltrating through the proposed infiltration trench is 71 mm/year. Infiltrating 71 mm of runoff from a catchment area of 1,740 m² results in a volume of 124 m³/year.

Implementing the infiltration trench proposed by D.G. Biddle will result in 124 m³/year of runoff capture and infiltration. Thereby reducing the infiltration deficit to 471 m³/year (which is 24%

less than pre-development conditions). The proposed infiltration trench is considered to be a best efforts approach to maintain the pre-development water balance.

6.0 Water Supply Assessment

Information from the Client indicates that the daily water demand rate of the proposed development is 9,050 L/day. As such the pumping test was tailored to assess the ability of TW101-22 to provide that volume of water, on a daily basis. The results obtained for the water supply assessment are discussed in the following subsections.

6.1 Hydraulic Pumping Test – TW101-22

The pumping test of the on-Site well (TW101-22) commenced on February 7, 2023, at 8:57 AM. During the pumping test the cumulative water withdrawal volume was monitored continuously. The pumping test was terminated when 9,050 L of water was withdrawn from the well by 9:27 PM (a total of 12 hours and 30 minutes). Recovery was monitored from 9:27 PM until to 10:12 PM on February 7, 2023. The water level response of well TW101-22 to the pumping test is outlined in Figure 5.

Based on the steady state conditions achieved during the test, as well as the rate of water level recovery after the test, it is Cambium's opinion that TW101-22 can sustainably yield 9,050 L/day.

The well was tested at 12 L/min. As such, this flow rate should be considered when the water treatment and distribution system are designed. The pump should also be installed at or below 18.5 mbtop in order to allow for sufficient drawdown in the well.

6.1.1 Monitoring Wells

The water levels in the monitoring wells (MW101-22, MW102-22 and MW105-22) and the supply well at 27 Easy Street did not show a measurable response to the pumping test at well TW101-22. Water level responses are outlined in Figure 5.

6.2 Pumping Test Influence

The supply wells that services 27 Easy Street was included in the monitoring program. This well is located approximately 330 m north of test well TW101-22, and reported no influence from the water level monitoring program. Identified private supply wells located closer to

TW101-22 could not be accessed/monitored due to owner concerns, and the risk of impairing these wells.

In order to estimate potential off-site influences from water withdrawal at TW101-22 the Sichardt formula was referenced $R_0 = 3000 \times Drawdown \times \sqrt{K}$. Where:

- R_0 = the length to zero drawdown from the well (in m). This is the distance at which drawdown is expected to extend from well TW101-22.
- Drawdown is the depth of drawdown measured at the well TW101-22 at the end of the pumping test (i.e., 13.18 m)
- K = the hydraulic conductivity (in m/sec), derived below.

The Sichardt formula requires the drawdown (m) hydraulic conductivity (m/sec) of the water bearing aquifer to be input in order to yield results. The drawdown was measured during the February 7, 2023, pumping test, and the hydraulic conductivity was calculated from test results, as per the methods described below.

6.2.1 Aquifer Properties

To calculated aquifer properties the drawdown data recorded from TW101-22 were imported into AquiferTest Pro™. The results of the analysis yielded the transmissivity and hydraulic conductivity for the sand aquifer the well was screened across.

The transmissivity was calculated to be 0.32 m²/day; the hydraulic conductivity was 2.03 x 10^{-6} m/sec. The results of the aquifer test analyses are outlined below in Table 9. The AquiferTest Pro™ results are included in Appendix D.

Table 9 Aquifer Test Pro Results

Well	Transmissivity (m²/day)	Hydraulic Conductivity (m/s)
TW101-22	0.32	2.03 x 10^{-6}

6.2.2 Anticipated Water Withdrawal Influence

Based on hydraulic conductivity, the expected radius of influence (R_o) that will develop from pumping TW101-22 at a constant discharge rate of 12 L/min was 56 m (from the well).

The radius of influence of 56 m was plotted on Figure 6. The radius of influence is maintained within the Site property boundaries to the northwest, but extends on 1 Easy Street to the east, and onto 4 Easy Street to the south. There were no supply wells plotted within the R_o as per reference to the MECP WWIS. Nor are either of the supply wells that service 1 and 12 Easy Street captured within the radius. The location of the well that services 4 Easy Street was not confirmed. Available satellite imagery indicates that the area of 4 Easy Street that is captured by the radius of influence is not developed. As such, the supply well for that property is likely not located therein. Water withdrawal from TW101-22 at a rate of 9,050 L/day is not expected to influence adjacent groundwater users.

6.3 Water Quality

The groundwater sample collected from well TW101-22 (at the end of the pumping test on February 7, 2022) indicates that groundwater at the Site can be treated to the quality required for potable water supply. The concentrations of all parameters were reported at concentrations less than ODWQS (Ministry of the Environment, 2006) with the exception of turbidity, organic nitrogen, hardness, total iron, and total coliform. A complete summary of water quality results and certificates of lab analyses are provided in Appendix F. Parameters reported at concentrations exceeding ODWQS criteria are outlined in Table 10.

Table 10 Summary of Water Quality Results

Parameter	TW101-22	ODWQS Criteria AO/OG(1)	ODWQS Criteria MAC(2)
Total Coliform (cfu/100ml)	<2 (<2)(3)	-	0 cfu/100ml
Turbidity (NTU)	2.5	5	1 (4)
Organic Nitrogen (mg/L)	<0.5	0.15	-
Hardness (mg/L)	246	80-100	-
Total Iron (mg/L)	0.537	0.3	-

1. *Aesthetic Objective and Operational Guidelines.*
2. *Maximum Acceptable Concentration.*
3. *Concentration reported from duplicate bacterial sample.*
4. *After filtration*

Elevated concentrations of iron and hardness in groundwater is a relatively common occurrence in southern Ontario and can be readily treated with conventional water softening techniques and/or with an additional iron treatment system if required.

Turbidity was reported greater than the MAC of 1 NTU, but less than the AO objective of 5 NTU. The ODWQS criteria of 1 NTU for turbidity is for treated water. The sample collected was a raw water source. Filtration can be put in place to reduce turbidity as required.

The concentrations of total coliform (<2 cfu/100ml) and organic nitrogen (<0.5 mg/L) were reported as being below the project laboratory's limits of detection, which were greater than the ODWQS criteria for these parameters due to a laboratory communication error. Although the results do not confirm concentrations in excess of the applicable standards, they are reported herein as technical exceedances as a precautionary measure.

Organic nitrogen is inferred to be less than the operational criteria. Organic nitrogen is generally associated with surface water contamination/contamination from sewage systems. The aquifer in which TW101-22 is installed is considered to be confined, therefore direct contamination from surface sources is considered unlikely.

The reported concentrations for the sample and duplicate analysed for total coliform was <2 cfu/100 ml, and E. Coli was not detected in either bacterial sample. It is noted that MECP Procedure D-5-5 (Ministry of the Environment, 1996) indicates that a total concentration of total coliform of less than 6 cfu/100 ml shall be considered as indicative of acceptable water quality. Procedure D-5-5 is generally referenced as part of residential development applications, however the potable water quality assessment is considered a relevant guideline that can be applied to the proposed development described herein. Therefore, it is inferred the concentration of that total coliform meets applicable guidelines at well TW101-22.

Water treatment requirements bacteria or other parameters can be confirmed at a later date. If the presence of bacteria in is confirmed in future samples from the well, water can be treated using a variety of methods (ultraviolet disinfection, chlorination, etc.). A water treatment specialist should be consulted for appropriate treatment options.

6.3.1 Shallow Groundwater Quality

The concentrations of nitrate and nitrite reported from well MW101-22 were reported below detectable limits. These results indicate that ambient concentrations of nitrate are low.

6.4 Other Considerations

TW101-22 is a flowing well. Flowing conditions at well TW101-22 should be controlled during (and prior to) construction and operation of the proposed development.

7.0 Conclusions and Recommendations

Cambium was retained by 0507 Industries Ltd. to complete a hydrogeological assessment for the property located at 8 Easy St, Port Perry, in support of the proposed industrial development.

The water balance assessment indicates that there will be an infiltration deficit upon development of the Site of about 595 m^3/year. By implementing a best efforts design of an infiltration trench, approximately 124 m^3/year of runoff can be re-infiltrated at the Site (which reduces the projected infiltration deficit to 471 m^3/year, and is 24% less than pre-development conditions).

Based on the steady state conditions achieved during the pumping test, as well as the rate of water level recovery after the test, it is expected that TW101-22 can sustainably yield 9,050 L/day. The well was tested at 12 L/min. As such this flow rate should be considered when the water treatment and distribution system are designed. The pump should also be installed at or below 18.5 mbtop in order to allow for sufficient drawdown in the well.

No impacts were noted at the nearby supply well at 27 Easy Street or the on-Site monitoring wells during the pumping test. The radius of influence from well TW101-22 is anticipated to be 56 m. The radius of influence extends onto adjacent properties (1 and 4 Easy Street). There were no observed (and no expected) supply wells located within the radius of influence. Additionally, there were no apparent impacts on water levels in the test well from adjacent wells during the twelve-hour pumping test. Therefore, there is not expected to be any significant off-site influences to adjacent groundwater users from water withdrawal at TW101-22.

The water quality results from TW101-22 were generally good, with the exception of slightly elevated concentrations of turbidity, hardness, total iron, organic nitrogen (potentially) and total coliform (potentially). The parameters reported at slightly elevated concentrations are not considered to be a significant concern and can be treated with common treatment methodologies (as needed). The Client should regularly test for bacteria if bacterial treatment

is not included as part of the water treatment/distribution system. A water treatment specialist should be consulted for appropriate treatment options.

Based off the water supply assessment, Cambium concludes that the Site can provide 9,050 L/day on a sustainable basis, without negative impact on surrounding groundwater users. Water supplied from TW101-22 is expected to be potable with the implementation of water treatment systems (as needed).

Flowing conditions at well TW101-22 should be controlled during (and prior to) construction and operation of the proposed development.

8.0 Closing

We trust that the information in this submission meets your current requirements. If you have any questions regarding the contents of this report, please contact the undersigned.

8.1 Respectfully submitted,

Cambium Inc.

Nicole Heikoop, M.Sc., GIT
Project Coordinator

Cameron MacDougall, P.Geo.
Project Manager

P:\14200 to 14299\14273-001 0507 Industries Ltd - Geo & HydroG - 8 Easy Street, Port Perry\Deliverables\REPORT - Pumping Test HydroG\Final\2023-06-05 Hydrogeo Assessment, 8 Easy St, Port Perry.docx

9.0 References

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10.0 Standard Limitations

Limited Warranty

In performing work on behalf of a client, Cambium relies on its client to provide instructions on the scope of its retainer and, on that basis, Cambium determines the precise nature of the work to be performed. Cambium undertakes all work in accordance with applicable accepted industry practices and standards. Unless required under local laws, other than as expressly stated herein, no other warranties or conditions, either expressed or implied, are made regarding the services, work or reports provided.

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The findings and results presented in reports prepared by Cambium are based on the materials and information provided by the client to Cambium and on the facts, conditions and circumstances encountered by Cambium during the performance of the work requested by the client. In formulating its findings and results into a report, Cambium assumes that the information and materials provided by the client or obtained by Cambium from the client or otherwise are factual, accurate and represent a true depiction of the circumstances that exist. Cambium relies on its client to inform Cambium if there are changes to any such information and materials. Cambium does not review, analyze or attempt to verify the accuracy or completeness of the information or materials provided, or circumstances encountered, other than in accordance with applicable accepted industry practice. Cambium will not be responsible for matters arising from incomplete, incorrect or misleading information or from facts or circumstances that are not fully disclosed to or that are concealed from Cambium during the provision of services, work or reports.

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Site Assessments

A site assessment is created using data and information collected during the investigation of a site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the extent that Cambium's work or report considers any locations or times other than those from which information, sample results and data was specifically received, the work or report is based on a reasonable extrapolation from such information, sample results and data but the actual conditions encountered may vary from those extrapolations.

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Cambium's services, work and reports may be relied on by the client and its corporate directors and officers, employees, and professional advisors. Cambium is not responsible for the use of its work or reports by any other party, or for the reliance on, or for any decision which is made by any party using the services or work performed by or a report prepared by Cambium without Cambium's express written consent. Any party that relies on services or work performed by Cambium or a report prepared by Cambium without Cambium's express written consent, does so at its own risk. No report of Cambium may be disclosed or referred to in any public document without Cambium's express prior written consent. Cambium specifically disclaims any liability or responsibility to any such party for any loss, damage, expense, fine, penalty or other such thing which may arise or result from the use of any information, recommendation or other matter arising from the services, work or reports provided by Cambium.

Limitation of Liability

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Personal Liability

The client expressly agrees that Cambium employees shall have no personal liability to the client with respect to a claim, whether in contract, tort and/or other cause of action in law. Furthermore, the client agrees that it will bring no proceedings nor take any action in any court of law against Cambium employees in their personal capacity.

Appended Figures

HYDROGEOLOGICAL ASSESSMENT

0507 INDUSTRIES LTD
8 Easy Street
Port Perry, Ontario

LEGEND

- Test Well
- Benchmark
- Borehole
- Monitoring Well
- Site (approximate)

Notes:
- Site Plan overlay was created by D.G Biddle & Associates Limited, Project No. 121053, drawing no. SP-1, dated June 2021.
- Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

CAMBIUM

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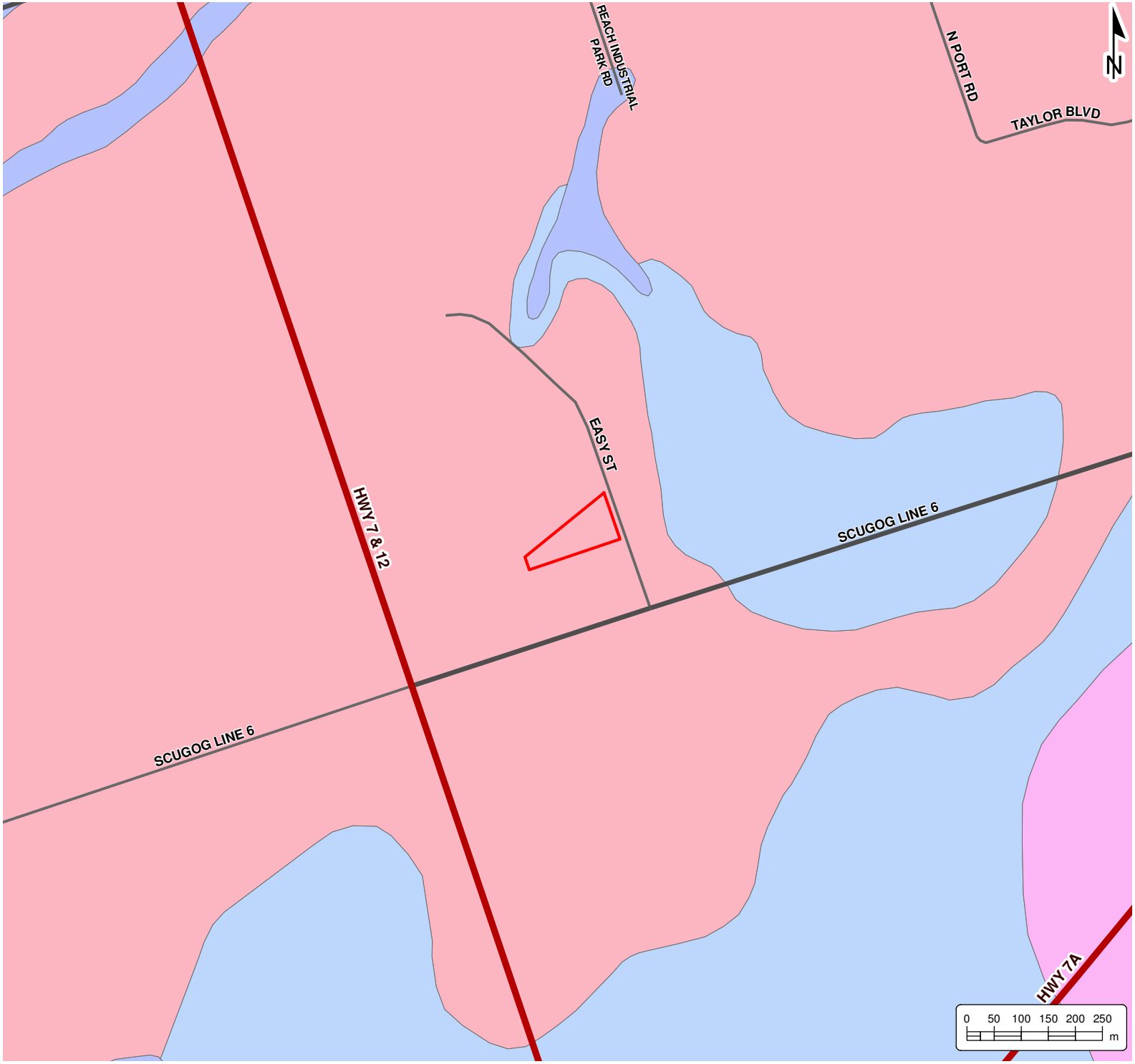
Peterborough, Ontario, K9H 1E5
Tel: (705) 742.7900 Fax: (705) 742.7907
www.cambium-inc.com

SITE PLAN

Project No.: 14273-001		Date: May 2023	
		Rev.:	
Scale: 1:1,000		Projection: NAD 1983 UTM Zone 17N	
Created by: ACS	Checked by: CM	Figure:	1

O:\GIS\MXDs\14200-14299\14273-001 0507 Industries Ltd - Geo & Hydro\G - 8 Easy Street, Port Perry\2022-09-01 FIG 1 - Site Plan.mxd



HYDROGEOLOGICAL ASSESSMENT

0507 INDUSTRIES LTD
8 Easy Street
Port Perry, Ontario

LEGEND

- Highway
- Major Road
- Minor Road
- Site (approximate)

Primary Overburden Material:

- clay, silt
- diamicton
- organic deposits
- sand

Notes:
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OVERBURDEN MAPPING

Project No.: 14273-001		Date: March 2023	Rev.:
Scale: 1:10,000		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: CM	Figure: 2	

O:\GIS\MXDs\14200-14299\14273-001 0507 Industries Ltd - Geo & HydroG - 8 Easy Street, Port Perry\2022-09-20 FIG 2 - Overburden Mapping.mxd

HYDROGEOLOGICAL ASSESSMENT

0507 INDUSTRIES LTD
8 Easy Street
Port Perry, Ontario

LEGEND

- Water Well Records
- Test Well
- Off-Site Supply Well
- Study Area (~500m)
- Site (approximate)

Notes:
- Site Plan overlay was created by D.G Biddle & Associates Limited, Project No. 121053, drawing no. SP-1, dated June 2021.
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MECP WELL RECRODS WITHIN 500m

Project No.: 14273-001		Date: March 2023	Rev.:
Scale: 1:6,500		Projection: NAD 1983 UTM Zone 17N	
Created by: PAS	Checked by: CM	Figure: 3	

O:\GIS\MXDs\14200-14299\14273-001 0507 Industries Ltd - Geo & HydroG - 8 Easy Street, Port Perry\2022-09-20 FIG 3 - MECP Well Records Map.mxd

HYDROGEOLOGICAL ASSESSMENT

0507 INDUSTRIES LTD
8 Easy Street
Port Perry, Ontario

LEGEND

- Benchmark
- Borehole
- Monitoring Well
- Test Well
- Site (approximate)
- (259.02) Groundwater Elevation *(April 6, 2022)*
- Groundwater Flow Direction *(April 6, 2022)*

Notes:
- Site Plan overlay was created by D.G Biddle & Associates Limited, Project No. 121053, drawing no. SP-1, dated June 2021.
- Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
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GROUNDWATER CONFIGURATION MAP

Project No.: 14273-001		Date: March 2023	Rev.:
Scale: 1:1,500		Projection: NAD 1983 UTM Zone 17N	
Created by: ACS	Checked by: CM	Figure: 4	

O:\GIS\MXDs\14200-14299\14273-001 0507 Industries Ltd - Geo & HydroG - 8 Easy Street, Port Perry\2022-09-20 FIG 4 - Groundwater Configuration Map.mxd

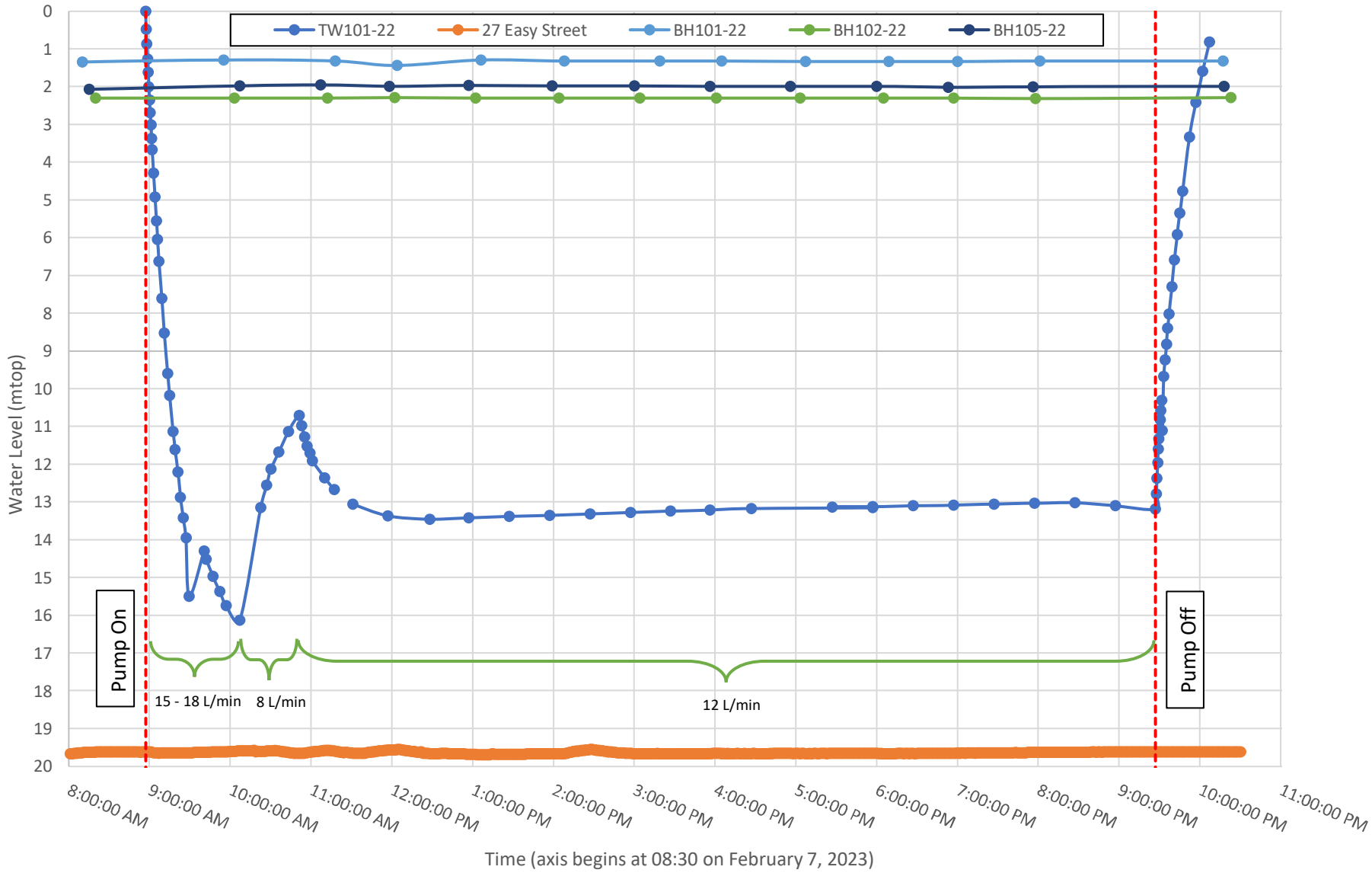

Figure 5. TW101-22 February 7, 2023 Pumping Test Hydrograph

HYDROGEOLOGICAL ASSESSMENT

0507 INDUSTRIES LTD
8 Easy Street
Port Perry, Ontario

LEGEND

- Benchmark
- Borehole
- Monitoring Well
- Test Well
- Off-Site Supply Well
- Water Well Record
- Zone of Influence (56m)
- Adjacent Lot Boundaries
- Site (approximate)

Notes:
- Site Plan overlay was created by D.G Biddle & Associates Limited, Project No. 121053, drawing no. SP-1, dated June 2021.
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- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
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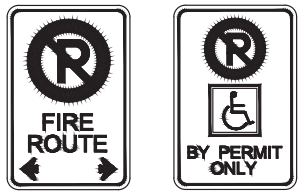
ZONE OF INFLUENCE

Project No.: 14273-001		Date: March 2023	Rev.:
Scale: 1:2,500		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: CM	Figure: 6	

O:\GIS\MXDs\14200-14299\14273-001 0507 Industries Ltd - Geo & HydroG - 8 Easy Street, Port Perry\2023-03-06 FIG 6 - Zone of Influence.mxd

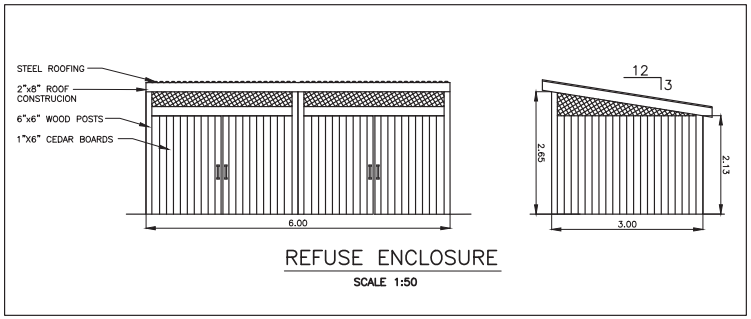
Appendix A

Land Information and Proposed Development Plans



(FR) TYP. FIRE ACCESS ROUTE SIGNAGE

(AC) TYP. ACCESSIBLE SIGNAGE



REFUSE ENCLOSURE

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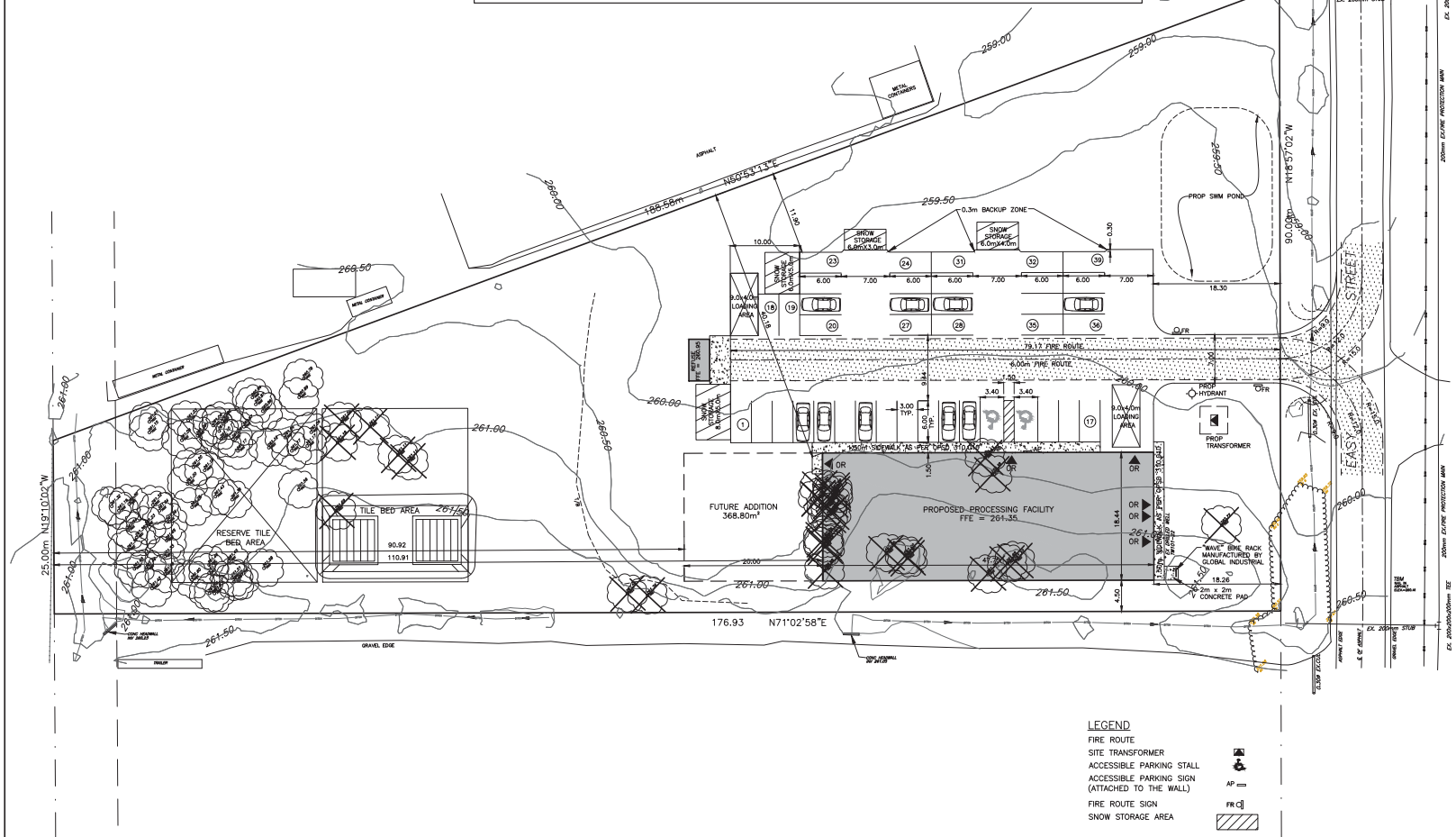


LEGEND

FIRE ROUTE

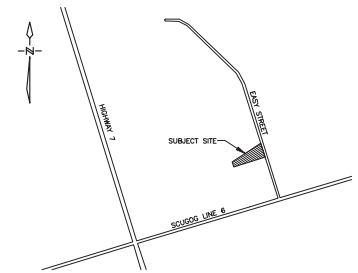
SITE TRANSFORMER

ACCESSIBLE PARKING STALL

ACCESSIBLE PARKING SIGN (ATTACHED TO THE WALL)

FIRE ROUTE SIGN

SNOW STORAGE AREA



KEY PLAN

NOT TO SCALE

SITE STATISTICS

ZONING	M1	
SITE AREA	10177.60m²	
BUILDING AREA	1284.31m²	12.62%
FACILITY	880.51m²	
FUTURE ADDITION	368.80m²	
REFUSE	35.00m²	
LANDSCAPE AREA	7128.51m²	70.04%
ASPHALT AREA	1764.78m²	17.34%
SNOW STORAGE AREA REQ'D	88.25m²	
SNOW STORAGE AREA PROVIDED	112.00m²	
BUILDING GROSS FLOOR AREA	1482.57m²	
FIRST FLOOR	880.51m²	
SECOND FLOOR	233.26m²	
FUTURE ADDITION	368.80m²	
PARKING REQUIRED (1/40m² GFA)	38	
PARKING PROVIDED	39	
ACCESSIBLE PARKING PROVIDED	2	
ACCESSIBLE PARKING REQUIRED	2	
LOADING SPACES REQUIRED	2	
LOADING SPACES PROVIDED	2	

LEGEND

EXISTING TREE TO BE REMOVED

NOTES

GENERAL NOTES

1. RESPECTING ALL WORK IN THE TOWN RIGHT OF WAY, THE CONTRACTOR IS TO PROVIDE AT LEAST 48 HOURS PRIOR NOTICE TO OUR TRANSPORTATION AND DESIGN STAFF.
2. A ROAD OCCUPANCY PERMIT WILL BE REQUIRED FOR ANY WORK DONE IN THE TOWNSHIP ROAD ALLOWANCE. ALL RESTORATION OR WORK DONE IN THE ROAD ALLOWANCE MUST BE COMPLETED AS PER TOWNSHIP FIELD STAFF DIRECTION.
3. THE PERFORMANCE GUARANTEE WILL NOT BE REFUNDED BY THE TOWNSHIP OF SCUGOG UNLESS THE WORKS HAVE BEEN INSPECTED BY SCUGOG FORCES AND DEEMED TO BE COMPLETE AND SATISFACTORY.

FIRE ROUTE

4. FIRE ROUTE TO BE PROVIDED IN ACCORDANCE WITH ARTICLES 3.2.5.5 AND 3.2.5.6 OF THE ONTARIO BUILDING CODE.
5. FIRE ROUTE SIGNS TO BE POSTED IN COMPLIANCE WITH THE HIGHWAY TRAFFIC ACT AND THE ONTARIO TRAFFIC MANUAL.

SITE SIGNAGE

6. ALL PARKING STALLS FOR PERSONS WITH DISABILITIES SHALL BE SIGNED WITH ACCESSIBLE PARKING SIGNS CENTERED ON THE PARKING STALL AS SHOWN ON THIS PLAN.
7. ALL SIGNS SHALL BE MOUNTED AT A HEIGHT BETWEEN 2 AND 3m ABOVE FINISHED GRADE.
8. ALL SIGNS SHALL CONFORM TO THE ONTARIO TRAFFIC MANUAL, HIGHWAY TRAFFIC ACT AND ARTICLE 3.8.3.1 OF THE ONTARIO BUILDING CODE.

NO.	DATE	REVISION	BY

REVISIONS

8 EASY STREET, PORT PERRY

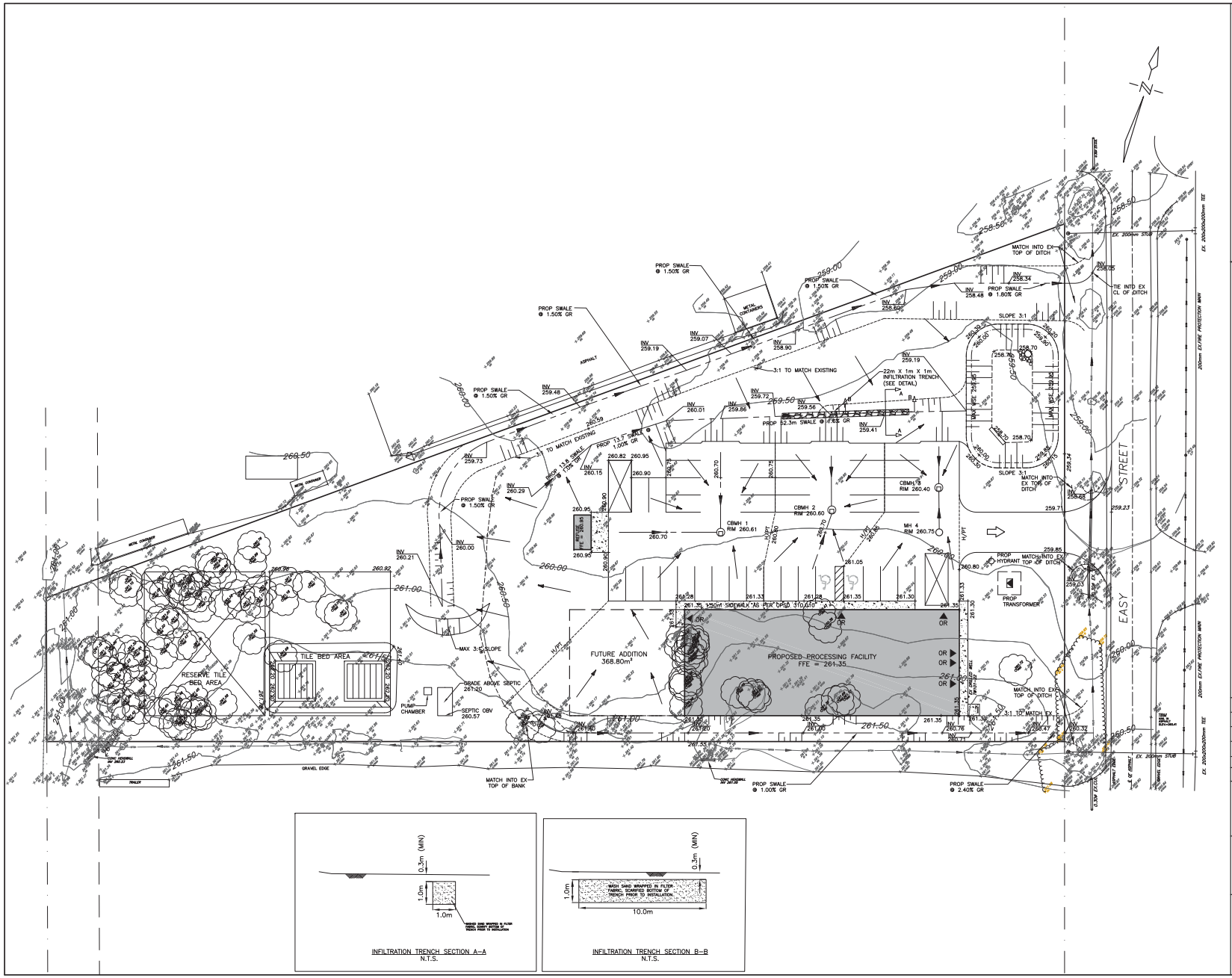
SITE PLAN

D.G. Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST • OSHAWA,ON L1H 1B6
PHONE (905)576-8500 • FAX (905)576-9730
info@dgbiddle.com

SCALE:	1:300
DRAWN BY:	B.C.
DESIGN BY:	B.C.
CHECKED BY:	P.D.C
DATE:	JUNE 2021

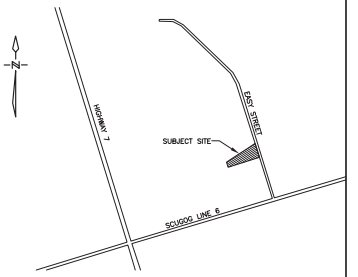
PROJECT NO. 121053

DRAWING NO. SP-1



INFILTRATION TRENCH SECTION A–A
N.T.S.

INFILTRATION TRENCH SECTION B–B
N.T.S.



KEY PLAN
NOT TO SCALE

SITE GRADING NOTES

1. A ROAD OCCUPANCY PERMIT WILL BE REQUIRED FOR ANY WORKS WITHIN THE TOWN RIGHT OF WAY.
2. ALL WORKS OR RESTORATION WITHIN THE TOWN RIGHT OF WAY SHALL BE COMPLETED AS PER TOWNSHIP OF SCUGOG FIELD STAFF DIRECTION.
3. THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES AND SERVICES TO BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. CONCERNED UTILITIES TO BE GIVEN ADVANCED NOTICE FOR STAKE OUT. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE UTILITIES SHOWN ON THE DRAWINGS.
4. QUANTITIES, DIMENSIONS AND ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS OR COMMENCING CONSTRUCTION.
5. ALL SLOPES SHALL BE CONSTRUCTED AT 3:1 (MAXIMUM) UNLESS OTHERWISE NOTED ON THE DRAWINGS.
6. ALL SWALES SHALL BE CONSTRUCTED WITH 2% MINIMUM GRADE UNLESS OTHERWISE NOTED ON THE DRAWINGS.
7. ALL SLOPES, SWALES AND OPEN SPACE AREAS SHALL BE SODDED ON A MINIMUM OF 150mm OF TOPSOIL.
8. ALL DISTURBED AREAS WITHIN ABUTTING TOWN RIGHT OF WAYS SHALL BE SODDED ON A MINIMUM OF 150mm OF TOPSOIL.
9. DRIVE AISLE SHALL CONSIST OF THE FOLLOWING UNLESS OTHERWISE APPROVED BY THE GEOTECHNICAL ENGINEER:
   - 300mm GRANULAR 'B'
   - 150mm GRANULAR 'A'
   - 50mm HL8 ASPHALT
   - 40mm HL3 ASPHALT

LEGEND

ORIGINAL SURVEY ELEVATION
ORIGINAL ELEVATION TO REMAIN
PROPOSED ELEVATIONS
PROPOSED SWALE
DIRECTION OF DRAINAGE
DIRECTION OF OVERLAND FLOW

PRELIMINARY
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY

REVISIONS

8 EASY STREET, PORT PERRY

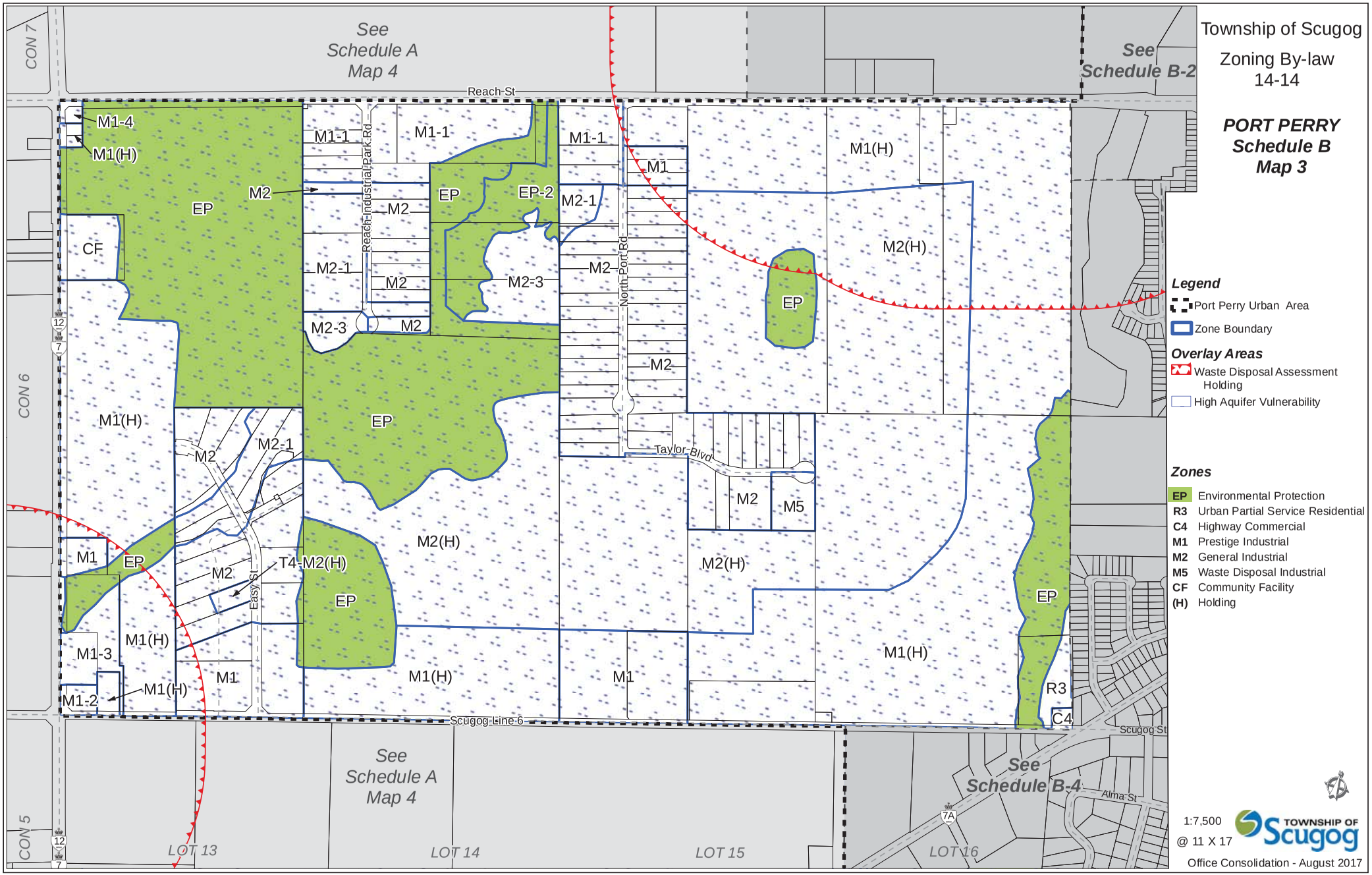
SITE GRADING PLAN

D.G. Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST • OSHAWA,ON L1H 1B6
PHONE (905)576-8500 • FAX (905)576-9730
info@dgbiddle.com

SCALE:	1:300
DRAWN BY:	B.C.
DESIGN BY:	B.C.
CHECKED BY:	P.D.C.
DATE:	JUNE 2021

PROJECT NO. 121053
DRAWING NO. SG–1

PLOT FILE: I:\2021\121053\121053 8 EASY STREET\121053 DRAWINGS CAD\121053 DRAWINGS PLANS\121053 20220330 3D-SITE PLAN.DWG
30/05/2022


Township of Scugog
Zoning By-law 14-14
PORT PERRY Schedule B Map 3
See Schedule A Map 4
See Schedule B-2
See Schedule B-4
See Schedule A Map 4
Reach St
Scugog Line 6
Reach Industrial Park Rd
North Port Rd
Easy St
Taylor Blvd
Scugog St
Alma St
CON 7
CON 6
CON 5
LOT 13
LOT 14
LOT 15
LOT 16
M1-4
M1(H)
EP
M2
CF
M1-1
M2-1
M2-3
EP-2
M1
M2(H)
M5
T4-M2(H)
M1-3
M1-2
R3
C4
7A
Legend
Port Perry Urban Area
Zone Boundary
Overlay Areas
Waste Disposal Assessment Holding
High Aquifer Vulnerability
Zones
EP Environmental Protection
R3 Urban Partial Service Residential
C4 Highway Commercial
M1 Prestige Industrial
M2 General Industrial
M5 Waste Disposal Industrial
CF Community Facility
(H) Holding
1:7,500
@ 11 X 17
TOWNSHIP OF Scugog
Office Consolidation - August 2017

SPIA Map

Legend

- Watercourse Direction
- Source Protection Areas
- Quaternary
- Highly Vulnerable Aquifers
- Assessment Parcel with Addre

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

Ontario

Map Created: 8/30/2022
Map Center: 44.09315 N, -78.98392 W

Kawartha Conservation Regulation Mapping

8/30/2022, 11:42:19 AM

World Imagery	Citations
Low Resolution 15m Imagery	1.2m Resolution Metadata
High Resolution 60cm Imagery	KRCA Watershed Boundary
High Resolution 30cm Imagery	Assessment Parcel

1:4,514

0 0.03 0.06 0.11 mi

0 0.04 0.09 0.17 km

Appendix B
Borehole Logs

CAMBIUM
Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH101-22

Client:	0507 Industries LTD	**Project Name:**	8 Easy Street, Port Perry	**Project No.:**	14273-001
Contractor:	DrillTech Drilling Ltd	**Method:**	Solid Stem Auger	**Date Completed:**	March 10, 2022
Location:	8 Easy Street, Port Perry	**UTM:**	17T 661392.5 m E; 4884239 m N	**Elevation:**	259.6 mASL

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
260 / 0		TOPSOIL: Light brown sandy silt topsoil, trace organics, moist, loose	1A	SS	67	12			Cap	
			1B	SS					Monument	
259 / 1		SILTY SAND: Light brown - orange silty sand, trace organics, moist, compact								
		CLAYEY SANDY SILT: Grey clayey sandy silt, WTPL, very soft to stiff	2	SS	17	2			PVC Riser	
258 / 2			3	SS	50	11			Bentonite Plug	
		-Firm	4	SS	100	6				
257 / 3		SILT AND CLAY: Grey silt and clay, ATPL, stiff	5	SS	100	10			Sand Pack	
256 / 4									PVC Screen	
255 / 5		-Firm	6	SS	100	6			Cap	
		Borehole terminated at 5.0 mbgs in SILT AND CLAY								
254 / 6										
253 / 7										

Water level measured at 0.6 mbgs on April 6, 2022

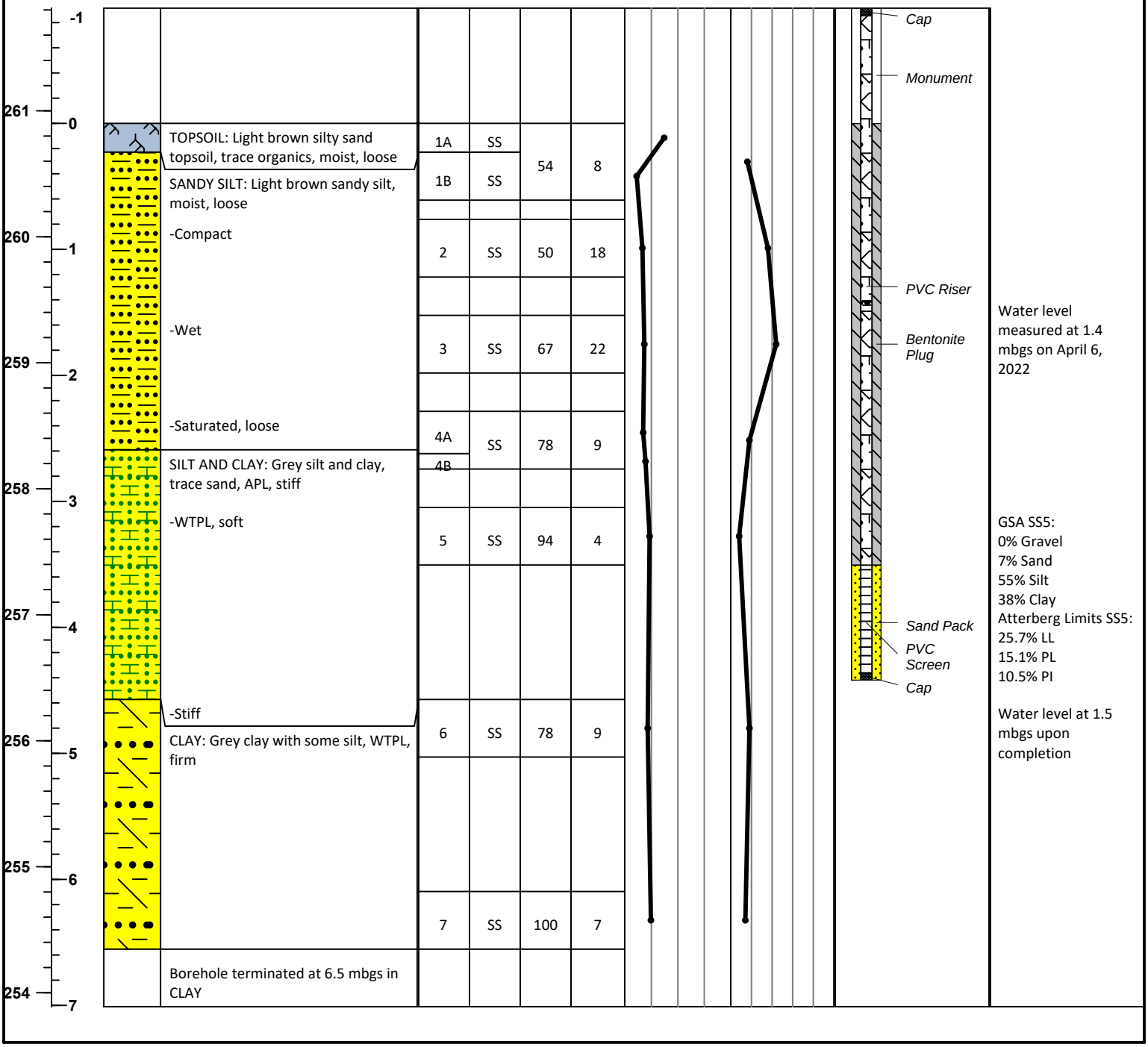
Water level at 1.2 mbgs upon completion

Logged By: E. Couperthwaite **Input By:** E. Couperthwaite

CAMBIUM
Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH102-22

Client:	Durham District School Board	**Project Name:**	8 Easy Street, Port Perry	**Project No.:**	14273-001
Contractor:	DrillTech Drilling Ltd	**Method:**	Solid Stem Auger	**Date Completed:**	March 10, 2022
Location:	8 Easy Street, Port Perry	**UTM:**	17T 661412.8 m E; 4884187.6 m N	**Elevation:**	260.9 mASL



Logged By: E. Couperthwaite **Input By:** E. Couperthwaite

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH103-22

Client:	0507 Industries LTD	**Project Name:**	8 Easy Street, Port Perry	**Project No.:**	14273-001
Contractor:	DrillTech Drilling Ltd	**Method:**	Solid Stem Auger	**Date Completed:**	March 10, 2022
Location:	8 Easy Street, Port Perry	**UTM:**	17T 661362.5 m E; 4884184 m N	**Elevation:**	260.5 mASL

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
0 / 260		SILTY SAND: Light brown silty sand with trace gravel, wet, loose	1	SS	42	3				
1 / 259		-Brown-grey, some clay, moist, compact	2	SS	83	15				
2 / 258		Clayey Sandy Silt: Grey clayey sandy silt, trace gravel, WTPL, stiff	3	SS	44	10				
3 / 257		SILTY CLAY: Grey silty clay, APL, stiff	4	SS	100	14				
4 / 256			5	SS	100	10				
5 / 255		Borehole terminated at 5.0 mbgs in SILTY CLAY	6	SS	100	11				Water level at 1.2 mbgs upon completion
6 / 254										
7										

Logged By: E. Couperthwaite **Input By:** E. Couperthwaite

CAMBIUM
Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH104-22

Client:	0507 Industries LTD	**Project Name:**	8 Easy Street, Port Perry	**Project No.:**	14273-001
Contractor:	DrillTech Drilling Ltd	**Method:**	Solid Stem Auger	**Date Completed:**	March 10, 2022
Location:	8 Easy Street, Port Perry	**UTM:**	17T 661363.9 m E; 4884206.8 m N	**Elevation:**	259.37 mASL

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
259 / 0		TOPSOIL: Dark brown sandy silt topsoil, trace organics, moist, loose	1A	SS	83	3				
			~~1B~~	~~SS~~						
258 / 1		SAND AND SILT: Grey sand and silt, some clay, trace organics, moist, loose -Trace gravel, compact	2	SS	100	13				GSA SS2: 1% Gravel 45% Sand 35% Silt 19% Clay
257 / 2		SILT AND CLAY: Grey silt and clay, trace sand, APL, stiff	3	SS	100	11				
			4	SS	100	10				
256 / 3		-Firm, some sand	5	SS	100	7				Borehole open and dry upon completion
		Borehole terminated at 3.5 mbgs in SILT AND CLAY								
255 / 4										
254 / 5										
253 / 6										
7										

Logged By: E. Couperthwaite **Input By:** E. Couperthwaite

Peterborough
Barrie
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH105-22

Client:	0507 Industries LTD	**Project Name:**	8 Easy Street, Port Perry	**Project No.:**	14273-001
Contractor:	DrillTech Drilling Ltd	**Method:**	Solid Stem Auger	**Date Completed:**	March 10, 2022
Location:	8 Easy Street, Port Perry	**UTM:**	17T 661330 m E; 4884168.3 m N	**Elevation:**	261.73 mASL

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
262 / 0		TOPSOIL: Dark brown silty sand topsoil, trace organics, moist, loose	1A	SS	75	5			Cap	
			1B	SS					Monument	
		SILTY SAND: Brown and orange silty sand, trace organics, moist, loose								
261 / 1		-Grey, trace organics, compact	2	SS	89	16				Water level measured at 1.1 mbgs on April 6, 2022
									PVC Riser	
260 / 2		-Some clay, wet	3	SS	67	14			Bentonite Plug	
		CLAYEY SANDY SILT: Grey clayey sandy silt, WTPL, very stiff	4	SS	100	22				GSA SS4: 0% Gravel 23% Sand 48% Silt 29% Clay
259 / 3		SILTY CLAY: Grey silty clay, WTPL, very stiff	5	SS	100	19				
258 / 4									Sand Pack	
									PVC Screen	
257 / 5			6	SS	100	15			Cap	Water level at 1.5 mbgs upon completion
		Borehole terminated at 5.0 mbgs in SILTY CLAY								
256 / 6										
255 / 7										

Logged By: E. Couperthwaite **Input By:** E. Couperthwaite

Appendix C
Grain Size Analysis

Grain Size Distribution Chart

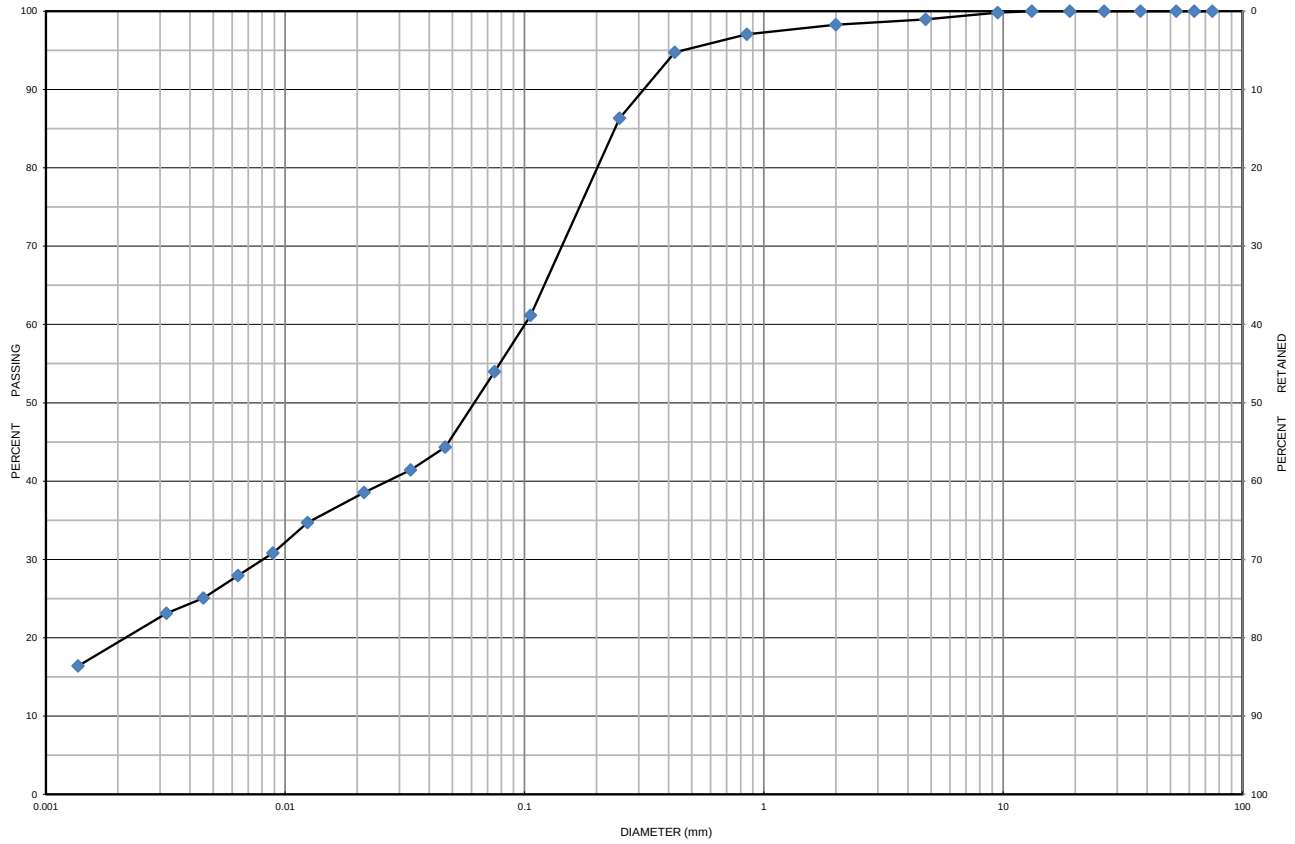
Project Number: *14273-001* **Client:** *0507 Industries Ltd.*

Project Name: *Geo, HydroG & ESA - 8 Easy Street, Port Perry*

Sample Date: *March 10, 2022* **Sampled By:** *Emily Couperthwaite - Cambium Inc.*

Location: *BH 104-22 SS 2* **Depth:** *0.8 m to 1.2 m* **Lab Sample No:** *S-22-0411*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 104-22	SS 2	0.8 m to 1.2 m	1	45	35	19	13.0

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sand and Silt some Clay trace Gravel	ML	0.100	0.008	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *March 28, 2022*

(Senior Project Manager)

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

Grain Size Distribution Chart

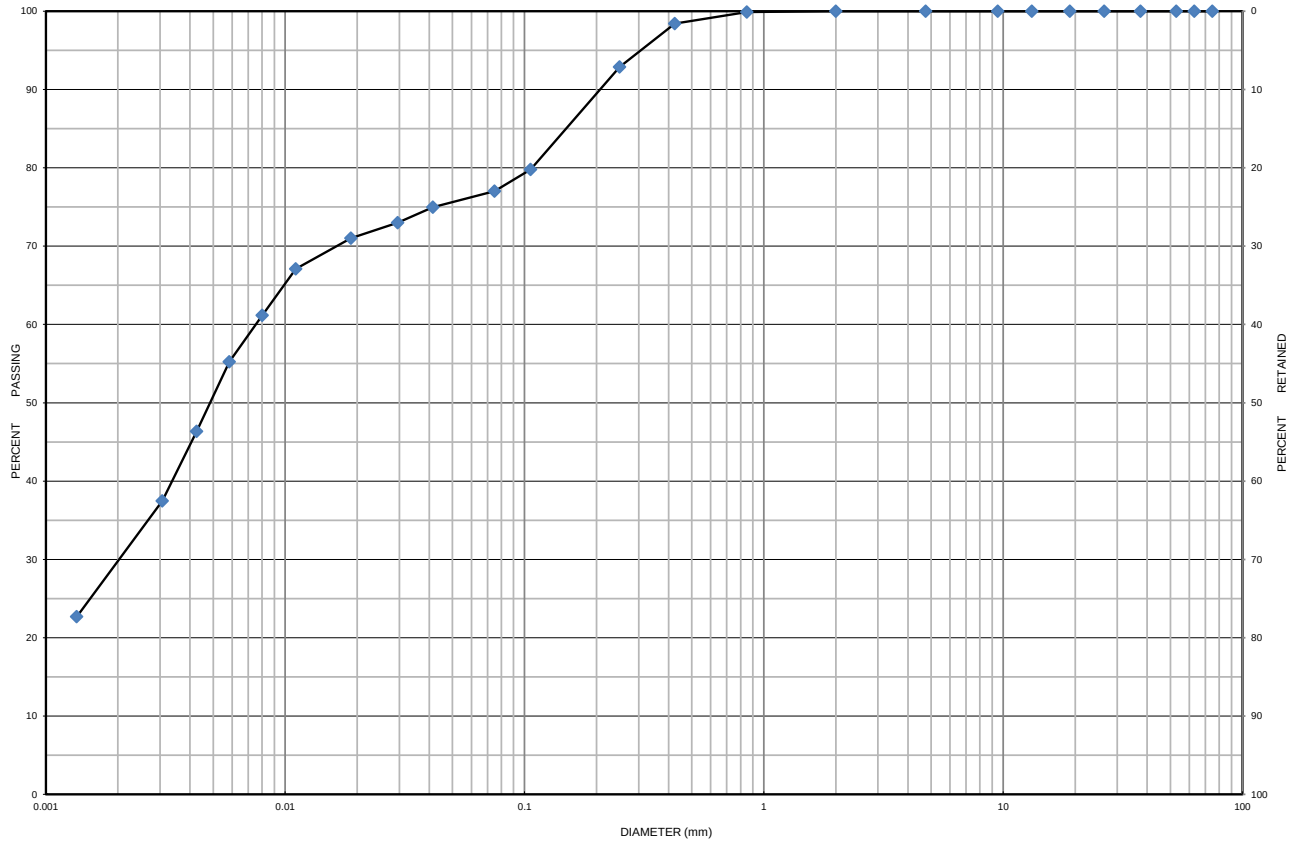
Project Number: *14273-001* **Client:** *0507 Industries Ltd.*

Project Name: *Geo, HydroG & ESA - 8 Easy Street, Port Perry*

Sample Date: *March 10, 2022* **Sampled By:** *Emily Couperthwaite - Cambium Inc.*

Location: *BH 105-22 SS 4* **Depth:** *2.3 m to 2.7 m* **Lab Sample No:** *S-22-0412*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 105-22	SS 4	2.3 m to 2.7 m	0	23	48	29	16.6

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Clayey Sandy Silt	ML	0.0076	0.0021	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *March 28, 2022*

(Senior Project Manager)

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

Grain Size Distribution Chart

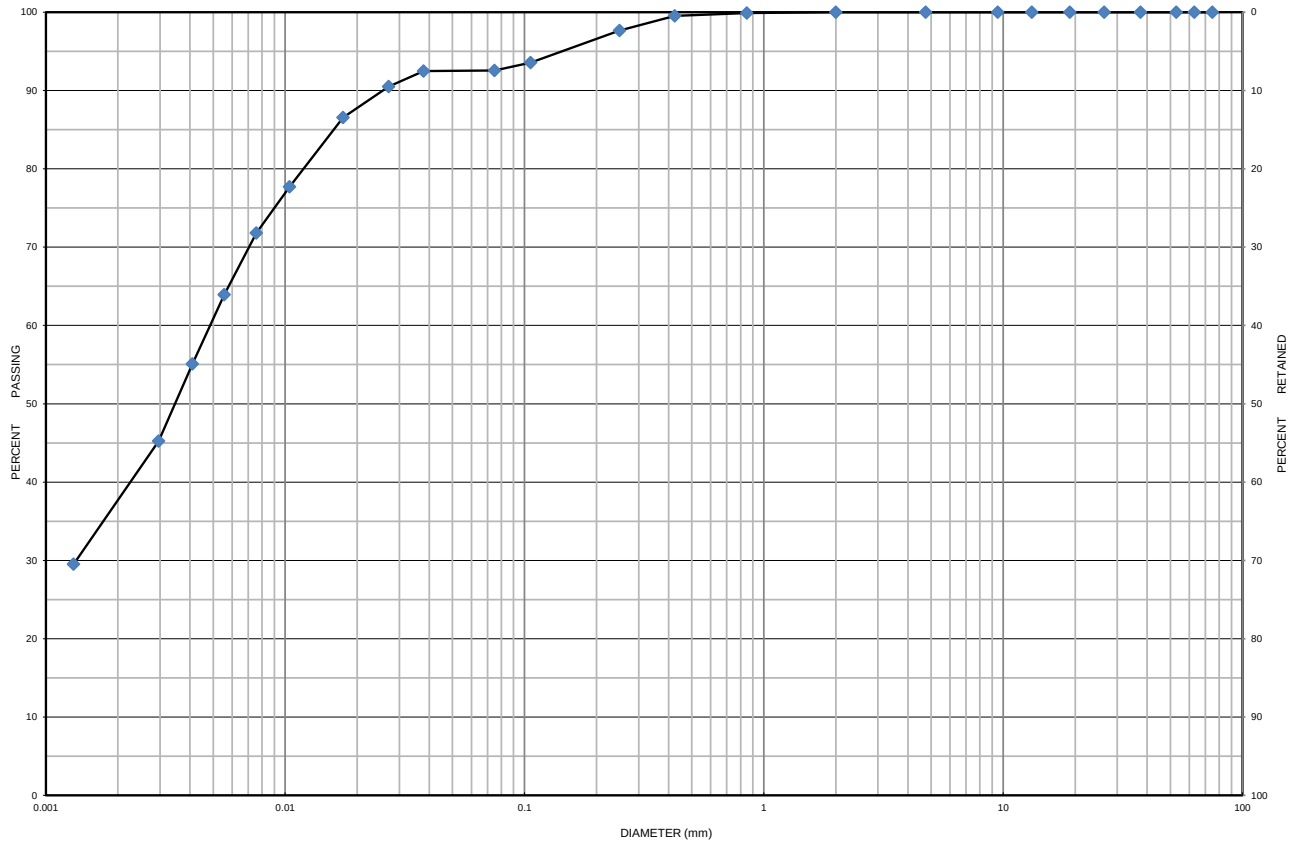
Project Number: *14273-001* **Client:** *0507 Industries Ltd.*

Project Name: *Geo, HydroG & ESA - 8 Easy Street, Port Perry*

Sample Date: *March 10, 2022* **Sampled By:** *Emily Couperthwaite - Cambium Inc.*

Location: *BH 102-22 SS 5* **Depth:** *3 m to 3.5 m* **Lab Sample No:** *S-22-0410*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 102-22	SS 5	3 m to 3.5 m	0	7	55	38	23.3

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silt and Clay trace Sand	ML	0.0049	0.0014	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *March 28, 2022*

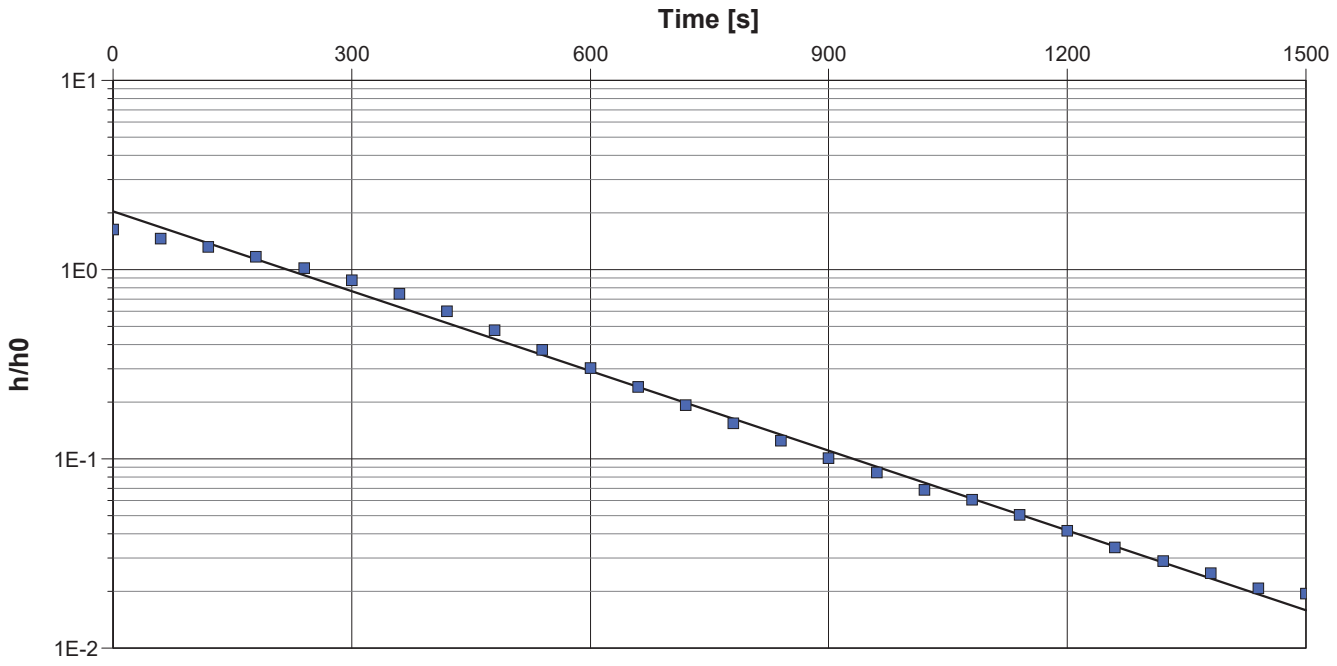
(Senior Project Manager)

Cambium Inc. (Laboratory)
866.217.7900 | cambium-inc.com
194 Sophia St. | Peterborough | ON | K9H 1E5

Appendix D
Aquifer Test Pro Results

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report** Project: Hydrogeological Assessment Number: 14273-001 Client: 0507 Industries Ltd.

Location: 8 Easy Street, Port Perry	Slug Test: BH101-22 Test 1	Test Well: BH101-22
Test Conducted by: W. Young		Test Date: 11/8/2022
Analysis Performed by: N. Heikoop	Hvorslev	Analysis Date: 2/9/2023
Aquifer Thickness: 3.88 m		

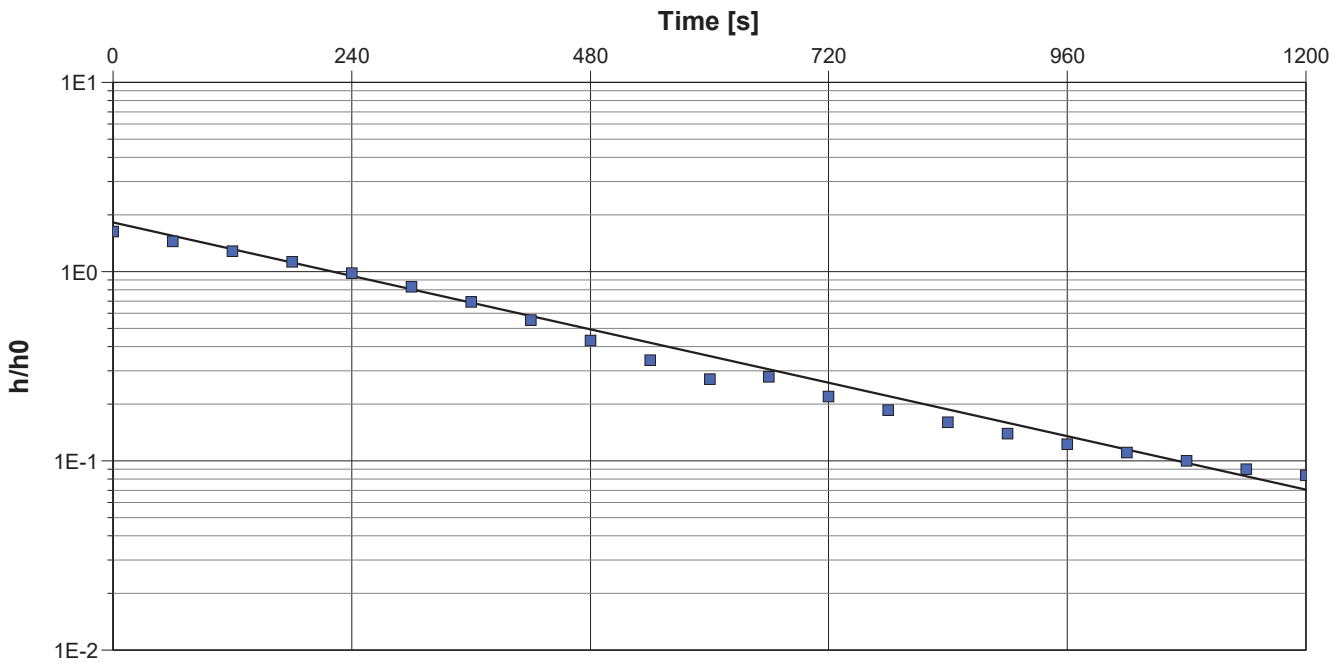


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
BH101-22	2.78×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report** Project: Hydrogeological Assessment Number: 14273-001 Client: 0507 Industries Ltd.

Location: 8 Easy Street, Port Perry	Slug Test: BH101-22 Test 2	Test Well: BH101-22
Test Conducted by: W. Young		Test Date: 11/8/2022
Analysis Performed by: N. Heikoop	Hvorslev	Analysis Date: 2/9/2023
Aquifer Thickness: 3.88 m		

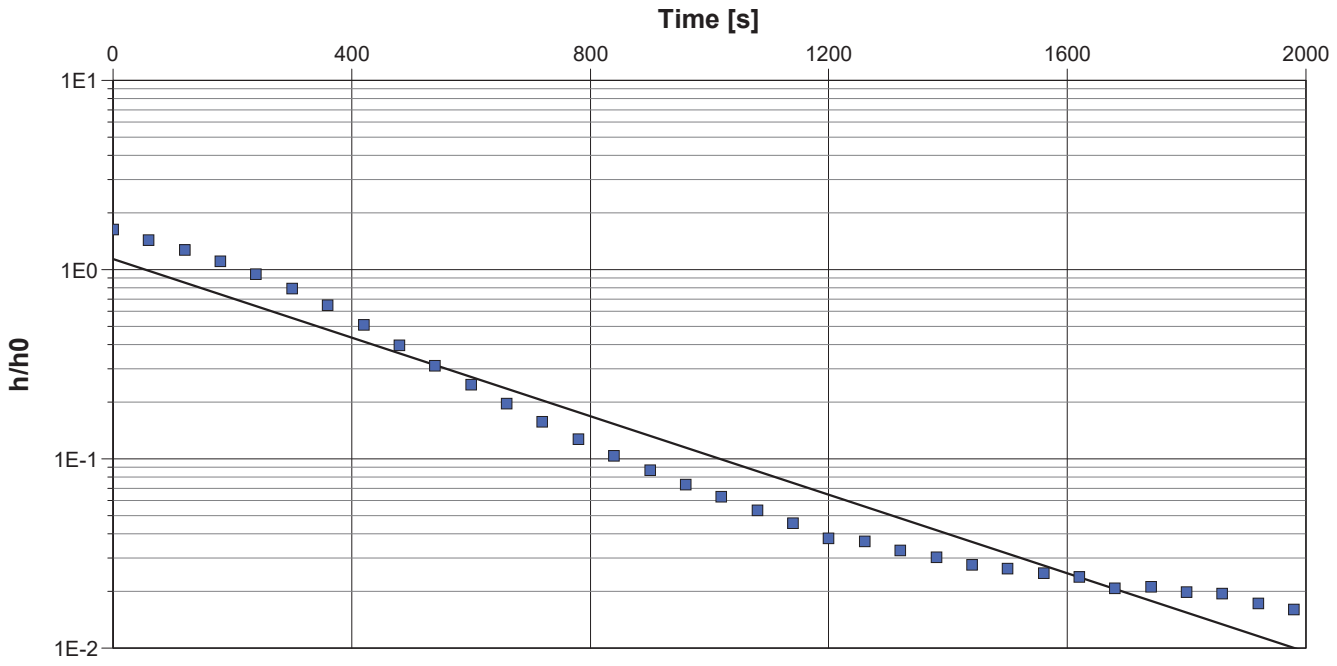


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
BH101-22	2.32×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report** Project: Hydrogeological Assessment Number: 14273-001 Client: 0507 Industries Ltd.

Location: 8 Easy Street, Port Perry	Slug Test: BH101-22 Test 3	Test Well: BH101-22
Test Conducted by: W. Young		Test Date: 11/8/2022
Analysis Performed by: N. Heikoop	Hvorslev	Analysis Date: 2/9/2023
Aquifer Thickness: 3.88 m		

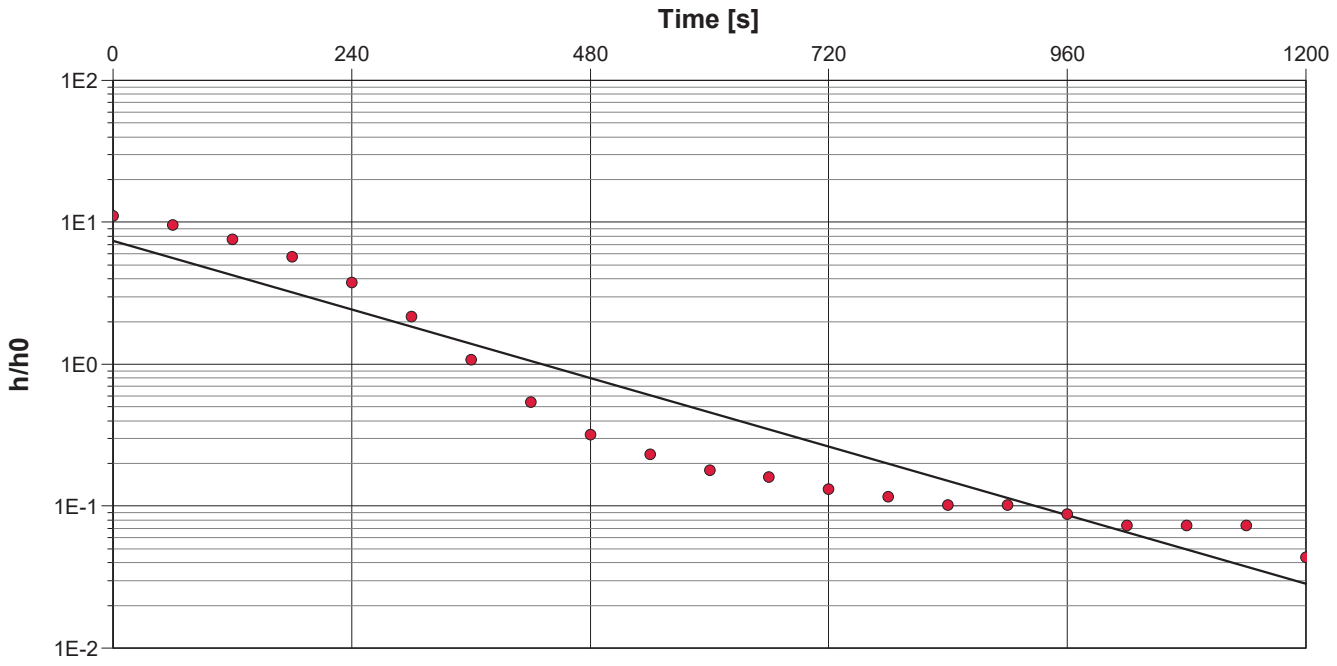


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
BH101-22	2.05×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report** Project: Hydrogeological Assessment Number: 14273-001 Client: 0507 Industries Ltd.

Location: 8 Easy Street, Port Perry	Slug Test: BH102-22 Test 1	Test Well: BH102-22
Test Conducted by: W. Young		Test Date: 11/8/2022
Analysis Performed by: N. Heikoop	Hvorslev	Analysis Date: 2/10/2023
Aquifer Thickness: 2.64 m		

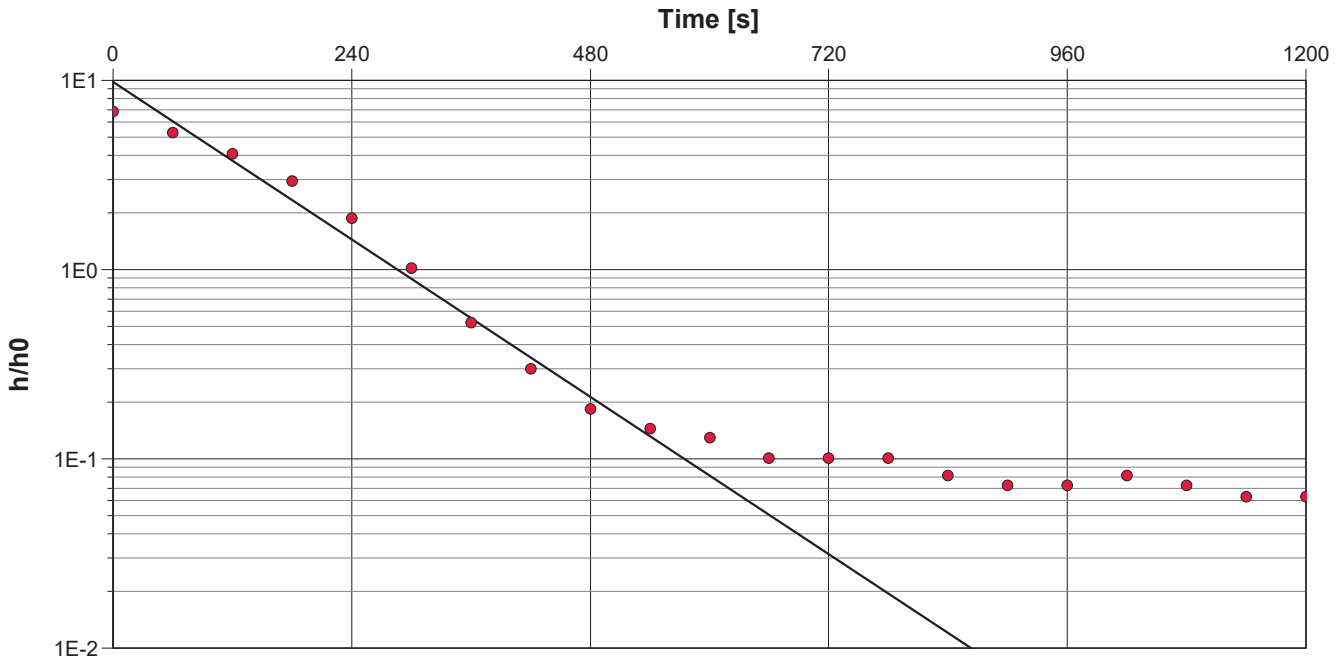


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
BH102-22	5.37×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report** Project: Hydrogeological Assessment Number: 14273-001 Client: 0507 Industries Ltd.

Location: 8 Easy Street, Port Perry	Slug Test: BH102-22 Test 2	Test Well: BH102-22
Test Conducted by: W. Young		Test Date: 11/8/2022
Analysis Performed by: N. Heikoop	Hvorslev	Analysis Date: 2/10/2023
Aquifer Thickness: 2.64 m		

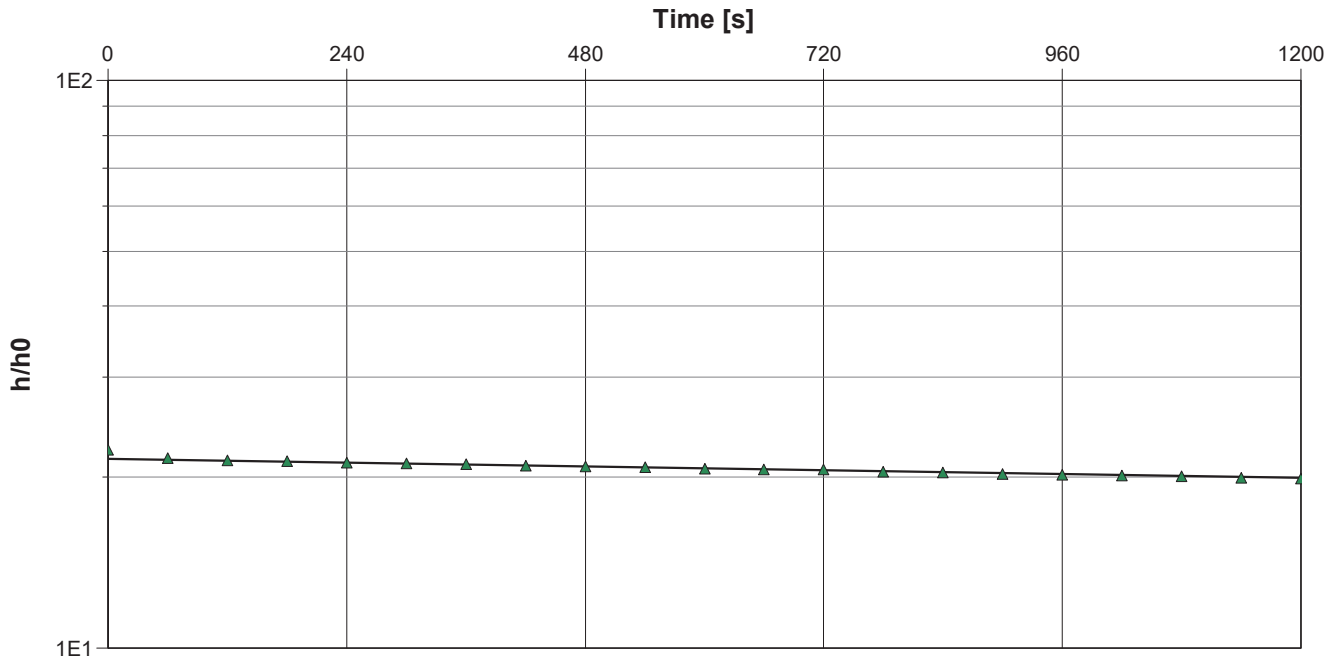


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
BH102-22	9.26×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14273-001	
	Client: 0507 Industries Ltd.	

Location: 8 Easy Street, Port Perry	Slug Test: BH105-22 Test 1	Test Well: BH105-22
Test Conducted by: W. Young		Test Date: 11/8/2022
Analysis Performed by: N. Heikoop	Hvorslev	Analysis Date: 2/10/2023
Aquifer Thickness: 2.59 m		

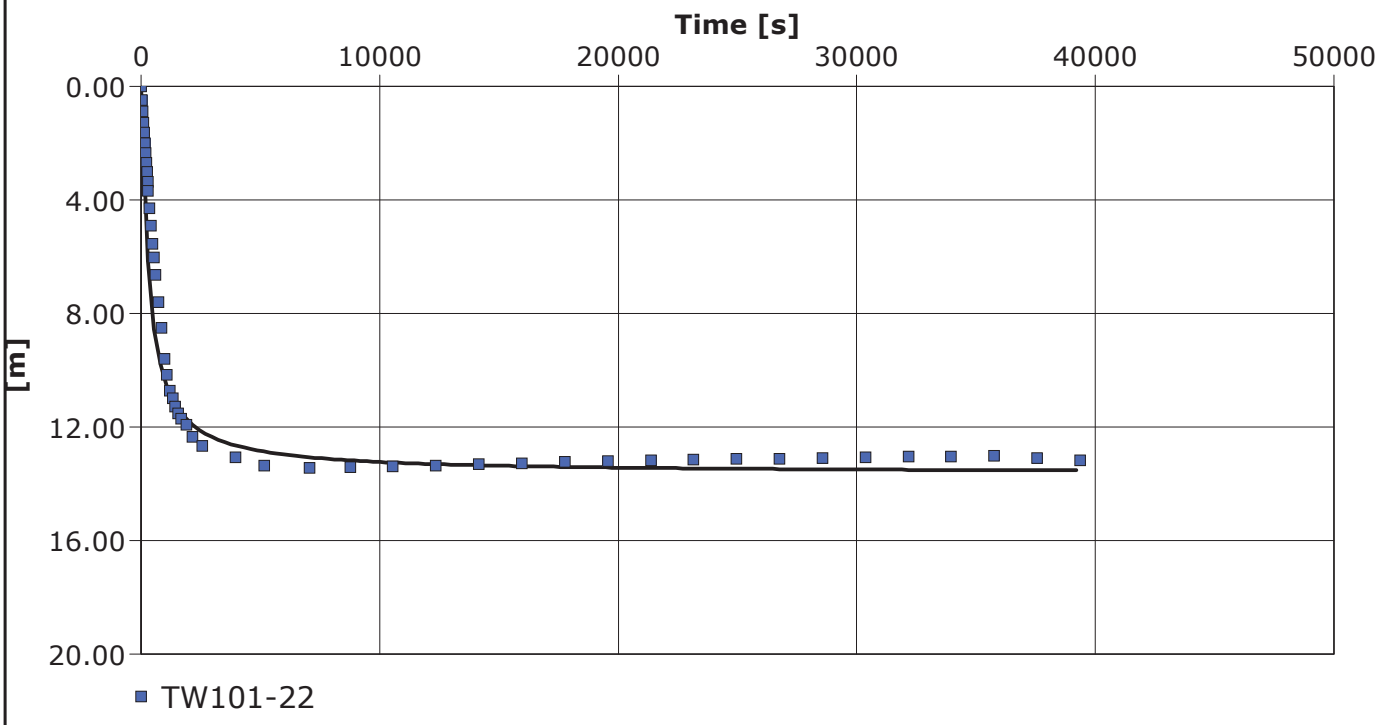


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
BH105-22	7.53×10^{-8}	

194 Sophia St. Peterborough, ON K9H1E5	**Pumping Test Analysis Report**
	Project: Hydrogeological Assessment
	Number: 14273-001
	Client: 0507 Industries Ltd.

Location: 8 Easy Street, Port Perry	Pumping Test: TW101-22	Pumping Well: TW101-22
Test Conducted by: W. Young		Test Date: 2/7/2023
Analysis Performed by: N. Heikoop	TW101-22	Analysis Date: 2/16/2023
Aquifer Thickness: 1.83 m	Discharge Rate: 3.17 [U.S. gal/min]	



Calculation using Theis

Observation Well	Transmissivity [m²/s]	Hydraulic Conductivity [m/s]	Storage coefficient	P	Radial Distance to PW [m]
TW101-22	3.71×10^{-6}	2.03×10^{-6}	1.08×10^{-1}	4.90×10^{0}	0.08

Appendix E
Test Well Record

Ontario — Ministry of the Environment, Conservation and Parks

Well Tag#:A310974 (See Below)

A310974

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	
0507	Industries Ltd		☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
4966 Vandorf Sdrd	Stouffville	ON	L4A3G6	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
8 Easy Street	Port Perry	14	5

County/District/Municipality	City/Town/Village	Province	Postal Code
Durham	Port Perry	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	17	661428	4884205		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Topsoil		Soft	0	2
Brown	Fine Sand	Stones, Clay	Dry, loose	2	6
Brown	Clay		Dense	6	15
Grey	Clay	Stones	Hard	15	70
Grey	Fine Sand		Loose	70	76

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	20	Bentonite Hole Plug	7.86

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☒ Other, specify: Air Dual Rotary

Well Use

☐ Public ☐ Commercial ☐ Not used ☒ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6	Steel	.188	0	70

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To
5	Stainless Steel	8	70	76

Status of Well

☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	Other, specify
70	☐	☐ Fresh ☒ Untested	
	☐	☐ Fresh ☐ Untested	
	☐	☐ Fresh ☐ Untested	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	76	6
0	20	10

Results of Well Yield Testing

After test of well yield, water was: ☒ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 60

Pumping rate (l/min / GPM): 5

Duration of pumping: 1 hrs + ___ min

Final water level end of pumping (m/ft): 47.8

If flowing give rate (l/min/GPM): 1

Recommended pump depth (m/ft): 67'

Recommended pump rate (l/min/GPM): 5 I

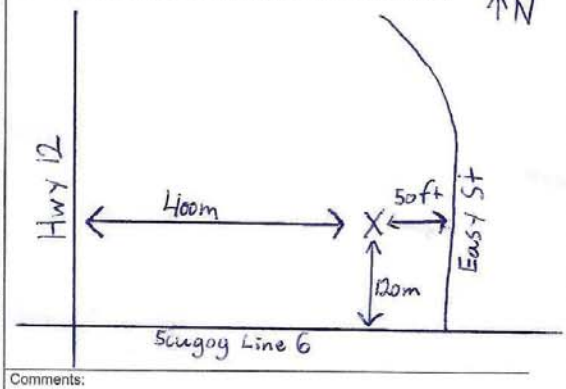
Well production (l/min/GPM): 5

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	+5		
1	+2.3	1	45.2
2	2.1	2	43.6
3	4.1	3	41.4
4	7.0	4	39.7
5	9.1	5	37.1
10	17.8	10	29.5
15	24.2	15	21.8
20	29.3	20	13.9
25	33.5	25	5.3
30	36.9	30	+3
40	42.0	40	+4
50	45.5	50	+5
60	47.8	60	+5

Map of Well Location

Please provide a map below following instructions on the back.



Comments: 200 PPm 100 PPm residule 17 hrs

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Wilson's Water Wells LTD.	5459

Business Address (Street Number/Name)	Municipality
13787 Hwy 48	Stouffville

Province	Postal Code	Business E-mail Address
ON	L4A3B3	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
9056404369	Hinves, Jesse

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
3662		2022/12/22

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2022/12/21	2022/12/21

Ministry Use Only

Audit No. Z386894

Received

Ministry's Copy

Appendix F
Water Quality Data

FINAL REPORT

CA15168-FEB23 R1

8 Easy Street, 14273-001

Prepared for

Cambium Inc.

FINAL REPORT

First Page

CLIENT DETAILS

Client	Cambium Inc.
Address	194 Sofia Street Peterborough, ON K9H 1E3. Canada
Contact	Cameron MacDougall
Telephone	705-742-7900
Facsimile	705-742-7907
Email	cameron.macdougall@cambium-inc.com; file@cambium-inc.cc
Project	8 Easy Street, 14273-001
Order Number	
Samples	Ground Water (3)

LABORATORY DETAILS

Project Specialist	Jill Campbell, B.Sc.,GISAS
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	2165
Facsimile	705-652-6365
Email	jill.campbell@sgs.com
SGS Reference	CA15168-FEB23
Received	02/08/2023
Approved	02/17/2023
Report Number	CA15168-FEB23 R1
Date Reported	02/28/2023

COMMENTS

Temperature of Sample upon Receipt: 6 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes
Chain of Custody Number: n/a

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

TABLE OF CONTENTS

Client: Cambium Inc.
Project: 8 Easy Street, 14273-001
Project Manager: Cameron MacDougall
Samplers: Warren Young

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	6	7	8
				Sample Name	PW1	MW101-22	PW1 Bacti #2
				Sample Matrix	Ground Water	Ground Water	Ground Water
				Sample Date	07/02/2023	07/02/2023	07/02/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**
General Chemistry							
Alkalinity	mg/L as CaCO3	2	500		223	---	---
Conductivity	uS/cm	2			441	---	---
Colour	TCU	3	5		4	---	---
Turbidity	NTU	0.10	5	1	2.5	---	---
Dissolved Organic Carbon	mg/L	1	5		< 1	---	---
Organic Nitrogen	mg/L	0.5	0.15		< 0.5	---	---
Total Kjeldahl Nitrogen	as N mg/L	0.5			< 0.5	---	---
Total Dissolved Solids	mg/L	30	500		249	---	---
Ammonia+Ammonium (N)	as N mg/L	0.1			0.1	---	---
Metals and Inorganics							
Fluoride	mg/L	0.06		1.5	0.11	---	---
Sulphate	mg/L	2	500		26	---	---
Nitrite (as N)	as N mg/L	0.03		1	< 0.03	< 0.03	---
Nitrate (as N)	as N mg/L	0.06		10	< 0.06	< 0.06	---
Nitrate + Nitrite (as N)	as N mg/L	0.06			< 0.06	< 0.06	---
Hardness	mg/L as CaCO3	0.05	100		246	---	---
Calcium (total)	mg/L	0.01			64.0	---	---
Iron (total)	mg/L	0.007	0.3		0.537	---	---
Magnesium (total)	mg/L	0.001			21.0	---	---
Manganese (total)	mg/L	0.00001	0.05		0.0108	---	---
Sodium (total)	mg/L	0.01			4.40	---	---

Client: Cambium Inc.
Project: 8 Easy Street, 14273-001
Project Manager: Cameron MacDougall
Samplers: Warren Young

MATRIX: WATER

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

				Sample Number	6	7	8
				Sample Name	PW1	MW101-22	PW1 Bacti #2
				Sample Matrix	Ground Water	Ground Water	Ground Water
				Sample Date	07/02/2023	07/02/2023	07/02/2023
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**	**Result**
Microbiology							
E. Coli	cfu/100mL	0		0	---	---	0
Total Coliform	cfu/100mL	0		0	---	---	< 2↑
E. Coli	cfu/100mL	0		0	0	---	---
Total Coliform	cfu/100mL	0		0	< 2↑	---	---
Other (ORP)							
pH	No unit	0.05	8.5		8.06	---	---
Chloride	mg/L	1	250		3	---	---

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03 L1	ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03 L2
PW1					
Organic Nitrogen	N/A - Calculation	mg/L	< 0.5	0.15	
Turbidity	SM 2130	NTU	2.5		1
Hardness	SM 3030/EPA 200.8	mg/L as CaCO3	246	100	
Iron	SM 3030/EPA 200.8	mg/L	0.537	0.3	
Total Coliform	SM 9222	cfu/100mL	< 2		0
PW1 Bacti #2					
Total Coliform	SM 9222	cfu/100mL	< 2		0

QC SUMMARY

Alkalinity

Method: SM 2320 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0134-FEB23	mg/L as CaCO3	2	< 2	2	20	94	80	120	NA		

Ammonia by SFA

Method: SM 4500 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0086-FEB23	as N mg/L	0.1	<0.1	3	10	99	90	110	93	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-026

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO5030-FEB23	mg/L	1	<1	0	20	110	80	120	82	75	125
Sulphate	DIO5032-FEB23	mg/L	2	<2	5	20	110	80	120	93	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate + Nitrite (as N)	DIO0178-FEB23	mg/L	0.06	<0.06	NA		NA			NA		
Nitrite (as N)	DIO0178-FEB23	mg/L	0.03	<0.03	ND	20	97	90	110	100	75	125
Nitrate (as N)	DIO0178-FEB23	mg/L	0.06	<0.06	ND	20	100	90	110	103	75	125
Nitrate + Nitrite (as N)	DIO0179-FEB23	mg/L	0.06	<0.06	NA		NA			NA		
Nitrite (as N)	DIO0179-FEB23	mg/L	0.03	<0.03	ND	20	97	90	110	101	75	125
Nitrate (as N)	DIO0179-FEB23	mg/L	0.06	<0.06	ND	20	102	90	110	104	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0093-FEB23	mg/L	1	<1	2	20	97	90	110	86	75	125

Colour

Method: SM 2120 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0177-FEB23	TCU	3	< 3	0	10	100	80	120	NA		

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0134-FEB23	uS/cm	2	< 2	0	20	99	90	110	NA		

QC SUMMARY

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0171-FEB23	mg/L	0.06	<0.06	3	10	102	90	110	96	75	125

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 I Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Calcium (total)	EMS0067-FEB23	mg/L	0.01	<0.01	2	20	100	90	110	90	70	130
Iron (total)	EMS0067-FEB23	mg/L	0.007	<0.007	ND	20	100	90	110	100	70	130
Magnesium (total)	EMS0067-FEB23	mg/L	0.001	<0.001	6	20	102	90	110	98	70	130
Manganese (total)	EMS0067-FEB23	mg/L	0.00001	<0.00001	0	20	98	90	110	95	70	130
Sodium (total)	EMS0067-FEB23	mg/L	0.01	<0.01	6	20	101	90	110	95	70	130

QC SUMMARY

Microbiology

Method: SM 9222D | Internal ref.: ME-CA-[ENV]MIC-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
E. Coli	BAC9107-FEB23	cfu/100mL	-	ACCEPTED	ACCEPTED							
Total Coliform	BAC9107-FEB23	cfu/100mL	-	ACCEPTED	ACCEPTED							
E. Coli	BAC9128-FEB23	cfu/100mL	-	ACCEPTED	ACCEPTED							
Total Coliform	BAC9128-FEB23	cfu/100mL	-	ACCEPTED	ACCEPTED							

pH

Method: SM 4500 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High	Spike Recovery (%)	Recovery Limits (%) Low	Recovery Limits (%) High
pH	EWL0134-FEB23	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0137-FEB23	mg/L	30	<30	3	20	99	80	120	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENVISFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0081-FEB23	as N mg/L	0.5	<0.5	2	10	100	90	110	103	75	125

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0141-FEB23	NTU	0.10	< 0.10	0	10	100	90	110	NA		

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

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

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS	Insufficient sample for analysis.
RL	Reporting Limit.
↑	Reporting limit raised.
↓	Reporting limit lowered.
NA	The sample was not analysed for this analyte
ND	Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY (General)

SGS Environmental Services - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Toll Free: 877-747-7658 Fax: 705-652-6365 Web: www.ca.sgs.com {4}

SGS Environmental Services - London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361 Web: www.ca.sgs.com {4}

Laboratory Information Section

Received Date (mm/dd/yyyy): 02/08/2023 | LAB LIMS #: Feb-15168 SR.

Received Time (After Hours Only): 07:30 | Temperature Upon Receipt (°C): 6 x 3

Billing & Reporting Information

Invoice/Receipt to {3}:

Company: Cambium Inc

Attention: Cameron MacDougall

Address: 194 Sophia Street, Peterborough, Ontario, K9H1E5

Email: Cameron-MacDougall@Cambium-Inc.com

Project Name/Number: 8 Foster Street / 14273-001 | P.O. #: 14273-001

Quote #: 2023-423

Attached Parameter List: ☐ YES ☒ NO

Turnaround Time

Is *Rush Turnaround Time Required? ☐ YES ☒ NO

Specify:

* Rush TA Requests Require Lab Approval

Client Information/Report To:

Client Lab #:

Company Name: Cambium Inc | Phone Number: 705 957 0137

Contact Name: Cameron MacDougall | Fax Number:

Address: 194 Sophia Street, Peterborough ON, K9H1E5 | E-mail: Cameron-MacDougall@Cambium-Inc.com

Copy to:

Sample Information

Sample Identifier	Date Sampled (mm/dd/yy)	Time Sampled	# of Bottles	Analysis Requested: On-Site Supply Well	Nitrate & Ammonia						
PW1	Feb 7/23	21:00	10	X							
MW101-22	Feb 7/23	23:00	3		X						
Time as per bottles. SR.				2EC received.			SR.				

Sampled By {1}: (Name) Warren Young (Signature) | Date: 02/07/23 (mm/dd/yy)

Relinquished by {2}: (Name) Warren Young (Signature) | Date: 02/07/23 (mm/dd/yy)

Note: {1} Submission of samples to SGS is acknowledgement that you have been provided direction on sample collection/handling and transportation of samples. {2} Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). {3} Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. {4} Completion of work may require the subcontracting of samples between the London and Lakefield laboratories.

Appendix G

MECP Well Records

Water Well Records Summary Report

Produced by Cambium Inc. using MOECP Water Well Information System (WWIS)

All units in meters unless otherwise specified

Well ID: 1910887
Construction Date: 1990-11-13
Easting: 661328
Northing: 4884477
UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth: 68.3
Water First Found:
Static Level: 0
Water Kind MINERIAL
Final Status Water Supply
Primary Water Use: Commerical
Pump Rate (LPM): 23
Recommended Pump Rate: 14
Pumping Duration (h:m): 1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	CLAY	0	3.66
1	CLAY	0	3.66
2	CLAY	3.66	18.3
2	CLAY	3.66	18.3
3	GRAVEL	18.3	18.6
3	GRAVEL	18.3	18.6
4	CLAY	18.6	28.6
4	CLAY	18.6	28.6
5	CLAY	28.6	29
5	CLAY	28.6	29
6	CLAY	29	57
6	CLAY	29	57
7	SILT	57	66.1
7	SILT	57	66.1
8	SAND	66.1	68.3
8	SAND	66.1	68.3

Well ID: 1911102
Construction Date: 1991-07-03
Easting: 661211
Northing: 4884635
UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth: 75.3
Water First Found: 75.3
Static Level: 0
Water Kind Not stated
Final Status Water Supply
Primary Water Use: Commerical
Pump Rate (LPM): 59
Recommended Pump Rate: 59
Pumping Duration (h:m): 4 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.61
2	CLAY	0.61	5.49
3	CLAY	5.49	21.3
4	SAND	21.3	21.6
5	CLAY	21.6	57.9
6	CLAY	57.9	68.3
7	SAND	68.3	69.5
8	CLAY	69.5	74.7
9	LIMESTONE	74.7	75.3

Well ID: 1911163
Construction Date: 1991-08-15

Easting: 661370
Northing: 4884119

UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth: 21.3
Water First Found:
Static Level: 0

Water Kind FRESH
Final Status Water Supply
Primary Water Use: Commerical

Pump Rate (LPM): 23
Recommended Pump Rate: 18
Pumping Duration (h:m): 2 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	CLAY	0.30	6.1
3	SAND	6.1	7.62
4	CLAY	7.62	18.3
5	SAND	18.3	19.8
6	GRAVEL	19.8	21.3

Well ID: 1911165
Construction Date: 1991-08-15

Easting: 661465
Northing: 4884088

UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth: 36.3
Water First Found: 34.8
Static Level: 0

Water Kind FRESH
Final Status Water Supply
Primary Water Use: Commerical

Pump Rate (LPM): 23
Recommended Pump Rate: 14
Pumping Duration (h:m): 1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	CLAY	0.30	6.1
3	SAND	6.1	8.53
4	CLAY	8.53	18.3
5	SAND	18.3	25
6	SAND	25	30.5
7	SAND	30.5	34.8
8	GRAVEL	34.8	36.3

Well ID: 1913784
Construction Date: 1998-09-14

Easting: 661608
Northing: 4884106

UTM Zone 17
Positional Accuracy: margin of error : 3 - 10 m

Well Depth: 26.5
Water First Found: 9.14
Static Level: 1

Water Kind FRESH
Final Status Water Supply
Primary Water Use: Commerical

Pump Rate (LPM): 77
Recommended Pump Rate: 45
Pumping Duration (h:m): 48 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	CLAY	0	3.66
1	CLAY	0	3.66
2	CLAY	3.66	9.14
2	CLAY	3.66	9.14
3	SAND	9.14	9.45
3	SAND	9.14	9.45
4	CLAY	9.45	18.9
4	CLAY	9.45	18.9
5	FINE SAND	18.9	25.3
5	FINE SAND	18.9	25.3
6	GRAVEL	25.3	26.5

6	GRAVEL	25.3	26.5

Well ID: 1914586
Construction Date: 2000-07-27
Easting: 661094
Northing: 4884701
UTM Zone 17
Positional Accuracy: unknown UTM

Well Depth: 75.6
Water First Found: 75.6
Static Level: 0
Water Kind FRESH
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 23
Recommended Pump Rate: 23
Pumping Duration (h:m): 10 :

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	CLAY	0.30	5.79
3	CLAY	5.79	27.1
4	SAND	27.1	27.4
5	CLAY	27.4	29.9
6	CLAY	29.9	39.6
7	HARDPAN	39.6	61.9
8	CLAY	61.9	71.6
9	GRAVEL	71.6	75.6
10	SHALE	75.6	75.6

Well ID: 1914588
Construction Date: 2000-07-27
Easting: 661094
Northing: 4884701
UTM Zone 17
Positional Accuracy: unknown UTM

Well Depth: 23.2
Water First Found: 23.2
Static Level: -1
Water Kind FRESH
Final Status Water Supply
Primary Water Use:
Pump Rate (LPM): 9
Recommended Pump Rate:
Pumping Duration (h:m): 6 :

Layer:	Driller's Description:	Top:	Bottom:
1	CLAY	0	0.30
2	TOPSOIL	0.30	0.61
3	SAND	0.61	2.74
4	CLAY	2.74	14.6
5	CLAY	14.6	18.3
6	CLAY	18.3	21.6
7	FINE SAND	21.6	23.2

Well ID: 1914589
Construction Date: 2000-07-27
Easting: 661094
Northing: 4884701
UTM Zone 17
Positional Accuracy: unknown UTM

Well Depth: 28.0
Water First Found: 27.1
Static Level:
Water Kind Not stated
Final Status Water Supply
Primary Water Use:
Pump Rate (LPM): 9
Recommended Pump Rate:
Pumping Duration (h:m): 6 :

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	SAND	0.30	1.52
3	SAND	1.52	3.66
4	CLAY	3.66	10.1
5	CLAY	10.1	18.9
6	CLAY	18.9	25.6
7	SAND	25.6	27.1

8	CLAY	27.1	28.0

Well ID: 1917595
Construction Date: 2005-07-04
Easting: 661069
Northing: 4884220
UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 12.8
Water First Found: 12.8
Static Level: 0
Water Kind FRESH
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 23
Recommended Pump Rate: 23
Pumping Duration (h:m): 3 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	2.74
2	SAND	2.74	7.62
3	CLAY	7.62	11.6
4	SAND	11.6	12.8

Well ID: 4606250
Construction Date: 1975-07-08
Easting: 661810
Northing: 4884026
UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 77.1
Water First Found: 73.2
Static Level: 0
Water Kind FRESH
Final Status Water Supply
Primary Water Use: Industrial
Pump Rate (LPM): 36
Recommended Pump Rate: 32
Pumping Duration (h:m): 3 : 30

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	1.22
2	SAND	1.22	25.3
3	CLAY	25.3	67.7
4	CLAY	67.7	71.6
5	GRAVEL	71.6	73.2
6	LIMESTONE	73.2	77.1

Well ID: 4606573
Construction Date: 1976-08-09
Easting: 660865
Northing: 4884373
UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth: 82.3
Water First Found: 81.7
Static Level:
Water Kind SULPHUR
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 91
Recommended Pump Rate: 45
Pumping Duration (h:m): 2 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	1.22
2	FINE SAND	1.22	6.1
3	CLAY	6.1	24.1
4	GRAVEL	24.1	25
5	CLAY	25	27.4
6	CLAY	27.4	39.6
7	CLAY	39.6	48.8
8	LIMESTONE	48.8	73.2
9	GRAVEL	73.2	77.7
10	SHALE	77.7	82.3

Well ID: 7042638
Construction Date: 2007-04-16

Easting: 661397
Northing: 4884114

UTM Zone 17
Positional Accuracy: margin of error : 10 - 30 m

Well Depth:	27.7	**Water Kind**	FRESH	**Pump Rate (LPM):**	45
Water First Found:	27.7	**Final Status**	Water Supply	**Recommended Pump Rate:**	45
Static Level:	0	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.60
2	CLAY	0.60	7.31
3	CLAY	7.31	26.8
4	SAND	26.8	27.7

Well ID: 7121055
Construction Date: 2009-03-30

Easting: 661233
Northing: 4884617

UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:	75.6	**Water Kind**	FRESH	**Pump Rate (LPM):**	45
Water First Found:	74.3	**Final Status**	Water Supply	**Recommended Pump Rate:**	45
Static Level:	-1	**Primary Water Use:**	Industrial	**Pumping Duration (h:m):**	2 : 30

Layer:	Driller's Description:	Top:	Bottom:
1	CLAY	0	4.30
2	CLAY	4.30	17.4
3	CLAY	17.4	22.6
4	CLAY	22.6	33.8
5	CLAY	33.8	47.8
6	GRAVEL	47.8	74
7	LIMESTONE	74	75.6

Well ID: 7139788
Construction Date: 2010-02-16

Easting: 661318
Northing: 4884375

UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	45.7	**Water Kind**	FRESH	**Pump Rate (LPM):**	150
Water First Found:	44	**Final Status**	Water Supply	**Recommended Pump Rate:**	57
Static Level:	-2	**Primary Water Use:**	Commerical	**Pumping Duration (h:m):**	1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	2.70
2	CLAY	2.70	14
3	SILT	14	32.6
4	CLAY	32.6	43.9
5	SAND	43.9	45.7

Well ID: 7272367
Construction Date: 2016-09-28

Easting: 661201
Northing: 4884515

UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:	28.0	**Water Kind**	FRESH	**Pump Rate (LPM):**	36
Water First Found:	28.0	**Final Status**	Water Supply	**Recommended Pump Rate:**	27
Static Level:		**Primary Water Use:**	Commerical	**Pumping Duration (h:m):**	1 :

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	4.57
2	CLAY	4.57	22.9
3	SAND	22.9	25.6
4	SAND	25.6	28.0

Well ID: 7346189
Construction Date: 2019-10-31

Easting: 660830
Northing: 4883887

UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 4.27
Water First Found: 2.13
Static Level:

Water Kind Untested
Final Status Observation W
Primary Water Use: Monitoring

Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m): :

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	1.22
2	SAND	1.22	2.13
3	CLAY	2.13	4.27

Well ID: 7355913
Construction Date: 2020-03-24

Easting: 661363
Northing: 4884270

UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 35.1
Water First Found: 28.4
Static Level:

Water Kind FRESH
Final Status Water Supply
Primary Water Use: Domestic

Pump Rate (LPM): 23
Recommended Pump Rate: 23
Pumping Duration (h:m): 1 :

Layer:	Driller's Description:	Top:	Bottom:
1	GRAVEL	0	0.30
2	SAND	0.30	1.52
3	CLAY	1.52	21.3
4	SAND	21.3	24.1
5	SAND	24.1	29.6
6	SAND	29.6	35.0
7	CLAY	35.0	35.0

Appendix H
Water Balance Calculations

Water Balance Calculations

8 Easy Street, Port Perry, Ontario

THORNTHWAITE-TYPE MONTHLY WATER-BALANCE MODEL

modified from Dingman 2015: Box 6-8 (pg 299) using ET model of Hamon (1963)

		Input Data				Computed Values							
											Surplus	390	mm/yr
Weather Station Location:	**Port Perry, ON**					**Latitude:**	**44.0**	**degree**					
Solar Declination (degree)	-20.6	-12.6	-1.5	10.0	19.0	23.1	21.0	13.4	2.6	-9.0	-18.5	-23.0	
DayLength (hr)*	9.2	10.3	11.8	13.3	14.6	15.2	14.9	13.8	12.3	10.8	9.5	8.8	
Available Water Storage Capacity		0.18	m/m		**Root Depth**	1000	mm		**SOILmax**	180.0	mm		

MONTHLY WATER BALANCE DATA

Temperatures in C, water-balance terms in mm.

Month:	J	F	M	A	M	J	J	A	S	O	N	D	Year
TEMPERATURE (T)	-7.4	-6.0	-1.5	5.9	12.6	17.4	20.0	19.2	14.7	8.4	2.0	-4.0	
PRECIPITATION (P)	60.7	48.5	50.7	70.4	88.3	93.3	72.8	96.7	100.2	84.6	89.6	64.7	921
RAIN	23.1	21.5	30.6	65.7	88.3	93.3	72.8	96.7	100.2	83.7	78.4	33.6	788
SNOW	38	27	20	5	0	0	0	0	0	1	11	31	133
MELT FACTOR (F)	0.00	0.00	0.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.00	
PACK	76	103	123	2	0	0	0	0	0	0	7	39	
MELT	0	0	0	126	2	0	0	0	0	1	4	0	133
INPUT (W)	23	22	31	192	90	93	73	97	100	85	82	34	921
POTENTIAL ET (PET)	0	0	0	40	69	93	110	97	64	39	22	0	534
NET INPUT (ΔW)	23	22	31	152	22	0	-37	0	36	45	60	34	
SOIL MOISTURE (SOIL)	180	180	180	180	180	180	146	146	180	180	180	180	
ΔSOIL	0	0	0	0	0	0	-34	0	34	0	0	0	0
ET	0	0	0	40	69	93	106	97	64	39	22	0	531
SURPLUS=W-ET-DSOIL	23	22	31	152	22	0	0	0	2	45	60	34	390

Notes:

Precipitation, Rain, Temperature, and Latitude are inputted parameters

SOILmax = available water storage capacity * root depth

m = month

D = Day length (hrs) $=2*\cos^{-1}(-\tan(\text{Latitude})*\tan(\text{Declination}))/0.2618$ [calculation is in radians]

$SNOW_m = P_m - RAIN_m$

$F_m = 0$ if $T_m <= 0^oC$; $F_m = 0.167*T_m$ if $0^oC<T_m<6^oC$; $F_m = 1$ if $T_m>=6^oC$

$PACK_m = (1-F_m)*(SNOW_m+PACK_{m-1})$

$MELT = F_m*(SNOW_m+PACK_{m-1})$

$W_m = RAIN_m+MELT_m$.

PET = 0 if $T_m<0$; otherwise $PET = 2.98*0.611*\exp(17.3*T_m/(T_m+237))/(T_m+237.2)*$Number of days in month [Hamon ET model (1963)]

$\Delta W_m = W_m - PET_m$

$SOIL = \min\{[\Delta W_m+SOIL_{m-1}], SOILmax\}$, if $\Delta Wm>0$; otherwise $SOIL = SOIL_{m-1}* \exp(\Delta W/SOILmax)$

$\Delta SOIL = SOIL_{m-1} - SOIL_m$

ET = PET if W_m > PET; otherwise, $ET=W_m-\Delta SOIL$

Pre- and Post-Development Water Balance Calculations

8 Easy Street, Port Perry, Ontario

1 Climate Information

Precipitation	921	mm/yr
Actual Evapotranspiration	531	mm/yr
Water Surplus	390	mm/yr

2 Infiltration Rates

Table 2 Approach - Infiltration factors

Topography: Flat to Gently Sloping Land	0.25
Soil Type: sandy silt to sand and silt, some clay and gravel	0.15
Cover: Cultivated land	0.1
Total Infiltration Factor	**0.5**

Infiltration (Water Surplus * Infiltration Factor)	**195**	mm/yr
Run-off (Water Surplus - Infiltration)	**195**	mm/yr

Table 3 Approach - Typical Recharge Rates

Coarse Sand and Gravel	>250	mm/yr
Fine to medium sand	200-250	mm/yr
Silty sand to sandy silt	150-200	mm/yr
Silt	125-150	mm/yr
Clayey Silt	100- 125	mm/yr
Clay	<100	mm/yr

Site development area is underlain predominantly by silty sand to sand and silt

Based on the above, the recharge rate is typically	150-200	mm/yr

3 Pre-Development Property Statistics	**ha**	**m^2**
Total Paved Area	0.00	0
Total Roof Area	0.00	0
Total Landscape Area	1.02	10,178
Total	**1.02**	**10,178**

4 Post-Development Property Statistics	**ha**	**m^2**
Total Paved Area	0.18	1,800
Total Roof Area	0.12	1,249
Total Landscape Area	0.71	7,129
Total	**1.02**	**10,178**

Pre- and Post-Development Water Balance Calculations

8 Easy Street, Port Perry, Ontario

5 Pre-Development Water Balance

Land Use		Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Impervious Areas	Paved Area	-	-	-	-	-
	Roof Area	-	-	-	-	-
Pervious Areas	Landscape Area	10,178	9,374	5,405	1,985	1,985
	Totals	10,178	9,374	5,405	1,985	1,985

Assuming no infiltration occurring in paved and roof areas, and 10% of precipitation to be evaporated from paved and roof areas.

6 Post-Development Water Balance

Land Use		Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Impervious Areas	Paved Area	1,800	1,658	166	-	1,492
	Roof Area	1,249	1,150	115	-	1,035
Pervious Areas	Landscape Area	7,129	6,566	3,785	1,390	1,390
	Totals	10,178	9,374	4,066	1,390	3,917

Assuming no infiltration occurring in paved and roof areas, and 10% of precipitation to be evaporated from paved and roof areas.

7 Comparision of Pre- and Post -Development

	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Pre-Development	9,374	5,405	1,985	1,985
Post-Development	9,374	4,066	1,390	3,917
Change in Volume	-	- 1,338	- 595	1,933
Change in %	-	- 25	- 30	97

8 Requirement for Infiltration of Roof Run-off

Volume of Pre-Development Infiltration (m^3/yr)	1,985
Volume of Post-Development Infiltration (m^3/yr)	1,390
Deficit from Pre to Post Development Infiltration (m^3/yr)	595
Percentage of Roof Runoff required to match the pre-development infiltration (%)	57

Appendix I

Proposed Re-Infiltration Feature Calculations

121053
8 Easy St. Port Perry
Infiltration gallery Sizing

i	11	mm/hr	$K=10^{-6}$
Area	1740	m²	
Capture	5	mm	
WQV	8.7	m³	
vr	0.4		
ts	48	hours	

Therefore Use dc = 1000 mm

Af WQV/(dc*vr) footprint area required
21.8 m²

Proposed Dimensions

Length	22.0	m²	
Width	1.0	m	
Depth	1.0	m	
Water Volume Proposed		8.8	m³
Total Stone Volume Prop		22.0	
Bottom Area		22	m²