Hydrogeological Assessment, 1255 Fuller Avenue, Penetanguishene, ON

August 14, 2023

Prepared for:
1000239074 Ontario Inc.

Cambium Reference: 16599-001

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1.0 Introduction

Cambium Inc. (Cambium) was retained by 1000239074 Ontario Inc. (Client) to complete a hydrogeological assessment of the property located at 1255 Fuller Avenue, Penetanguishene, Ontario (Site).

The hydrogeological assessment is in support of a proposed residential development consisting of 27 single detached lots, 4semi-detached and 33 standard townhouse dwellings, a stormwater management pond (SWMP), and associated infrastructure including paved driveways, landscape areas, walkways, and on-grade surface level parking. The assessment will include a general review of available geological / hydrogeological information, hydraulic testing of existing monitoring wells, dewatering calculations using the results of the hydraulic testing, a water balance, and a source water impact assessment.

1.1 Scope of Work

This hydrogeological investigation was carried out with the following tasks:

- **Review of available background information:** a review of available geological and hydrogeological information for the Site and surrounding areas and the previous investigation reports for the Site was conducted to provide background information and to characterize the Site's soil and groundwater conditions.
- **Detailed site inspection:** an inspection was completed to review existing Site conditions, including identification of any hydrogeological features such as significant areas of potential groundwater recharge or areas of groundwater discharge.
- **Measurement of groundwater levels:** groundwater levels were measured at the existing monitoring wells to establish and/or confirm the general groundwater flow conditions and water level elevations.
- **In-situ hydraulic conductivity tests:** single well response tests (i.e., in-situ hydraulic conductivity tests, SWRTs) will be conducted on existing monitoring wells to estimate the

hydraulic conductivity of the underlying soils and/or bedrock, which are used for assessing the potential dewatering requirements.

- **Preliminary dewatering assessment:** was completed for the construction excavations for basements based on the water level monitoring and SWRT tests completed at the Site. However, it should be noted that no detailed estimates of dewatering were completed.
- **Water balance (preliminary):** a preliminary water balance study was completed for the proposed development using the Thornthwaite-Mather approach and climate data obtained from Environment Canada.
- **Source water protection:** a source water protection assessment was completed for the Site as the Subject lands are situated within a Highly Vulnerable Aquifer (HVA) as per the South Georgian Bay Lake Simcoe Source Protection Plan (SBSLS SPR, 2021).
- **Report preparation:** a hydrogeological report was prepared presenting the results, findings, and recommendations of this investigation.

It should be noted that a geotechnical investigation (Cambium, 2023) is being completed at the Site concurrently by Cambium and will be provided under separate cover. The data or information obtained in the current and previous investigations has been incorporated into this hydrogeological assessment report.

1.2 Site Description and Site Development

The total area of the Site is approximately 3.86 ha (9.53 acres) and it is currently zoned as a Rural (RU) Zone. Land to the north of the Site is zoned as Institutional (G) Zone, to the east as Rural Residential (RR-1) Zone, to the south as RU Zone, and to the west as a mix of Residential Second Density (R2) Zone and Residential Third Density (R3) Zone. The Site is bordered to the north by Sandy Bay Road and to the west by Fuller Avenue.

The Site is currently predominantly undeveloped woodland; however, there is a single-family dwelling and associated driveway developed in the southwestern corner of the Site. The proposed development consists of 27 single detached, 4 semi-detached and 33 townhouse units, a SWMP, and associated infrastructure. The Town of Penetanguishene will provide

water and wastewater services to the development from the access at the intersection of Broad Street and Fuller Avenue.

The regional location of the Site is outlined on Figure 1, the property and surrounding areas outlined on Figure 2, and the proposed development plan is included in Appendix A.

2.0 Environmental Features

To assess environmental features, databases maintained by the Ministry of Natural Resources and Forestry (MNRF), the Ministry of Environment, Conservation and Parks (MECP), and South Georgian Bay Lake Simcoe (SGBLS) Source Protection Region were reviewed.

Based on the data reviewed, the Site is situated within the South Georgian Bay Shoreline watershed. Surface drainage at the Site will follow the local topography and flow radially from the north-south trending ridge. It is assumed that surface drainage will ultimately discharge to the north-northeast of Site into the unevaluated wetland located on the northern side of Pine Grove Road where surface water will ultimately drain into Georgian Bay, located approximately 1.4 km northeast of the Site.

As per the MNRF Natural Heritage System database, there are no mapped wetlands or watercourses at the Site; however, the majority of the Site is within a mapped woodland. There is a mapped unevaluated wetland located northeast of the Site on the northern side of Sandy Bay Road. The Site does not have any Areas of Environmental Significance or Areas of Natural and Scientific Interests (ANSI)(Appendix A).

The Site is under the SGBLS Source Protection Region under the Severn Sound Source Protection Area (SPA) and is not situated in a regulated area and therefore, development restrictions do not apply to the proposed development.

As shown on the MECP Source Water Protection Atlas (SPIA) map, the southwestern and southeastern corners of the Site are within a Highly Vulnerable Aquifer (HVA) with a vulnerability score of 6 (Appendix A). There are no other vulnerable groundwater areas (i.e. wellhead protection areas, significant groundwater recharge areas, intake protection zones, etc.) identified at the Site.

3.0 Physical Setting

3.1 Topography and Drainage

Based on the topographic survey conducted by C.T. Strongman Survey Ltd. on August 17, 2022 (Appendix A), a maximum elevation of 238.00 metres above sea level (masl) was found in the northwest and the lowest elevation of 233.50 masl in the southeast. The topography of the Site generally slopes to the east and southeast to a minimum elevation of 233.50 masl.

As discussed in Section 2.0, there are no mapped waterbodies on Site; however, there is an unevaluated wetland located to the north and south of Site. Surface drainage will likely flow from the topographic high in the northwest to the southeast ultimately discharging to St. Andrews Lake situated at about 0.4 km southeast of the Site.

3.2 Physiography

The Site is located in the physiographic region known as the Simcoe Uplands. This region is comprised of a series of broad, rolling, till plains separated by steep-sided flat-floor valleys. The region is encircled by numerous shorelines, indicating that there were used to be islands in Lake Algonquin. On the Penetang Peninsula, the uplands were submerged in glacial Lake Algonquin with the result that boulder pavement, sand, and silt appear on the surface. The Penetang area is included in the Simcoe Uplands because they are elevated and have rolling topography (Chapman, L.J. and D.F. Putnam, 1984).

3.3 Overburden Geology

According to Data 126 - Revised from the Ontario Geological Survey (OGS, 2010), the predominant overburden soils at the surface of the Site are described as stone-poor, sandy silt to silty sand-textured till deposited on Paleozoic terrain. The very southwestern corner of the Site is mapped as fine-grained glaciolacustrine deposits described as silt and clay, minor sand, and gravel that can be massive to well laminated.

3.4 Bedrock Geology

According to Miscellaneous Release – Data 219 from the Ontario Geological Survey (OGS, 2007), the bedrock in the area of the Site consists of Middle Ordovician rocks from the Simcoe Group identified as the Gull River Formation. The Gull River Formation is divided into two members: a lower member that consists of interbedded limestones and dolostones and an upper member that consists of thin-bedded shaly limestones. The formation commonly has small lenses of calcite, “birds-eye” texture, sulphate nodules and molds, and abundant fossils.

4.0 MECP Well Records Assessment

Cambium accessed the Ministry of the Environment Conservation and Parks (MECP) Water Well Information System (WWIS) to review water well records within 500 m of the Site.

There were about seventeen water well records found within approximately 500 m of the Site (Figure 3; Appendix B). Of the well records, 16 wells were installed in overburden to an average depth of 54.3 metres below ground surface (mbgs) and one well record was installed in bedrock to a depth of 71.0 mbgs. The depth of the overburden-bedrock contact from the bedrock well record (Well Record No. 5716422) was 66.1 mbgs. The wells were installed between the years 1965 and 2013. A total of 15 well records were for water supply wells, 1 well record was an abandonment record, and one well record was for a monitoring well. A summary of the depths, static water levels, and pumping rates for the bedrock wells and overburden wells are shown in Table 1.

Table 1 Summary of Surrounding Water Well Record Information

Well Type		Depth (mbgs)	Water Found at (mbgs)	Static Water Level (mbgs)	Recommended Pumping Rate (L/min)
Bedrock Count = 1		71.0	38.1	38.0	55.0
Overburden Count = 16	Minimum	9.1	8.5	5.0	18.0
	Maximum	64.3	62.2	53.0	455.0
	Average	54.3	51.6	37.9	87.6

A summary of the information outlined in the well records is provided below:

- Overburden was generally reported as being sand-dominant with varying amounts of gravel, silt, and clay. Some well records also recorded gravel-dominant and clay-dominant horizons.
- Bedrock was described as limestone.
- Water yields in the area are generally high indicating the presence of a productive aquifer capable of supporting many groundwater users.

5.0 Borehole Drilling and Monitoring Well Installation

5.1 Borehole Investigation

Cambium completed a geotechnical investigation at the Site on November 24 and 25 of 2022 to assess the subsurface conditions at the Site. A total of six boreholes were advanced into the overburden, designated as BH101-22 through BH106-22; the boreholes were extended to termination depth of 6.3 mbgs to 6.6 mbgs. BH101-22, BH102-22, and BH105-22 were outfitted with monitoring wells; the three monitoring wells were used for stabilized water level monitoring and to define the local groundwater regime across the Site. Borehole and monitoring well locations (including the existing monitoring wells) are appended as Figure 4. Borehole logs are included in Appendix C.

A summary of general lithological details is presented below.

Topsoil

A layer of organic topsoil was encountered at the surface of each of the boreholes advanced at the Site. The encountered topsoil ranged in thickness from 0.10 m to 0.15 m and was black in colour.

Sand

A deposit of cohesionless native sandy soils were encountered beneath surficial topsoil within borehole BH101-22, extending to a depth of 3.0 mbgs. The native sand deposit was gravelly in composition and contains traces of silt and clay.

Glacial Till

A deposit of native glacial till soils was encountered beneath the upper native sand deposit within borehole BH101-22, and beneath the surficial topsoil in each of the remaining boreholes. The glacial till deposit generally consisted of a silty sand matrix containing varying amounts of gravel and clay. The glacial till soils extended to the borehole termination depths from 6.3 mbgs to 6.6 mbgs.

Bedrock

Bedrock was not encountered in any of the boreholes advanced to a maximum termination depth of 6.6 mbgs. Each of the boreholes advanced throughout the site were terminated due to practical refusal within the generally compact to very dense native silty sand glacial till soils.

Monitoring wells construction details including screen elevations are presented in the Table 2.

Table 2 Well Construction Details

Monitoring Well	Borehole Termination Depth (mbgs)	Monitoring Well Termination Deth (mbgs)	Ground Elevation (masl)	Screen Top (masl)	Screen Bottom (masl)
BH101-22	6.4	6.1	232.53	229.48	226.43
BH102-22	6.6	6.1	233.92	230.87	227.82
BH105-22	6.6	6.1	236.59	233.54	230.49

5.2 Physical Laboratory Testing

Physical laboratory testing was completed for a total of five soil samples to confirm textural classification and to estimate the percolation rates of the native soils. Results are presented in Appendix D and details of the grain-size analysis are presented in Table 3, below.

Table 3 Particle Size Distribution

Borehole	Depth (mbgs)	Description	% Gravel	% Sand	% Silt	% Clay	Percolation Times (min/cm)
BH101-22 SS3	1.5 – 2.1	Gravelly Sand some Silt trace Clay	23	61	15	1	8
BH102-22 SS5	3.0 – 3.7	Sand and Silt trace Clay trace Gravel	1	57	36	6	20
BH103-22 SS4	2.3 – 2.9	Silty Sand trace Clay trace Gravel	3	59	34	4	18
BH104-22 SS3	1.5 – 2.1	Silty Sand trace Clay trace Gravel	3	57	34	6	20
BH106-22 SS4	2.3 – 2.9	Silt and Sand trace Clay trace Gravel	1	43	52	4	20

The native soil percolation rates ranged from 20 min/cm to 8 min/cm. The geometric mean of the percolation rates was estimated at about 16 min/cm. These results indicate a moderate to high infiltration capacity of the native soils.

5.3 Groundwater Level Monitoring

All boreholes and monitoring wells were open and dry at the completion of drilling on November 24 and 25, 2022, and the monitoring wells remained dry upon a subsequent Site visit on December 8, 2022, to complete the survey of the borehole locations. Therefore, it was determined that groundwater levels were deeper than 6.1 mbgs during the late fall and winter months.

Spring seasonal water level monitoring (from March to June of 2023) was completed to capture the seasonal high water table conditions across the Site and the results of this groundwater monitoring program are provided in Table 4, below.

Table 4 Measured Groundwater Details (March to June, 2023)

Well		BH101-22	BH102-22	BH105-22
Top of Pipe Elevation (masl)		233.57	235.00	237.64
Ground Surface Elevation (masl)		232.53	232.53	236.59
Stick-up (m)		1.04	1.08	1.05
Mar. 15, 2023	Water Level (mbgs)	5.45	Dry	6.02
	Groundwater Elev.(masl)	227.08	-	230.57
Apr. 17,2023	Water Level (mbgs)	2.56	5.58	5.92
	Groundwater Elev.(masl)	229.97	228.35	230.67
May 17,2023	Water Level (mbgs)	2.93	5.61	5.96
	Groundwater Elev.(masl)	229.60	228.32	230.63
Jun 27, 2023	Water Level (mbgs)	5.76	5.68	5.96
	Groundwater Elev.(masl)	226.77	228.25	230.63

As presented above, the measured groundwater levels in the monitoring wells during the spring monitoring event ranged in depth from 2.56 mbgs to 6.02 mbgs, while the elevations were between 226.77 masl to 230.67 masl. Therefore, the spring high water level and elevation were 2.56 mbgs and 230.67 masl, respectively.

5.4 Groundwater Flow Direction

A site-specific groundwater elevation contour map was prepared using the April 2023 groundwater level measurements at the Site and is depicted in Figure 5. Accordingly, the

groundwater flow was found to be to the southeast towards the St. Andrews Lake and ultimately to the Lake Huron.

5.5 Hydraulic Conductivity of Shallow Subsurface Soils

As the monitoring wells were either dry or having in-sufficient hydraulic head during Cambium's Site visits, single well response tests (slug tests) were not able to be performed to estimate the hydraulic conductivities (K-values) of the shallow subsurface soils.

However, there is an established relationship between hydraulic conductivity (m/s) and percolation rate (min/cm), as outlined in the *Supplementary Guidelines to the Ontario Building Code: SG-6 Percolation Time and Soil Descriptions* (OMMAH, 1997) and the calculated saturated hydraulic conductivity results from this relationship are presented in Table 5 based off the percolation rates presented in Section 5.2.

Table 5 Calculated Saturated Hydraulic Conductivity

Borehole	Soil Description	Estimated Hydraulic Conductivity (m/sec)
BH101-22 SS3	Gravelly Sand some Silt trace Clay	6.17×10^{-6}
BH102-22 SS5	Sand and Silt trace Clay trace Gravel	2.01×10^{-7}
BH103-22 SS4	Silty Sand trace Clay trace Gravel	2.98×10^{-7}
BH104-22 SS3	Silty Sand trace Clay trace Gravel	2.01×10^{-7}
BH106-22 SS4	Silt and Sand trace Clay trace Gravel	2.01×10^{-7}

The calculated hydraulic conductivities based on the established relationship with percolation rate ranged between 2.01×10^{-7} m/sec and 6.17×10^{-6} m/sec.

6.0 Construction Dewatering

The proposed development will include detached, semi-detached, and standard townhouse units and it is assumed that each unit/lot will have a basement level. Detailed designs were not available at the time of this report's preparation; therefore, it was assumed that the basement excavations would be extended to a depth of 3.5 mbgs, allowing for a 0.5 m allowance for the basement slab and the underneath granular base.

Based on the groundwater monitoring completed in the spring of 2023, the depth to the groundwater at the Site found to range between 2.56 mbgs to 6.02 mbgs, while the elevations were between 226.77 masl and 230.67 masl. The spring high water levels were observed in April and May ranging in depth from 2.56 mbgs to 2.93 mbgs in the southwest corner of the Site proposed for a SWM pond. Rest of the Site has deeper groundwater levels greater than 3.5 mbgs, which is the maximum excavation depth for the one level basement for the proposed development. Therefore, no short-term construction dewatering is anticipated at the Site, provided all construction activities will take place between late spring and late winter periods.

7.0 Water Balance Assessment

Based on the Thornthwaite and Mather methodology (1957), a 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 be transpired 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) in a steady-state system.

The annual water budget of a site 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)

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

The Site is currently predominantly undeveloped with a single-family dwelling and associated driveway in the southwestern corner of the Site. It is understood that the proposed development consists of residential units, a SWMP, and associated infrastructure including paved driveways, landscape areas, walkways, and on-grade surface level parking. The pre-development surfaces and post-development plans for the proposed development are shown in Figure 6 and Figure 7, respectively.

Based on the available design information, the pre- and post-development Site coverage can be generally categorized into three types: paved areas, roof areas, and landscaped areas. A detailed landscape plan was not available at the time of this report. However, based on the

Site statistics provided by the client, a summary of the surface areas of the development is listed in Table 6:

Table 6 Pre- and Post-Development Statistics

Type of Land Coverage	Pre-Developments Areas (m^2)	Post Development Areas (m^2)
Paved Area	120	9.340
Roof Area	130	24,850
Landscaped Area	38,305	4,635
Total (m^2)	**38,555**	**38,555**

7.1 Water Surplus

Water surplus is calculated by determining the difference between precipitation and evapotranspiration at a site over the course of a year (changes in soil water storage were assumed to be negligible). 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 from 1981 to 2010, were obtained from Environment Canada for Midland Water Pollution Control Plant weather station (Climate ID: 6115127), located about 5.4 km distance from the Site. Accordingly, the average annual evapotranspiration was estimated to be about 542 mm/year using the USGS Thornthwaite Monthly Water Balance methodology (Appendix E), and the average annual precipitation was recorded to be 1,041 mm/year. The water surplus of the Site was calculated to be 499 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 runoff.

7.2 Infiltration Rate

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* (MOE, 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* (MOE, 2003) methodology for calculating total infiltration 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 infiltration factor calculated for the Site is included in Table 7.

Table 7 Infiltration Factor

Category	Infiltration Factor
Topography	Rolling land = 0.2
Soils	Predominantly silty sand till = 0.25
Cover	Woodland and cultivated land = 0.15
Total	**0.60**

The calculation of infiltration and runoff in the stages of pre-development and post-development is provided in Appendix E, and are presented in Table 8 through Table 11, below.

7.3 Pre-Development Water Balance

The water balance for the existing conditions of the Site is summarized in Table 8. The pre-development infiltration rate was calculated to be about 11,469 m^3/yr and the runoff rate was about 7,880 m^3/yr.

Table 8 Pre-Development Water Balance

Land Use		Area (m^2)	Precipitation (m^3)	Evapo-transpiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Impervious Areas	Paved Area	120	125	12	-	112
	Roof Area	130	135	14	-	122
Pervious Area	Landscaped Area	38,305	39,876	20,761	11,469	7,646
Total		**38,555**	**40,136**	**20,787**	**11,469**	**7,880**

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

7.4 Post-Development Water Balance

The post-development water balance is summarized in Table 9. The post-development infiltration rate was calculated to be approximately 1,388 m^3/yr and the runoff volume was about 32,705 m^3/yr.

Table 9 Post-Development Water Balance

Land Use		Area (m^2)	Precipitation (m^3)	Evapo-transpiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Impervious Areas	Paved Area	**9,340**	**9,723**	**972**	-	**8,751**
	Roof Area	**24,580**	**25,588**	**2,559**	-	**23,029**
Pervious Area	Landscaped Area	**4,635**	**4,825**	**2,512**	**1,388**	**925**
Total		**38,555**	**40,136**	**6,043**	**1,388**	**32,705**

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

7.5 Water Balance Comparison

The water balances of the pre-development and post-development scenarios are summarized below in Table 10.

Table 10 Comparison of Pre- and Post Development Water Balance

	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Pre-Development	40,136	20,787	11,469	7,880
Post-Development	40,136	6,043	1,388	32,705
Change in Volume	-	14,744	10,081	24,825
Change in %	-	71	88	315

Based on the above, there is an infiltration deficit of about 10,081 m^3/year compared to the pre-development infiltration. The runoff rate upon development of the Site was increased by about 24,825 m^3/year.

As shown below in Table 11, approximately 44% of roof runoff is required to compensate the pre-development infiltration.

Table 11 Requirement of Infiltration from Roof Run-off

Volume of Pre-Development Infiltration (m^3/year)	11,469
Volume of Post-Development Infiltration (m^3/year)	1,388
Deficit from Pre to Post-Development Infiltration (m^3/year)	10,081
% of Roof Runoff required to match the Pre-Development Infiltration	44

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

1. There is a net increase in run-off at the Site of about 24,825 m^3/year, from 7,880 m^3/year to 32,705 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 decrease in pervious areas.
2. Post-development landscape area was decreased by about 33,670 m^2, when compared to the pre-development landscape, causing less infiltration and more run-off across the Site.
3. Without implementing any mitigation measures, there is a net deficit of about 10,080 m^3 /year in the post-development infiltration on a yearly basis.
4. Based on the estimation, a diversion of 44% of general roof water for infiltration would allow the proposed development to maintain an enhanced infiltration after the development.

Therefore, Cambium would recommend the implementation of any Low Impact Development (LID) measures at the Site in its present design, in order to compensate the infiltration deficit caused due to the Site development.

7.6 Discussions on LID Measures

It is known that low impact development (LID) practices have received increasing attention as these strategies attempt to capture the runoff and mimic the natural hydrologic cycle.

In general, there are two primary categories of LIDs. The first promotes the infiltration of Stormwater close to the source, besides reducing runoff and to improve the water quality. These infiltration type LIDs are preferred when hydrogeological and physical conditions are optimal and allow for their emplacement. The proposed development does include a SWMP, primarily to maintain water quality and also to enhance the lost infiltration due to the Site development with paved and roof areas. A SWMP will likely not encompass the entire infiltration deficit; therefore, the second option described below should also be considered.

The second option captures and slowly releases the water to the groundwater system through the process of storage and filtration by infiltration LIDs. Infiltration targets may be achieved through the incorporation of a variety of stormwater management practices including reduced lot grading, roof downspout disconnection, roof leaders discharging to ponding areas or soak away pits, infiltration trenches, grassed swales etc.

The conceptual water balance indicates that there will be an infiltration deficit of about 10,080 m^3/year in the post-development infiltration upon development of the Site, compared to the pre-development. Based on the estimation, a diversion of 44% of the general roof water for infiltration would allow the proposed development to maintain an enhanced infiltration after the development.

Given the proposed design by the proponent, there is enough space available for the implementation of LID measures, either by means of infiltration galleries or infiltration trenches or any other suitable means. It should be noted that the minimum distance between the bottom elevation of an infiltration LID feature and the maximum elevation of the water table should be

1.0 m. Due to the presence of deep water table conditions across the property, the implementation of LID features is feasible at the Site. As Cambium has not been provided any design of LID facilities, it would be beneficial to consult with design engineers for the LID design recommendations.

In-situ infiltration testing, if requested will be completed as a supplementary investigation to determine infiltration rates expected in specific areas of the Site and to aid the detailed design process of the LID measures.

8.0 Source Water Protection and Risk Management

As per the South Georgian Bay Lake Simcoe Source Protection Plan (SBSLS SPR, 2021), the Site is located within a HVA (Appendix A).

8.1 Highly Vulnerable Aquifer Area

The extreme southwestern and southeastern corners of the Site are located within an HVA.

An HVA is an aquifer that can be easily changed or affected by contamination from both human activities and natural processes. This is a result of preferential pathways to the aquifer or the areas intrinsic susceptibility as a function of the thickness and permeability of the overlying soils. In Ontario, a HVA is defined as having an Intrinsic Susceptibility Index (ISI) of less than 30. In general, an HVA will consist of granular materials (e.g., sand and/or gravel) or fractured rock that has a high permeability and is near the surface of the ground. It is important to protect highly vulnerable areas to prevent drinking water contamination.

The land use practices at the proposed development Site are not expected to cause any contamination to the water resources as it is assumed that there are no chemicals, fertilizers, or petroleum hydrocarbons proposed to be stored at or handled on Site. However, the proposed location of SWMP should be reconsidered as it is situated within the HVA.

9.0 Assessment of Potential Impacts

Based on the information available, the proposed residential development consists of detached, semi-detached and townhouse units, a SWMP, and associated infrastructure including paved driveways, landscape areas, walkways, and on-grade surface level parking. The potential hydrogeological impacts due to the proposed Site development are summarized below.

9.1 Natural Features

Although there are no mapped woodlands, wetlands, or waterbodies at the Site; there is an unevaluated mapped wetland located to the northeast of the Site and therefore set-back distances or buffer zones as prescribed by the Nottawasaga Valley Conservation Authority should be followed to protect the natural features. The Site is not situated in a regulated area as per the NVCA regulated areas mapping and therefore, development restrictions do not apply to the proposed development.

9.2 Water Supply Wells near the Site

It is assumed that each residential unit will have a basement level; however, based on the measured groundwater levels, dewatering activities are not required for the proposed development and therefore there will be no impacts on water quantity for water supply wells in the area. However, we recommend to undertake all construction activities during peak summer to late winter to avoid any potential short-term dewatering. Moreover, it is assumed that all the properties surrounding the Site have access to municipal water supply. As such, no impacts are anticipated on the local groundwater users.

9.3 Considerations on Drinking Water Vulnerability

Based on the MECP Source Protection Information Atlas, the Site is situated within a HVA and therefore potential contaminants discharged from the Site could ultimately end up in the municipal drinking water supply. However, based on the nature of the proposed development,

there is a low likelihood of run-off from the Site containing contaminants at concentrations that could pose a risk to the municipal water intake.

Best Management Practices (BMPs) should be implemented so as to avoid the overland flow of any contaminants from the Site to the natural environment. Section 8.0 of this report has additional details on the issue of source water protection.

10.0 Conclusions and Recommendations

Cambium Inc. (Cambium) was retained by 1000239074 Ontario Inc. (the Client) to complete a hydrogeological assessment of the property located at 1255 Fuller Avenue, Penetanguishene, Ontario.

The Site is not within a regulated area as per the Severn Sound SPA and therefore, development restrictions do not apply to the proposed development. There are no mapped wetlands or watercourses at the Site; the majority of the Site is mapped as a woodland.

Spring seasonal water level monitoring (from March to June of 2023) was completed to capture the seasonal high water table conditions across the Site. The measured groundwater levels in the monitoring wells during the spring monitoring event ranged in depth from 2.56 mbgs to 6.02 mbgs, while the elevations were between 226.77 masl to 230.67 masl. Therefore, the spring high water level and elevation were 2.56 mbgs and 230.67 masl, respectively.

Groundwater flow was found to be to the southeast towards St. Andrews Lake and ultimately into the Lake Huron.

The calculated hydraulic conductivities based off the established relationship with percolation rate ranged between 2.01×10^{-7} m/sec and 6.17×10^{-6} m/sec.

No major short-term construction dewatering, or installation of long-term sub-drain drainage, is anticipated at the Site based on the groundwater levels measured. Except the water levels measured in April and May near the SWM pond area, the rest of the Site has deeper water table conditions and therefore, it is not anticipated that excavations will intercept the water table at the Site.

The conceptual water balance indicates that there will be an infiltration deficit upon development of the Site in the order of about 10,080 m^3/year. It is Cambium's opinion that the infiltration deficit can be accommodated for the proposed post-development plan if roof runoff is directed into a suite of LID measures (i.e. infiltration trench/gallery, roof downspout disconnection, etc.).

The LID measures can easily be implemented due to the fact that the deep water table conditions (> 5 mbgs) were encountered at most of the proposed development area.

The Site is situated with a HVA and therefore, any contaminants discharged from the Site may ultimately end up in the municipal drinking water supply. However, based on the nature of the proposed development, there is a low likelihood of run-off from the Site containing contaminants at concentrations that could pose a significant risk to the municipal water intake. Best Management Practices (BMPs) should be implemented so as to avoid the overland flow of any contaminants to the natural environment.

11.0 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.

Respectfully submitted,

Cambium Inc.

Nicole Heikoop, M.Sc., GIT	Sudhakar Kurli, M.Sc., P.Geo.
Project Coordinator	Project Manager/Hydrogeologist

NH/sk

P:\16500 to 16599\16599-001 1000239074 Ont Inc - Angelo Lavinio - GEO & HydroG - 1255 Fuller Ave, Penetanguishene\Deliverables\REPORT - HydroG\Final\2023-08-15 RPT - HydroG - 1255 Fuller Ave.docx

12.0 References

Cambium. (2023). *Geotechnical Investigation Report - 1255 Fuller Avenue, Penetanguishene, Ontario.* Cambium Inc.

Chapman, L.J. and D.F. Putnam. (1984). *The Physiography of Southern Ontario: Ontario Geological Survey, Special Volume 2.*

MOE. (2003). *Stormwater Management Planning and Design Manual.* Ministry of the Environment.

OGS. (2007). *Paleozoic Geology of Southern Ontario.* Ontario Geological Survey, Miscellaneous Release - Data 219.

OGS. (2010). *Surficial geology of Southern Ontario; Miscellaneous Release - Data 128 - Revised.* Ontario Geological Survey.

OMMAH. (1997). *Supplementary Guidelines to the Ontario Building Code - SG-6 Percolation Time and Soil Descriptions.* Toronto, Ontario: Ontario Ministry of Municipal Affairs and Housing.

SBSLS SPR. (2021). *Approved South Georgian Bay Lake Simcoe Source Protection Plan.* South Georgian Bay Lake Simcoe Source Protection Region.

13.0 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.

Reliance on Materials and Information

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.

Facts, conditions, information and circumstances may vary with time and locations and Cambium's work is based on a review of such matters as they existed at the particular time and location indicated in its reports. No assurance is made by Cambium that the facts, conditions, information, circumstances or any underlying assumptions made by Cambium in connection with the work performed will not change after the work is completed and a report is submitted. If any such changes occur or additional information is obtained, Cambium should be advised and requested to consider if the changes or additional information affect its findings or results.

When preparing reports, Cambium considers applicable legislation, regulations, governmental guidelines and policies to the extent they are within its knowledge, but Cambium is not qualified to advise with respect to legal matters. The presentation of information regarding applicable legislation, regulations, governmental guidelines and policies is for information only and is not intended to and should not be interpreted as constituting a legal opinion concerning the work completed or conditions outlined in a report. All legal matters should be reviewed and considered by an appropriately qualified legal practitioner.

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.

Only conditions at the site and locations chosen for study by the client are evaluated; no adjacent or other properties are evaluated unless specifically requested by the client. Any physical or other aspects of the site chosen for study by the client, or any other matter not specifically addressed in a report prepared by Cambium, are beyond the scope of the work performed by Cambium and such matters have not been investigated or addressed.

Reliance

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

Potential liability to the client arising out of the report is limited to the amount of Cambium's professional liability insurance coverage. Cambium shall only be liable for direct damages to the extent caused by Cambium's negligence and/or breach of contract. Cambium shall not be liable for consequential damages.

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

1000239074 ONTARIO INC
1255 Fuller Avenue,
Penetanguishene, Ontario

LEGEND

- Highway
- Major Road
- Minor Road
- Watercourse
- Water Area
- Provincial Park
- Wooded Area
- Built Up Area

Notes:
- Site plan overlay created by Morgan Planning & Development. Created by A.M on August 25,2022.
- 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

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

REGIONAL SITE LOCATION MAP

Project No.: 16599-001		Date: January 2023	Rev.:
Scale: 1:100,000		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: SK	Figure: 1	

O:\GIS\MXDs\16500-16599\16599-001 1000239074 Ont Inc - Angelo Lavino - GEO & HydroG - 1255 Fuller Ave, Penetanguishene\2022-12-21 FIG 1- Regional Site Location Map.mxd

HYDROGEOLOGICAL ASSESSMENT

1000239074 ONTARIO INC
1255 Fuller Avenue,
Penetanguishene, Ontario

LEGEND

Site (approximate)

Notes:
- Site plan overlay created by Innovative Planning Solutions, File no. 23-1314, dated August 1, 2023.
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SITE PLAN

Project No.: 16599-001		Date: January 2023 Rev.: August 2023	
Scale: 1:1,750		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: SK	Figure:	2

O:\GIS\MXDs\16500-16599\16599-001 1000239074 Ont Inc - Angelo Lavino - GEO & HydroG - 1255 Fuller Ave, Penetanguishene\2022-12-21 FIG 2- Site Plan.mxd

HYDROGEOLOGICAL ASSESSMENT

1000239074 ONTARIO INC
1255 Fuller Avenue,
Penetanguishene, Ontario

LEGEND

- Water Well Records
- Study Area (500m)
- Site (approximate)

Notes:
- Site plan overlay created by Morgan Planning & Development. Created by A.M on August 25,2022.
- 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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MECP WELL RECORDS WITHIN 500m

Project No.: 16599-001		Date: December 2022	Rev.:
Scale: 1:7,000		Projection: NAD 1983 UTM Zone 17N	
Created by: PAS	Checked by: SK	Figure: 3	

O:\GIS\MXDs\16500-16599\16599-001 1000239074 Ont Inc - Angelo Lavino - GEO & HydroG - 1255 Fuller Ave, Penetanguishene\2022-12-21 FIG 3- MECP Well Record Map.mxd

HYDROGEOLOGICAL ASSESSMENT

1000239074 ONTARIO INC
1255 Fuller Avenue,
Penetanguishene, Ontario

LEGEND

- Borehole
- Monitoring Well
- Site (approximate)

Notes:
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BOREHOLE LOCATION PLAN

Project No.:	16599-001	Date:	January 2023
		Rev.:	August 2023
Scale:	1:1,750	Projection:	NAD 1983 UTM Zone 17N
Created by:	DBB	Checked by:	SK
Figure:	4		

O:\GIS\MXDs\16500-16599\16599-001 1000239074 Ont Inc - Angelo Lavino - GEO & HydroG - 1255 Fuller Ave, Penetanguishene\2022-12-21 FIG 4- Borehole Location Plan.mxd

HYDROGEOLOGICAL ASSESSMENT

1000239074 ONTARIO INC
1255 Fuller Avenue,
Penetanguishene, Ontario

LEGEND

- Borehole
- Monitoring Well
- Groundwater Contour (0.5m intervals)
- Site (approximate)
- Groundwater Flow Direction
- (229.97) Groundwater Elevation (masl) (April 17, 2022)

Notes:
- Site plan overlay obtained from Innovative Planning Solutions, File 23-1314, Dated August 1, 2023.
- 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.: 16599-001		Date: August 2023	Rev.:
Scale: 1:1,500		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: SK	Figure: 5	

O:\GIS\MXDs\16500-16599\16599-001 1000239074 Ont Inc - Angelo Lavinto - GEO & HydroG - 1255 Fuller Ave, Penetanguishene\2023-08-15 FIG 5 - Groundwater Configuration Map.mxd

	Area (m^2)
Roofed	130
Paved	120
Landscaped	38,305
Total	38,555

HYDROGEOLOGICAL ASSESSMENT

1000239074 ONTARIO INC
1255 Fuller Avenue,
Penetanguishene, Ontario

LEGEND

- Roofed
- Paved
- Landscaped
- Site (approximate)

Notes:
- Site plan overlay created by Morgan Planning & Development. Created by A.M on August 25,2022.
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PRE-DEVELOPMENT PLAN

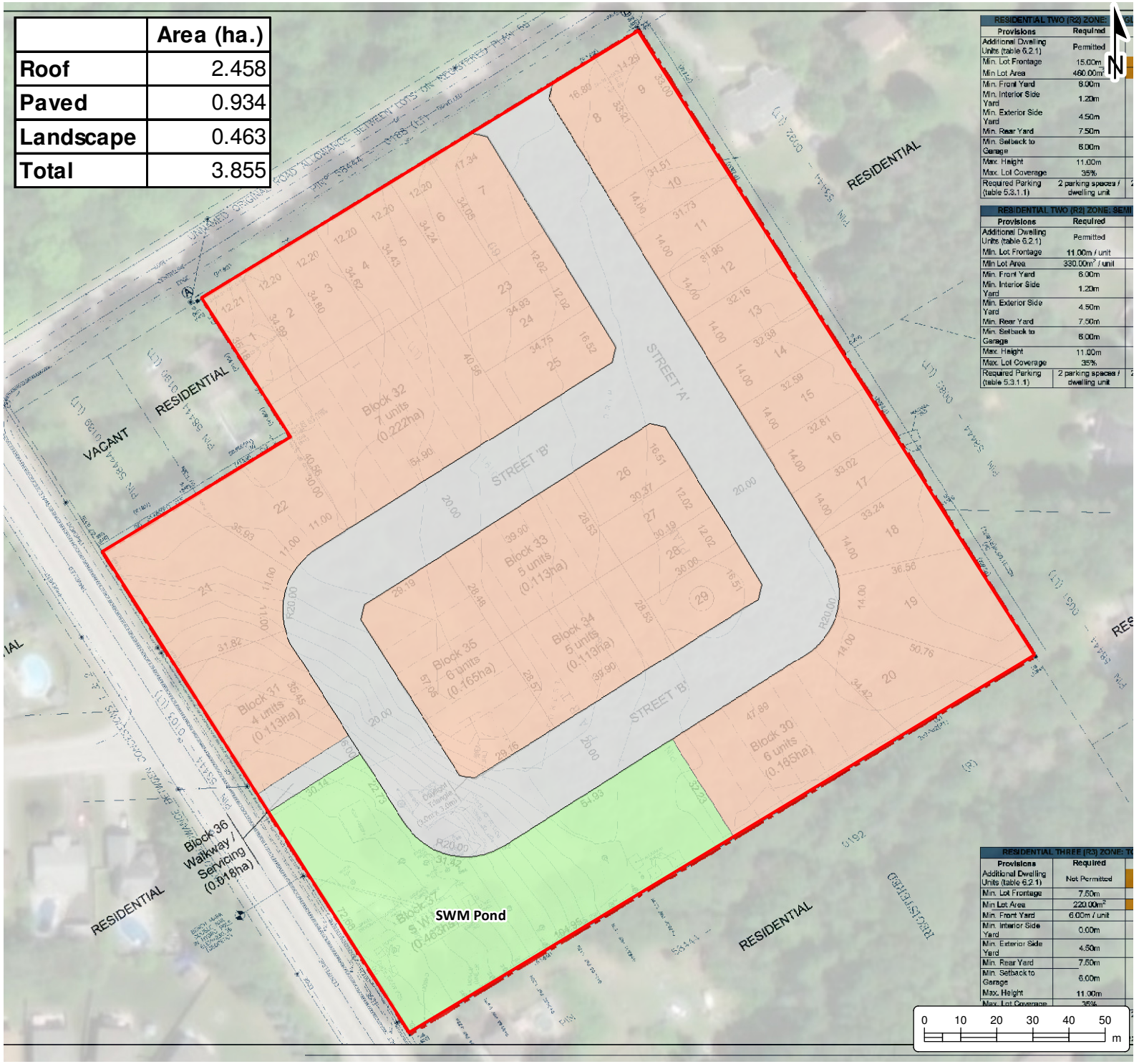
Project No.: 16599-001		Date: January 2023 Rev.:	
Scale: 1:1,750		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: SK	Figure:	6

O:\GIS\MXDs\16500-16599\16599-001 1000239074 Ont Inc - Angelo Lavino - GEO & HydroG - 1255 Fuller Ave, Penetanguishene\2022-12-21 FIG 6 - Pre-Development Plan\mxd

HYDROGEOLOGICAL ASSESSMENT

1000239074 ONTARIO INC
1255 Fuller Avenue,
Penetanguishene, Ontario

	Area (ha.)
Roof	2.458
Paved	0.934
Landscape	0.463
Total	3.855



LEGEND

- Roof Area
- Paved Area
- Landscape Area
- Site (approximate)

Notes:
- Site plan overlay obtained from Innovative Planning Solutions, File 23-1314, Dated August 1, 2023.
- 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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POST- DEVELOPMENT PLAN

Project No.:	16599-001	Date: / Rev.:	January 2023 / August 2023
Scale:	1:1,500	Projection:	NAD 1983 UTM Zone 17N
Created by:	DBB	Checked by:	SK
Figure:	7		

O:\GIS\MXDs\16500-16599\16599-001 1000239074 Ont Inc - Angelo Lavinio - GEO & HydroG - 1255 Fuller Ave, Penetanguishene\2022-12-21 FIG 7 - Post-Development Plan\mxd

Appendix A

Proposed Development Plan and Land Information

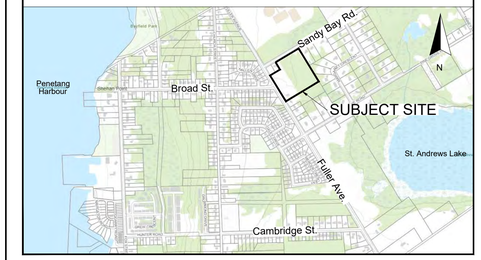
RESIDENTIAL TWO (R2) ZONE: SINGLE DETACHED		
Provisions	**Required**	**Provided**
Additional Dwelling Units (table 6.2.1)	Permitted	Permitted
Min. Lot Frontage	15.00m	12.02m
Min Lot Area	460.00m^2	351.59m^2
Min. Front Yard	6.00m	> = 6.00m
Min. Interior Side Yard	1.20m	> = 1.20m
Min. Exterior Side Yard	4.50m	> = 4.50m
Min. Rear Yard	7.50m	> = 7.50m
Min. Setback to Garage	6.00m	> = 6.00m
Max. Height	11.00m	< = 11.00m
Max. Lot Coverage	35%	> = 35%
Required Parking (table 5.3.1.1)	2 parking spaces / dwelling unit	2 parking spaces / dwelling unit

RESIDENTIAL TWO (R2) ZONE: SEMI - DETACHED		
Provisions	**Required**	**Provided**
Additional Dwelling Units (table 6.2.1)	Permitted	Permitted
Min. Lot Frontage	11.00m / unit	11.00m
Min Lot Area	330.00m^2 / unit	378.80m^2
Min. Front Yard	6.00m	> = 6.00m
Min. Interior Side Yard	1.20m	> = 1.20m
Min. Exterior Side Yard	4.50m	> = 4.50m
Min. Rear Yard	7.50m	> = 7.50m
Min. Setback to Garage	6.00m	> = 6.00m
Max. Height	11.00m	< = 11.00m
Max. Lot Coverage	35%	> = 35%
Required Parking (table 5.3.1.1)	2 parking spaces / dwelling unit	2 parking spaces / dwelling unit

RESIDENTIAL THREE (R3) ZONE: TOWNHOSUE		
Provisions	**Required**	**Provided**
Additional Dwelling Units (table 6.2.1)	Not Permitted	Permitted
Min. Lot Frontage	7.50m	7.50m
Min Lot Area	220.00m^2	213.97m^2
Min. Front Yard	6.00m / unit	> = 6.00m
Min. Interior Side Yard	0.00m	0.00m
Min. Exterior Side Yard	4.50m	> = 4.50m
Min. Rear Yard	7.50m	> = 7.50m
Min. Setback to Garage	6.00m	> = 6.00m
Max. Height	11.00m	< = 11.00m
Max. Lot Coverage	35%	> = 35%
Required Parking (table 5.3.1.1)	2 parking spaces / dwelling unit	2 parking spaces / dwelling unit

Town of Penetanguishene Zoning By-Law No. 2022-17, June 8, 2022

KEY MAP n.t.s.



DRAFT PLAN OF SUBDIVISION

Topographic Plan of Survey
of Part of Lot B1, Registered Plan No. 69
(Geographic Township of Tay)
Town of Penetanguishene,
County of Simcoe

Scale
0 10 20 30 40 50m

LEGEND

SUBJECT LANDS (38,555.09m^2 / 3.855ha)

OWNER'S CERTIFICATE
I HEREBY AUTHORIZE INNOVATIVE PLANNING SOLUTIONS TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

DATE YORK CAPITAL PROPERTIES INC.

SURVEYOR'S CERTIFICATE
I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE J. EVEN, O.L.S.

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a) SHOWN ON PLAN
b) SHOWN ON PLAN
c) SEE KEY PLAN
d) RESIDENTIAL
e) SHOWN ON PLAN
f) SHOWN ON PLAN
g) SHOWN ON PLAN
h) MUNICIPAL WATER
i) SAND, SILT GLACIAL TILL
j) SHOWN ON PLAN
k) MUNICIPAL WATER & SEWAGE
l) NONE

LAND USE STATISTICS			
LAND USE	**LOT No. / BLK. No.**	**UNITS**	**AREA (ha)**
Single - Detached Residential	1 - 20, 23 - 29	27	1.341
Semi - Detached Residential	21 - 22	4	0.226
Standard Townhouse Dwellings	30 - 35	33	0.891
Walk-way / Servicing	36		0.018
S.W.M. Pond	37		0.463
Streets 'A' & 'B'			0.916
TOTAL	**37**	**64**	**3.855**

IPS INNOVATIVE PLANNING SOLUTIONS
PLANNERS • PROJECT MANAGERS • LAND DEVELOPERS
647 WELHAM ROAD, UNIT 9, BARRIE, ON, L4N 0B7
tel: 705 • 812 • 3281 fax: 705 • 812 • 3438 e: info@ipsconsultinginc.com www.ipsconsultinginc.com

Date:	August 1, 2023	Drawn By:	A.S.
File:	23 - 1314	Checked:	J.A. / K.B.

TOPOGRAPHIC PLAN OF SURVEY

OF PART OF LOT B1, REGISTERED PLAN No. 69

(GEOGRAPHIC TOWNSHIP OF TAY)
TOWN OF PENETANGUISHENE
COUNTY OF SIMCOE

10 0 5 10 20 30 40 50 METRES

SCALE 1 : 500

J. EVEN B.SC., O.L.S., O.L.I.P
2022

TABLE OF TREES	
1	TREE 0.4ø
2	TREE 0.8ø
3	TREE CLUSTER 1.1ø
4	TREE 1.2ø
5	TREE 0.4ø
6	TREE 0.55ø
7	TREE 0.25ø
8	TREE 0.4ø
9	TREE 0.65ø
10	TREE 0.45ø
11	TREE 0.1ø
12	TREE 0.3ø
13	TREE 0.3ø
14	TREE 0.9ø
15	TREE 0.4ø
16	TREE 0.8ø
17	TREE 0.3ø
18	TREE 0.3ø
19	STUMP 0.9ø

PIN 58444 – 0188 (LT)
UNNAMED ROAD ALLOWANCE BETWEEN LOTS ON REGISTERED PLAN 69
(REGISTERED PLAN No. 69, 20.117 WIDE)
KNOWN AS SANDY BAY ROAD

LOT A1

REGISTERED PLAN 69

PIN 58444 – 0189 (LT)

PIN 58444 – 0190 (LT)

PIN 58444 – 0103 (LT)

PIN 58444 – 0092 (LT)

PIN 58444 – 0191 (LT)

PIN 58444 – 0192 (LT)

LOT B1

LOT 34

LOT 25

LOT 24

LOT 23

LOT 22

0.610(P1&S)

N58°30'50"E 142.308 (OBSERVATION LINE) 141.698

(A) IB (WIT) (840) CLF

(B) SIB (650)

0+44.01 CLF 0.19E

N-W ANGLE LOT B1 RP 69

459

204.906

106.000

51.035

47.871 N32°22'00"W

202.176 N58°50'35"E

45.720 N32°30'25"W

0+25.57 CLF 0.05E

2.43

3.51

0+00.53 B.P 0.02E
0+00.50 CLF 0.16W
0+00.00 SSIB (840)

0+0.29 B.P 0.16N
0+00.00 SSIB (840)

N58°32'45"E 30.438 CLF IB (840) 30.480 CLF 60.918

CLF 0.21N 0.16W

CLF 0.30N

158.069 N32°28'45"W

BUILDING MUN # 1009

SWALE

PAVEMENT

TRAVELLED

EDGE OF PAVEMENT

CENTRELINE OF TRAVELLED ROAD

MUN # 1045 BRICK ATTACHED GARAGE

ALUMINUM SHED

PORTABLE SHED

0.7

6.57

5.25

IB (1094)

DRIP LINE

FOREST

BROAD STREET

FULLER AVENUE (REGISTERED PLAN No. 69, 20.117 WIDE)

KNOWN AS ROAD ALLOWANCE BETWEEN CONCESSIONS 1 & 2

BENCH MARK
DOUBLE NAIL
IN HYDRO POLE
ELEV=230.36
(GEODETIC)

GARDEN AREA

CONCRETE PLANTER

WATER TAP

STONE PATIO

GF 231.98
ALUMINUM SIDED GARAGE

GRAVEL DRIVEWAY

CONCRETE PAD

CONCRETE PORCH

PLANTER

OIL TANK

DS 231.57
1 STOREY VINYL SIDED DWELLING
MUN # 1255

STONE OVEN

CONCRETE PAD

PLANTERS

16.98

18.15

33.21

33.82

TOP OF BANK

BOTTOM OF BANK

MOWED LINDER

ALUMINUM SHEDS

1.76

1.49

DS 229.83
VINYL SIDED BUILDING

0+13.24 PWF 0.22N
0+22.83 PWF 0.97N
0+36.63 PWF 1.35N
0+52.03 PWF 1.12N
0+63.31 PWF 1.17N
0+76.56 PWF 1.28N
0+01.71 PWF 0.73N

EDGE OF DITCH
CENTRELINE OF ASPHALT
INV. 228.13

PART 2 51R–3562

REGISTERED PLAN

DISTANCES & COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048		
FOR BEARING COMPARISON, A ROTATION OF 0°51'25" (COUNTER CLOCK WISE) WAS APPLIED TO CONVERT TO GRID BEARINGS. *DISTANCES ON THIS PLAN ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999657945* OBSERVED REFERENCE POINTS (ORPs): UTM ZONE 17, NAD 83 (CSRS) (2010). COORDINATES TO RURAL ACCURACY PER SEC. 14 (2) OF O.REG. 216/10		
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.		
POINT ID	UTM NORTHING	UTM EASTING
Ⓐ	4960680.157	585199.429
Ⓑ	4960754.456	585320.744

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

D–4271

NOTES

BEARINGS ARE UTM GRID DERIVED FROM THE LINE BETWEEN POINTS Ⓐ & Ⓑ, BEING THE SOUTHERLY LIMIT OF SANDY BAY ROAD, HAVING A UTM GRID BEARING OF N58°30'50"E. UTM ZONE 17, NAD 83 (CSRS) (2010)

(P1) – REFERS TO UNDEPOSITED PLAN BY C. T. STRONGMAN SURVEYING LTD. DATED AUGUST 15, 2022 (DWG No. D–4270)

ALL DIMENSIONS ARE (P&M), UNLESS OTHERWISE NOTED

(650) – DENOTES C. P. O'DALE OLS
(840) – DENOTES J. M. HARVEY OLS
(1094) – DENOTES J. W. NICHOLSON OLS

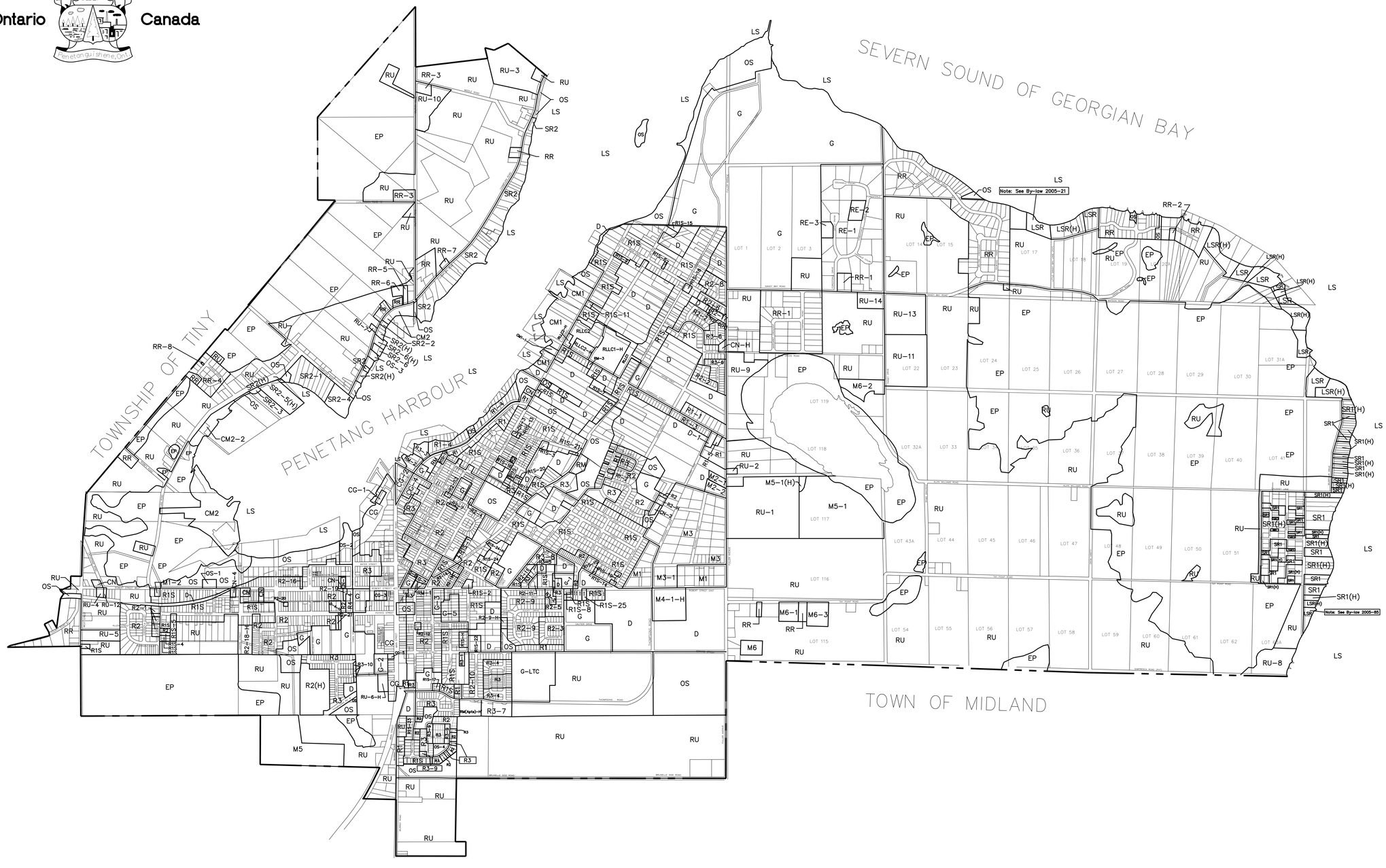
ALL ELEVATIONS ARE GEODETIC REFERRED TO GPS OBSERVATIONS USING THE REAL TIME NETWORK (RTN), GPS VERTICAL DATUM HTv2 (HEIGHT TRANSFORMATION VERSION 2.0).

LEGEND

SIB –DENOTES STANDARD IRON BAR
SSIB –DENOTES SHORT STANDARD IRON BAR
IB –DENOTES IRON BAR
(WIT) –DENOTES WITNESS
(M) –DENOTES MEASURED
■ –DENOTES MONUMENT FOUND
⊙ –DENOTES HYDRO POLE
—H— –DENOTES HYDRO LINE
~~~ –DENOTES FOREST DRIP LINE
–DENOTES FIRE HYDRANT
Ⓦ –DENOTES CONCRETE WELL
WV –DENOTES WATER VALVE

INV. –DENOTES INVERT
⟹ –DENOTES EXISTING CULVERT 0.40ø
Ⓜ –DENOTES MANHOLE
DS –DENOTES DOOR SILL
GF –DENOTES GARAGE FLOOR
B.P –DENOTES BRICK POST
CLF –DENOTES CHAIN LINK FENCE
PWF –DENOTES POST & WIRE FENCE
GF –DENOTES GARAGE FLOOR

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, AND THE REGULATIONS MADE UNDER THEM.
2) THE SURVEY WAS COMPLETED ON THE 2nd DAY OF AUGUST, 2022

ORILLIA, ONTARIO
AUGUST 17, 2022

J. EVEN
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER 2195309

C.T. STRONGMAN SURVEYING LTD.
Ontario Land Surveyors
86 Coldwater St. E.
Orillia, Ontario L3V–1W7
Telephone (705) 329–0765
Fax (705) 329–0764
email: info@ctssurveys.ca
a Division of Dearden And Stanton LTD.
ORILLIA – ONTARIO

AC21 File: 12194–TOPO | D–4271

2022–08–17 12:01:57 PM

S:\CT JOBSANDCARDING\SUBDIVISIONS AND CONDOS\12194 (RICHARD –TOPO) 1255 FULLER AVE\12194–TOPO.DWG
~~~

PENETANGUISHENE

Ontario Canada



Schedule 'A' to Bylaw No. 2000-02 (as amended by By-Law 2003-14) Town of Penetanguishene

Zoning Map

LEGEND

Residential First Density	R1
Residential Second Density	R2
Residential Third Density	R3
Residential Multiple Density	RM
Residential First Density Special	R1S
Rural Residential	RR
Rural Residential Estate	RE
Shoreline Rural Residential One	SR1
Shoreline Rural Residential Two	SR2
Limited Services Rural Residential	LSR
Commercial General	CG
Commercial Neighbourhood	CN
Commercial Marine One	CM1
Commercial Marine Two	CM2
Industrial Services	M1
Storage and Light Manufacturing	M2
Yard Storage and Heavy Manufacturing	M3
Industrial Packaging	M4
Extractive Industrial	M5
Rural Industrial	M6
Rural	RU
Institutional	G
Open Space	OS
Deferred Development	D
Environmental Protection	EP
Lake Side	LS
	ZONE BOUNDARY
	TOWN BOUNDARY

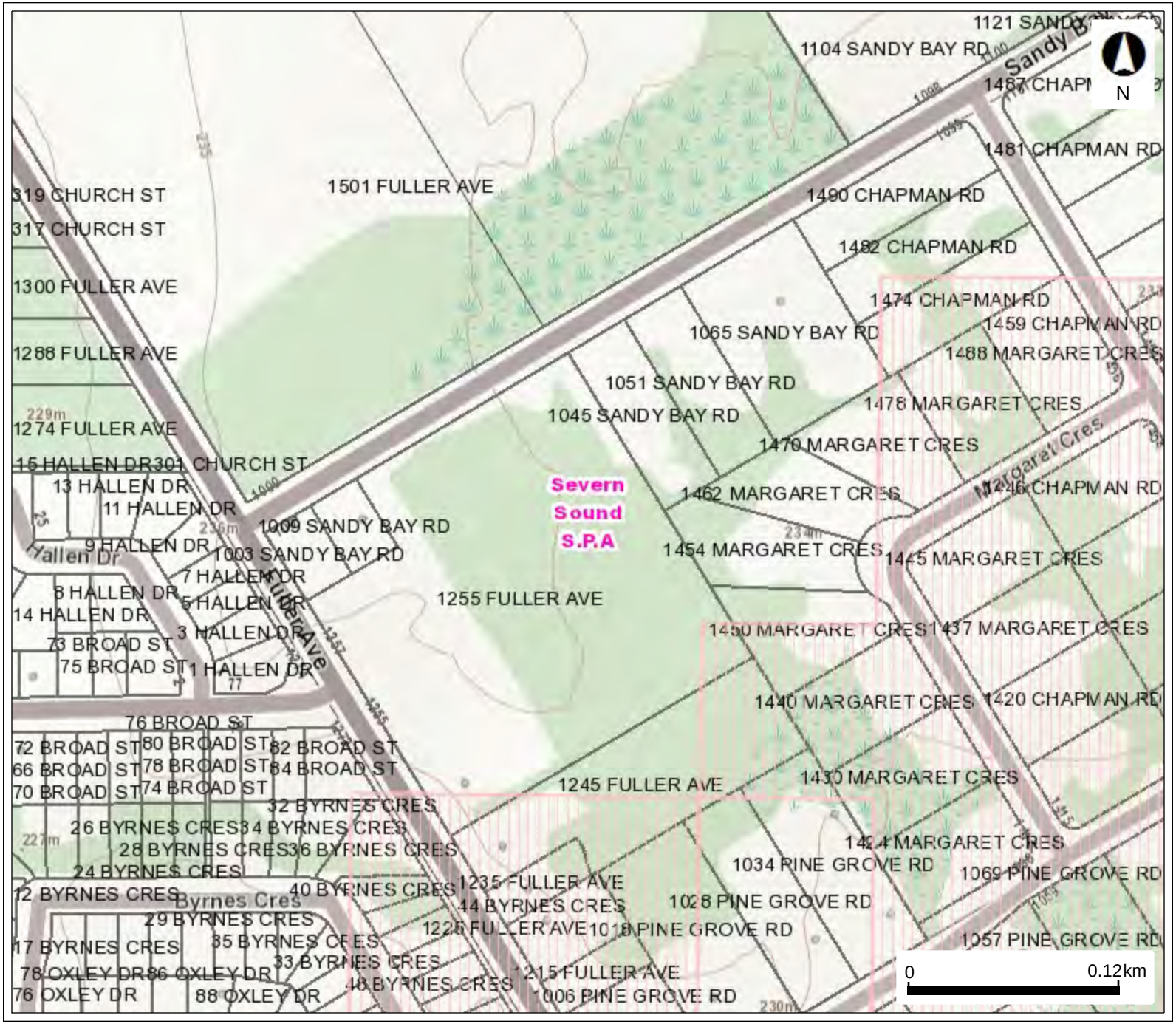
LIST OF REVISIONS

JULY 23, 2003 – MODIFICATIONS DONE BY M.LEFAIVE
DECEMBER 22, 2004 – MODIFICATIONS DONE BY M.LEFAIVE
DECEMBER 20, 2006 – MODIFICATIONS DONE BY D. WALTER
JANUARY 5, 2009 – MODIFICATIONS DONE BY M. MURRAY
MAY 13, 2011 – MODIFICATIONS DONE BY M. MURRAY
JANUARY 9, 2012 – MODIFICATIONS DONE BY G. DEVILLERS

200 100 0 200 400 600 800 1000

1 = 7500

SPIA Map



Legend

- Source Protection Areas
- 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: 1/10/2023
Map Center: 44.79428 N, -79.92115 W

Ontario

Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

Natural Heritage Map

Map created:1/10/2023

Notes:

Enter map notes

Legend

- Assessment Parcel
- ANSI
- Earth Science Provincially Significant/sciences de la terre d'importance provinciale
- Earth Science Regionally Significant/sciences de la terre d'importance régionale
- Life Science Provincially Significant/sciences de la vie d'importance provinciale
- Life Science Regionally Significant/sciences de la vie d'importance régionale
- Evaluated Wetland
- Provincially Significant/considérée d'importance provinciale
- Non-Provincially Significant/non considérée d'importance provinciale
- Unevaluated Wetland
- Woodland

0.2 0 0.08 0.2 Kilometres

Absence of a feature in the map does not mean they do not exist in this area.

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 Natural Resources and Forestry(OMNRF) shall not be liable in any way for the use of, or reliance upon, this map or any information on this map.

Appendix B
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: 5703915
Construction Date: 1965-11-23
Easting: 585478
Northing: 4960814
UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth: 53.6
Well Diameter (cm): 15.2
Water First Found: 51.8
Static Level: 41
Water Kind FRESH
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 45
Recommended Pump Rate: 45
Pumping Duration (h:m): 3 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	CLAY	0.30	12.2
3	MEDIUM SAND	12.2	24.4
4	FINE SAND	24.4	51.8
5	COARSE SAND	51.8	53.6

Well ID: 5703916
Construction Date: 1965-11-23
Easting: 585274
Northing: 4960588
UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth: 53.0
Well Diameter (cm): 15.2
Water First Found: 51.5
Static Level: 40
Water Kind FRESH
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 45
Recommended Pump Rate: 45
Pumping Duration (h:m): 1 : 30

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	MEDIUM SAND	0.30	5.49
3	GRAVEL	5.49	20.7
4	MEDIUM SAND	20.7	48.2
5	COARSE SAND	48.2	51.5
6	GRAVEL	51.5	53.0

Well ID: 5703917
Construction Date: 1967-01-31
Easting: 585487
Northing: 4961024
UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth: 59.4
Well Diameter (cm): 15.2
Water First Found: 56.4
Static Level: 53
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	0.30
2	MEDIUM SAND	0.30	3.05
3	MEDIUM SAND	3.05	51.8
4	MEDIUM SAND	51.8	59.4

Well ID: 5706078
Construction Date: 1969-02-11

Easting: 585414
Northing: 4960324

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

Well Depth: 9.14
Well Diameter (cm): 12.7
Water First Found: 8.53
Static Level: 5

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

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

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.61
2	CLAY	0.61	8.53
3	MEDIUM SAND	8.53	9.14

Well ID: 5708631
Construction Date: 1972-02-14

Easting: 585389
Northing: 4960421

UTM Zone 17
Positional Accuracy: margin of error : 300 m - 1 km

Well Depth: 45.1
Well Diameter (cm): 15.2
Water First Found: 44.2
Static Level: 38

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

Pump Rate (LPM): 45
Recommended Pump Rate: 45
Pumping Duration (h:m): 2 : 30

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.61
2	GRAVEL	0.61	44.2
3	GRAVEL	44.2	45.1

Well ID: 5710051
Construction Date: 1973-08-15

Easting: 585277
Northing: 4960499

UTM Zone 17
Positional Accuracy: margin of error : 300 m - 1 km

Well Depth: 59.1
Well Diameter (cm): 12.7
Water First Found: 57.9
Static Level: 41

Water Kind Not stated
Final Status Water Supply
Primary Water Use: Domestic

Pump Rate (LPM): 114
Recommended Pump Rate: 68
Pumping Duration (h:m): 2 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	7.32
2	GRAVEL	7.32	17.1
3	SAND	17.1	40.2
4	MEDIUM SAND	40.2	42.7
5	SAND	42.7	51.2
6	MEDIUM SAND	51.2	59.1

Well ID: 5713245
Construction Date: 1976-07-08

Easting: 585524
Northing: 4960424

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

Well Depth: 61
Well Diameter (cm): 15.2
Water First Found: 50.3
Static Level: 36

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

Pump Rate (LPM): 18
Recommended Pump Rate: 18
Pumping Duration (h:m): 5 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	56.1
2	CLAY	56.1	61

Well ID: 5714447
Construction Date: 1977-08-08

Easting: 585714
Northing: 4960624

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

Well Depth: 64.3
Well Diameter (cm): 15.2
Water First Found: 62.2
Static Level: 37

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

Pump Rate (LPM): 9
Recommended Pump Rate: 18
Pumping Duration (h:m): 3 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	OVERBURDEN	0	2.44
2	HARDPAN	2.44	14.0
3	SAND	14.0	49.4
4	COARSE SAND	49.4	53.0
5	SAND	53.0	64.3

Well ID: 5716422
Construction Date: 1979-11-28

Easting: 585464
Northing: 4960424

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

Well Depth: 71.0
Well Diameter (cm): 15.2
Water First Found: 38.1
Static Level: 38

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

Pump Rate (LPM): 91
Recommended Pump Rate: 55
Pumping Duration (h:m): 3 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	11
2	SAND	11	42.7
3	MEDIUM SAND	42.7	58.2
4	SAND	58.2	59.7
5	CLAY	59.7	66.1
6	LIMESTONE	66.1	68.6
7	LIMESTONE	68.6	71.0

Well ID: 5717647
Construction Date: 1981-10-13

Easting: 585764
Northing: 4961074

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

Well Depth: 53.0
Well Diameter (cm): 15.2
Water First Found: 53.0
Static Level: 40

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

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

Layer:	Driller's Description:	Top:	Bottom:
1	OVERBURDEN	0	15.9
2	HARDPAN	15.9	29.3
3	SAND	29.3	53.0

Well ID: 5718418
Construction Date: 1983-03-16

Easting: 585664
Northing: 4960474

UTM Zone 17
Positional Accuracy: unknown UTM

Well Depth: 50.3
Well Diameter (cm): 15.2
Water First Found: 50.3
Static Level: 40

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

Pump Rate (LPM): 27
Recommended Pump Rate: 27
Pumping Duration (h:m): 1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	OVERBURDEN	0	4.27
2	SAND	4.27	12.8
3	SAND	12.8	50.3

Well ID: 5725105
Construction Date: 1989-07-18

Easting: 585318
Northing: 4960713

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

Well Depth: 64.0
Well Diameter (cm): 15.2
Water First Found: 61.9
Static Level: 43

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

Pump Rate (LPM): 455
Recommended Pump Rate: 455
Pumping Duration (h:m): 2 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	SAND	0.30	1.22
3	GRAVEL	1.22	2.44
4	GRAVEL	2.44	23.2
5	CLAY	23.2	32
6	GRAVEL	32	51.8
7	SAND	51.8	64.0

Well ID: 5727044
Construction Date: 1990-08-28

Easting: 585477
Northing: 4960446

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

Well Depth: 58.8
Well Diameter (cm): 15.2
Water First Found: 53.3
Static Level: 46

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

Pump Rate (LPM): 36
Recommended Pump Rate: 36
Pumping Duration (h:m): 1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	SAND	0.30	7.01
3	FINE SAND	7.01	26.5
4	SAND	26.5	48.5
5	SAND	48.5	58.8

Well ID: 5728101
Construction Date: 1991-06-17

Easting: 585339
Northing: 4960722

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

Well Depth: 64.0
Well Diameter (cm): 20.3
Water First Found: 61.9
Static Level: 43

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

Pump Rate (LPM): 364
Recommended Pump Rate: 318
Pumping Duration (h:m): 2 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.61
2	SAND	0.61	1.22

3	GRAVEL	1.22	32
4	CLAY	32	51.8
5	SAND	51.8	64.0

Well ID: 5737288
Construction Date: 2002-10-10
Easting: 585707
Northing: 4960744
UTM Zone 17
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth: 64.0
Well Diameter (cm): 12.7
Water First Found: 59.4
Static Level: 15
Water Kind FRESH
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 18
Recommended Pump Rate: 18
Pumping Duration (h:m): 4 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	CLAY	0	9.14
2	CLAY	9.14	33.5
3	SILT	33.5	51.8
4	SAND	51.8	64

Well ID: 5739504
Construction Date: 2005-01-21
Easting: 585662
Northing: 4960953
UTM Zone 17
Positional Accuracy: unknown UTM

Well Depth:
Well Diameter (cm):
Water First Found:
Static Level:
Water Kind
Final Status Abandoned-Ot
Primary Water Use: Not Used
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:

Well ID: 5739506
Construction Date: 2005-01-21
Easting: 585658
Northing: 4960948
UTM Zone 17
Positional Accuracy: unknown UTM

Well Depth:
Well Diameter (cm): 5.2
Water First Found:
Static Level:
Water Kind
Final Status Observation W
Primary Water Use: Not Used
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:

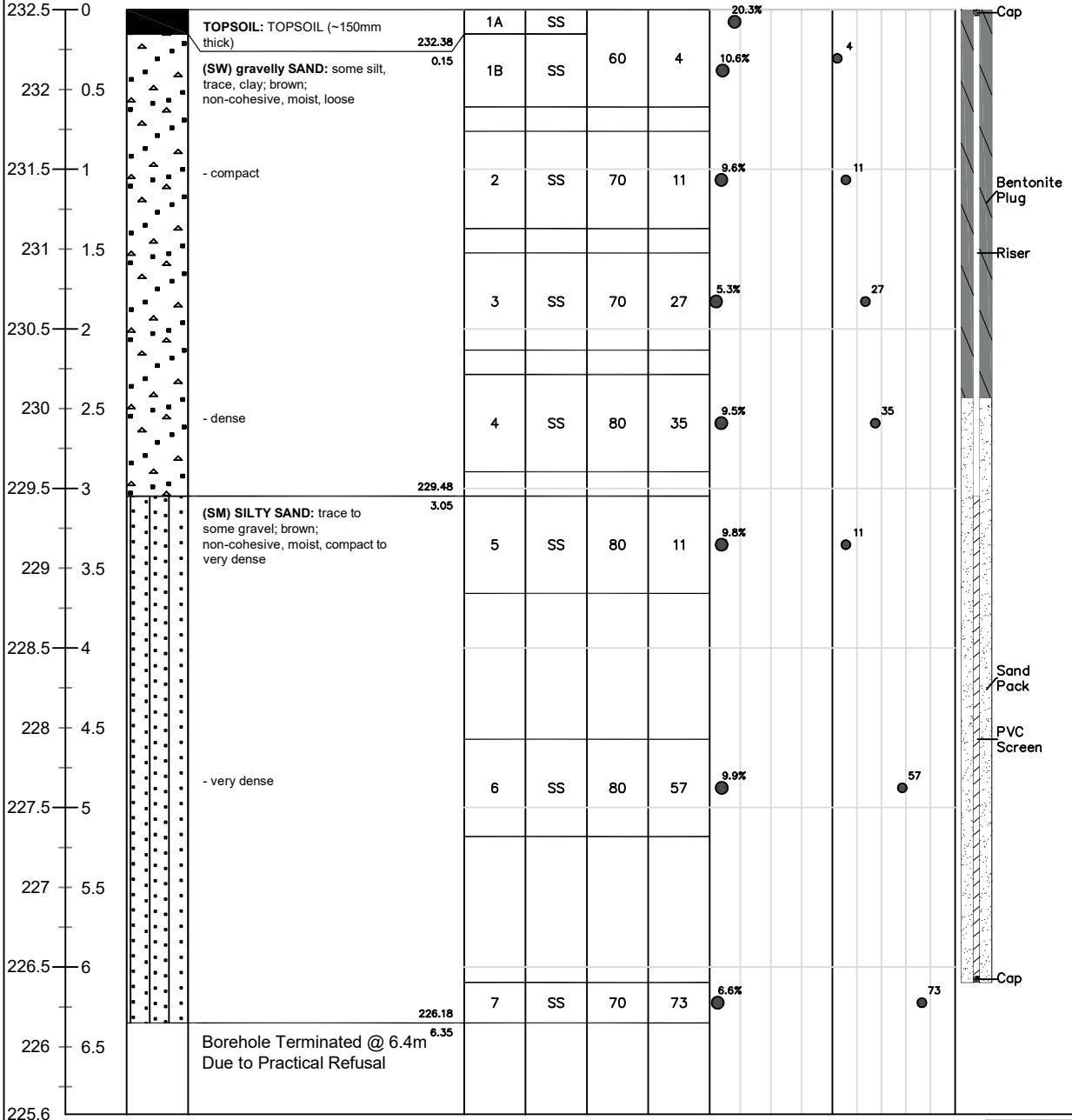
Well ID: 7196330
Construction Date: 2013-01-30
Easting: 585647
Northing: 4961114
UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 53.6
Well Diameter (cm): 15.2
Water First Found: 52.7
Static Level: 52
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	TOPSOIL	0	0.30
2	SAND	0.30	45.7
3	SAND	45.7	53.0
4	SAND	53.0	53.6

Appendix C
Borehole Logs

Client:	1000239074 Ontario Inc.	**Project Name:**	1255 Fuller Avenue, Penetanguishene, ON	**Log of Borehole:**	BH101-22
Contractor:	Walker Drilling	**Method:**	Track Mounted Hollow Stem Auger	Page:	1 of 1
Location:	1255 Fuller Avenue	**Elevation:**	232.53 mASL	**Date Completed:**	Nov 24, 2022
Project No.:	16599-001	**UTM:**	17T **N:** 4960515 **E:** 585286		



GRAINSIZE DISTRIBUTION	SAMPLE	GRAVEL	SAND	SILT	CLAY
	SS3	23	61	15	1

1m = 26 units

Logged By: WA **Input By:** WA

Peterborough, Barrie, Oshawa, Kingston, Ottawa

Client:	1000239074 Ontario Inc.	**Project Name:**	1255 Fuller Avenue, Penetanguishene, ON	**Log of Borehole:**	BH102-22
Contractor:	Walker Drilling	**Method:**	Track Mounted Hollow Stem Auger	Page:	1 of 1
Location:	1255 Fuller Avenue	**Elevation:**	233.92 mASL	**Date Completed:**	Nov 24, 2022
Project No.:	16599-001	**UTM:**	17T **N:** 4960568 **E:** 585389		

Elevation (m)	Depth	Description	Elevation / Depth	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	Shear Strength Cu, kPa (nat V. / rem V.) (20 40 60 80)	SPT (N) (20 40 60 80)	Well Installation	Log Notes
233.9	0	**TOPSOIL:** TOPSOIL (~100mm thick)	233.82 / 0.1	1A	SS			28.8%			Cap	
		(SM) SILTY SAND: trace organic matter; brown; non-cohesive, moist, loose		1B	SS	50	5	13.4%	5			
233.4	0.5		233.16 / 0.76									
		(SM) SILTY SAND: trace to some gravel, trace clay ; brown; non-cohesive, moist, compact		2	SS	80	20	9.0%	20		Bentonite Plug	
232.9	1											
232.4	1.5										Riser	
		- very dense		3	SS	80	88	8.3%		88		
231.9	2											
				4	SS	80	56	4.8%		56		
231.4	2.5											
230.9	3			5	SS	80	50	7.1%		50		
		- grey at a depth of about 3.1mbgs										
230.4	3.5											
229.9	4										Sand Pack	
229.4	4.5										PVC Screen	
				6	SS	70	89	6.8%		89		
228.9	5											
228.4	5.5											
227.9	6										Cap	
		- some gravel	227.37	7	SS	80	96	6.1%		96		No groundwater encountered during monitoring event on December 8, 2022
227.4	6.5	Borehole Terminated @ 6.6m Due to Practical Refusal	6.55									
227												

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
SS5	1	57	36	6

1m = 26 units

Logged By: WA **Input By:** WA

Peterborough, Barrie, Oshawa, Kingston, Ottawa

Client:	1000239074 Ontario Inc.	**Project Name:**	1255 Fuller Avenue, Penetanguishene, ON	**Log of Borehole:**	BH103-22
Contractor:	Walker Drilling	**Method:**	Track Mounted Hollow Stem Auger	Page:	1 of 1
Location:	1255 Fuller Avenue	**Elevation:**	236.56 mASL	**Date Completed:**	Nov 25, 2022
Project No.:	16599-001	**UTM:**	17T **N:** 4960584 **E:** 585270		

Elevation (m)	Depth	Description	Elevation / Depth	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	Shear Strength Cu, kPa (nat V. / rem V.) (20 40 60 80)	SPT (N) (20 40 60 80)	Well Installation	Log Notes
236.6	0	**TOPSOIL:** TOPSOIL (~125mm thick)	236.43 / 0.13	1A	SS			22.2%				
236.1	0.5	**(SM) SILTY SAND:** trace organic matter; brown; non-cohesive, moist, loose	235.8 / 0.76	1B	SS	50	5	8.5%	5			
235.6	1	**(SM) SILTY SAND:** trace gravel, trace clay; brown; non-cohesive, moist, dense		2	SS	60	32	5.4%		32		
235.1	1.5	- compact		3	SS	70	28	8.4%		28		
234.6	2											
234.1	2.5	- very dense		4	SS	80	88	7.9%		88		
233.6	3											
233.1	3.5			5	SS	80	82	7.5%		82		
232.6	4											
232.1	4.5											
231.6	5			6	SS	80	76	10.9%		76		
231.1	5.5											
230.6	6			7	SS	80	50	8.0%		50		Borehole noted as open and dry upon completion
230.1	6.5	Borehole Terminated @ 6.3m Due to Practical Refusal	230.26 / 6.3									
229.6												

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
SS4	3	59	34	4

1m = 26 units

Logged By: WA **Input By:** WA

Peterborough, Barrie, Oshawa, Kingston, Ottawa

Client:	1000239074 Ontario Inc.	**Project Name:**	1255 Fuller Avenue, Penetanguishene, ON	**Log of Borehole:**	BH104-22
Contractor:	Walker Drilling	**Method:**	Track Mounted Solid Stem Auger	Page:	1 of 1
Location:	1255 Fuller Avenue	**Elevation:**	235.85 mASL	**Date Completed**	November 25, 2022
Project No.:	16599-001	**UTM:**	17T **N:** 4960604 **E:** 585206		

Elevation (m)	Depth	Description	Elevation / Depth	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	Shear Strength Cu, kPa (nat V. / rem V.) (20 40 60 80)	SPT (N) (20 40 60 80)	Well Installation	Log Notes
235.8	0	**TOPSOIL:** TOPSOIL (~125mm thick)	235.72 / 0.13	1A	SS			27.4%				
235.4	0.5	**(SM) SILTY SAND:** some clay, trace organic matter; brown, moist, loose	235.09 / 0.76	1B	SS	40	4	13.4%	4			
234.8	1	**(SM) SILTY SAND:** trace gravel, trace clay; brown, non-cohesive, moist, compact		2	SS	60	17	9.7%	17			
234.4	1.5											
233.8	2			3	SS	70	29	7.9%	29			
233.4	2.5	- some gravel		4	SS	80	27	7.8%	27			
232.8	3											
232.4	3.5	- moist to wet		5	SS	80	11	11.0%	11			
231.8	4											
231.4	4.5											
230.8	5	- brown to grey		6	SS	90	15	9.7%	15			
230.4	5.5											
229.8	6											
229.4	6.5	- very dense	229.3	7	SS	90	100	8.0%		100		Borehole noted as open and dry upon completion
228.9		Borehole Terminated @ 6.6m Due to Practical Refusal	6.55									

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
SS3	3	57	34	6

1m = 26 units

Logged By: WA **Input By:** WA

Peterborough, Barrie, Oshawa, Kingston, Ottawa

Client:	1000239074 Ontario Inc.	**Project Name:**	1255 Fuller Avenue, Penetanguishene, ON	**Log of Borehole:**	BH105-22
Contractor:	Walker Drilling	**Method:**	Track Mounted Solid Stem Auger	Page:	1 of 1
Location:	1255 Fuller Avenue	**Elevation:**	236.59 mASL	**Date Completed:**	Nov 25, 2022
Project No.:	16599-001	**UTM:**	17T **N:** 4960691 **E:** 585256		

Elevation (m)	Depth	Description	Elevation / Depth	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	Shear Strength Cu, kPa (nat V. / rem V.) (20 40 60 80)	SPT (N) (20 40 60 80)	Well Installation	Log Notes
236.6	0	**TOPSOIL:** TOPSOIL (~125mm thick)	236.46 / 0.13	1A	SS			35.0%			Cap	
236.1	0.5	**(SM) SILTY SAND:** trace clay, trace organic matter; brown, non-cohesive, moist, loose	235.83 / 0.76	1B	SS	60	5	11.9%	5			
235.6	1	**(SM) SILTY SAND:** trace gravel; brown, non-cohesive, moist, dense		2	SS	80	49	5.4%		49	Bentonite Plug	
235.1	1.5	- some gravel, brown to grey, compact		3	SS	80	28	8.6%		28	Riser	
234.6	2											
234.1	2.5	- very dense		4	SS	70	56	6.4%		56		
233.6	3	- grey		5	SS	70	50	6.2%		50		
233.1	3.5											
232.6	4										Sand Pack	
232.1	4.5	- decreased gravel content		6	SS	80	58	5.3%		58	PVC Screen	
231.6	5											
231.1	5.5											
230.6	6											
230.1	6.5		230.04	7	SS	80	64	11.7%		64	Cap	No groundwater encountered during monitoring event on December 8, 2022
229.6		Borehole Terminated @ 6.6m Due to Practical Refusal	6.55									

GRAINSIZE DISTRIBUTION: SAMPLE | GRAVEL | SAND | SILT | CLAY

1m = 26 units

Logged By: WA **Input By:** WA

Client:	1000239074 Ontario Inc.	**Project Name:**	1255 Fuller Avenue, Penetanguishene, ON	**Log of Borehole:**	BH106-22
Contractor:	Walker Drilling	**Method:**	Track Mounted Solid Stem Auger	Page:	1 of 1
Location:	1255 Fuller Avenue	**Elevation:**	234.5 mASL	**Date Completed:**	Nov 25, 2022
Project No.:	16599-001	**UTM:**	17T **N:** 4960723 **E:** 585322		

Elevation (m)	Depth	Description	Elevation / Depth	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	Shear Strength Cu, kPa (nat V. / rem V.) (20 40 60 80)	SPT (N) (20 40 60 80)	Well Installation	Log Notes
234.5	0	**TOPSOIL:** TOPSOIL (~125mm thick)	234.37 / 0.13	1A	SS			30.2%				
234	0.5	**(SM) SILTY SAND:** trace clay, trace organic matter; brown, moist, loose	233.74 / 0.76	1B	SS	50	5	15.2%	5			Borehole elevation is approximate, and inferred from topographic survey due to dense tree cover within the site not allowing for accurate measurement following completion of investigations
233.5	1	**(SM) SILTY SAND:** trace clay, trace gravel; brown, non-cohesive, moist, compact		2	SS	70	28	7.9%		28		
233	1.5			3	SS	70	28	9.8%		28		
232.5	2											
232	2.5	- brown to grey		4	SS	80	19	10.4%		19		
231.5	3											
231	3.5	- decreased gravel content, grey		5	SS	90	29	12.6%		29		
230.5	4											
230	4.5											
229.5	5	- very dense		6	SS	80	83	12.6%				
229	5.5									83		
228.5	6											
228	6.5		228.1	7	SS	80	68	7.8%		68		Borehole noted as open and dry upon completion
227.5		Borehole Terminated @ 6.4m Due to Practical Refusal	6.4									

GRAINSIZE DISTRIBUTION

SAMPLE	GRAVEL	SAND	SILT	CLAY
SS4	1	43	52	4

1m = 26 units

Logged By: WA **Input By:** WA

Peterborough, Barrie, Oshawa, Kingston, Ottawa

Appendix D
Grain Size Analysis Results

Grain Size Distribution Chart

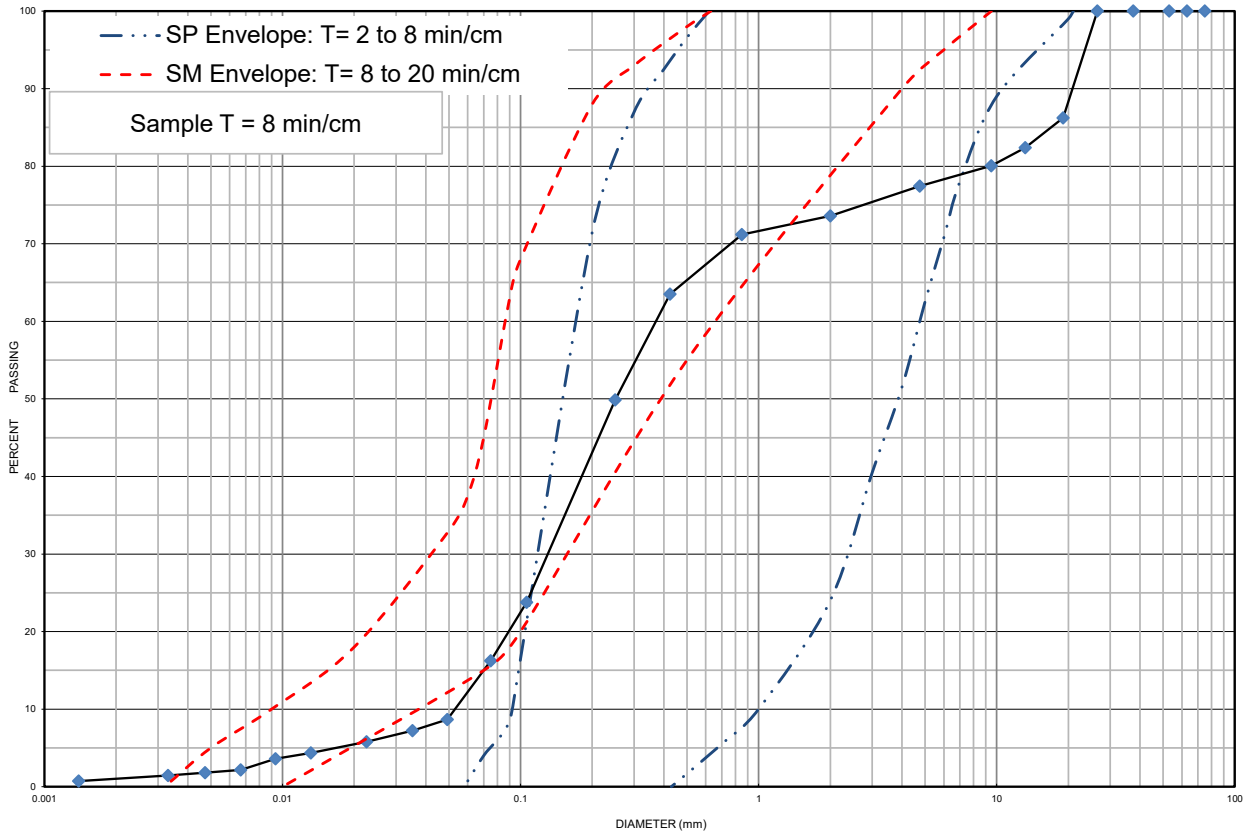
Project Number: *16599-001* **Client:** *1000239074 Ontario Inc. - Angelo Lavinio*

Project Name: *1255 Fuller Avenue Penetanguishene*

Sample Date: *November 24, 2022* **Sampled By:** *Waleed El-Taweel - Cambium Inc.*

Location: *BH 101-22 SS 3* **Depth:** *1.5 m to 2.1 m* **Lab Sample No:** *S-22-1831*

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 101-22	SS 3	1.5 m to 2.1 m	23	61	15	1	5.3

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Gravelly Sand some Silt trace Clay	SM	0.360	0.140	0.054	6.67	1.01

Additional information available upon request

Issued By: _____ *Date Issued:* *December 19, 2022*

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Grain Size Distribution Chart

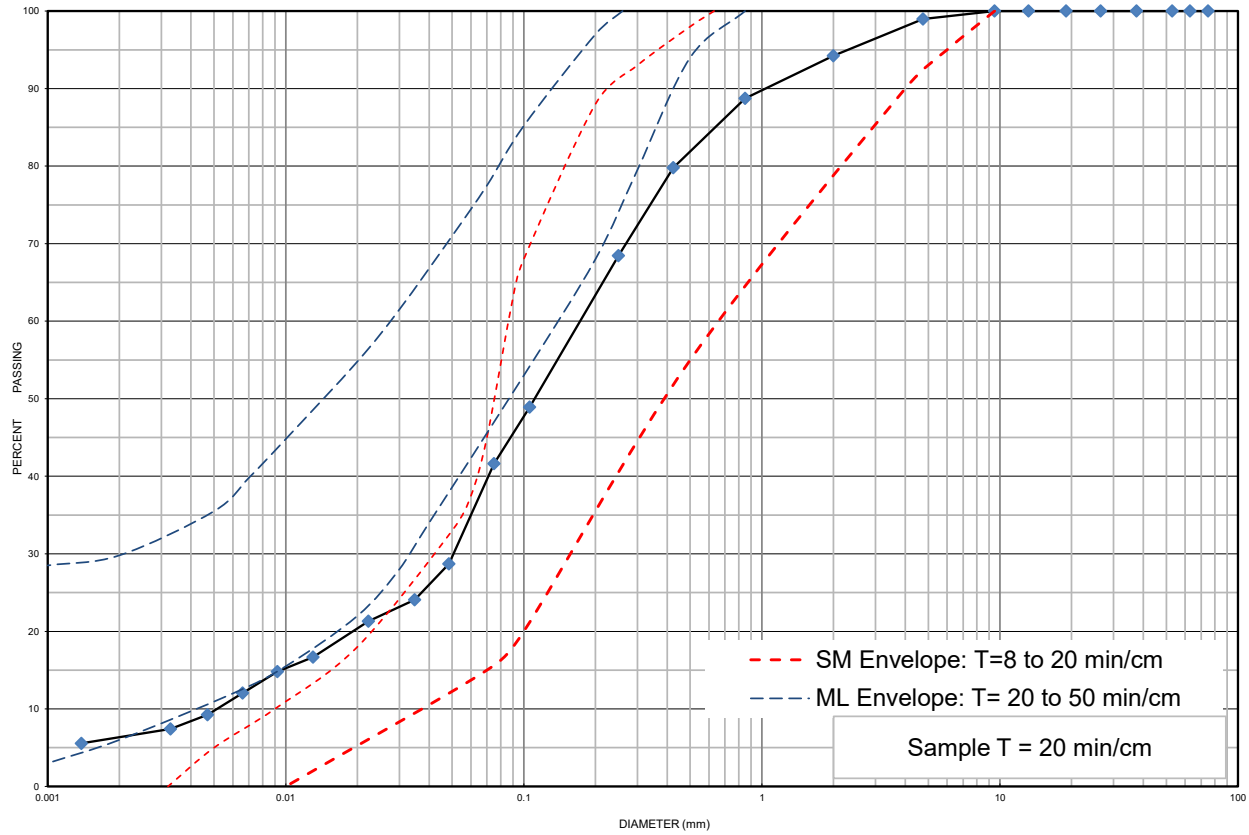
Project Number: *16599-001* **Client:** *1000239074 Ontario Inc. - Angelo Lavinio*

Project Name: *1255 Fuller Avenue Penetanguishene*

Sample Date: *November 24, 2022* **Sampled By:** *Waleed El-Taweel - Cambium Inc.*

Location: *BH 102-22 SS 5* **Depth:** *3 m to 3.7 m* **Lab Sample No:** *S-22-1832*

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 3.7 m	1	57	36	6	7.1

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sand and Silt trace Clay trace Gravel	SM	0.1750	0.0500	0.0051	34.31	2.80

Additional information availabe upon request

Issued By: _____ *Date Issued:* *January 13, 2023*

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Grain Size Distribution Chart

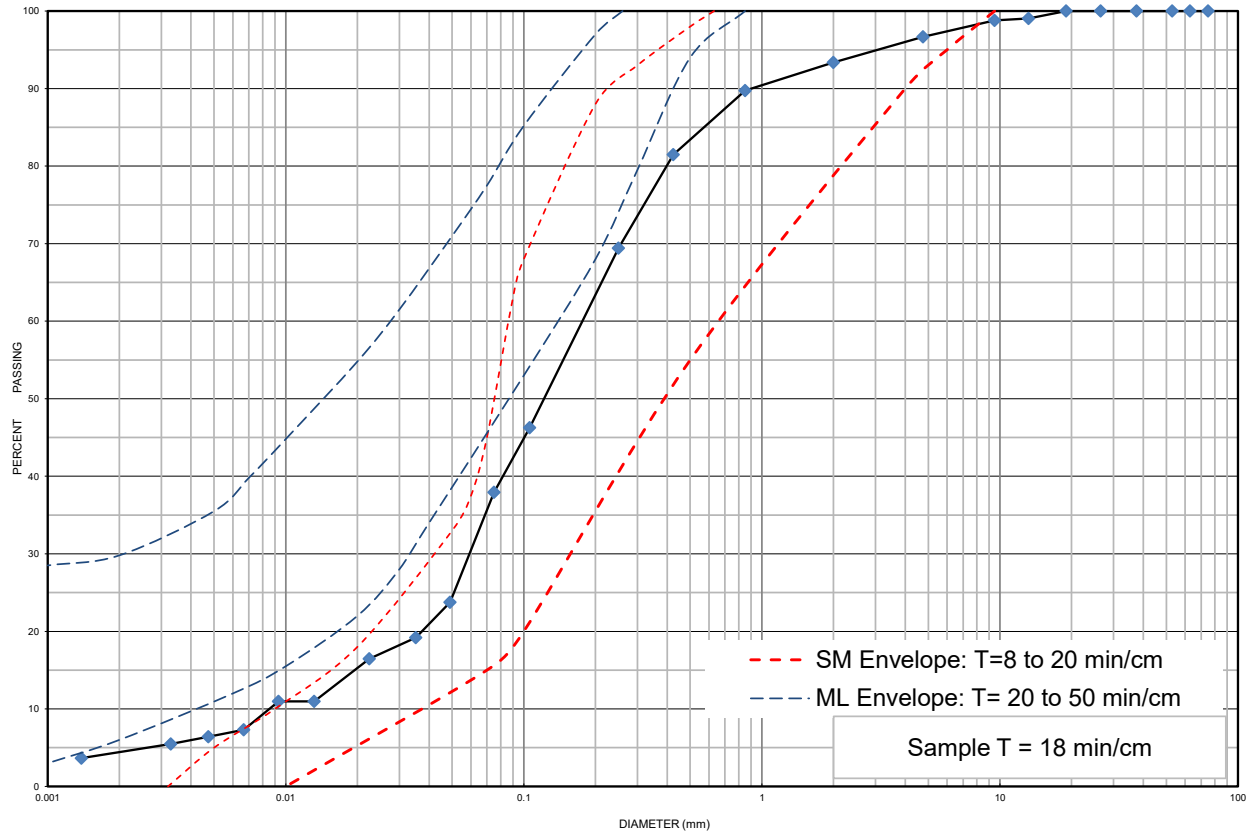
Project Number: *16599-001* **Client:** *1000239074 Ontario Inc. - Angelo Lavinio*

Project Name: *1255 Fuller Avenue Penetanguishene*

Sample Date: *November 24, 2022* **Sampled By:** *Waleed El-Taweel - Cambium Inc.*

Location: *BH 103-22 SS 4* **Depth:** *2.3 m to 2.9 m* **Lab Sample No:** *S-22-1835*

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 103-22	SS 4	2.3 m to 2.9 m	3	59	34	4	7.9

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand trace Clay trace Gravel	SM	0.1800	0.0600	0.0086	20.93	2.33

Additional information availabe upon request

Issued By: _____ *Date Issued:* *January 13, 2023*

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Grain Size Distribution Chart

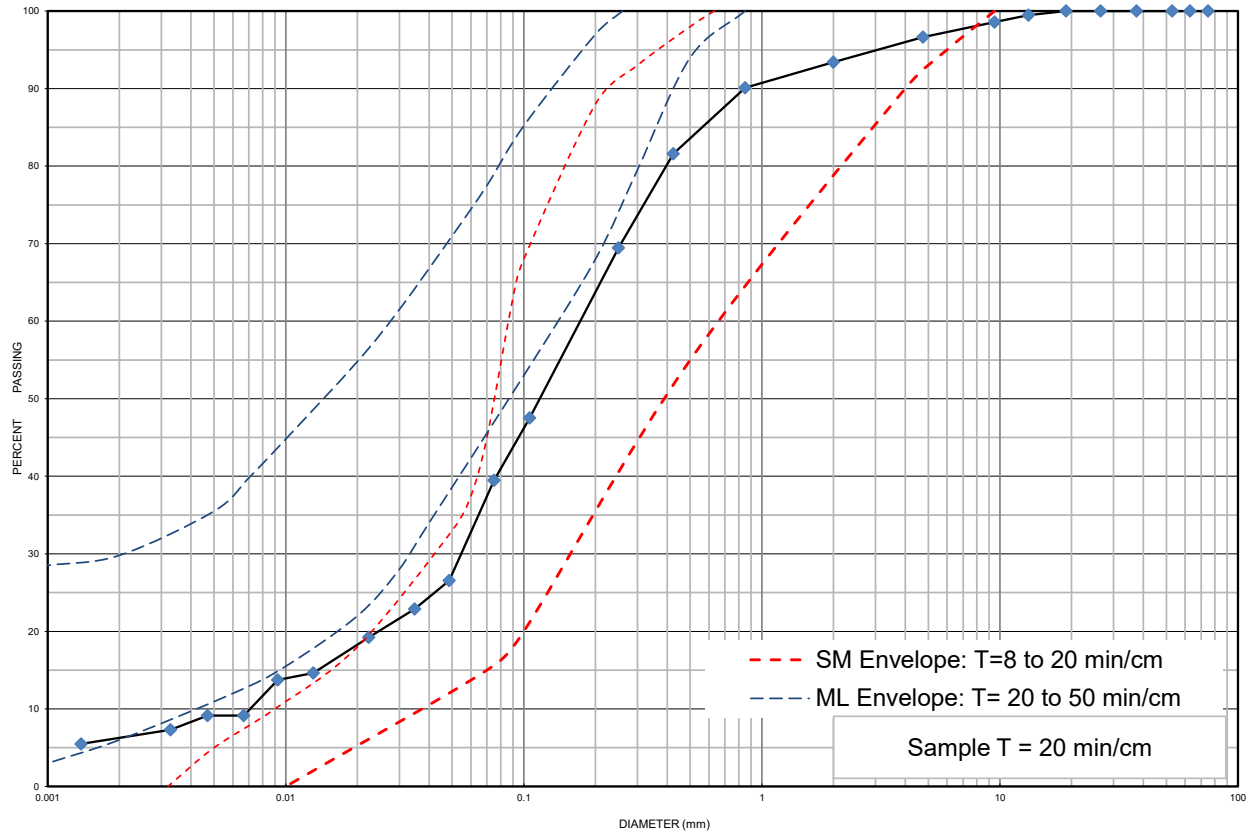
Project Number: *16599-001* **Client:** *1000239074 Ontario Inc. - Angelo Lavinio*

Project Name: *1255 Fuller Avenue Penetanguishene*

Sample Date: *November 24, 2022* **Sampled By:** *Waleed El-Taweel - Cambium Inc.*

Location: *BH 104-22 SS 3* **Depth:** *1.5 m to 2.1 m* **Lab Sample No:** *S-22-1834*

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 3	1.5 m to 2.1 m	3	57	34	6	8.1

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand trace Clay trace Gravel	SM	0.1750	0.0550	0.0070	25.00	2.47

Additional information availabe upon request

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Grain Size Distribution Chart

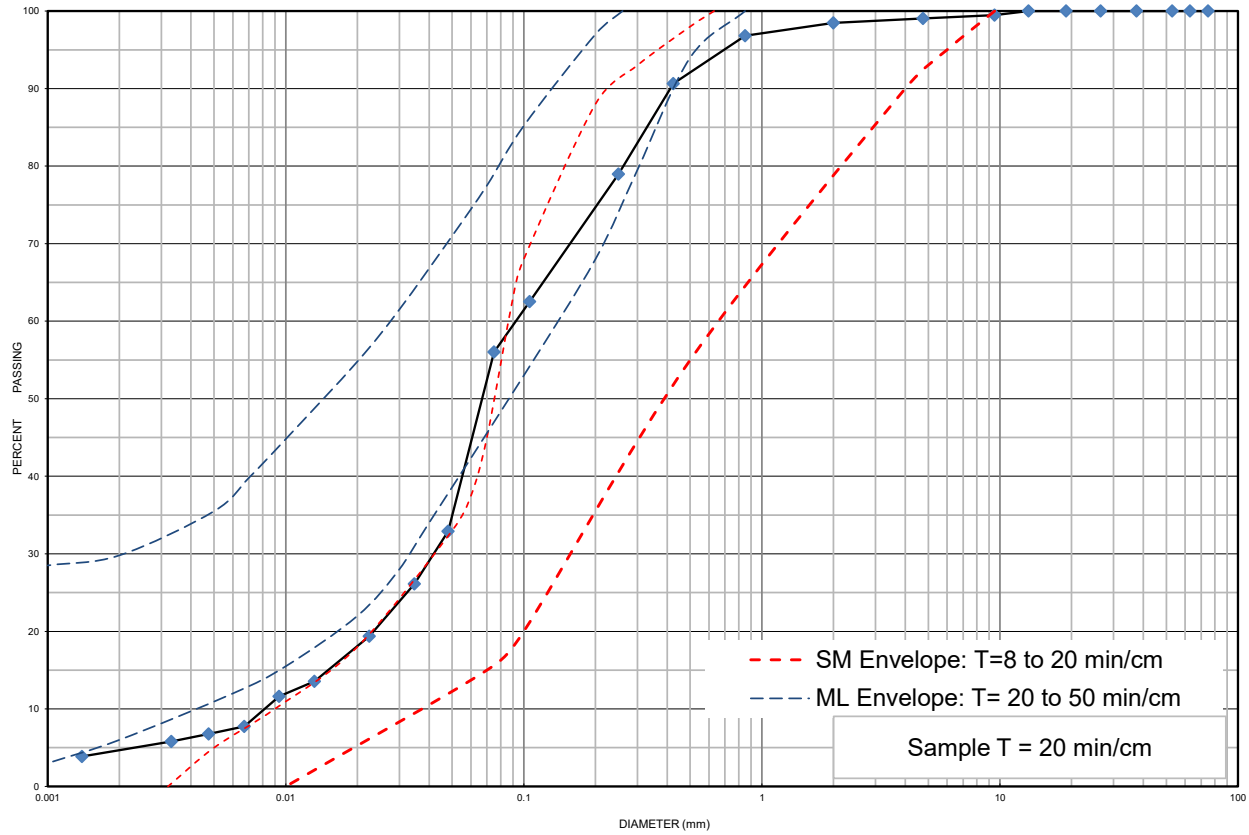
Project Number: *16599-001* **Client:** *1000239074 Ontario Inc. - Angelo Lavinio*

Project Name: *1255 Fuller Avenue Penetanguishene*

Sample Date: *November 24, 2022* **Sampled By:** *Waleed El-Taweel - Cambium Inc.*

Location: *BH 106-22 SS 4* **Depth:** *2.3 m to 2.9 m* **Lab Sample No:** *S-22-1833*

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 106-22	SS 4	2.3 m to 2.9 m	1	43	52	4	10.4

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silt and Sand trace Clay trace Gravel	ML	0.0910	0.0430	0.0082	11.10	2.48

Additional information availabe upon request

Issued By: _____ *Date Issued:* *January 13, 2023*

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Appendix E
Water Balance Calculations

Water Balance Calculations

1255 Fuller Avenue, Penetanguishene, 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	499	mm/yr
Weather Station Location:	**Penetanguishene, ON**				**Latitude:**	**44.5**	**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)*	9.1	10.3	11.8	13.3	14.6	15.3	15.0	13.8	12.3	10.8	9.4	8.7	
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)	-8.5	-6.4	-1.9	5.8	12.2	18.1	20.8	19.9	15.9	9.3	3.2	-3.1	
PRECIPITATION (P)	109.8	69.9	65.7	65.1	92.8	89.5	72.7	77.9	99.1	90.1	103.6	104.4	1041
RAIN	21.5	20.9	36.1	59.3	92.8	89.5	72.7	77.9	99.1	88.0	74.8	27.5	760
SNOW	88	49	30	6	0	0	0	0	0	2	29	77	281
MELT FACTOR (F)	0.00	0.00	0.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.53	0.00	
PACK	179	228	257	9	0	0	0	0	0	0	13	90	
MELT	0	0	0	254	9	0	0	0	0	2	15	0	281
INPUT (W)	22	21	36	314	102	90	73	78	99	90	90	28	1041
POTENTIAL ET (PET)	0	0	0	39	67	98	116	101	69	41	23	0	556
NET INPUT (ΔW)	22	21	36	274	34	-8	-43	-23	30	49	67	28	
SOIL MOISTURE (SOIL)	180	180	180	180	180	172	135	119	149	180	180	180	
ΔSOIL	0	0	0	0	0	-8	-37	-17	30	31	0	0	0
ET	0	0	0	39	67	98	109	94	69	41	23	0	542
SURPLUS=W-ET- Δ SOIL	22	21	36	274	34	0	0	0	0	17	67	28	499

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

1255 Fuller Avenue, Penetanguishene, Ontario

1 Climate Information

Precipitation	1041	mm/yr
Actual Evapotranspiration	542	mm/yr
Water Surplus	499	mm/yr

2 Infiltration Rates

Table 2 Approach - Infiltration factors		
Topography: Rolling Land	0.2	
Soil Type: Silty sand matrix with minimal gravel and clay	0.25	
Cover: Cultivated land/Woodland	0.15	
Total Infiltration Factor	**0.6**	
Infiltration (Water Surplus * Infiltration Factor)	**299**	mm/yr
Run-off (Water Surplus - Infiltration)	**200**	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 sand and silty sand		
Based on the above, the recharge rate is typically	200-250	mm/yr

3 Pre-Development Property Statistics	**ha**	**m^2**
Total Paved Area	0.01	120
Total Roof Area	0.01	130
Total Landscape Area	3.83	38,305
Total	**3.86**	**38,555**

4 Post-Development Property Statistics	**ha**	**m^2**
Total Paved Area	0.41	9,340
Total Roof Area	0.28	24,580
Total Landscape Area	0.31	4,635
Total	**1.01**	**38,555**

Pre- and Post-Development Water Balance Calculations

1255 Fuller Avenue, Penetanguishene, 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	120	125	12	-	112
	Roof Area	130	135	14	-	122
Pervious Areas	Landscape Area	38,305	39,876	20,761	11,469	7,646
	Totals	38,555	40,136	20,787	11,469	7,880

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	9,340	9,723	972	-	8,751
	Roof Area	24,580	25,588	2,559	-	23,029
Pervious Areas	Landscape Area	4,635	4,825	2,512	1,388	925
	Totals	38,555	40,136	6,043	1,388	32,705

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	40,136	20,787	11,469	7,880
Post-Development	40,136	6,043	1,388	32,705
Change in Volume	-	- 14,744	- 10,081	24,825
Change in %	-	- 71	- 88	315

8 Requirement for Infiltration of Roof Run-off

Volume of Pre-Development Infiltration (m^3/yr)	11,469
Volume of Post-Development Infiltration (m^3/yr)	1,388
Deficit from Pre to Post Development Infiltration (m^3/yr)	10,081
Percentage of Roof Runoff required to match the pre-development infiltration (%)	44