Hydrogeological Assessment - 52 Mill Street, Norwood, Ontario

January 5, 2024

Prepared for:
CAP Norwood Developments Inc.

Cambium Reference: 14288-003

CAMBIUM INC.

866.217.7900

cambium-inc.com

Peterborough | Barrie | Oshawa | Kingston

Table of Contents

List of Tables

List of Appended Figures

List of Appendices

1.0 Introduction

CAP Norwood Developments Inc. (Client) retained Cambium Inc. (Cambium) to complete a hydrogeological assessment in support of a proposed a residential development at 52 Mill Street in the town of Norwood, Ontario (Site).

It is understood that the proposed development will include mixed density residential land use with 640 residential units, a stormwater management pond, and associated infrastructure including, but not limited to, roads, sidewalks, and greenspace.

The hydrogeological assessment was required to characterize local hydrogeological conditions for reference at the detailed design stage of development. The hydrogeological assessment included a review of existing documentation, hydraulic testing of monitoring wells, groundwater sampling, a water well survey of surrounding residences, and preliminary dewatering calculations.

Cambium was also retained to complete a geotechnical investigation (Cambium, 2022a), an Environmental Impact Study (EIS) (Cambium, 2023), and a Phase I Environmental Site Assessment (ESA) (Cambium, 2022b). These reports were provided to the Client under separate covers and are referenced herein as appropriate.

1.1 Site Description

The Site is irregularly shaped, consisting of approximately 35.4 ha (87 acres) within Lot 18, Concession 9 of Asphodel Township (Figure 1). 52 Mill Street is designated as a Rural Zone (RU). The Site is bound by Mill Street and properties zoned as Residential 1 (R1) Zone and Residential 2 (R2) Zone to the southwest through southeast, Asphodel 10th Line and a property zoned as Rural Residential (RR) Zone to the northeast, and a railway line to the northwest.

The Site is currently developed for agricultural use and contains a single family dwelling, a barn, storage sheds, and a silo. The single family dwelling is provided water from a private supply well, and wastewater servicing (presumably) by an on-site treatment system.

It is understood that the proposed development will include mixed density residential land use with 640 units, a stormwater management pond, and associated infrastructure including, but not limited to, roads, sidewalks, and greenspace. Water and wastewater services are expected to be provided by the Township of Asphodel-Norwood (Township). All existing structures and dwellings (including associated water supply well and on-site wastewater treatment system) will be removed prior to development of the Site.

A proposed development concept plan is attached in Appendix A and the Site Plan in included in Figure 1.

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.
- Source Protection Area Mapping provided by the Ministry of Environment, Conservation and Parks (MECP)
- Water Well Information System provided by the MECP

2.2 Borehole Investigation

A borehole investigation and test pit investigation were conducted on April 20, 21 and 23, 24, 2022, to assess subsurface conditions at the Site. A total of seventeen (17) boreholes, designated BH101-22 through BH117-22 and twenty-four (24) test pits, designated TP118-22 through TP141-22, were advanced at the Site for geotechnical and hydrogeological purposes and are shown on Figure 1.

Drilling and sampling for the boreholes was completed using a track-mounted drill rig, under the supervision of a Cambium technician. The boreholes were advanced to their terminated depths by means of continuous flight solid stem augers with 50 mm O.D. split spoon samplers. Standard Penetration Test (SPT) N values were recorded for the sampled intervals as the number of blows required to drive a split spoon (SS) sampler 305 mm into the soil using a 63.5

kg drop hammer falling 750 mm, as per ASTM D1586 procedures. The SPT N values are used in this report to assess consistency of cohesive soils and relative density of non-cohesive materials. Soil samples were collected at 0.75 m intervals from 0 mbeg to 5.03 mbeg. Test pits were excavated to a predetermined depth of 3 mbeg using a Cambium sourced backhoe, under the supervision of a Cambium technician. Dynamic Probe Penetration Test (DPT) values were recorded for the sampled intervals as the number of blows required to drive a 19 mm diameter steel rod 150 mm into the soil with an 8 kg hammer falling 750 mm. The DPT values are used in this report to assess consistency of cohesive soils and relative density of non-cohesive materials. Borehole and test pit logs are provided in Appendix B.

The encountered soil units were logged in the field using visual and tactile methods, and samples were placed in labelled plastic bags for transport, future reference, possible laboratory testing, and storage. Open test pits were checked for groundwater and general stability prior to backfilling. All test pits were backfilled to as close to pre-existing conditions as possible.

Borehole and test pit locations were surveyed in the field using a Sokkia RTK unit. Elevations were measured in relation to the top nut of the fire hydrant located at the intersection of King Street and Mill Street. Geodetic elevation of the fire hydrant was provided by Jewel Engineering to be 206.05 meters above sea level (masl). The ground surface at the location of each borehole and test pit has been measured relative to this elevation, with an accuracy of 0.01m.

The borehole and test pit coordinates and elevations are provided in Appendix B and locations are shown on Figure 1. Site soil and groundwater conditions are described in the following sections of this report.

2.3 Physical Soil Testing

Physical laboratory testing, including eight (8) particle size distribution analyses (LS-702, 705), was completed on selected soil samples to confirm textural classification. Moisture content testing (LS-701) was completed on all retrieved soil samples. Results are presented in Appendix C and are discussed in Section 3.1.

2.4 Hydrogeological Field Tasks

On April 18, 2022, well surveys were mailed to adjacent properties requesting information on their private supply well (if one exists) on their property. Cambium did not receive any responses to the April 18 letter mailing campaign, so a follow up mailing campaign was completed on May 19, 2022. Details pertaining to the residences contacted as part of the letter mailing campaigns and responses are outlined in Section 4.3. Copies of the letter and water well questionnaire sent to property owners are included in Appendix D.

On May 4, 2022, two groundwater samples were collected from well BH105-22 and BH115-22. The groundwater samples were analysed for general organic and inorganic parameters and compared against the Provincial Water Quality Objective (PWQO) (MOE, 1994). Prior to sample collection at least three well bore volumes of water were purged from the sampled wells. The Certificates of Analysis are attached in Appendix E.

On May 5, 2022, Cambium staff visited the Site to complete Single Well Hydraulic Tests (SWHTs) on the monitoring wells. 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 F and are discussed further in Section 4.1.

On May 5, 2022 Cambium staff also located and measured the water level and depth of the existing supply well that serviced the dwelling on-site. The existing residential supply well was located north of the existing dwelling and is outlined on Figure 1. All equipment used in the private supply well investigation was decontaminated prior to usage.

3.0 Geological and Hydrogeological Setting

The topography of the Site is generally flat lying, with a general approximate elevation of 210 masl, ranging from 213 masl in the most eastern corner to 205 masl in the most western corner of the Site. Surface water is assumed to flow to the southwest, off-site through a culvert beneath the railway, and discharge into the Ouse River.

The Site is located in the Dummer Moraines region, nestled between Georgian Bay Fringe to the north, and the Peterborough Drumlin fields to the south (Chapman & Putnam, 1984). The Dummer Moraines are an area of rough stony land bordering the Canadian Shield.

According to available mapping, surficial soils at the Site are composed of coarse-grained glaciolacustrine deposits described as sand and gravel with minor silt and clay components. These sediments are interpreted as being deposited in a foreshore or basin depositional environment. The western corner of the Site has sediments described as glaciofluvial deposits composed of primarily gravel and deposited in a fluvial river environment (OGS, 2010).

Site investigations indicate that surficial soils at the Site contain more finer grained sediments than may be expected, as per the available mapping. See section 3.1.

The bedrock of the area consists of Middle Ordovician rocks of the Simcoe Group (OGS, 2007). The Site is composed of rocks composing Bobcaygeon Formation, which is described as limestone with shale partings and interbeds of varying thickness and frequency. The formation is generally 60 to 75 m thick.

3.1 Results of Subsurface Investigation

Subsurface conditions at the Site generally consist of layer of loose to compact, dark brown silt topsoil underlain by moist silty sand, which extends to a depth of 0.3 mbeg to 2.1 mbeg in locations BH101-22, BH102-22, BH105-22 to BH113-22, BH115-22 to BH117-22, TP118-22 to TP122-22, TP126-21 to TP130-22, and TP132-22 to TP141-22, and to 3.6 mbeg in TP121-22. In test pits and boreholes BH102-22, BH103-22, BH107-22, BH110-22, BH112-22, and BH117-22, loose, moist to wet, silt dominant soils were found underlying the silty sand soil, extending to depths of 1.4 mbeg to 2.9 mbeg. Moist to saturated, gravel and sand dominant

soils were found to extend from the base of the aforementioned soils to termination depth in all locations except BH107-22, TP121-22, TP137-22, and TP138-22. The gravel and sand was found to have a dense to very dense relative density. Bedrock was encountered at depths ranging from 1.5 mbgs to 4.88 mbgs in TP119-22, TP127-22, and TP134-22 to TP138-22, and all boreholes, except BH101-22 and BH103-22. For a more detailed description of the subsurface investigation, see the companion geotechnical investigation report (Cambium, 2022a).

3.1.1 Grain Size Analyses

Laboratory particle size distribution analyses were completed on eight (8) 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 Results

Borehole / Test Pit	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt	% Clay
BH102-22 SS4	2.3 – 2.7	Silt some Clay trace Sand	0	3	86	11
BH104-22 SS3	1.5 – 2.0	Sand and Silt some Clay some Gravel	10	42	35	13
BH105-22 SS3	1.5 – 2.0	Sandy Silt	0	28	72	
BH107-22 SS3	1.5 – 2.0	Sandy Silt	0	28	72	
BH109-22 SS3	1.5 – 2.0	Gravelly Sand and Silt	21	40	39	
BH111-22 SS2	0.8 – 1.2	Gravelly Silty Sand trace Clay	27	44	24	5
BH115-22 SS3	1.5 – 2.0	Gravelly Silty Sand	34	46	20	
BH117-22 SS3	1.5 – 2.0	Gravelly Sand some Silt	20	65	15	

3.2 Water Well Records

The Ministry of Environment Conservation and Parks (MECP) Water Well Information System (WWIS) was accessed to review water well records in the area of the Site. There were 32 water well records located within 500 m of the Site (Appendix G; Figure 2). The following water well record well types were identified:

- Nineteen (19) well records were for water supply wells

- Four (4) well abandonment records were for water supply wells
- Eight (8) well abandonment records were for monitoring wells or test holes
- One (1) well record was for an unfinished well

As per the MECP records, topsoil was an average thickness of 1.0 m (when observed), topsoil was generally underlain by sand with varying gravel, silt, and clay components. Several well records recorded clay dominant and/or gravel dominant units as well. A bedrock contact was reported in 21 well records and ranged in depth between 1 mbgs and 38 mbgs (average of 13.5 mbgs). Bedrock was described as interbedded limestone and shale. The maximum depth advanced was 51.8 mbgs within bedrock. Water bearing sediments were identified within overburden between 7.6 to 26.5 mbgs, average of 12.4 mbgs. Water bearing fractures were identified in bedrock between 5.8 to 51.8 mbgs, average of 18.2 mbgs.

Static water level of overburden supply wells was an average of 6.2 mbgs; static water level of bedrock supply wells was an average of 8.2 mbgs. The recommended flow rate ranged from 0.6 litres per minute (lpm) to 364 lpm, averaging 44 lpm. 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 (lpm)
Overburden Supply Well Count: 5	Min	7.9	7.6	2.0	23
	Max	12.8	12.8	10.0	23
	Avg.	11.0	10.5	6.2	23
Bedrock Supply Well Count: 15	Min	6.4	5.8	3.0	0.6
	Max	51.8	51.8	29.0	36
	Avg.	22.6	18.2	8.2	19
Monitoring Wells / Test Holes Count: 8	Min	4.6	7.6	3.0	364
	Max	27.1	26.5	23.0	364
	Avg.	10.4	12.4	13.0	364

Four water well records were plotted within the Site boundaries (5100148, 5100149, 5115821, and 7110601). These records were for wells that were installed to depths that ranged from 12.2 to 42.7 mbgs. In general, the overburden was described as sandy clay with boulders; however, one well record also described purely gravel units. The bedrock contact was found between 5.5 to 26.8 mbgs and bedrock was described as limestone or shale.

Well record 5115821 reported the deepest bedrock contact at 26.8 mbgs. This record is likely not installed within the property boundaries (or near the Site) as per the sketch provided in the record. The sketch indicates this record was installed north of Highway 7.

Well records 5100148 and 5100149 likely detail well installations on properties located adjacent the Site to the south on Mill Street (according to the provided sketches), and not within the property boundaries. The results of the well survey (and other available information) indicate that most of the residences along Mill Street are provided water by the Township. See section 4.3. As such, the wells described by records 5100148 and 5100149 may have been decommissioned, or are no longer in use.

Well record 7110601 is presumably for the on-site supply well. Cambium staff located the on-site supply well during the May 5, 2022 Site visit. The depth of the well was measured to be 43.60 mbgs and a water level 6.31 mbgs. The Universal Transverse Mercator coordinates of

the well are 263363 mE and 4919138 mN. The location of the existing well is outlined on Figure 1. No other supply wells were observed on-site by Cambium staff. Any wells not intended for use on the Site should be decommissioned according to Ontario Regulation 903.

3.3 Vulnerable and Regulated Areas

As per the MECP Source Water Protection Information Atlas (SPIA), the Site is located within the following areas:

- Highly Vulnerable Aquifer (HVA)
- Significant Groundwater Recharge Area (SGRA) with a vulnerability score of 6
- Wellhead Protection Areas B and C (WHPA-B/C)

The HVA covers the entirety of the Site, the SGRA covers the majority of the central and eastern portions of the Site, and the WHPAs B and C fall just within the western boundary of the Site. The SPIA and mapping is attached in Appendix A.

As Cambium understands, the Otonabee Region Conservation Authority (ORCA) has issued a Restricted Land Use Notice (Otonabee Region Conservation Authority, 2023) for the proposed development (as per Part IV the Clean Water Act, 2006, Section 59 (2) (a)). The Restricted Land Use Notice indicates that there is no prohibition or risk management plan required for the proposed development.

It is noted, the Restricted Land Use Notice also states the following:

This Notice does not reflect an assessment of significant drinking water threats where the Risk Management Official is not responsible for implementing the Trent Source Protection Plan policy, including sewage and stormwater related activities, low or moderate drinking water threats or Transport Pathways.

Discussions regarding the proposed stormwater management plan should be held between the Client and regulatory authorities, as required.

3.4 Hydrogeological Conditions

Findings from the geotechnical investigation indicate that overburden soils consist primarily of silty sand, underlain by silt with some sand and clay, underlain by gravel and sand dominated soils to borehole and test pit termination ranging between 1.50 and 5.03 mbgs.

An unconfined aquifer exists within the shallow overburden and is the aquifer which the monitoring wells are installed within. According to the MECP WWIS, there is assumed to be at least two bedrock aquifers present in the area of the Site. The first bedrock aquifer is generally within 25 mbgs and was the most commonly drawn upon aquifer for the bedrock water supply wells; one well record indicated a bedrock aquifer at 41.2 that is assumed that this is a separate, deeper bedrock aquifer. The connectivity of the shallow overburden aquifer and the deeper aquifer systems is not known. However, it is likely that there is some degree of hydraulic connection between the shallow overburden aquifer and the underlying bedrock aquifer.

On April 27 and May 5, 2022 water levels measured from the on-site monitoring wells ranged from 0.88 mbgs and 2.72 mbgs (this range does not include the April 20, 21, 23, and 24, results since the wells were installed on these days and as such the water levels were not representative of static conditions). Well BH104-22 was reported as dry during both monitoring events. Groundwater elevations ranged from 199.74 masl to 208.93 masl during the two measurement events. The water levels referenced herein were near their annual average high conditions, since the measurement events occurred in late April and early May.

In general, groundwater flow of the shallow overburden aquifer is southwest, where it is assumed to discharge to surface into the Ouse River, located adjacent to the Site. Groundwater flow contours are outlined on Figure 1. Groundwater levels and elevations are outlined below in Table 3.

Table 3 Groundwater Level and Elevation Information

Well		BH104-22	BH105-22	BH112-22	BH115-22
Top of Pipe Elevation (masl) (1)		210.06	203.70	210.42	212.09
Ground Surface Elevation (masl) (1)		208.93	202.46	209.28	210.83
Stick-up (m)		1.13	1.24	1.14	1.25
April 27, 2022	Water Level (mbgs) (2)	Dry	2.68	0.88	1.91
	Groundwater Elev.(masl) (1)	-	199.78	208.40	208.93
May 4, 2022	Water Level (mbgs) (2)	Dry	2.72	1.24	2.02
	Groundwater Elev.(masl) (1)	-	199.74	208.04	208.82

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

As Cambium understands, the proposed development will be provided water and wastewater servicing by the Township. Construction dewatering, and potentially operational dewatering, for the development may be required, depending on building and infrastructure depths. Preliminary dewatering estimates are provided in Section 4.3.

4.0 Assessment Results

This section presents the results of the SWHTs and groundwater quality analyses.

4.1 Single Well Hydraulic Tests

SWHTs were completed on wells BH105-22, BH112-22, and BH115-22 on May 5, 2022. The data generated from the bail tests was processed by AquiferTest Pro™ software, the results of which are summarized in Table 4.

The hydraulic conductivity results of the SWHTs ranged between 4.88 x 10^{-8} m/s and 5.95 x 10^{-6} m/s. The hydraulic conductivity of the tested soils for BH105-22, BH112-22, and BH115-22 were in agreement with those published in literature for silty sand and sandy silts (Fetter, 2001) (J.P.Powers, 2007). The borehole log of BH112-22 indicated that this well was screened across various types of soil, including silt. The variability of the soils could account for the lower hydraulic conductivity reported from this well. Hydraulic testing results are attached in Appendix F.

Table 4 SWHT Results (all results in m/s)

Test #	BH105-22	BH112-22	BH115-22
Test 1	1.61 x 10^{-6}	7.35 x 10^{-8}	5.95 x 10^{-6}
Test 2	2.79 x 10^{-6}	7.32 x 10^{-8}	2.64 x 10^{-6}
Test 3	3.00 x 10^{-6}	4.88 x 10^{-8}	3.25 x 10^{-6}
Test 4	3.50 x 10^{-6}	-	2.17 x 10^{-6}

4.2 Groundwater Quality

Groundwater samples were collected from monitoring wells BH105-22 and BH115-22 on May 4, 2022 and analyzed for general organic and inorganic parameters. The groundwater samples were collected with inertial lift footvalve and were unfiltered. The water quality results were then compared against the PWQO (MOE, 1994).

The total fraction of several metals were reported at concentrations greater than PWQO criteria. Further, the dissolved fraction of aluminum and iron were reported at concentrations greater than PWQO criteria at both wells. The concentration of dissolved phosphorus was

reported at a concentration greater than PWQO criteria only at well BH105-22. Parameter exceedances are outlined below in Table 5. Results are attached in Appendix E.

Table 5 Groundwater Quality

Parameter	Concentration – BH105-22 (mg/L)	PWQO Criteria (mg/L)
total aluminum	**9.52**	0.075
dissolved aluminum	**0.241**	0.075
total cobalt	**0.00543**	0.0009
total copper	**0.0109**	0.005 (1)
total iron	**6.89**	0.3
dissolved iron	**0.235**	0.3
total lead	**0.00883**	0.005 (2)
total nickel	**0.0093**	0.0025
total phosphorus	**0.326**	0.03 (3)
dissolved phosphorus	**0.018**	0.03 (3)
total vanadium	**0.0145**	0.006
total zinc	**0.026**	0.02
total zirconium	**0.007**	0.004
Parameter	Concentration – BH115-22 (mg/L)	PWQO Criteria (mg/L)
total aluminum	**72.4**	0.075
dissolved aluminum	**0.187**	0.075
total cobalt	**0.00164**	0.0009
total iron	**2.82**	0.3
dissolved iron	**0.177**	0.3
total nickel	**0.0030**	0.0025
total phosphorus	**0.132**	0.03 (3)

1. *Based off average regional Southern Ontario concentrations, hardness is assumed to be >20 mg/L*
2. *Based off average regional Southern Ontario concentrations, alkalinity is assumed to be >80 mg/L*
3. *PWQO criteria to avoid excessive plant growth in rivers and streams*

The total fraction of most metals reported at elevated concentrations is likely a result of suspended sediments being captured in the samples. The suspended sediments were introduced into the samples by the nature of the sampling methodology (i.e., non-filtered samples and mechanical disruption of sediments from the inertial lift footvalve). Generally,

groundwater samples are not filtered in order to simulate water quality that would be dewatered from a construction excavation. The total fraction of metals can be reduced by filtering discharge water to removed suspended sediments (if required).

Dewatering during construction activities may be required (dewatering estimates are outlined in Section 5.0). The fate of dewatering discharge water was not known at the time this document was prepared. However, the Client indicates that dewatering discharge water will likely be managed wholly within the property boundaries and allowed to re-infiltrate into the subsurface. Is this scenario dewatering discharge water will not runoff the Site and treatment of discharge water before re-infiltration is not considered necessary.

If discharge water is to be disposed to the subsurface on-site then the sensitivity of those groundwater users located hydraulically down-gradient the Site should be reviewed at a later date (but prior to dewatering activities). As per Figure 1 groundwater flow across the Site is to the southwest. The water supply of those properties located southwest have not been confirmed. However, as outlined in Section 4.3, the Township of Asphodel-Norwood indicated that municipal water is provided to all residents on Mill St. between Queen Street and 108 Mill St. It is noted that the concentrations of dissolved manganese (0.107 mg/L and 0.5963 mg/L), dissolved aluminum (0.241 mg/L and 0.187 mg/L) and nitrate (23.4 mgL and 18.9 mg/L) were reported at concentrations greater than the Ontario Drinking Water Quality Standards (ODWQS) (Ministry of Environment Conservation and Parks, 2020). Manganese and aluminum are not health related parameters and only have an aesthetic/operational limit under the ODWQS (being 0.05 mg/L and 0.1 mg/L, respectively). Only nitrate is a health related parameter, and has a maximum allowable concentration of 10 mg/L, as per the ODWQS. The parameter exceedances of the ODWQS listed above are representative of background conditions within the shallow overburden aquifer. If the shallow overburden aquifer is dewatered during construction activities (on a temporary basis), and discharge water is disposed on-site through re-infiltration efforts, then no significant degradation of groundwater quality off-site is expected to occur (because the water being re-infiltrated is from the same overburden aquifer it was drawn from). Regardless, the sensitivity of those groundwater users located hydraulically down-gradient the Site should be reviewed prior to construction. Potential

groundwater users located down-gradient the Site are those properties located at 2450 Asphodel 10th Line, 24 Mill Street, 26 Mill Street and 28 Mill Street.

4.3 Well Survey Results

A letter mailing campaign was initiated on April 18, 2022 in order to complete a water well survey of properties adjacent the Site. A total of 19 residences were contacted during the survey. Cambium did not receive any responses to the April 18 letter mailing campaign, so a follow up mailing campaign was completed on May 19, 2022. It is noted that two additional properties were included in the May 19, 2022 letter mailing campaign. The list of addresses contacted during the letter mailing campaigns is included in Appendix D. copies of the letter and water well questionnaire sent to property owners are included in Appendix D.

One landowner responded to the May 19, 2022 letter mailing campaign. Details provided by the respondent is listed below:

- 90 Mill Street – This property is serviced by town water and mentions that most, if not all, residents on Mill Street are serviced by Township water. This property does have a private septic system.

On August 17, 2022 the Client confirmed with the Township of Asphodel-Norwood that municipal water is provided to all residents on Mill St. between Queen Street and 108 Mill St.

5.0 Preliminary Dewatering Estimates

The proposed development will include 640 residential units. It is assumed that these units will have associated basements. Details regarding basements were not available at the time this document was prepared. However, as Cambium understands the Client intends on maintaining basements above the water table as much as possible. As such, dewatering estimates for basement excavations are not included herein.

The proposed development will include on-site servicing for water and sewer. Details pertaining to the construction of on-site services were not finalized at the time this document was prepared. Construction dewatering estimates for on-site servicing were based upon assumed depths and footprints of these excavations (during construction). Construction dewatering estimates for basements and on-site servicing should be reviewed/finalized at a later date, once detailed development plans are available for review.

On-site servicing was assumed to be built within trench excavations advanced at lengths not greater than 50 m, at any one time. It was assumed that the trench will be advanced to a depth of 3 mbgs for servicing, and the water level would be lowered to 3.5 mbgs to allow for safe working conditions.

The water level during construction dewatering was assumed to be 0.88 mbgs based off the shallowest groundwater reading measured on April 27, 2022 at BH112-22.

It was assumed that the trench would be advanced within overburden. The hydraulic conductivity of overburden soils was assumed to range from 4.88×10^{-8} m/s and 5.95×10^{-6} m/s (as per the SWHT results). The hydraulic conductivity rates were used to provide a range of construction dewatering estimates.

To calculate inflow into the excavation, the methods outlined in the Construction Dewatering and Groundwater Control (J.P.Powers, 2007) were utilized.

The preliminary construction dewatering rate estimates for the servicing trench excavations range from approximately 4 m³/day to 47 m³/day. Due to the preliminary nature of the

construction dewatering estimates a factor of safety was not applied to the results. Dewatering estimate calculations are included in Appendix H.

Based off the preliminary dewatering estimates for the trench excavations, and the assumptions outlined herein, the estimated daily dewatering rates for a trench excavation may be less than 50 m³/day (50,000 L/day). If actual construction dewatering rates are less than 50 m³/day then water taking permitting may not be required. If actual daily dewatering rates exceed 50,000 L/day (but remain less than 400,000 L/day) then dewatering activities are required to be registered on the Environmental Activity and Sector Registry (EASR). If actual daily dewatering rates exceed 400,000 L/day then a Category 3 Permit To Take Water (PTTW) will be required for water taking activities. Due to preliminary nature of these calculations, dewatering estimates should be reassessed when more details regarding the proposed development plans are available for review (i.e. excavation depth/footprint, etc.). The revised dewatering estimates should include a factor of safety. Appropriate water taking permitting should be acquired (as needed) once construction dewatering estimates have been revised.

It is noted that the daily dewatering estimates outlined herein model the daily inflow rates into construction excavations once equilibrium of groundwater inflow into the excavation has been achieved. The initial dewatering rate during groundwater inflow stabilization period (prior to equilibrium) is not included in the dewatering estimates. Further, the initial dewatering efforts of an open excavation (i.e., dewatering a construction excavation after it has been allowed to fill with groundwater over a prolonged period of time) are also not included in the dewatering calculations.

It is imperative that during construction daily dewatering rates are monitored (or the dewatering of stagnant water in the construction excavation estimated) to determine appropriate water taking permitting / registration requirements.

Further, the method of disposal of water removed from the construction excavation should be determined prior to the commencement of water withdrawal.

5.1 Operational Dewatering

Cambium recommends that operational dewatering estimates are confirmed at a later stage of development once detailed development plans are available for review.

5.1.1 Zone of Influence

The dewatering calculations include estimates of the horizontal distance away from the walls of each excavation where the influence of water withdrawal will be negligible (i.e., the length to zero drawdown (Kyrieleis, W., Sichardt, W, 1930). The area included within the length of zero drawdown from the excavation is the zone of influence (ZOI). The maximum length to zero drawdown (as determined from the highest hydraulic conductivity) for the trench excavation was calculated at 19 m (see Figure 3; Appendix H). The orientation of on-site servicing was not known at the time this document was prepared, as such the length to zero drawdown was applied to the property boundaries as a conservative measure.

Construction dewatering influences of the proposed development intercept several adjacent private properties. The properties captured within the ZOI are listed below:

- 2370 Asphodel 10th Line
- 2366 Asphodel 10th Line
- Assessment Roll # 15010100031510000000 (located at the corner of Mill St., and 2319 Asphodel 10th Line)
- Assessment Roll # 15010100031501400000
- 78 Mill Street
- 76 Mill Street
- 36 Mill Street
- 28 Mill Street
- 26 Mill Street
- Railway Property

As per Section 4.3, the Township of Asphodel-Norwood indicated that the properties on Mill St. between Queen Street and 108 Mill Street are provided water by municipal services.

Of the properties captured within the ZOI, it is likely that only 2370 and 2366 Asphodel 10th Line are provided water from a private on-site supply well. The ZOI encompasses a railway line adjacent the Site to the northwest.

Once detailed development plans are finalized the ZOI for dewatering activities should be recalculated. If the properties at 2370 and 2366 Asphodel 10th Line (or any other property provided water with a private supply well) are captured within the revised ZOI then further attempts to contact the owners of these properties should be made, and their private supply wells investigated. A private supply well monitoring program should be completed as required, and should be based upon the results of private well investigations.

If the revised ZOI encompasses the adjacent railway line then consideration should be given to establishing land settlement monitoring program during construction dewatering activities.

6.0 Conclusions and Recommendations

CAP Norwood Development Inc. (Client) retained Cambium Inc. to complete a hydrogeological assessment for the property located at 52 Mill Street in Norwood, Ontario.

Groundwater levels within the shallow overburden aquifer ranged from 0.88 to 2.72 mbgs in April and May of 2022 and flows to the southwest.

Based off the preliminary dewatering calculations for the trench excavations and the assumptions outlined herein, the estimated daily dewatering rates may be less than 50 m^3/day (50,000 L/day). If daily construction dewatering rates exceed 50,000 L/day then dewatering activities are required to be registered on the Environmental Activity and Sector Registry. Cumulative daily construction dewatering rates should be monitored on a daily basis to confirm total water withdrawal rates across the Site during construction. The calculated ZOI encompasses several adjacent the Site, including a rail line.

Due to preliminary nature of the calculations outlined herein, the construction dewatering estimates and ZOI should be reviewed and revised once detailed development plan are available for review (i.e. regrading depth, orientation, footprint, etc.). The revised dewatering estimates should include a factor of safety. Appropriate water taking permitting should be acquired (as needed) once construction dewatering estimates have been revised.

If the revised ZOI encompasses residential properties provided water from a private supply well (such as 2370 and 2366 Asphodel 10th Line) and/or the adjacent rail line, then appropriate monitoring programs for these properties should be developed. It is possible that portions of the proposed development will require operational dewatering. The need and scope of ongoing monitoring of adjacent private supply wells should be determined at a later date.

It is expected that construction dewatering discharge will be managed wholly on-site (by allowing for water re-infiltration). Allowing for discharge water re-infiltration is not expected to influence off-site surface water features or down-gradient groundwater users. However, the sensitivity of those groundwater users located hydraulically down-gradient the Site should be reviewed prior to construction.

In summary, the proposed development is considered feasible at the Site. Future development plans should be reviewed and the dewatering impact assessment should be reviewed to determine the need to establish monitoring programs for adjacent properties.

Cambium Inc.

Nicole Heikoop, M.Sc., GIT
Technologist

Cameron MacDougall, P.Geo.
Project Manager

CM/nh/pr

P:\14200 to 14299\14288-003 CAP Norwood Dev - HydroG GEO ESA - 42 & 52 Mill St, Norwood\Deliverables\REPORT - HydroG\Final\2024-01-03 RPT HydroG Assessment, 52 Mill St, Norwood.docx

7.0 References

Cambium. (2022a). *Geotechnical Investigation - Norwood Residential Development, Norwood, ON.* Cambium Inc.

Cambium. (2022b). *Phase I Environmental Site Assessment - 52 Mill Street, Norwood, Ontario.* Cambium Inc.

Cambium. (2023). *Environmental Impact Study - 52 Mill Street, Norwood, Ontario.* Cambium Inc.

Chapman, L. J., & Putnam, D. F. (1984). *The Physiography of Southern Ontario.* Ontario: Ministry of Natural Resources.

Fetter, C. (2001). *Applied Hydrogeology (4th Edition).*

J.P.Powers, A. C. (2007). *Construction Dewatering and Groundwater Control, New Methods and Applications.*

Kyrieleis, W., Sichardt, W. (1930). *Grundwasserabsenkung bei Fundierungsarbeiten.* Berlin: Springer.

Ministry of Environment Conservation and Parks. (2020). *O.Reg. 169/03: Ontario Drinking Water Quality Standards.*

MOE. (1994). *Water Management: Policies, Guidelines, Provincial Water Quality Objectives.* 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-REV. Scale 1:50,000.

Otonabee Region Conservation Authority. (2023). *Restricted Land Use Notice 2023-0158-N2a, 52 Mill Street, Norwood, Township of Asphodel-Norwood, Roll No.: 150101000315300.*

8.0 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

CAP NORWOOD DEVELOPMENTS INC
52 Mill Street
Norwood, Ontario

LEGEND

- (208.82) Groundwater Elevation (m.rel) (May 4, 2022)
- Residential Supply Well
- Benchmark
- Borehole
- Monitoring Well
- Test Pit
- Groundwater Contour (May 4, 2022)
- Railroad
- Site (approximate)
- Groundwater Flow Direction (May 4, 2022)

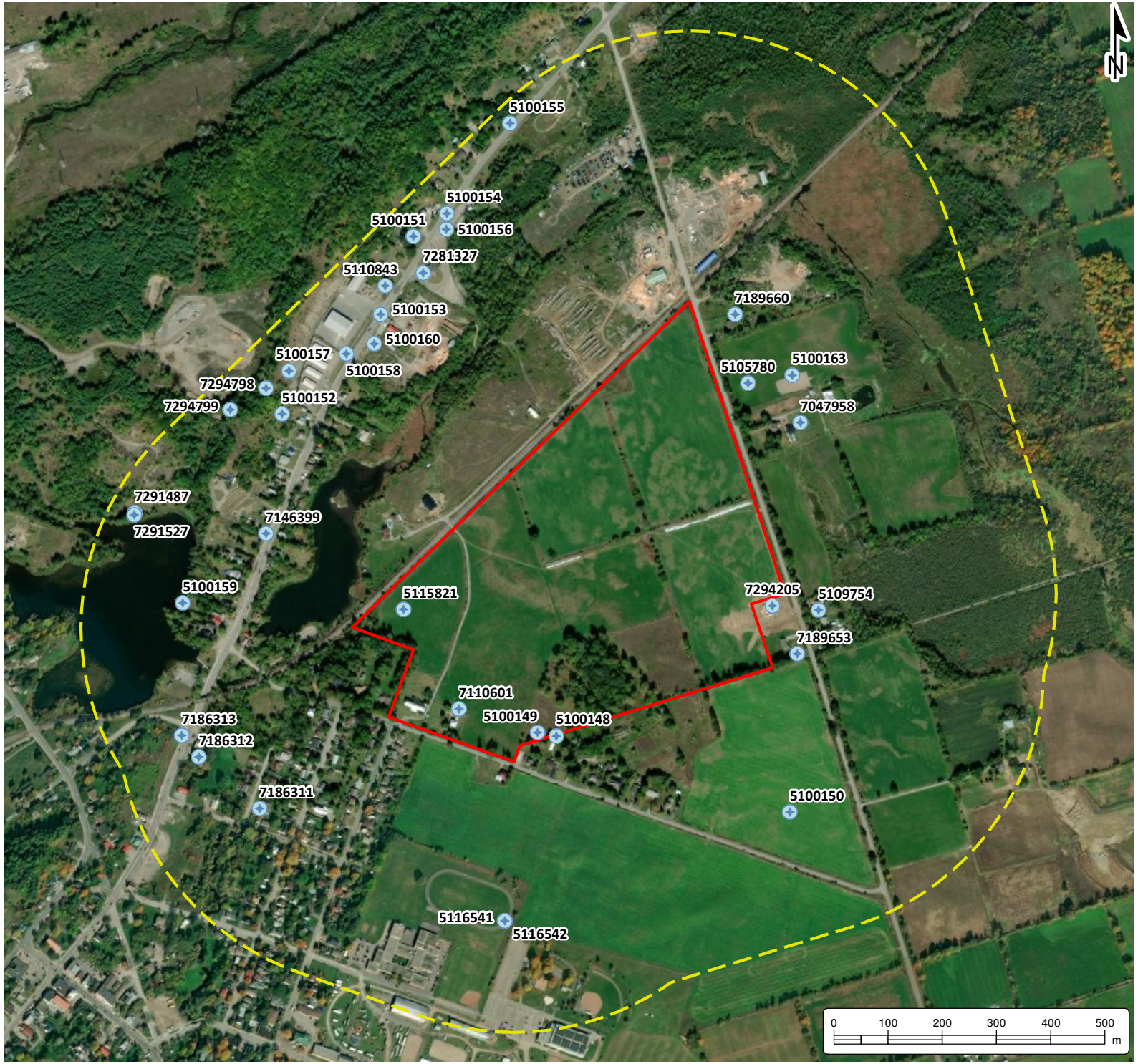
Notes:
- Overlay was obtained from RFA Planning Consultant Inc. Job No. 852. Draft Plan - Preliminary - Upper Mill Pond
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held 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
194 Sophia Street
Peterborough, Ontario, K9H 1E5
Tel: (705) 742.7900 Fax: (705) 742.7907
www.cambium-inc.com

SITE PLAN

Project No.: 14288-003		Date: June 2022	Rev.:
Scale: 1:4,500		Projection: NAD 1983 UTM Zone 18N	
Created by: ACS	Checked by: CMD	Figure: 1	

O:\GIS\MXDs\14200-14299\14288-003 CAP Norwood Dev - HydroG GEO ESA - 42 & 52 Mill St, Norwood\2023-11-13 Hydro G FIG 1 - Borehole Location Plan.mxd



GEOTECHNICAL INVESTIGATION

CAP NORWOOD DEVELOPMENTS INC
52 Mill Street
Norwood, Ontario

LEGEND

- MECP Water Well Record
- 500m Study Area
- Site (approximate)

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

MECP WELL RECORDS

Project No.: 14288-003		Date: June 2022	Rev.:
Scale: 1:10,000		Projection: NAD 1983 UTM Zone 18N	
Created by: ACS	Checked by: CMD	Figure: 2	

O:\GIS\MXDs\14200-14299\14288-003 CAP Norwood Dev - HydroG GEO ESA - 42 & 52 Mill St, Norwood\2022-06-10 FIG 2 - MECP Well Records.mxd

GEOTECHNICAL INVESTIGATION

CAP NORWOOD DEVELOPMENTS INC
52 Mill Street
Norwood, Ontario

LEGEND

- MECP Water Well Record
- 19m Study Area
- Site (approximate)

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

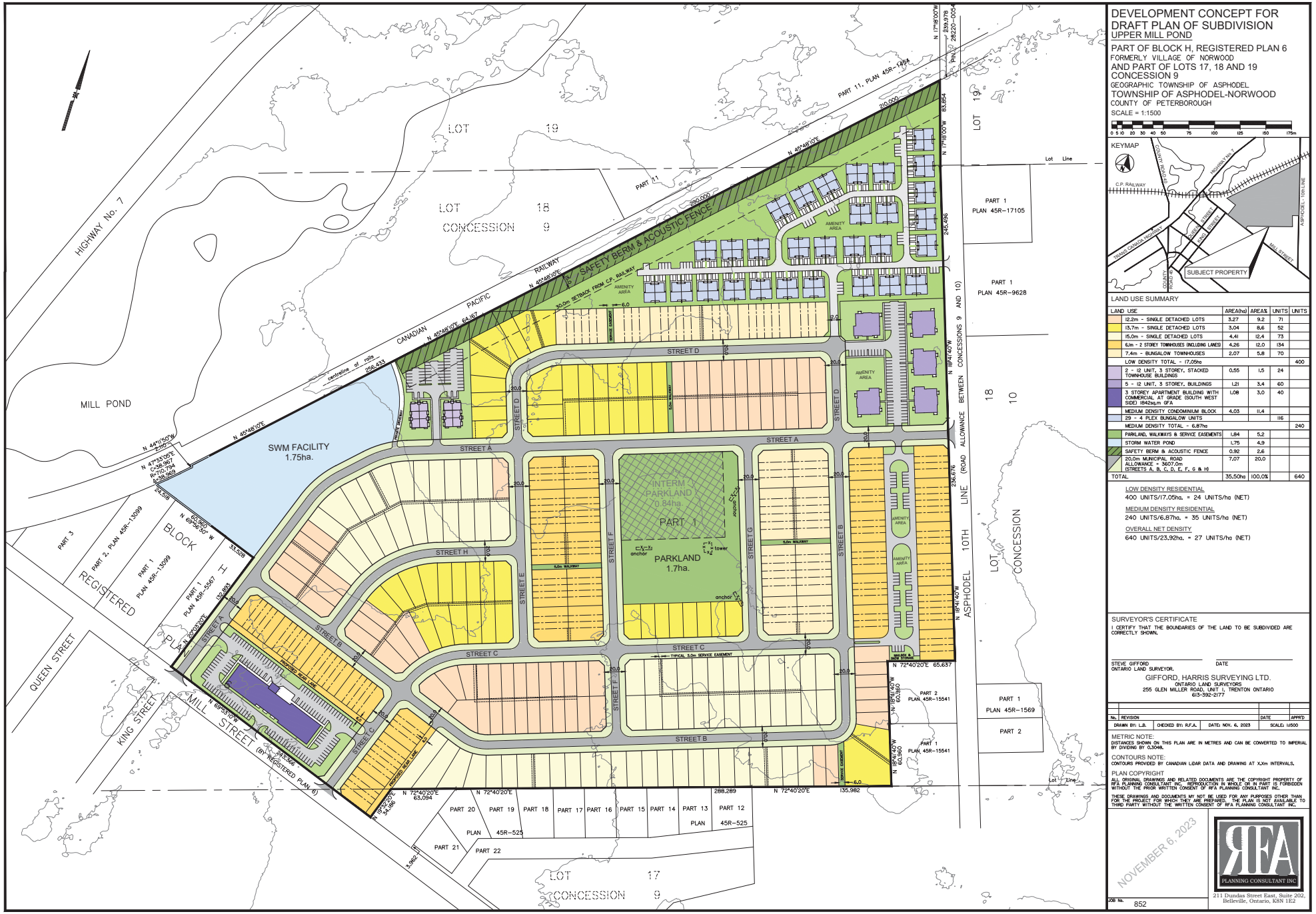
ZONE OF INFLUENCE – CONSTRUCTION EXCAVATION

Project No.: 14288-003	Date: June 2022
Scale: 1:5,000	Rev.:
Created by: ACS	Projection: NAD 1983 UTM Zone 18N
Checked by: CMD	Figure: 3

O:\GIS\MXDs\1:4200-14299\14288-003 CAP Norwood Dev - HydroG GEO ESA - 42 & 52 Mill St, Norwood\2022-06-10 FIG 3 - Zone of Influence – Construction Excavation.mxd

Appendix A

Land Information and Proposed Development Plan



DEVELOPMENT CONCEPT FOR DRAFT PLAN OF SUBDIVISION

UPPER MILL POND

PART OF BLOCK H, REGISTERED PLAN 6
FORMERLY VILLAGE OF NORWOOD
AND PART OF LOTS 17, 18 AND 19
CONCESSION 9
GEOGRAPHIC TOWNSHIP OF ASPHODEL
TOWNSHIP OF ASPHODEL-NORWOOD
COUNTY OF PETERBOROUGH

SCALE = 1:1500

0 5 10 20 30 40 50 75 100 125 150 175m

KEYMAP

LAND USE SUMMARY

LAND USE	AREA(ha)	AREA%	UNITS	UNITS
12.2m - SINGLE DETACHED LOTS	3.27	9.2	71	
13.7m - SINGLE DETACHED LOTS	3.04	8.6	52	
15.0m - SINGLE DETACHED LOTS	4.41	12.4	73	
6.1m - 2 STOREY TOWNHOUSES (INCLUDING LANES	4.26	12.0	134	
7.4m - BUNGALOW TOWNHOUSES	2.07	5.8	70	
LOW DENSITY TOTAL - 17.05ha				400
2 - 12 UNIT, 3 STOREY, STACKED TOWNHOUSE BUILDINGS	0.55	1.5	24	
5 - 12 UNIT, 3 STOREY, BUILDINGS	1.21	3.4	60	
3 STOREY APARTMENT BUILDING WITH COMMERCIAL AT GRADE (SOUTH WEST SIDE) 1842sq.m GFA	1.08	3.0	40	
MEDIUM DENSITY CONDOMINIUM BLOCK	4.03	11.4		
29 - 4 PLEX BUNGALOW UNITS			116	
MEDIUM DENSITY TOTAL - 6.87ha				240
PARKLAND, WALKWAYS & SERVICE EASEMENTS	1.84	5.2		
STORM WATER POND	1.75	4.9		
SAFETY BERM & ACOUSTIC FENCE	0.92	2.6		
20.0m MUNICIPAL ROAD ALLOWANCE = 3607.0m (STREETS A, B, C, D, E, F, G & H)	7.07	20.0		
TOTAL	35.50ha	100.0%		640

LOW DENSITY RESIDENTIAL
400 UNITS/17.05ha. = 24 UNITS/ha (NET)

MEDIUM DENSITY RESIDENTIAL
240 UNITS/6.87ha. = 35 UNITS/ha (NET)

OVERALL NET DENSITY
640 UNITS/23.92ha. = 27 UNITS/ha (NET)

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ARE CORRECTLY SHOWN.

STEVE GIFFORD DATE
ONTARIO LAND SURVEYOR.

GIFFORD, HARRIS SURVEYING LTD.
ONTARIO LAND SURVEYORS
255 GLEN MILLER ROAD, UNIT 1, TRENTON ONTARIO
613-392-2177

No.	REVISION	DATE	APP'D

DRAWN BY: L.B. CHECKED BY: R.F.A. DATE: NOV. 6, 2023 SCALE: 1:1500

METRIC NOTE:
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO IMPERIAL BY DIVIDING BY 0.3048.

CONTOURS NOTE:
CONTOURS PROVIDED BY CANADIAN LiDAR DATA AND DRAWING AT X.Xm INTERVALS.

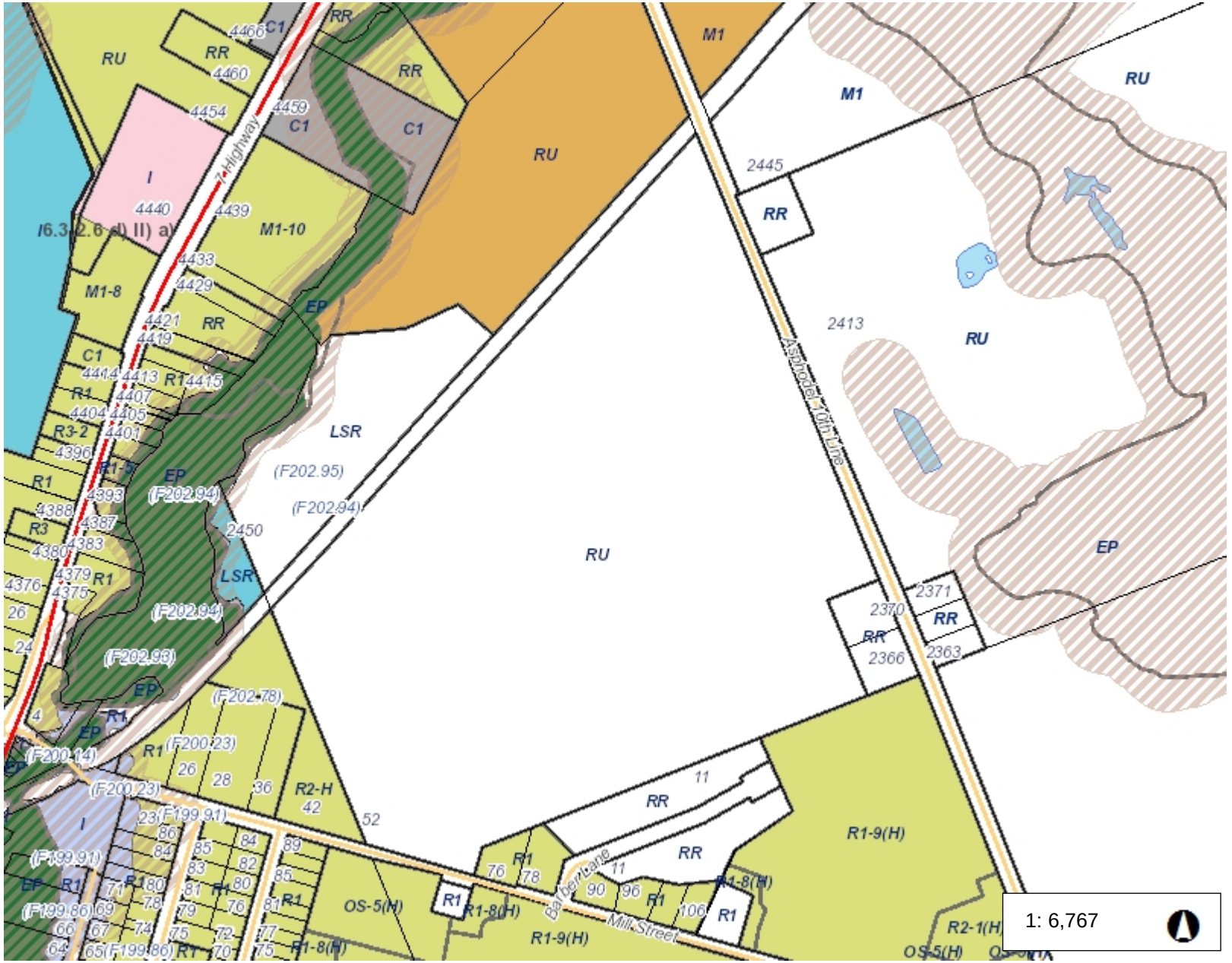
NOVEMBER 6, 2023

JOB No. 852

RFA PLANNING CONSULTANT INC

211 Dundas Street East, Suite 202,
Belleville, Ontario, K8N 1E2

County of Peterborough



Legend

Roads < 50,000

- PRIV ; Private; PRIV
- City Arterial
- City Collector and Local
- City Owned Unclassified
- Provincial
- County
- Township
- Water Access Only

Outside Roads < 50,000

- Major Roads
- Local Roads

- First Nations
- Civic Address
- Parcel Fabric
- Parcel First Nations - Canada
- ORCA Dev't Control Area
- AN Flood Fringe Elevation
- AN Zoning Bylaws
- AN Flood Fringe
- Norwood OP Special Section

Norwood OP Landuse

- Commercial
- Environmental Constraint Area
- Extractive Industrial
- Flood Fringe Overlay
- Industrial
- Institutional

1: 6,767

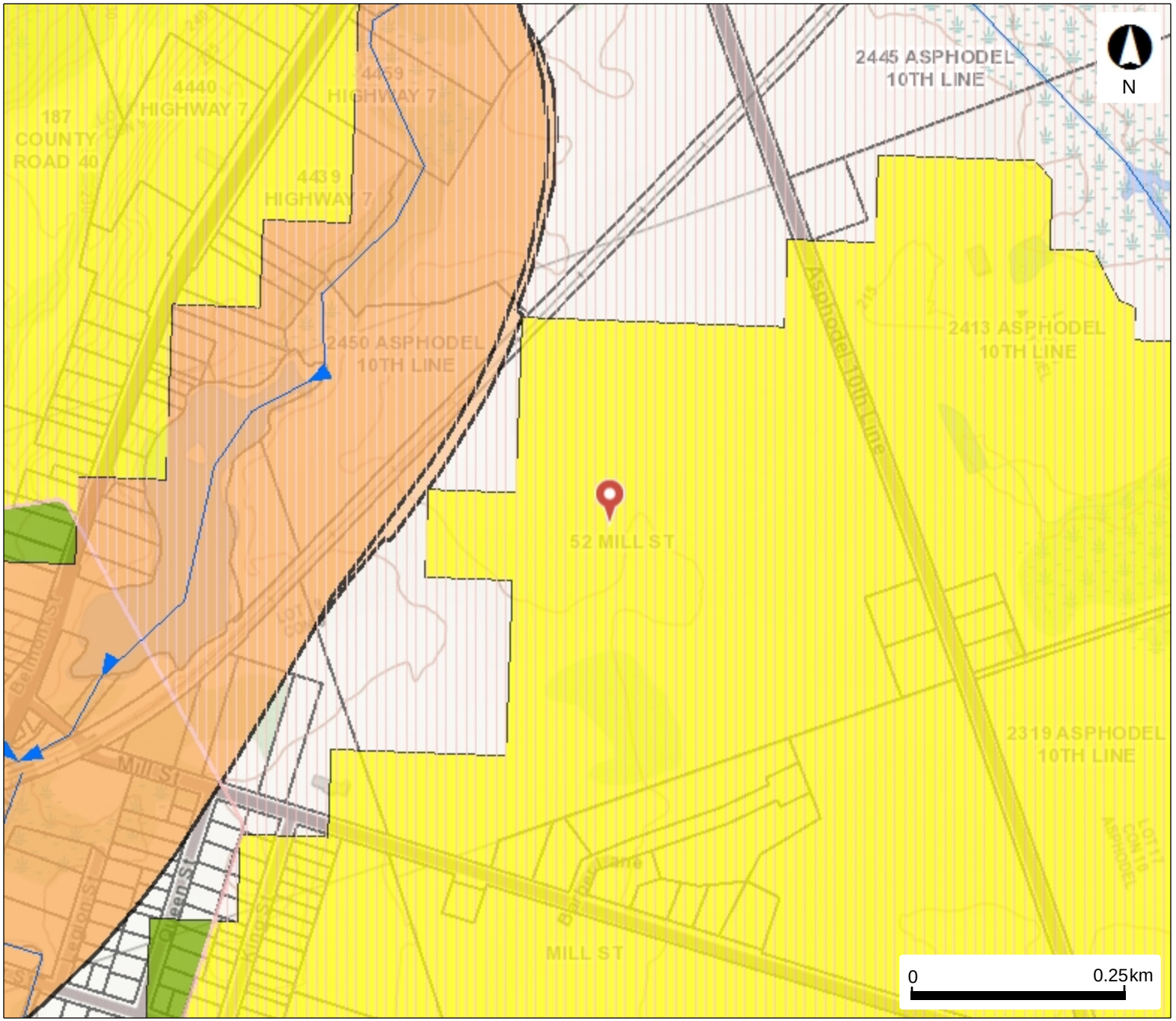
343.8 0 171.88 343.8 Meters

North_American_1983_CSRS_UTM_Zone_17N

Notes

ORCA regulated area

SPIA Map



Legend

- Watercourse Direction
- Source Protection Areas
- Highly Vulnerable Aquifers
- Significant Groundwater Recharge Area
  - 0
  - 2
  - 4
  - 6
- Wellhead Protection Area
  - A
  - B
  - C
  - C1
  - D
  - F
- 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

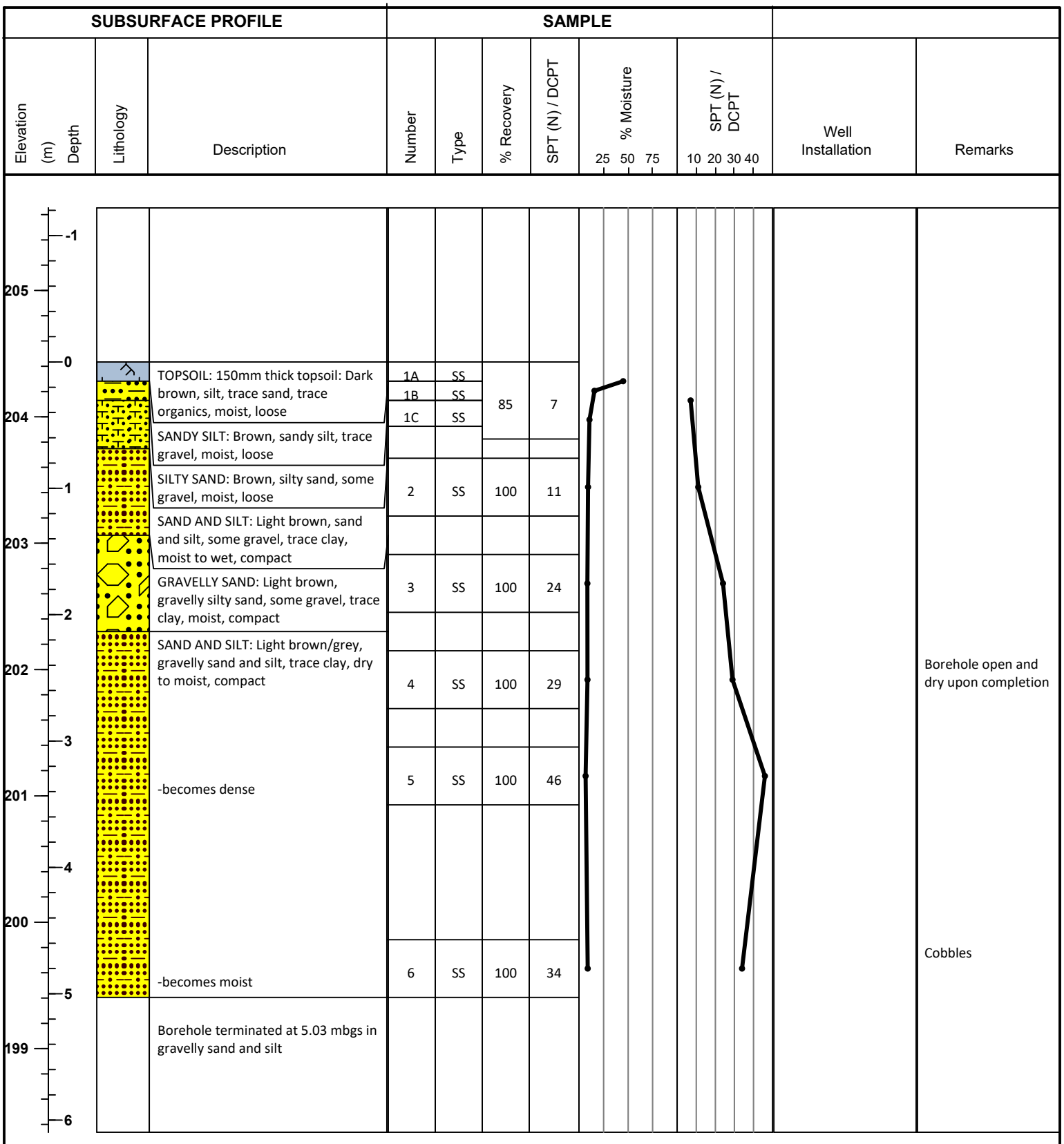
Map Created: 6/8/2022
Map Center: 44.38971 N, -77.96814 W

Appendix B
Borehole and Test Pit Logs

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

Log of Borehole: BH101-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 20, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263264.8937 E, 4919157.519 N	**Elevation:**	204.434 masl



Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH102-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 20, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263372.1357 E, 4919103.341 N	**Elevation:**	205.325 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
206 / 0		TOPSOIL: 300mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1A	SS	75	4				
			1B	SS						
205 / 1		SILTY SAND: Brown, silty sand, trace clay, moist, loose	2	SS	80	6				
204 / 2		SILT: Brown, silt, some clay, trace sand, moist to wet, loose	~~3A~~ 3B	~~SS~~ SS	100	5				Groundwater first encountered at 1.52 mbgs
203 / 3			4	SS	100	7				SS4 GSA: 0% gravel 3% sand 86% silt 11% clay
202 / 4		GRAVELLY SAND: Brown, gravelly silty sand, trace clay, moist to wet, very dense	~~5~~	~~SS~~	~~100~~	~~50/~~ 50				Water level upon completion at 3.05 mbgs
201 / 5		Borehole terminated at 3.05 mbgs on presumed bedrock								Borehole open upon completion
200 / 6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH103-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 20, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263401.7241 E, 4919213.468 N	**Elevation:**	206.096 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
207 / -1										
206 / 0		TOPSOIL: 100mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1A 1B	SS SS	50	5				
		SILTY SAND: Brown, silty sand, trace clay, trace organics, moist, loose								
205 / -1		-no organics	2	SS	80	4				
		SILT: Brown, silt, some clay, trace sand, moist to wet, loose	3	SS	100	5				
204 / -2		SILT AND SAND: Light brown, silt and sand, trace clay, moist to wet, compact	4	SS	100	19				
203 / -3		SILT AND SAND: Light brown, gravelly silt and sand, trace clay, moist, dense -becomes grey	5	SS	80	34				Borehole open and dry upon completion
202 / -4		SILT AND SAND: Grey, gravelly silt and sand, trace clay, dry to moist, dense	6	SS	80	46				
201 / -5		Borehole terminated at 5.03 mbgs in gravelly silt and sand								
200 / -6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH104-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 20, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263527.4327 E, 4919126.817 N	**Elevation:**	208.934 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
210 / -1										
209 / 0		TOPSOIL: 600mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1	SS	50	4			Cap	
208 / 1		GRAVELLY SAND: Light brown/grey, gravelly silty sand, trace clay, moist, dense	2	SS	60	43			Pipe; Bentonite Plug	No water level detected when measured on May 4, 2022
207 / 2		SAND AND SILT: Grey, sand and silt, some clay, some gravel, moist, compact	3	SS	100	15				SS3 GSA: 10% gravel 42% sand 35% silt 13%clay
206 / 3		SAND AND SILT: Grey, gravelly sand and silt, some clay, moist, dense	4	SS	100	46			Sand Pack; PVC Screen	Borehole open and dry upon completion
			5	SS	100	50/100			Cap	
205 / 4		Borehole terminated at 3.2 mbgs on presumed bedrock								
204 / 5										
203 / 6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH105-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 21, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263261.4148 E, 4919290.377 N	**Elevation:**	202.457 masl

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
203 / -1									Cap	
202 / 0		TOPSOIL: 225 mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1A	SS	75	4			Pipe	
			1B	SS						
		SANDY SILT: Brown, sandy silt, trace clay, moist, loose							Bentonite Plug	
201 / 1		SANDY SILT: Light brown, sandy silt, trace clay, moist to wet, loose	2	SS	100	4				Groundwater first encountered at 1.52 mbgs
		-becomes very loose, wet	3	SS	90	3				SS3 GSA: 0% gravel 28% sand 72% silt & clay
200 / 2		-becomes compact	4A	SS						
		SAND AND SILT: Grey, gravelly sand and silt, moist to wet, dense	4B	SS	80	37			Sand Pack PVC Screen	Water level measured at 2.72 mbgs on May 4, 2022
199 / 3		-becomes saturated	5	SS	40	29				Water level upon completion at 3.05 mbgs
198 / 4		Borehole terminated at 4.42 mbgs on presumed bedrock							Cap	Borehole caving occurred up to 4.11 mbgs upon completion
197 / 5										
196 / 6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH106-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 21, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263380.2677 E, 4919466.901 N	**Elevation:**	208.343 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
208 / 0		TOPSOIL: 300mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1A	SS	75	4				
			1B	SS						
		SANDY SILT: Brown, sandy silt, trace clay, moist, loose								
207 / 1		SAND AND SILT: Light brown, gravelly sand and silt, moist, compact	2A	SS	80	16				
			2B	SS						
		-becomes dense	3	SS	80	41				
206 / 2										
		-becomes dry to moist, very dense	4	SS	60	54				
205 / 3										
			5	SS	50	50/425				Borehole open and dry upon completion
204 / 4										
			6	SS	100	50/50				
203 / 5		Borehole terminated at 4.57 mbgs on presumed bedrock								
-6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH107-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 21, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263454.8087 E, 4919307.502 N	**Elevation:**	204.314 masl

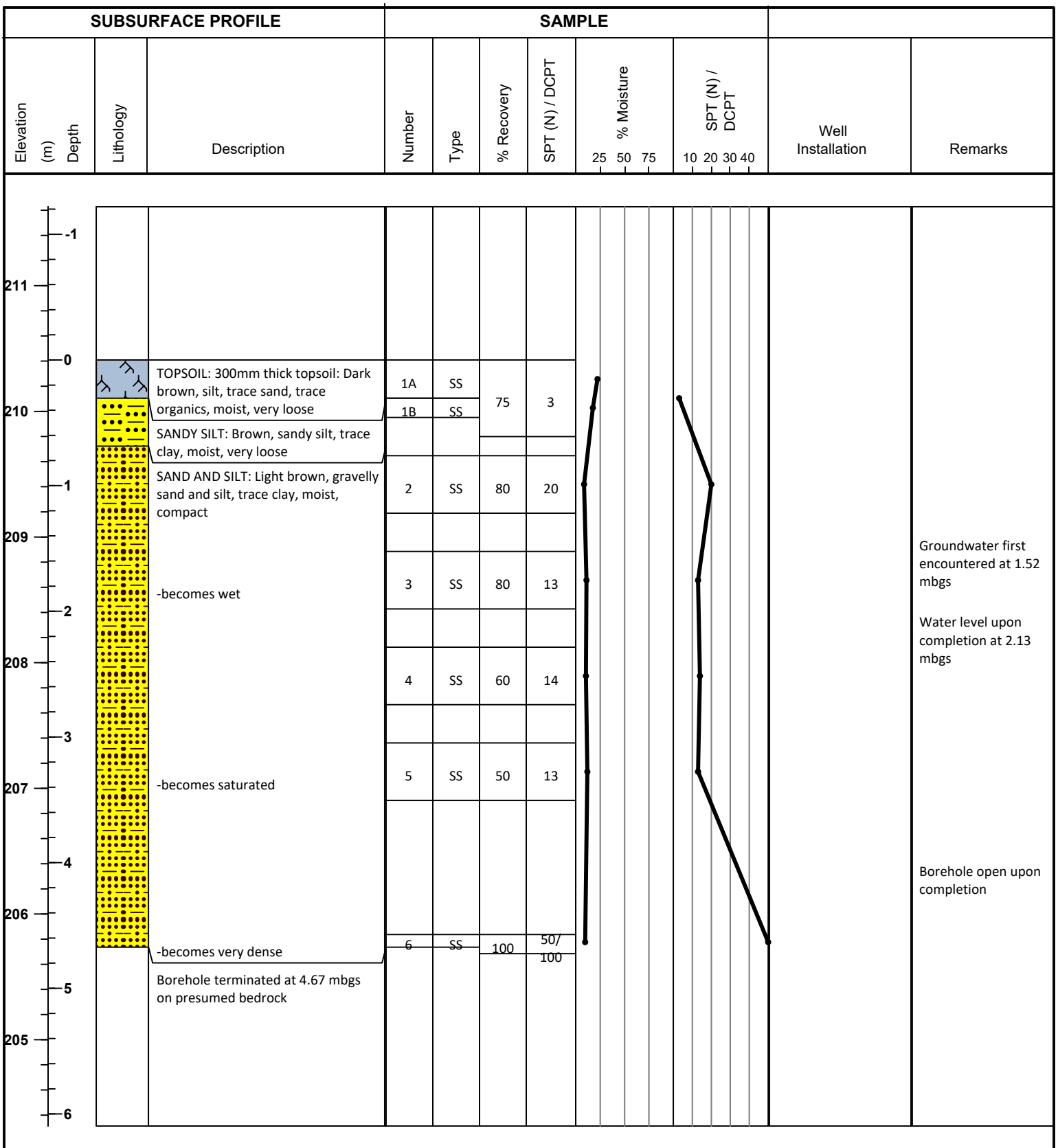
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
204 / 0		TOPSOIL: 300mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, very loose	1A	SS	85	3				
			1B	SS						
		SANDY SILT: Brown, sandy silt, trace clay, moist, very loose								
203 / 1		SILT: Light brown, silt, some sand, some clay, moist to wet, loose	2A	SS	100	8				
			2B	SS						
		SANDY SILT: Light brown, sandy silt, trace clay, moist to wet, compact	3	SS	100	18				SS3 GSA: 0% gravel 28% sand 72% silt & clay
202 / 2			4	SS	100	21				Borehole open upon completion
201 / 3		-sand becomes coarser	5	SS	100	17				
200 / 4		-trace gravel, wet, very dense	6	SS	100	50/75				Groundwater first encountered at 4.42 mbgs
		Borehole terminated at 4.42 mbgs on presumed bedrock								Water level upon completion at 4.42 mbgs
199 / 5										
/ 6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH108-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 21, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263506.3392 E, 4919437.261 N	**Elevation:**	210.409 masl



Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH109-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 21, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263498.4301 E, 4919578.083 N	**Elevation:**	209.636 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
210 / 0		TOPSOIL: 150mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, very loose	1A	SS						
			1B	SS	75	3				
209 / 1		SILTY SAND: Brown, silty sand, trace clay, moist, very loose								
			2A	SS						
		SILT AND SAND: Brown, silt and sand, trace clay, moist to wet, very loose	2B	SS	60	1				
208 / 2		SAND AND SILT: Light brown, gravelly sand and silt, moist, compact	3	SS	100	27				SS3 GSA: 21% gravel 40% sand 39% silt & clay
			4	SS	70	51				
207 / 3		-becomes very dense								
			5	SS	100	60				
206 / 4										
205 / 5			6	SS	100	50/ 275				Borehole open and dry upon completion
		Borehole terminated at 4.88 mbgs on presumed bedrock								
204 / 6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH110-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 21, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263594.2056 E, 4919677.787 N	**Elevation:**	209.735 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
210 / 0		TOPSOIL: 200mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1A	SS	65	4				
			1B	SS						
209 / 1		SANDY SILT: Brown, sandy silt, trace clay, moist, loose								
		SILTY SAND: Brown, silty sand, trace clay, moist, loose	2A	SS	100	5				
		SILT: Brown, silt, some sand, some clay, moist to wet, loose	2B	SS						
208 / 2			3A	SS	85	13				
		SILTY SAND: Light brown, silty sand, trace clay, trace gravel, moist to wet, compact	3B	SS						
		GRAVELLY SAND: Light brown, gravelly silty sand, trace clay, moist to wet, dense	4	SS	60	36				
207 / 3										
			5	SS	100	48				
206 / 4		Borehole terminated at 3.96 mbgs on presumed bedrock								Borehole open and dry upon completion
205 / 5										
204 / 6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH111-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 21, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T263661.3887 E, 4919579.516 N	**Elevation:**	210.205 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
211 / -1										
210 / 0		TOPSOIL: 150mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1A 1B 1C	SS SS SS	85	7				
		SILTY SAND: Brown, silty sand, trace clay, moist to wet, loose								
209 / 1		GRAVELLY SAND: Brown, gravelly silty sand, trace clay, moist to wet, compact	2	SS	80	45				SS2 GSA: 27% gravel 44% sand 24% silt 5%clay
		-becomes moist, dense								
208 / 2		-becomes light brown, moist to wet, very dense	3	SS	30	70				Water level upon completion at 1.83 mbgs
		-becomes dense	4	SS	20	30				
207 / 3		-becomes very dense	5	SS	100	50/ 400				Groundwater first encountered at 3.05 mbgs
206 / 4										Borehole open upon completion
205 / 5		Borehole terminated at 4.88 on presumed bedrock	6	SS	100	50/ 275				
206 / 6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH112-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 21, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263763.0134 E, 4919801.271 N	**Elevation:**	209.28 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
209 / 0		TOPSOIL: 200mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, very loose	1A	SS	85	3			Cap	Groundwater first encountered at 0.76 mbgs
			1B	SS						
		SANDY SILT: Brown, sandy silt, trace clay, moist, very loose							Pipe	
208 / 1		SILTY SAND: Brown, silty sand, wet, loose	2	SS	100	4			Bentonite Plug	Water level upon completion at 0.76 mbgs
		SILT: Brown, silt, some sand, some clay, wet, loose	3A	SS	50	5				Water level measured at 1.24 mbgs on May 4, 2022
207 / 2		SILTY SAND: Brown, silty sand, trace clay, wet, loose	3B	SS					Sand Pack	
		GRAVELLY SAND: Brown, gravelly silty sand, trace clay, saturated, very dense	4	SS	40	50/ 375			PVC Screen	
206 / 3		Borehole terminated at 2.67 mbgs on presumed bedrock							Cap	Borehole caving occurred up to 2.59 mbgs upon completion
205 / 4										
204 / 5										
/ 6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH113-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 20, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263859.3257 E, 4919563.455 N	**Elevation:**	211.703 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
212 / 0		TOPSOIL: 300mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, very loose	1A	SS	80	3				
			1B	SS						
211 / 1		SANDY SILT: Brown, sandy silt, trace clay, moist, very loose								
		GRAVELLY SAND: Grey, gravelly silty sand, dry to moist, dense	2	SS	50	38				
210 / 2		-becomes very dense	3	SS	70	50/ 400				Borehole open and dry upon completion
		Borehole terminated at 1.98 mbgs on presumed bedrock								
209 / 3										
208 / 4										
207 / 5										
206 / 6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH114-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 20, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263757.541 E, 4919417.733 N	**Elevation:**	213.015 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
214 / -1										
213 / 0		TOPSOIL: 100mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1A 1B	SS SS	50	16				
		GRAVELLY SAND: Brown/grey, gravelly silty sand, dry to moist, compact								
212 / -1		-becomes very dense	2	SS	60	50/ 275				
			3	SS	85	58				
211 / -2										
			4	SS	100	50/ 100				
210 / -3										
			5	SS	80	50/ 250				Borehole open and dry upon completion
209 / -4		Borehole terminated at 3.5 mbgs on presumed bedrock								
208 / -5										
207 / -6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH115-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 20, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263931.2517 E, 4919417.57 N	**Elevation:**	210.833 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
212 / -1										
211 / 0		TOPSOIL: 200mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1A	SS					Cap	
			1B	SS	65	4				
		SANDY SILT: Brown, sandy silt, trace clay, trace organics, moist, loose							Pipe	
210 / 1		GRAVELLY SAND: Brown, gravelly silty sand, moist, dense	2	SS	50	42			Bentonite Plug	
209 / 2			3	SS	80	32			Sand Pack	
		-becomes very dense	4	SS	60	50/ 300			PVC Screen	
208 / 3		Borehole terminated at 2.59 mbgs on presumed bedrock							Cap	
207 / 4										
206 / 5										
205 / 6										

Groundwater first encountered at 1.52 mbgs

SS3 GSA:
34% gravel
46% sand
20% silt & clay

Water level upon completion at 1.68 mbgs

Water level measured at 2.02 mbgs on May 4, 2022

Borehole open upon completion

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH116-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 20, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263788.3967 E, 4919215.355 N	**Elevation:**	210.406 masl

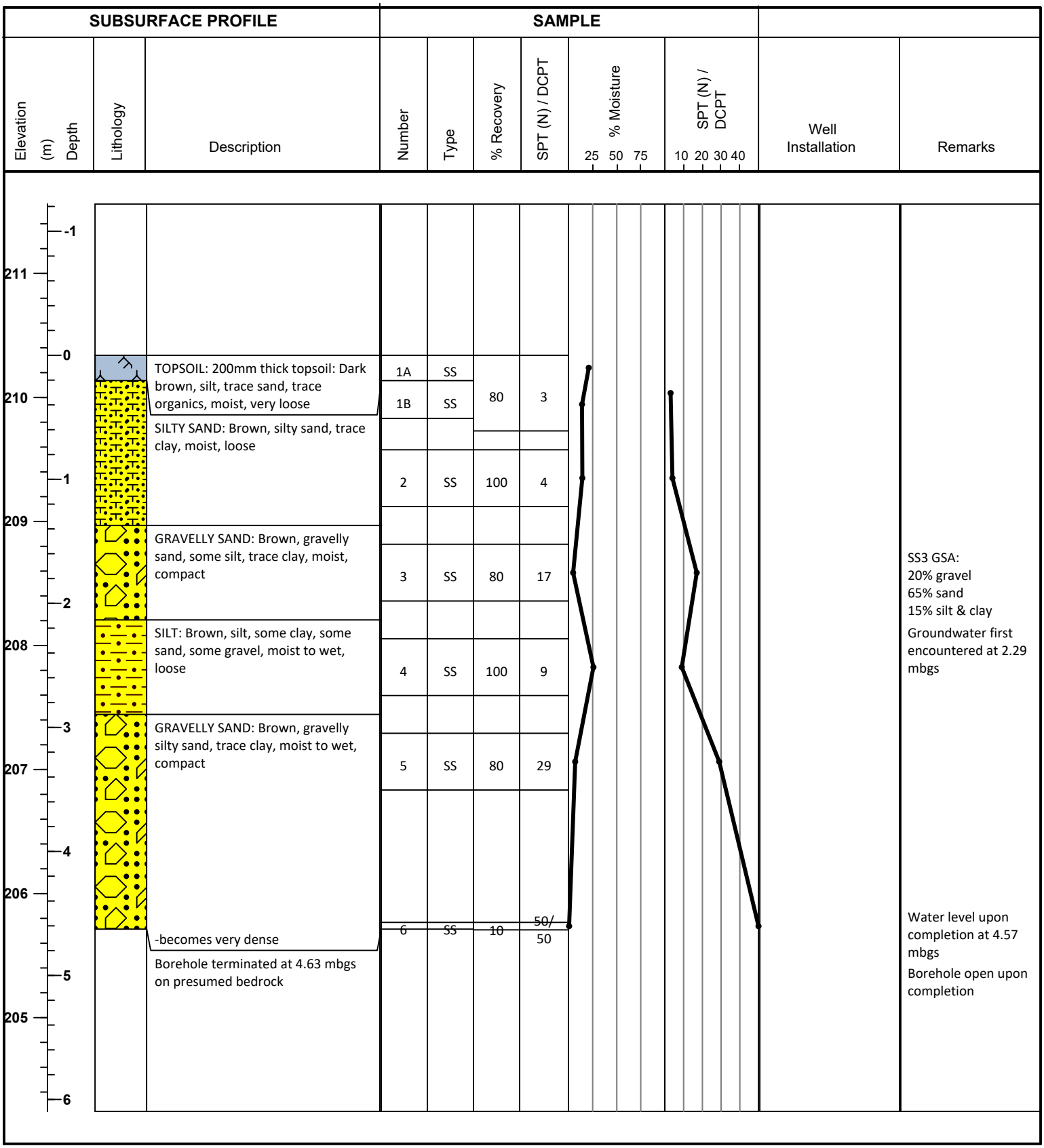
SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
211 / -1										
210 / 0		TOPSOIL: 150mm thick topsoil: Dark brown, silt, trace sand, trace organics, moist, loose	1A 1B	SS SS	60	7				
		SILTY SAND: Brown, silty sand, trace gravel, trace clay, moist, loose -becomes compact	2A 2B	SS SS	67	10				
209 / -1		GRAVELLY SAND: Brown, gravelly sand, some silt, trace clay, moist, dense	3	SS	100	42				
208 / -2		GRAVEL: Grey, gravel, some sand, some silt, dry, very dense	4A 4B	SS SS	50	50/ 275				Borehole open and dry upon completion
		Borehole terminated at 2.59 mbgs on presumed bedrock								
207 / -3										
206 / -4										
205 / -5										
-6										

Logged By: J. Riseling **Input By:** J. Riseling

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

Log of Borehole: BH117-22

Client:	CAP Norwood Dev	**Project Name:**	42 & 52 Mill Street, Norwood	**Project No.:**	14288-003
Contractor:	Canadian Environmental	**Method:**	Solid Stem Auger	**Date Completed:**	April 20, 2022
Location:	42 Mill Street, Norwood	**UTM:**	18T 263640.3596 E, 4919276.71 N	**Elevation:**	210.34 masl



Logged By: J. Riseling **Input By:** J. Riseling

TABLE 1: TEST PIT LOGS
42 & 52 Mill Street, Norwood
Technician: Josh Riseling
Cambium Reference No. 14288-003
Completed: April 26 & 27, 2022

Test Pit ID	Depth (mbgs[1])	Soil Sample	% Moisture	Material Description	Depth (m)	DPT[2] (Blows/150 mm)
					0.15	2
	0-0.15	GS1		150 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	4
TP118-22	0.15-0.75	GS2		Brown, SILTY SAND, trace clay, moist	0.45	6
	0.75-1.5	GS3		Light brown, GRAVELLY SILTY SAND, trace clay	0.6	8
18T 263459.2299 E	1.5-2.4	GS4		Same as above	0.75	6
4919096.046 N	2.4-3.0	GS5		Same as above	0.9	10
					1.05	17
206.812 masl					1.2	22
				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.35	4
				No groundwater or caving observed upon completion	1.5	12
					1.65	50
					0.15	2
	0-0.3	GS1		300 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	5
TP119-22	0.3-1.2	GS2		Light brown, SILTY SAND, trace clay, moist	0.45	7
	1.2-2.1	GS3		Light brown, GRAVELLY SILTY SAND, moist	0.6	6
18T 263307.8794 E	2.1-3.0	GS4		Same as above	0.75	6
4919249.476 N	3.3			Bedrock	0.9	8
					1.05	9
203.588 masl					1.2	13
				Test pit terminated at 3.3 mbgs on bedrock	1.35	4
				No groundwater or caving observed upon completion	1.5	16
					1.65	22
					1.8	28
					1.95	27
					2.1	35
					2.25	50
					0.15	1
	0-0.15	GS1		150 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	3
TP120-22	0.15-0.9	GS2		Brown, SILTY SAND, trace clay, moist	0.45	6
	0.9-1.5	GS3		Brown, SILTY SAND, some clay, moist to wet	0.6	7
18T 263381.7756 E	1.5-2.1	GS4		Light brown, SILTY SAND, some gravel, trace clay, moist	0.75	8
4919293.79 E	2.1-3.0	GS5		Light brown, GRAVELLY SILTY SAND, trace clay, moist	0.9	9
					1.05	10
203.488 masl					1.2	8
				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.35	2
				No groundwater or caving observed upon completion	1.5	4
					1.65	11
					1.8	11
					1.95	10
					2.1	28
					2.25	39
					2.4	48

1. mbgs = metres below ground surface
2. Dynamic probe penetration test, consisting of driving a 19 mm diameter steel rod 150 mm into the soil with an 8 kg hammer falling 750 mm.

TABLE 1: TEST PIT LOGS
42 & 52 Mill Street, Norwood
Technician: Josh Riseling
Cambium Reference No. 14288-003
Completed: April 26 & 27, 2022

Test Pit ID	Depth (mbgs[1])	Soil Sample	% Moisture	Material Description	Depth (m)	DPT[2] (Blows/150 mm)
					0.15	1
	0-0.15	GS1		150 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	3
TP121-22	0.15-0.75	GS2		Brown, SILTY SAND, trace clay, moist	0.45	6
	0.75-1.5	GS3		Brown, SILTY SAND, some clay, moist to wet	0.6	8
18T 263323.0037 E	1.5-2.4	GS4		Light brown/grey, SILTY SAND, some clay, moist	0.75	9
4919401.899 N	2.4-3.0	GS5		Same as above, trace gravel	0.9	10
					1.05	13
203.75 masl					1.2	15
				Test pit terminated at 3.6 mbgs in silty sand	1.35	1
				Groundwater seepage observed at 3.3 mbgs	1.5	3
				Water level observed at 3.6 mbgs upon completion	1.65	4
				Sidewall caving observed at 3.3 mbgs	1.8	5
					1.95	9
					2.1	17
					2.25	30
					2.4	38
					0.15	2
	0-0.2	GS1		200 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	5
TP122-22	0.2-1.2	GS2		Light brown, SILTY SAND, trace clay, moist	0.45	5
	1.2-2.25	GS3		Same as above	0.6	7
18T 263435.1018 E	2.25-3.0	GS4		Light brown, GRAVELLY SILTY SAND, moist	0.75	8
4919413.538 N					0.9	6
					1.05	5
208.78 masl				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.2	5
				No groundwater observed upon completion	1.35	1
				Sidewall caving observed at 0.9 mbgs	1.5	1
					1.65	1
					1.8	1
					1.95	1
					2.1	1
					2.25	1
					2.4	21

1. mbgs = metres below ground surface
2. Dynamic probe penetration test, consisting of driving a 19 mm diameter steel rod 150 mm into the soil with an 8 kg hammer falling 750 mm.

TABLE 1: TEST PIT LOGS
42 & 52 Mill Street, Norwood
Technician: Josh Riseling
Cambium Reference No. 14288-003
Completed: April 26 & 27, 2022

Test Pit ID	Depth (mbgs[1])	Soil Sample	% Moisture	Material Description	Depth (m)	DPT[2] (Blows/150 mm)
					0.15	2
	0-0.2	GS1		200 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	5
TP123-22	0.2-0.6	GS2		Brown, SAND, some silt, some gravel, moist	0.45	8
	0.6-1.5	GS3		Light brown, SAND, some silt, trace gravel, moist	0.6	8
18T 263570.6278 E	1.5-2.4	GS4		Brown, GRAVELLY SAND, some silt, moist	0.75	7
4919349.463 N	2.4-3.0	GS5		Same as above	0.9	5
					1.05	12
209.674 masl					1.2	22
				Test pit terminated at 3.0 mbgs in gravelly sand	1.35	3
				No groundwater or caving observed upon completion	1.5	9
					1.65	11
					1.8	13
					1.95	13
					2.1	17
					2.25	39
					2.4	50
					0.15	3
	0-0.3	GS1		300 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	9
TP124-22	0.3-1.2	GS2		Light brown, GRAVELLY SILTY SAND, trace clay, moist	0.45	39
	1.2-2.1	GS3		Same as above	0.6	50
18T 263487.625 E	2.1-3.0	GS4		Same as above	0.75	
4919227.613 N					0.9	
					1.05	
205.446 masl				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.2	
				No groundwater or caving observed upon completion	1.35	4
					1.5	20
					1.65	50
					0.15	1
	0-0.3	GS1		300 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	2
TP125-22	0.3-1.2	GS2		Light brown, GRAVELLY SILTY SAND, trace clay, moist	0.45	2
	1.2-2.1	GS3		Same as above	0.6	4
18T 263587.5195 E	2.1-3.0	GS4		Same as above	0.75	11
4919198.145 N					0.9	50
					1.05	
208.502 masl				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.2	
				No groundwater or caving observed upon completion	1.35	9
					1.5	42
					1.65	50

1. mbgs = metres below ground surface
2. Dynamic probe penetration test, consisting of driving a 19 mm diameter steel rod 150 mm into the soil with an 8 kg hammer falling 750 mm.

TABLE 1: TEST PIT LOGS
42 & 52 Mill Street, Norwood
Technician: Josh Riseling
Cambium Reference No. 14288-003
Completed: April 26 & 27, 2022

Test Pit ID	Depth (mbgs[1])	Soil Sample	% Moisture	Material Description	Depth (m)	DPT[2] (Blows/150 mm)
					0.15	1
	0-0.15	GS1		150 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	2
TP126-22	0.15-0.9	GS2		Brown, SILTY SAND, trace clay, trace organics, moist	0.45	2
	0.9-1.5	GS3		Light brown, SAND, some silt, trace clay, moist	0.6	2
18T 263673.8582 E	1.5-2.4	GS4		Light brown, GRAVELLY SILTY SAND, moist	0.75	3
4919184.81 N	2.4-3.0	GS5		Same as above	0.9	4
					1.05	3
211.056 masl					1.2	4
				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.35	3
				No groundwater or caving observed upon completion	1.5	11
					1.65	29
					1.8	50
					0.15	2
	0-0.15	GS1		150 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	4
TP127-22	0.15-0.75	GS2		Brown, SILTY SAND, trace clay, trace organics, moist	0.45	6
	0.75-1.65	GS3		Light brown, SAND, some silt, trace clay, moist	0.6	6
18T 263736.9108 E	1.65-2.55	GS4		Light brown, GRAVELLY SILTY SAND, moist	0.75	6
4919266.591 N					0.9	7
					1.05	5
208.81 masl				Test pit terminated at 2.55 mbgs on bedrock	1.2	5
				No groundwater or caving observed upon completion	1.35	8
					1.5	50
					0.15	2
	0-0.2	GS1		200 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	4
TP128-22	0.2-0.9	GS2		Brown, SANDY SILT, trace clay, moist	0.45	5
	0.9-1.5	GS3		Brown, SILTY SAND, trace clay, moist to wet	0.6	6
18T 263669.5935 E	1.5-2.4	GS4		Light brown, GRAVELLY SILTY SAND, moist to wet	0.75	9
4919343.14 N	2.4-3.0	GS5		Same as above	0.9	10
					1.05	12
208.276 masl					1.2	11
				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.35	2
				Groundwater seepage observed at 2.4 mbgs	1.5	4
				Water level observed at 2.55 mbgs upon completion	1.65	5
				Sidewall caving observed at 0.9 mbgs	1.8	12
					1.95	17
					2.1	7
					2.25	15
					2.4	50

1. mbgs = metres below ground surface
2. Dynamic probe penetration test, consisting of driving a 19 mm diameter steel rod 150 mm into the soil with an 8 kg hammer falling 750 mm.

TABLE 1: TEST PIT LOGS
42 & 52 Mill Street, Norwood
Technician: Josh Riseling
Cambium Reference No. 14288-003
Completed: April 26 & 27, 2022

Test Pit ID	Depth (mbgs[1])	Soil Sample	% Moisture	Material Description	Depth (m)	DPT[2] (Blows/150 mm)
					0.15	2
	0-0.3	GS1		300 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	7
TP129-22	0.3-0.9	GS2		Brown, SILTY SAND, trace clay, moist	0.45	8
	0.9-1.5	GS3		Brown, SILT AND SAND, trace clay, moist	0.6	12
18T 263689.7605 E	1.5-2.4	GS4		Light brown, GRAVELLY SILTY SAND, moist to wet	0.75	18
4919465.412 N	2.4-3.0	GS5		Same as above, wet	0.9	14
					1.05	13
210.846 masl					1.2	14
				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.35	5
				Groundwater seepage observed at 2.4 mbgs	1.5	15
				Water level observed at 2.85 mbgs upon completion	1.65	44
				No caving observed upon completion	1.8	50
					0.15	1
	0-0.2	GS1		200 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	4
TP130-22	0.2-0.9	GS2		Brown, SILTY SAND, trace clay, moist to wet	0.45	7
	0.9-1.8	GS3		Brown, SILTY SAND, some gravel, trace clay, moist to wet	0.6	9
18T 263592.0739 E	1.8-2.4	GS4		Light brown, GRAVELLY SILTY SAND, trace clay, moist to wet	0.75	10
4919499.753 N	2.4-3.0	GS5		Same as above	0.9	12
					1.05	16
210.096 masl					1.2	22
				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.35	4
				Groundwater seepage observed at 1.8 mbgs	1.5	4
				Water level observed at 3.0 mbgs upon completion	1.65	3
				No caving observed upon completion	1.8	4
					1.95	13
					2.1	33
					2.25	50
					0.15	1
	0-0.2	GS1		200 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	3
TP131-22	0.2-1.2	GS2		Light brown, GRAVELLY SAND, some silt, trace clay, moist to wet	0.45	5
	1.2-2.1	GS3		Same as above	0.6	7
18T 263566.1644 E	2.1-3.0	GS4		Same as above	0.75	9
4919572.217 N					0.9	12
					1.05	50
209.662 masl				Test pit terminated at 3.0 mbgs in gravelly sand	1.2	
				No groundwater or caving observed upon completion	1.35	4
					1.5	50

1. mbgs = metres below ground surface
2. Dynamic probe penetration test, consisting of driving a 19 mm diameter steel rod 150 mm into the soil with an 8 kg hammer falling 750 mm.

TABLE 1: TEST PIT LOGS
42 & 52 Mill Street, Norwood
Technician: Josh Riseling
Cambium Reference No. 14288-003
Completed: April 26 & 27, 2022

Test Pit ID	Depth (mbgs[1])	Soil Sample	% Moisture	Material Description	Depth (m)	DPT[2] (Blows/150 mm)
					0.15	1
	0-0.15	GS1		150 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	3
TP132-22	0.15-0.6	GS2		Brown, SILTY SAND, trace clay, moist	0.45	5
	0.6-1.5	GS3		Brown, SILT AND SAND, trace clay, moist	0.6	6
18T 263707.1165 E	1.5-2.4	GS4		Light brown, GRAVELLY SILTY SAND, moist to wet	0.75	9
4919695.665 N	2.4-3.0	GS5		Same as above, wet	0.9	12
					1.05	12
209.94 masl					1.2	11
				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.35	2
				Groundwater seepage observed at 2.4 mbgs	1.5	5
				Water level observed at 2.85 mbgs upon completion	1.65	7
				No caving observed upon completion	1.8	10
					1.95	18
					2.1	39
					2.25	50
					0.15	2
	0-0.3	GS1		300 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	5
TP133-22	0.3-0.9	GS2		Brown, SILTY SAND, trace clay, moist	0.45	5
	0.9-1.2	GS3		Light brown, GRAVELLY SILTY SAND, wet, trace clay	0.6	10
18T 263811.4872 E	1.2-2.4	GS4		Same as above, moist	0.75	8
4919691.934 N	2.4-3.0	GS5		Same as above	0.9	14
					1.05	10
210.921 masl					1.2	20
				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.35	1
				Groundwater at 1.05 mbgs	1.5	3
				No water level or caving observed upon completion	1.65	8
					1.8	20
					1.95	36
					2.1	50
					0.15	2
	0-0.2	GS1		200 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	4
TP134-22	0.2-1.2	GS2		Light brown, SILTY SAND, trace clay, moist	0.45	6
	1.2-1.8	GS3		Light brown, GRAVELLY SILTY SAND, moist	0.6	8
18T 263754.5517 E	1.8-2.25	GS4		Same as above	0.75	22
4919601.034 E					0.9	50
					1.05	
213.61 masl				Test pit terminated at 2.25 mbgs on bedrock	1.2	8
				No groundwater or caving observed upon completion	1.35	50

1. mbgs = metres below ground surface
2. Dynamic probe penetration test, consisting of driving a 19 mm diameter steel rod 150 mm into the soil with an 8 kg hammer falling 750 mm.

TABLE 1: TEST PIT LOGS
42 & 52 Mill Street, Norwood
Technician: Josh Riseling
Cambium Reference No. 14288-003
Completed: April 26 & 27, 2022

Test Pit ID	Depth (mbgs[1])	Soil Sample	% Moisture	Material Description	Depth (m)	DPT[2] (Blows/150 mm)
					0.15	2
	0-0.2	GS1		200 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	10
TP135-22	0.2-0.6	GS2		Brown, SILTY SAND, trace clay, moist	0.45	8
	0.6-1.2	GS3		Light brown, GRAVELLY SILTY SAND, moist	0.6	6
18T 263781.1848 E	1.2-1.95	GS4		Same as above	0.75	5
4919504.206 N					0.9	50
					1.05	
211.982 masl				Test pit terminated at 1.95 mbgs on bedrock	1.2	7
				No groundwater or caving observed upon completion	1.35	17
					1.5	50
					1.65	
					1.8	
					1.95	
					2.1	
					2.25	
					0.15	1
	0-0.3	GS1		300 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	5
TP136-22	0.3-0.6	GS2		Brown, SILTY SAND, trace clay, moist	0.45	6
	0.6-1.5	GS3		Brown, GRAVELLY SILTY SAND, moist	0.6	19
18T 263881.0651 E					0.75	50
4919463.612 N					0.9	
				Test pit terminated at 1.5 mbgs on bedrock	1.05	
213.088 masl				No groundwater or caving observed upon completion	1.2	10
					1.35	50
				Large cobbles throughout		
					0.15	2
	0-0.3	GS1		300 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	3
TP137-22	0.3-1.2	GS2		Brown, SILTY SAND, trace clay, moist	0.45	4
	1.2-1.95	GS3		Same as above	0.6	4
18T 263827.6047 E					0.75	5
4919332.42 N					0.9	5
				Test pit terminated at 1.95 mbgs on bedrock	1.05	6
210.368 masl				No groundwater or caving observed upon completion	1.2	6
					1.35	0
					1.5	2
					1.65	50
					1.8	

1. mbgs = metres below ground surface
2. Dynamic probe penetration test, consisting of driving a 19 mm diameter steel rod 150 mm into the soil with an 8 kg hammer falling 750 mm.

TABLE 1: TEST PIT LOGS
42 & 52 Mill Street, Norwood
Technician: Josh Riseling
Cambium Reference No. 14288-003
Completed: April 26 & 27, 2022

Test Pit ID	Depth (mbgs[1])	Soil Sample	% Moisture	Material Description	Depth (m)	DPT[2] (Blows/150 mm)
					0.15	1
	0-0.15	GS1		150 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	3
TP138-22	0.15-1.05	GS2		Brown, SILTY SAND, trace clay, moist	0.45	7
	1.05-1.5	GS3		Light brown, SILTY SAND, some clay, moist to wet	0.6	8
18T 263861.8087 E					0.75	15
4919252.342 N					0.9	50
				Test pit terminated at 1.5 mbgs on bedrock	1.05	
209.877 masl				No groundwater or water level observed upon completion	1.2	15
				Sidewall caving observed at 0.6 mbgs	1.35	50
					0.15	2
	0-0.3	GS1		300 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	5
TP139-22	0.3-1.2	GS2		Brown, SILTY SAND, trace clay, moist	0.45	6
	1.2-2.1	GS3		Light brown, GRAVELLY SILTY SAND, trace clay, moist	0.6	6
18T 263604.7646 E	2.1-3.0	GS4		Same as above	0.75	7
4919410.865 N					0.9	8
					1.05	10
209.924 masl				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.2	11
				No groundwater or caving observed upon completion	1.35	1
					1.5	2
					1.65	3
					1.8	9
					1.95	29
					2.1	50
					0.15	2
	0-0.3	GS1		300 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	5
TP140-22	0.3-0.75	GS2		Brown, SILTY SAND, trace clay, moist	0.45	9
	0.75-1.5	GS3		Light brown, GRAVELLY SAND, trace clay, moist to wet, some silt	0.6	9
18T 263475.3943 E	1.5-2.4	GS4		Same as above, wet	0.75	8
4919493.625 N	2.4-3.0	GS5		Same as above	0.9	10
					1.05	16
209.734 masl					1.2	29
				Test pit terminated at 3.0 mbgs in gravelly sand	1.35	5
				Groundwater seepage observed at 1.95 mbgs	1.5	10
				Water level observed at 2.85 mbgs upon completion	1.65	27
				Sidewall caving observed at 0.9 mbgs	1.8	50

1. mbgs = metres below ground surface
2. Dynamic probe penetration test, consisting of driving a 19 mm diameter steel rod 150 mm into the soil with an 8 kg hammer falling 750 mm.

TABLE 1: TEST PIT LOGS
42 & 52 Mill Street, Norwood
Technician: Josh Riseling
Cambium Reference No. 14288-003
Completed: April 26 & 27, 2022

Test Pit ID	Depth (mbgs[1])	Soil Sample	% Moisture	Material Description	Depth (m)	DPT[2] (Blows/150 mm)
					0.15	2
	0-0.15	GS1		150 mm TOPSOIL: Dark brown, silt, trace sand, frequent rootlets, moist	0.3	8
TP141-22	0.15-0.75	GS2		Light brown, SILTY SAND, trace clay, moist	0.45	11
	0.75-1.8	GS3		Same as above, some gravel	0.6	12
18T 263333.4648 E	1.8-2.1	GS4		Light brown, GRAVELLY SILTY SAND, moist	0.75	22
4919169.725 N	2.1-3.0	GS5		Same as above	0.9	18
					1.05	22
204.859 masl					1.2	28
				Test pit terminated at 3.0 mbgs in gravelly silty sand	1.35	1
				No groundwater or caving observed upon completion	1.5	2
					1.65	6
					1.8	4
					1.95	9
					2.1	50

Appendix C
Grain Size Analysis

Grain Size Distribution Chart

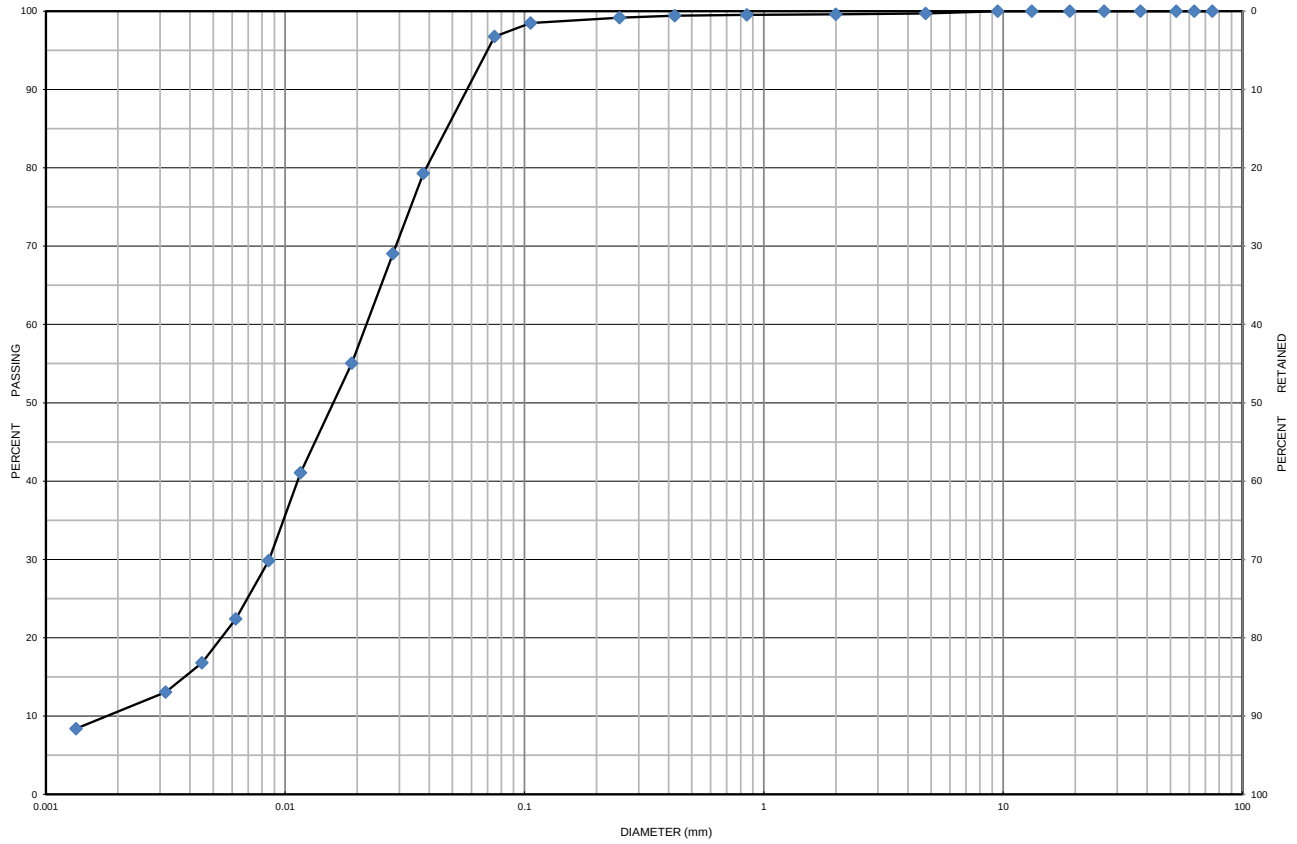
Project Number: *14288-003* **Client:** *CAP Norwood Developments Inc.*

Project Name: *Hydrogeological, Geotechnical, ESA - 42 & 52 Mill St, Norwood*

Sample Date: *April 20 & 21, 2022* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 102-22 SS 4* **Depth:** *2.3 m to 2.7 m* **Lab Sample No:** *S-22-0740*

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 4	2.3 m to 2.7 m	0	3	86	11	27.8

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silt some Clay trace Sand	ML	0.0220	0.0087	0.0017	12.94	2.02

Additional information available upon request

Issued By: _____ *Date Issued:* *May 18, 2022*

(Senior Project Manager)

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

Grain Size Distribution Chart

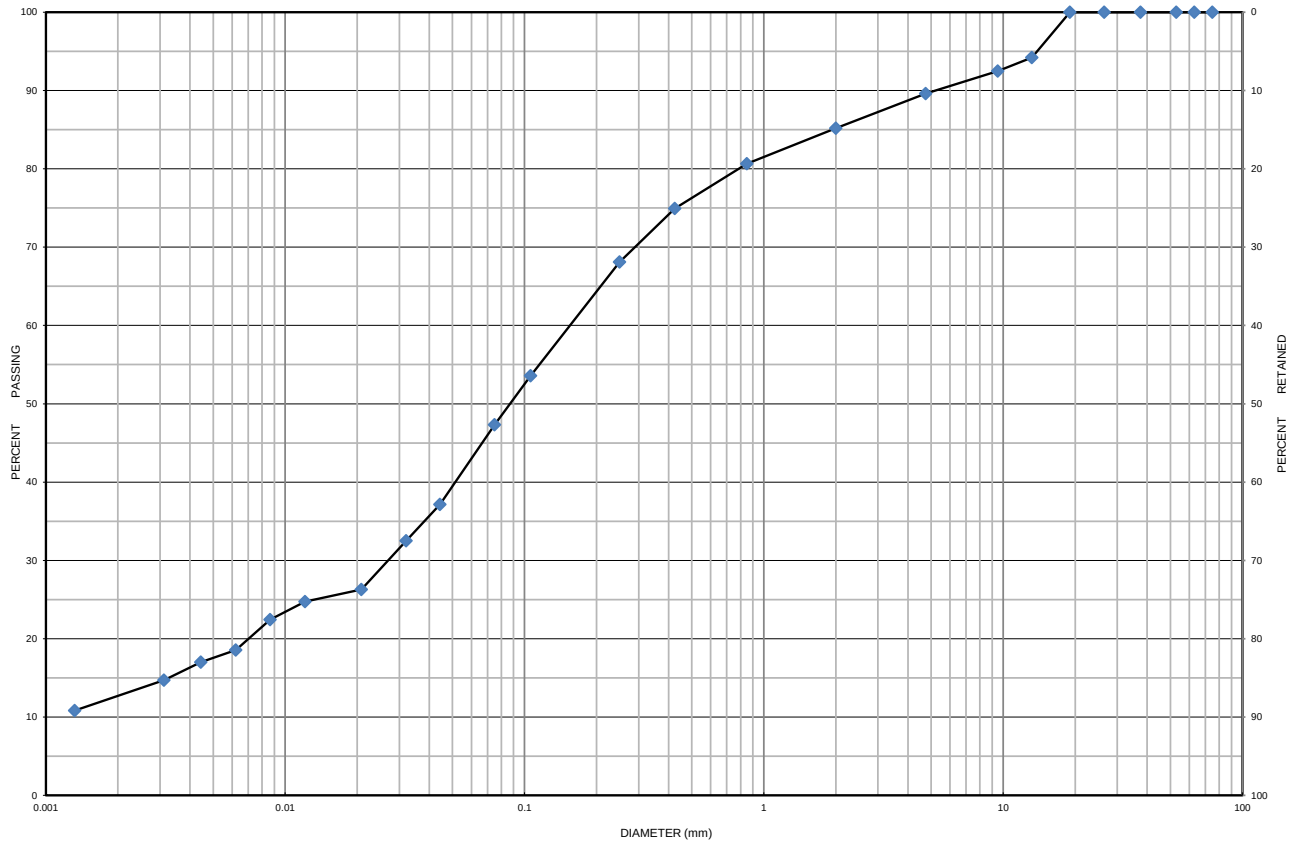
Project Number: *14288-003* **Client:** *CAP Norwood Developments Inc.*

Project Name: *Hydrogeological, Geotechnical, ESA - 42 & 52 Mill St, Norwood*

Sample Date: *April 20 & 21, 2022* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 104-22 SS 3* **Depth:** *1.5 m to 2 m* **Lab Sample No:** *S-22-0741*

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 m	10	42	35	13	8.2

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sand and Silt some Clay some Gravel	SM	0.160	0.026	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *May 18, 2022*

(Senior Project Manager)

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

Grain Size Distribution Chart

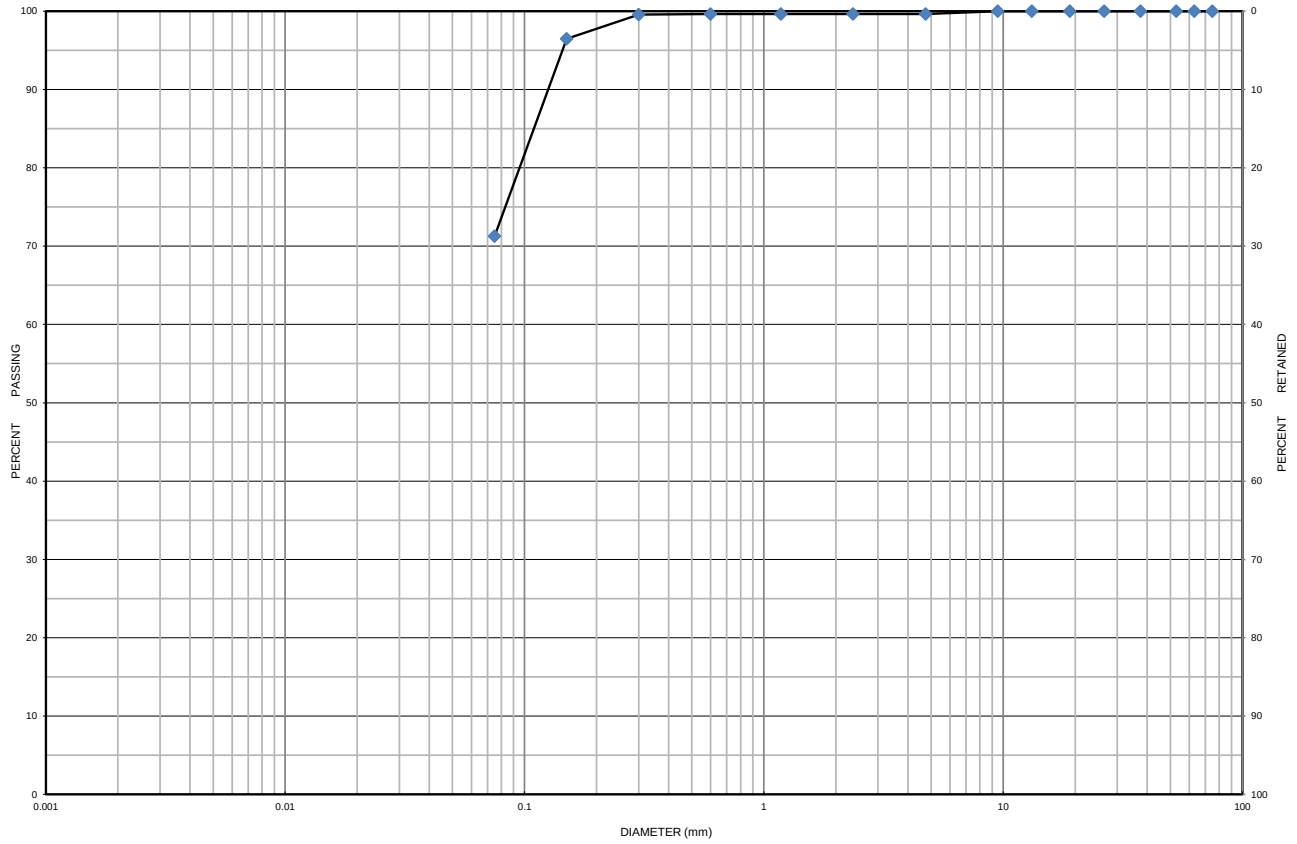
Project Number: *14288-003* **Client:** *CAP Norwood Developments Inc.*

Project Name: *Hydrogeological, Geotechnical, ESA - 42 & 52 Mill St, Norwood*

Sample Date: *April 20 & 21, 2022* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 105-22 SS 3* **Depth:** *1.5 m to 2 m* **Lab Sample No:** *S-22-0742*

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 3	1.5 m to 2 m	0	28	72		23.7

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

Additional information available upon request

Issued By: _____ *Date Issued:* *May 18, 2022*

(Senior Project Manager)

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

Grain Size Distribution Chart

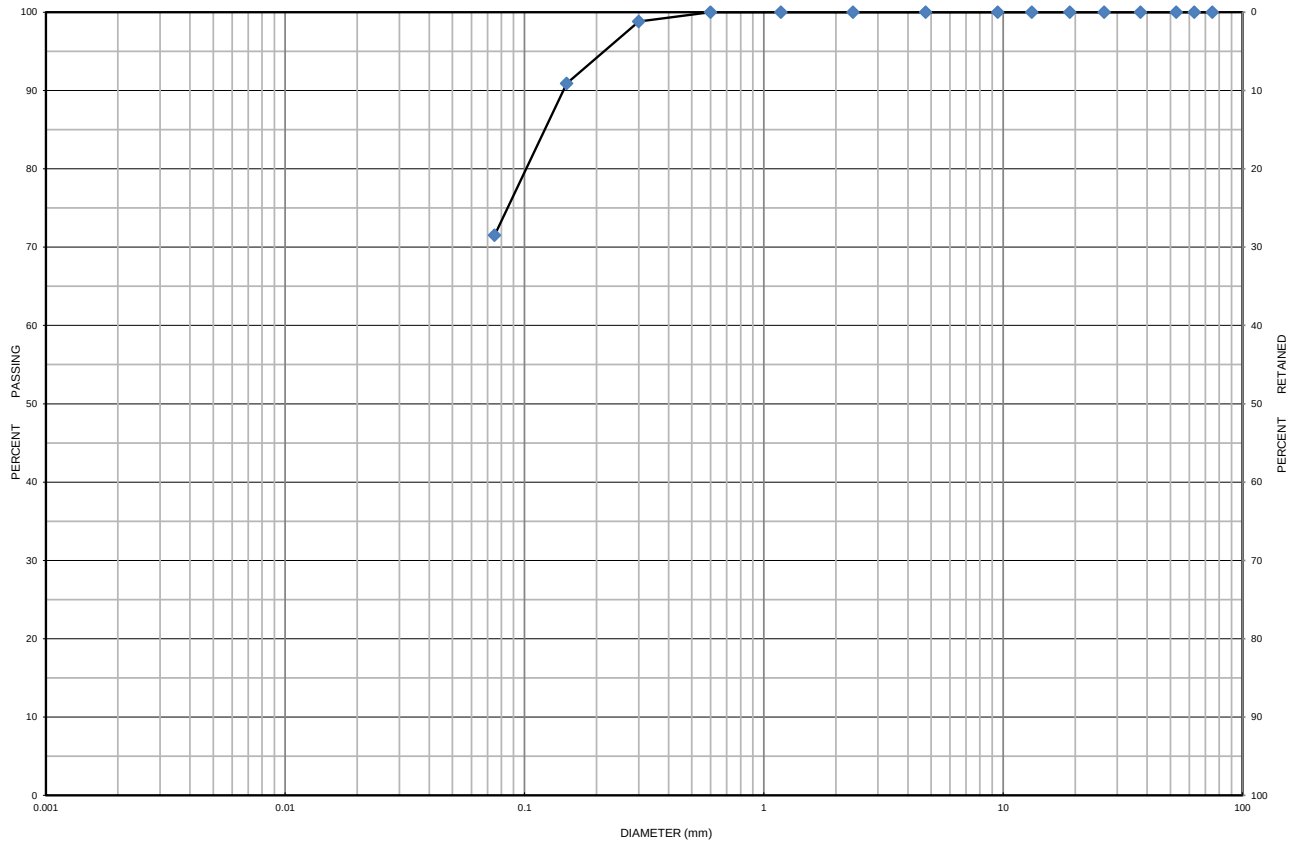
Project Number: *14288-003* **Client:** *CAP Norwood Developments Inc.*

Project Name: *Hydrogeological, Geotechnical, ESA - 42 & 52 Mill St, Norwood*

Sample Date: *April 20 & 21, 2022* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 107-22 SS 3* **Depth:** **Lab Sample No:** *S-22-0743*

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 107-22	SS 3		0	28	72		16.1

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

Additional information available upon request

Issued By: _____ *Date Issued:* *May 18, 2022*

(Senior Project Manager)

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

Grain Size Distribution Chart

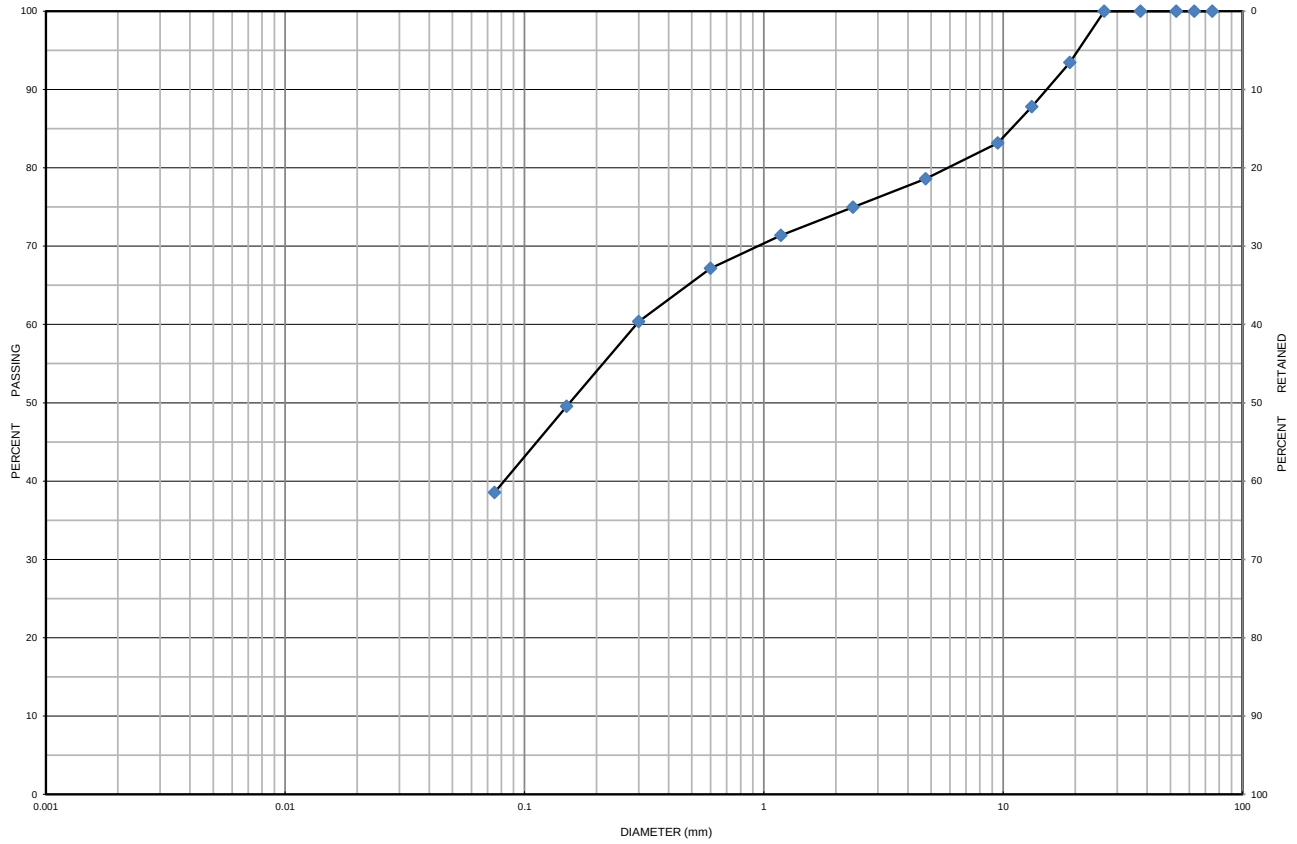
Project Number: *14288-003* **Client:** *CAP Norwood Developments Inc.*

Project Name: *Hydrogeological, Geotechnical, ESA - 42 & 52 Mill St, Norwood*

Sample Date: *April 20 & 21, 2022* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 109-22 SS 3* **Depth:** *1.5 m to 2 m* **Lab Sample No:** *S-22-0744*

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 109-22	SS 3	1.5 m to 2 m	21	40	39		8.2

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Gravelly Sand and Silt	SM	0.300	-	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *May 18, 2022*

(Senior Project Manager)

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

Grain Size Distribution Chart

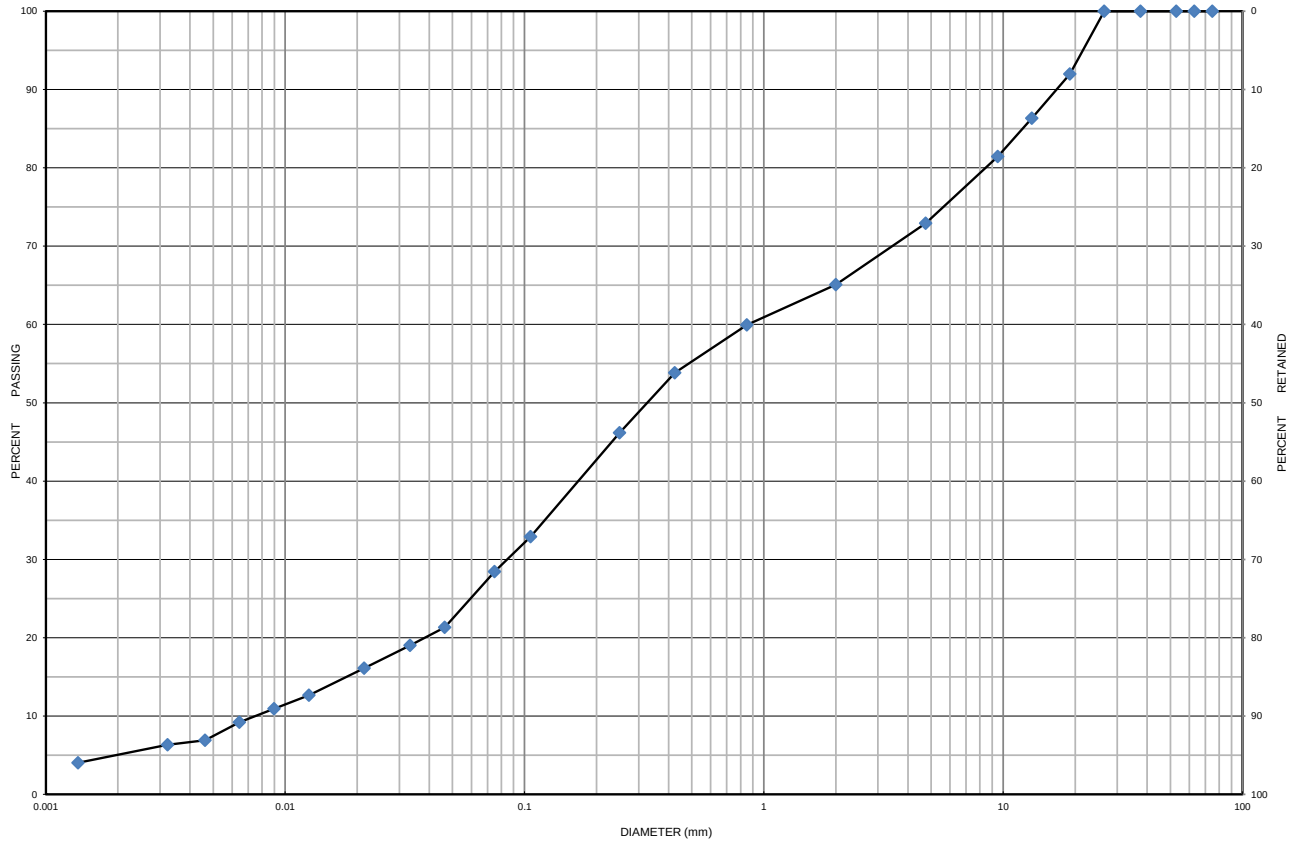
Project Number: *14288-003* **Client:** *CAP Norwood Developments Inc.*

Project Name: *Hydrogeological, Geotechnical, ESA - 42 & 52 Mill St, Norwood*

Sample Date: *April 20 & 21, 2022* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 111-22 SS 2* **Depth:** *0.8 m to 1.2 m* **Lab Sample No:** *S-22-0747*

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 111-22	SS 2	0.8 m to 1.2 m	27	44	24	5	6.3

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Gravelly Silty Sand trace Clay	SM	0.8800	0.0860	0.0075	117.33	1.12

Additional information available upon request

Issued By: _____ *Date Issued:* *May 18, 2022*

(Senior Project Manager)

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

Grain Size Distribution Chart

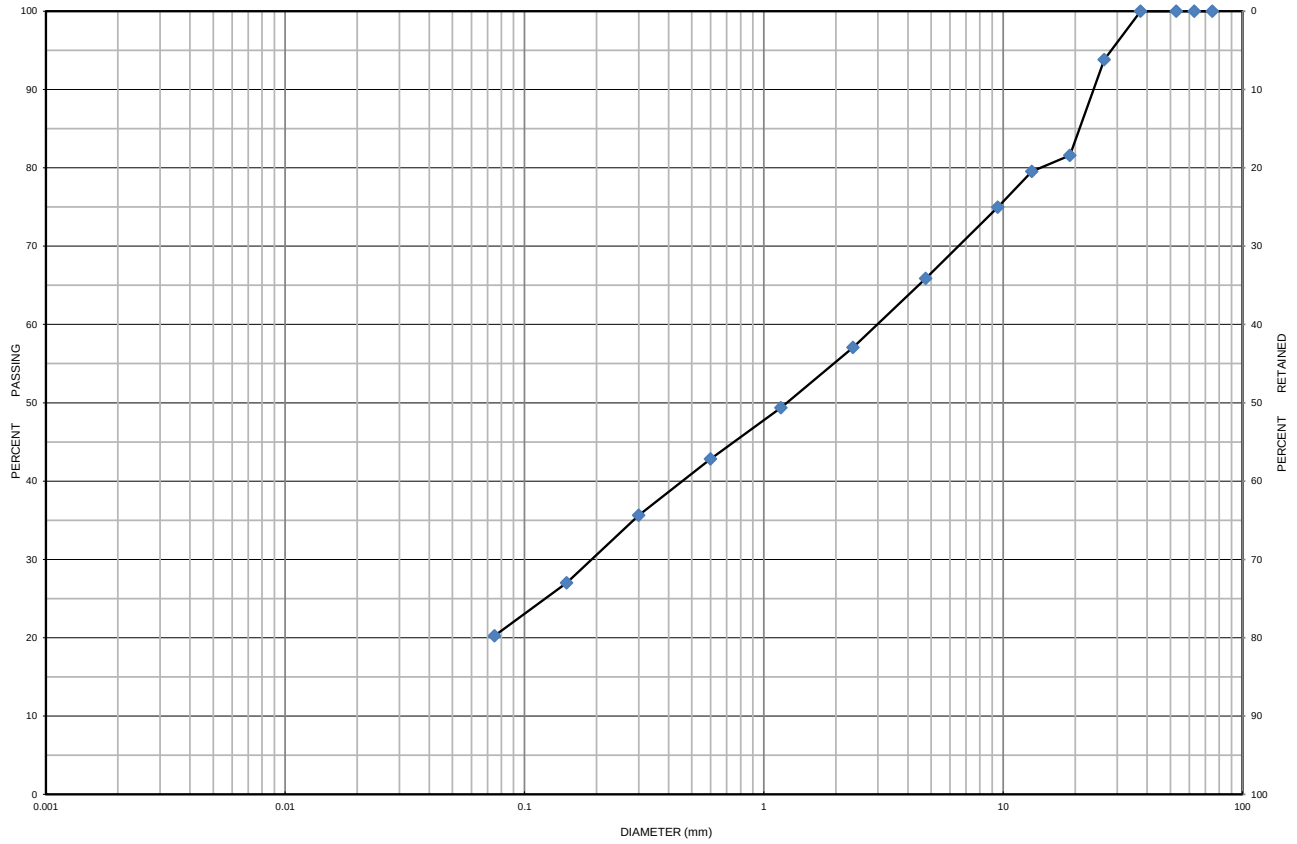
Project Number: *14288-003* **Client:** *CAP Norwood Developments Inc.*

Project Name: *Hydrogeological, Geotechnical, ESA - 42 & 52 Mill St, Norwood*

Sample Date: *April 20 & 21, 2022* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 115-22 SS 3* **Depth:** *1.5 m to 2 m* **Lab Sample No:** *S-22-0745*

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 115-22	SS 3	1.5 m to 2 m	34	46	20		6.4

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Gravelly Silty Sand	SM	3.000	0.190	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *May 18, 2022*

(Senior Project Manager)

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

Grain Size Distribution Chart

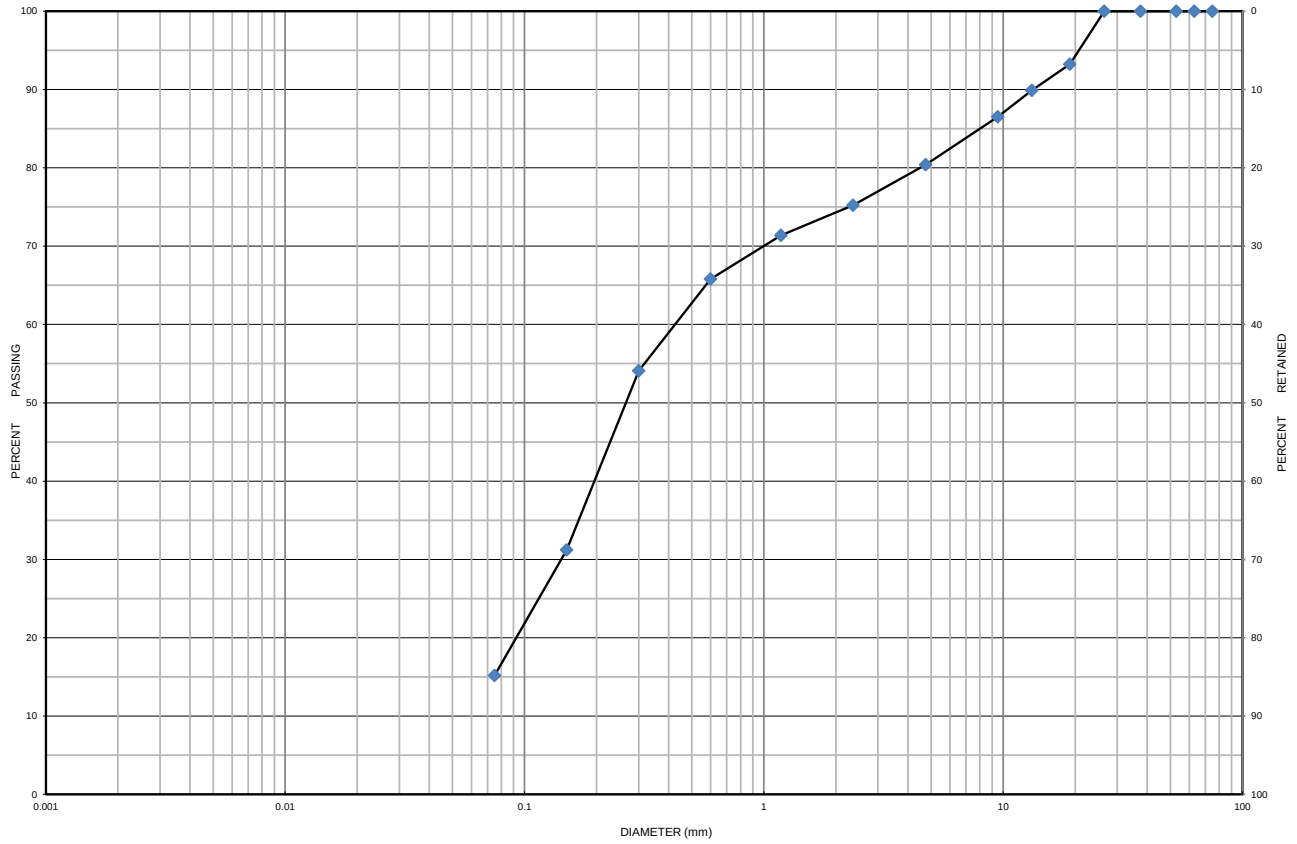
Project Number: *14288-003* **Client:** *CAP Norwood Developments Inc.*

Project Name: *Hydrogeological, Geotechnical, ESA - 42 & 52 Mill St, Norwood*

Sample Date: *April 20 & 21, 2022* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 117-22 SS 3* **Depth:** *1.5 m to 2 m* **Lab Sample No:** *S-22-0746*

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 117-22	SS 3	1.5 m to 2 m	20	65	15		4.7

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Gravelly Sand some Silt	SM	0.420	0.150	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *May 18, 2022*

(Senior Project Manager)

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

Appendix D

Water Well Survey Letter and Questionnaire

CAMBIUM

Environmental

Geotechnical

Building Sciences

Construction Quality Verification

Telephone
(866) 217.7900
(705) 742.7900

Facsimile
(705) 742.7907

Website
cambium-inc.com

Mailing Address
P.O. Box 325,
Peterborough, Ontario
Canada, K9J 6Z3

Locations
Peterborough
Kingston
Barrie
Oshawa
Calgary

Laboratory
Peterborough

Professional Engineers Ontario

APGO

May 2022

Cambium Reference: 14288-003

Dear property owner,

Cambium Inc. is completing a hydrogeological assessment of the property at 52 Mill Street, Norwood in support of potential residential development of that site. As part of the assessment, we are taking inventory of private groundwater users located adjacent to the work area. The purpose of the inventory is to identify nearby water supply wells that may be sensitive to the development.

If a supply well is located on your property, we are requesting that you please review and complete the attached questionnaire. Complete as much information as possible and scan the document (or take a photograph) and email to michelle.rea@cambium-inc.com. Please note, Cambium Inc. may contact you at a later date to request permission to monitor the water level in your well in the future.

You are not obligated to complete this form and participation on your part is voluntary. If you choose to provide a response to this letter, please do so before May 30, 2022.

If you have any questions regarding this assessment, please contact Michelle Rea at 1-705-957-3558.

Thank you. Best regards,

Cambium Inc.

Cameron MacDougall, P.Geo.
Project Manager

CJM

Attached: Water Well Survey Questionnaire

CAMBIUM INC.
BASELINE ASSESSMENT OF RESIDENTIAL WATER SUPPLY

Resident/Owner: _____ Info. Provided By: _____

Address: _____

_____

Phone: Home _____ Work _____

Email Address: _____

Part I: Well Construction Details

Location of Well: _____

_____

Well Record Number (i.e., tag on well) _____

Record Available?: _____ (attach copy) Construction Date: _____

Well Depth (m): _____ Diameter (cm): _____

Casing Length (m): _____ Diameter (cm): _____

Screen Installed? _____ Depth to Water From Ground Surface (m) _____

Details (slot size, diameter, length, depth) _____

_____

_____

Depth to Bedrock: _____ Bedrock Type: _____

Part II: Pump Installation Details

Pump Type (submersible, centifugal, jet, etc.): _____

Manufacturer/Model No.: _____ Power: _____

Design Pumping Rate (units): _____ Design Head (m): _____

Setting Depth (m): _____ Discharge Line (materials, diameter): _____

Pitless Adaptor (type, depth) : _____

Storage Details (pressure or holding tanks, filters or other treatment, operating pressures, etc.):

_____

_____

_____

CAMBIUM INC.
BASELINE ASSESSMENT OF RESIDENTIAL WATER SUPPLY

Part III: Groundwater Usage

What is groundwater used for (specify for each well)?

Water quantity (problems, amounts)

Water Discharge (septic system, settling ponds, other surface water, age, location, etc.)

Water Quality Tested ?: _____ (attach results if available)

Water quality (odour, taste, colour, hardness)

Diagram:

Residential survey contact addresses

#	Address	City	Province	Postal Code	Contacted in April	Contacted in May
24	Mill St	Norwood	Ontario	K0L 2V0	x	x
26	Mill St	Norwood	Ontario	K0L 2V0	x	x
28	Mill St	Norwood	Ontario	K0L 2V0	x	x
36	Mill St	Norwood	Ontario	K0L 2V0	x	x
67	Mill St	Norwood	Ontario	K0L 2V0	x	x
76	Mill St	Norwood	Ontario	K0L 2V0	x	x
78	Mill St	Norwood	Ontario	K0L 2V0	x	x
90	Mill St	Norwood	Ontario	K0L 2V0	x	x
96	Mill St	Norwood	Ontario	K0L 2V0	x	x
102	Mill St	Norwood	Ontario	K0L 2V0	x	x
106	Mill St	Norwood	Ontario	K0L 2V0	x	x
112	Mill St	Norwood	Ontario	K0L 2V0	x	x
2363	Asphodel 10th Line	Norwood	Ontario	K0L 2V0	x	x
2366	Asphodel 10th Line	Norwood	Ontario	K0L 2V0	x	x
2367	Asphodel 10th Line	Norwood	Ontario	K0L 2V0	x	x
2370	Asphodel 10th Line	Norwood	Ontario	K0L 2V0	x	x
2371	Asphodel 10th Line	Norwood	Ontario	K0L 2V0	x	x
2413	Asphodel 10th Line	Norwood	Ontario	K0L 2V0	x	x
2447	Asphodel 10th Line	Norwood	Ontario	K0L 2V0	x	x
2450	Asphodel 10th Line	Norwood	Ontario	K0L 2V0		x
2319	Asphodel 10th Line	Norwood	Ontario	K0L 2V0		x

Appendix E

Certificate of Laboratory Analysis

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : 14258-003

11-May-2022

Cambium Inc.
Attn : Cameron MacDougall

194 Sofia Street
Peterborough, ON
K9H 1E3, Canada

Phone: 705-742-7900
Fax:705-742-7907

Date Rec. : 04 May 2022
LR Report: **CA17977-MAY22**
Reference: 14288-003, Cameron MacDougall

Copy: Final # 1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	6: MW105-22	7: MW115-22
Sample Date & Time					04-May-22 13:45	04-May-22 14:30
Temp Upon Receipt [°C]	***	***	***	***	***	***
TSS [mg/L]	05-May-22	16:19	06-May-22	13:48	2020	3260
Cl [mg/L]	10-May-22	16:39	11-May-22	13:59	9	18
NH3+NH4 [as N mg/L]	04-May-22	22:31	05-May-22	10:36	< 0.1	< 0.1
NO2 [as N mg/L]	10-May-22	11:44	11-May-22	10:08	< 0.03	0.06
NO3 [as N mg/L]	10-May-22	11:44	11-May-22	10:08	18.9	23.4
NO2+NO3 [as N mg/L]	10-May-22	11:44	11-May-22	10:08	18.9	23.5
Al (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.241	0.187
Al (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	9.52	3.56
Sb (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	< 0.0009	< 0.0009
Sb (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	< 0.0009	< 0.0009
As (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	< 0.0002	< 0.0002
As (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.0019	0.0009
Ba (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.0251	0.0291
Ba (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.122	0.0724
Be (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.000015	0.000021
Be (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.000449	0.000161
B (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.018	0.035
B (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.030	0.017
Bi (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	< 0.00001	< 0.00001
Bi (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00004	0.00002
Cd (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	< 0.000003	< 0.000003
Cd (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.000046	0.000030
Ca (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	125	128
Ca (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	242	172
Cr (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.0111	0.00400

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : 14258-003

LR Report : **CA17977-MAY22**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	6: MW105-22	7: MW115-22
Cr (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00067	0.00050
Co (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.000489	0.000285
Co (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00543	0.00164
Cu (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.0014	0.0011
Cu (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.0109	0.0042
Fe (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.235	0.177
Fe (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	6.89	2.82
Pb (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00042	0.00032
Pb (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00883	0.00244
Li (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.0006	0.0008
Li (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.0083	0.0034
Mg (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	4.78	3.53
Mg (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	8.40	4.57
Mn (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.107	0.05963
Mn (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.897	0.137
Mo (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00013	0.00018
Mo (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00055	0.00027
Ni (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.0007	0.0006
Ni (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.0093	0.0030
P (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.018	0.020
P (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.326	0.132
K (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	1.29	1.02
K (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	4.80	2.12
Se (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	< 0.00004	0.00009
Se (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00009	0.00007
Si (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	4.33	4.22
Si (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	23.2	12.9
Ag (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	< 0.00005	< 0.00005
Ag (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00012	< 0.00005
Na (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	5.72	3.11
Na (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	5.88	3.12
Sr (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.305	0.282
Sr (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.473	0.360
Tl (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.000021	0.000016
Tl (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.000232	0.000089
Sn (diss) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00026	0.00048
Sn (tot) [mg/L]	09-May-22	18:57	11-May-22	16:01	0.00180	0.00146
Ti (diss) [mg/L]	09-May-22	18:57	11-May-22	16:02	0.0107	0.00870
Ti (tot) [mg/L]	09-May-22	18:57	11-May-22	16:02	0.510	0.171
U (diss) [mg/L]	09-May-22	18:57	11-May-22	16:02	0.000439	0.000234
U (tot) [mg/L]	09-May-22	18:57	11-May-22	16:02	0.000705	0.000293
V (diss) [mg/L]	09-May-22	18:57	11-May-22	16:02	0.00073	0.00052

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Project : 14258-003

LR Report : **CA17977-MAY22**

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	6: MW105-22	7: MW115-22
V (tot) [mg/L]	09-May-22	18:57	11-May-22	16:02	0.0145	0.00492
Zn (diss) [mg/L]	09-May-22	18:57	11-May-22	16:02	< 0.002	< 0.002
Zn (tot) [mg/L]	09-May-22	18:57	11-May-22	16:02	0.026	0.014
Zr (diss) [mg/L]	09-May-22	18:57	11-May-22	16:02	< 0.002	< 0.002
Zr (tot) [mg/L]	09-May-22	18:57	11-May-22	16:02	0.007	0.004

Note: Unionized ammonia calculated using lab results for pH and temperature.

Temperature of Sample upon Receipt: 11 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes

Chain of Custody Number: N/A

Jill Campbell

Jill Campbell, B.Sc.,GISAS
Project Specialist,
Environment, Health & Safety

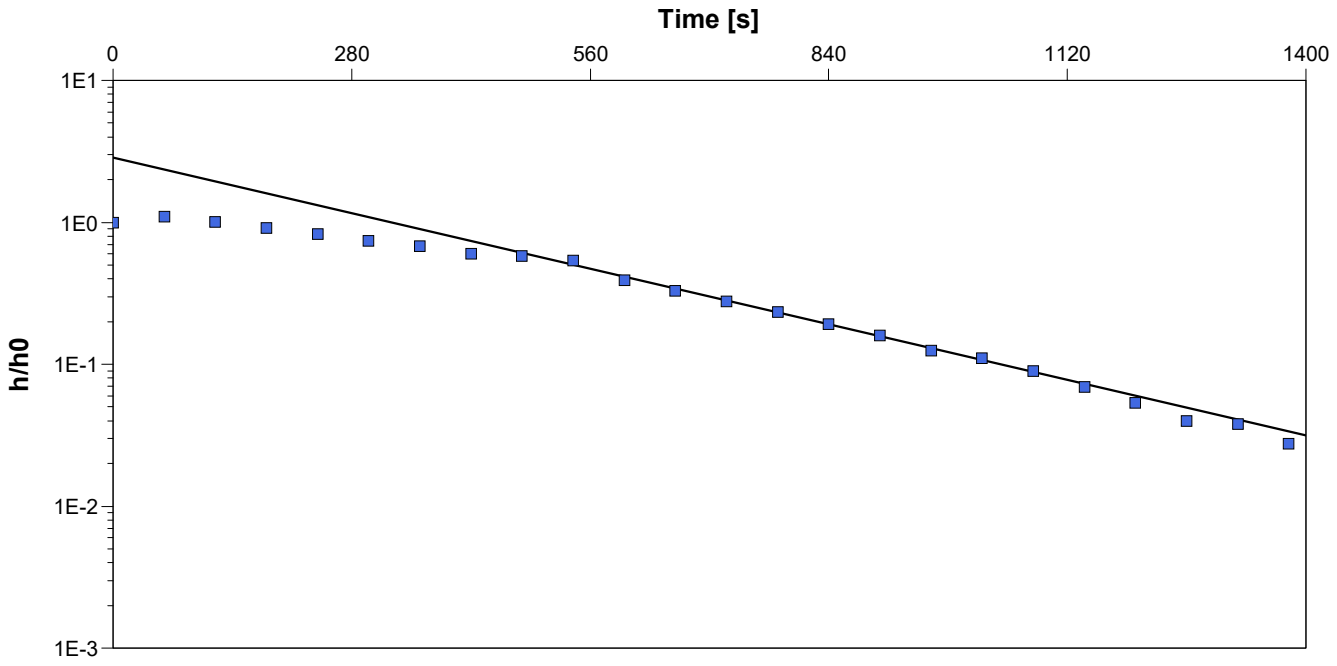
OnLine LIMS

0002897279

Appendix F
Aquifer Test Pro Results

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	

Location: 52 Mill Street, Norwood	Slug Test: MW105-22 - Slug Test 1	Test Well: MW105-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW105-22 - Slug Test 1	Analysis Date: 6/16/2022
Aquifer Thickness: 1.70 m		

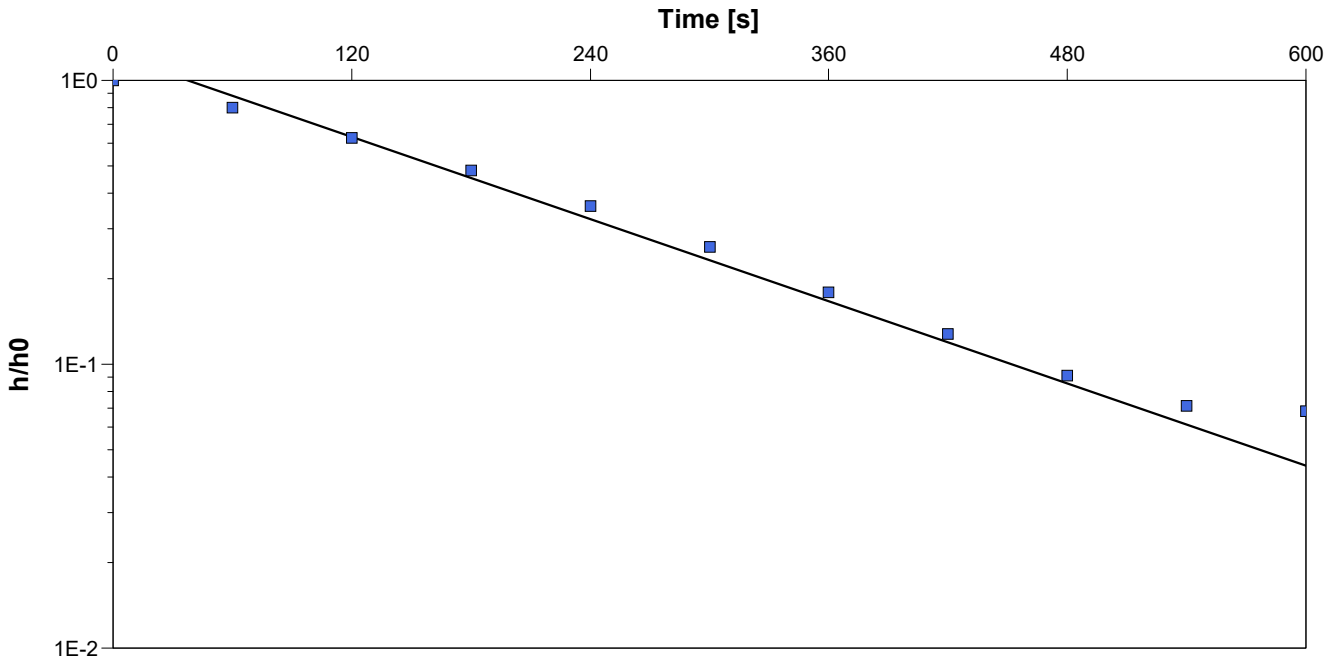


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW105-22	1.61×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	

Location: 52 Mill Street, Norwood	Slug Test: MW105-22 - Slug Test 2	Test Well: MW105-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW105-22 - Slug Test 2	Analysis Date: 6/16/2022
Aquifer Thickness: 1.70 m		

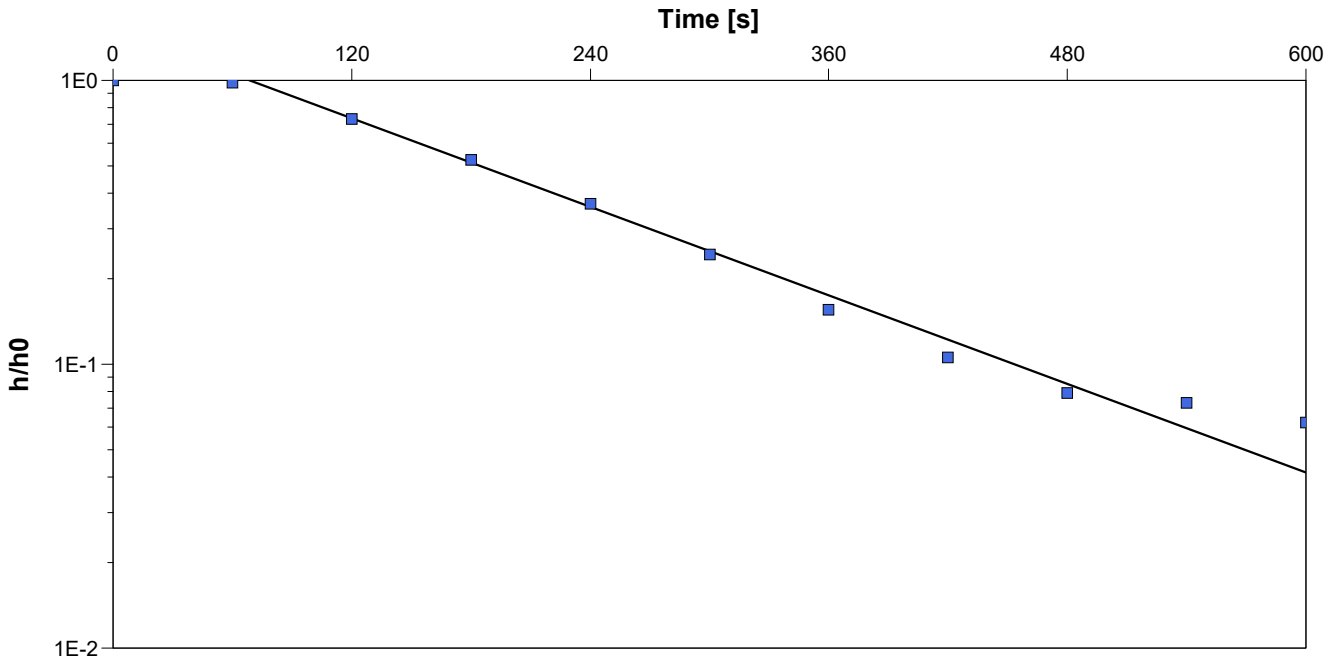


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW105-22	2.79×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	

Location: 52 Mill Street, Norwood	Slug Test: MW105-22 - Slug Test 3	Test Well: MW105-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW105-22 - Slug Test 3	Analysis Date: 6/16/2022
Aquifer Thickness: 1.70 m		

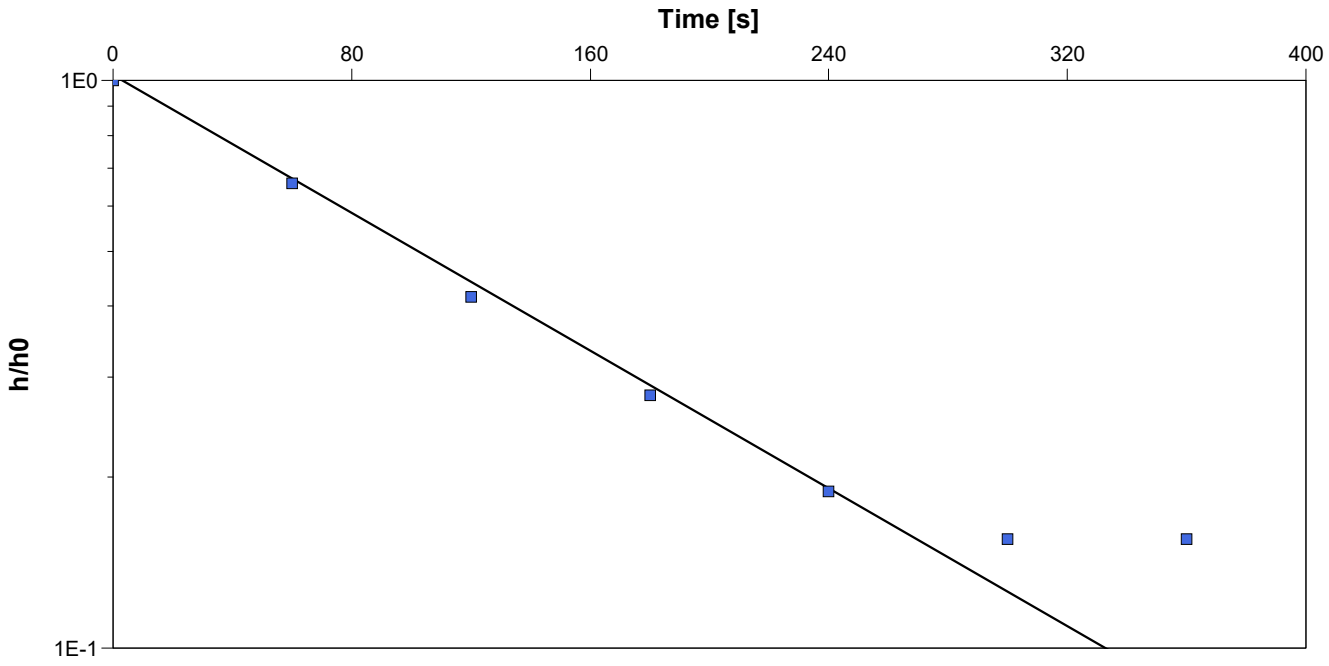


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW105-22	3.00×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	

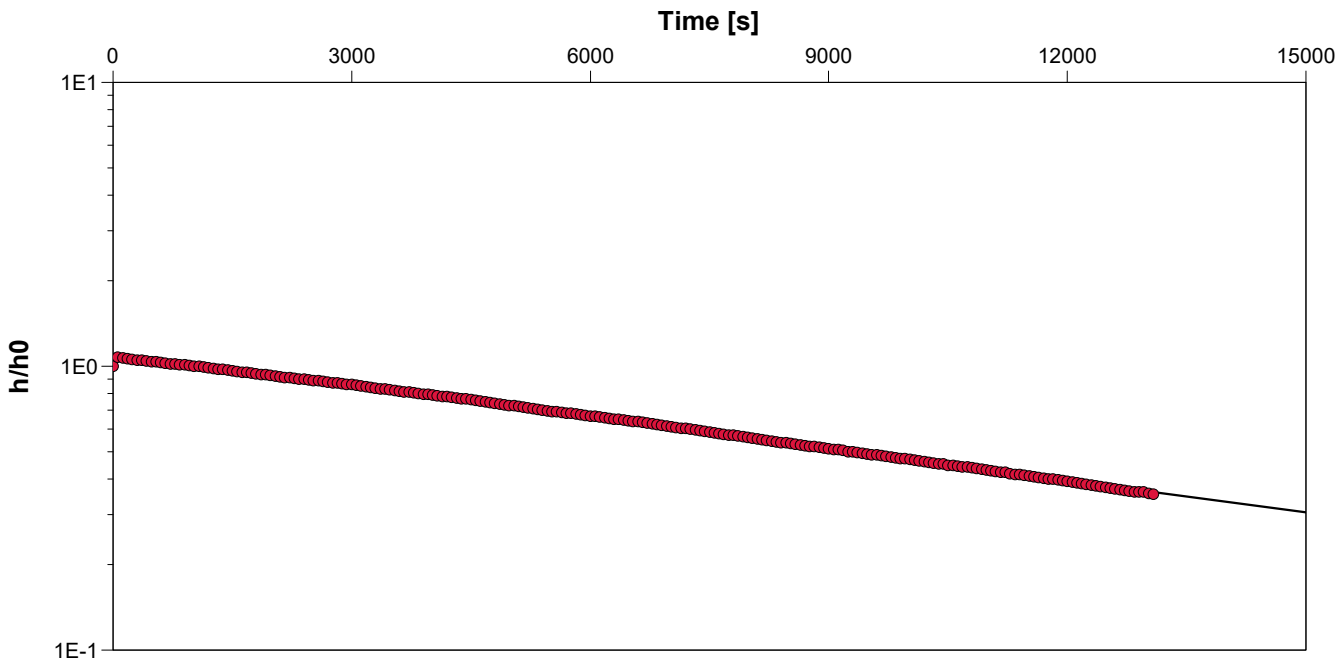
Location: 52 Mill Street, Norwood	Slug Test: MW105-22 - Slug Test 4	Test Well: MW105-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW105-22 - Slug Test 4	Analysis Date: 6/16/2022
Aquifer Thickness: 1.70 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW105-22	3.50×10^{-6}	

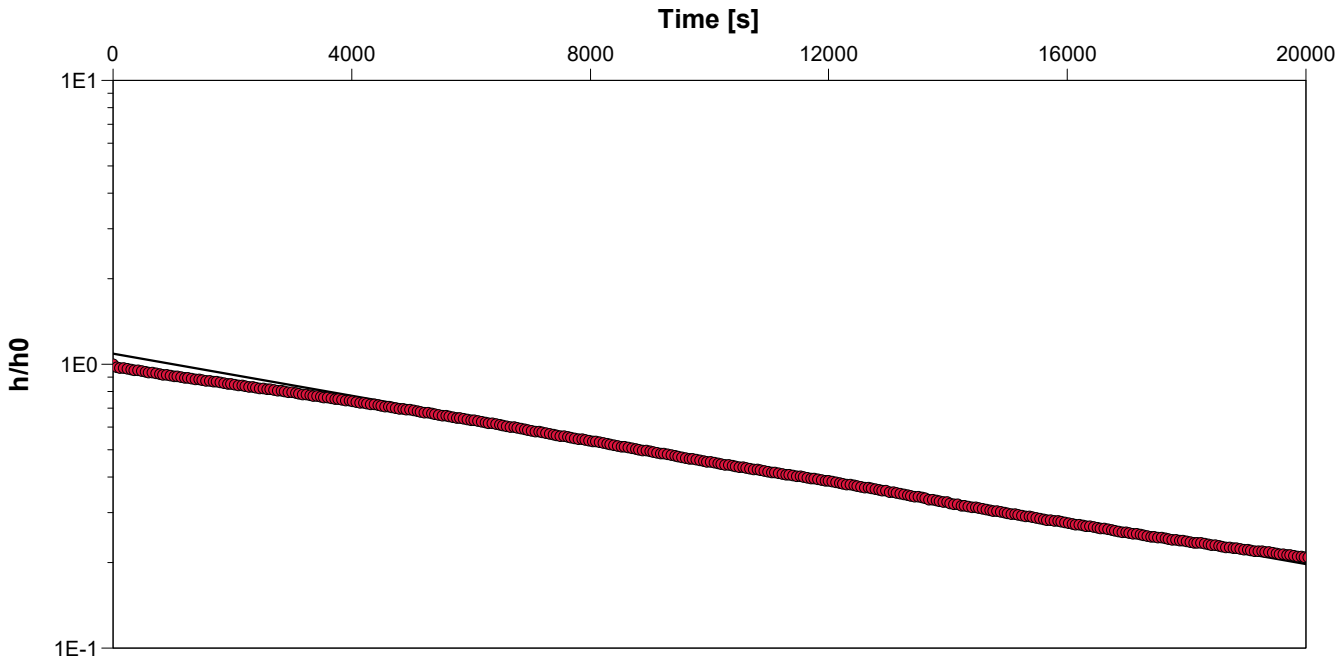
194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	
Location: 52 Mill Street, Norwood	Slug Test: MW112-22 - Slug Test 1	Test Well: MW112-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW112-22 - Slug Test 1	Analysis Date: 6/16/2022
Aquifer Thickness: 1.43 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW112-22	7.35×10^{-8}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	
Location: 52 Mill Street, Norwood	Slug Test: MW112-22 - Slug Test 2	Test Well: MW112-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW112-22 - Slug Test 2	Analysis Date: 6/16/2022
Aquifer Thickness: 1.43 m		

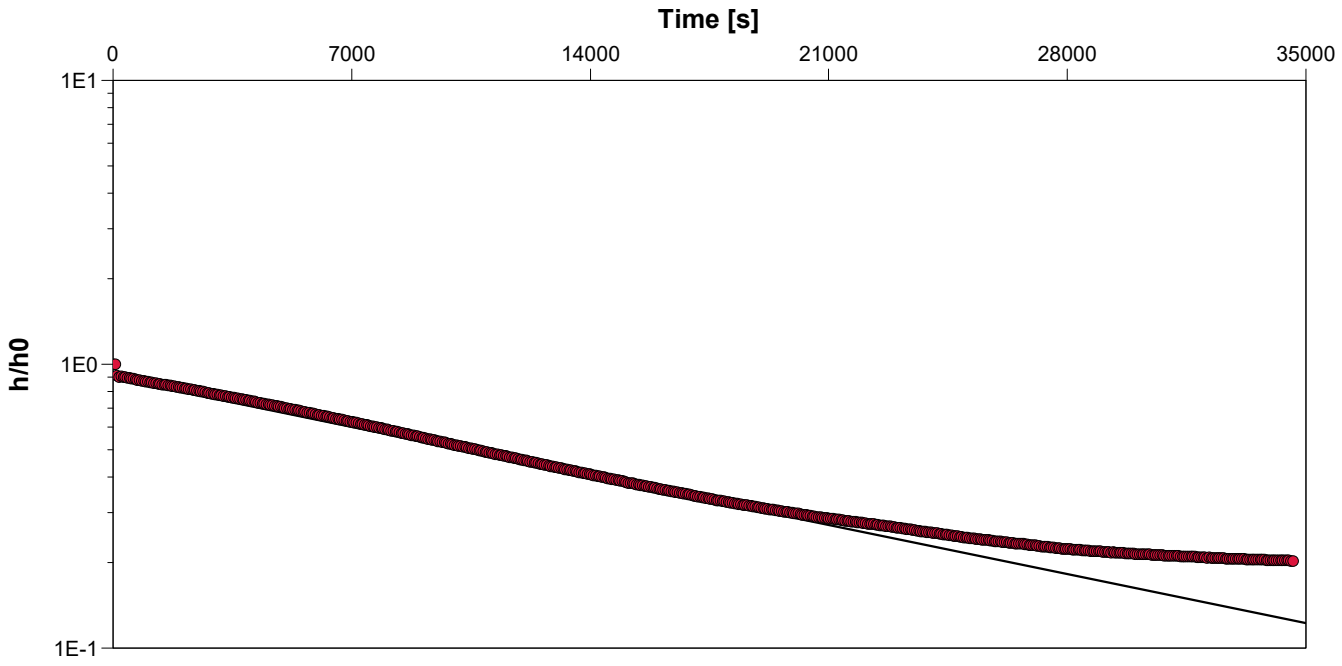


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW112-22	7.32×10^{-8}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	

Location: 52 Mill Street, Norwood	Slug Test: MW112-22 - Slug Test 3	Test Well: MW112-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW112-22 - Slug Test 3	Analysis Date: 6/16/2022
Aquifer Thickness: 1.43 m		

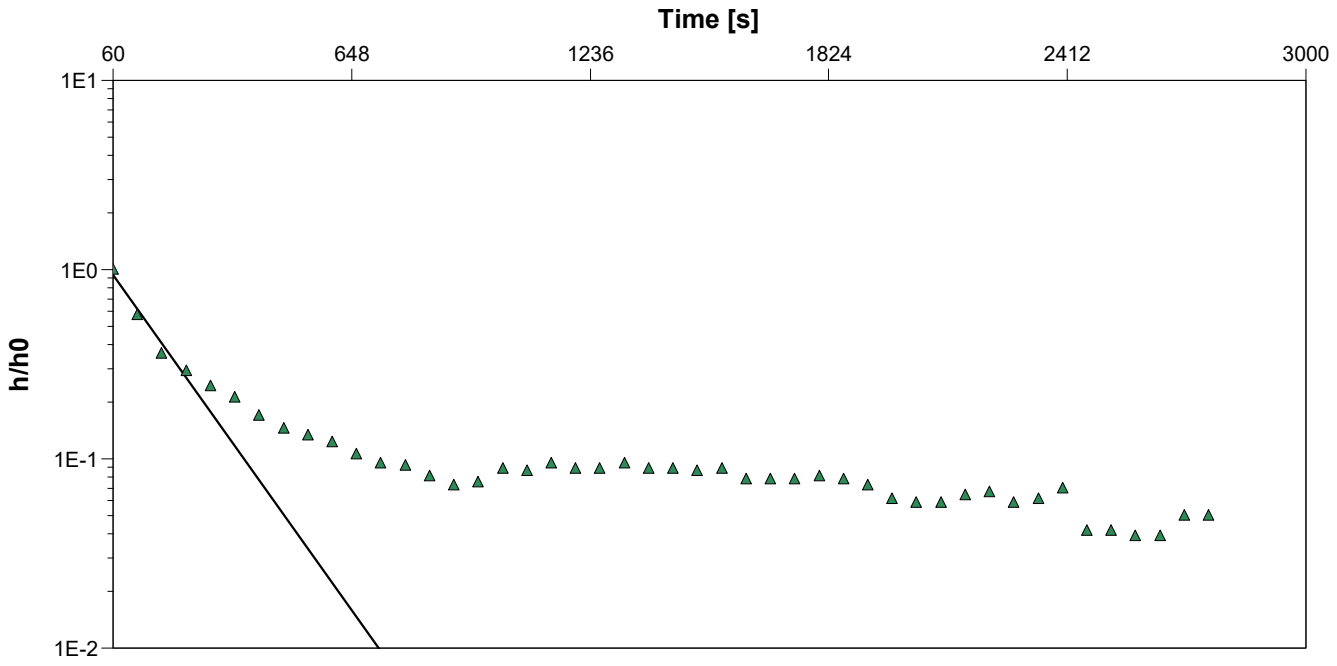


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW112-22	4.88×10^{-8}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	

Location: 52 Mill Street, Norwood	Slug Test: MW115-22 - Slug Test 1	Test Well: MW115-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW115-22 - Slug Test 1	Analysis Date: 6/16/2022
Aquifer Thickness: 0.57 m		

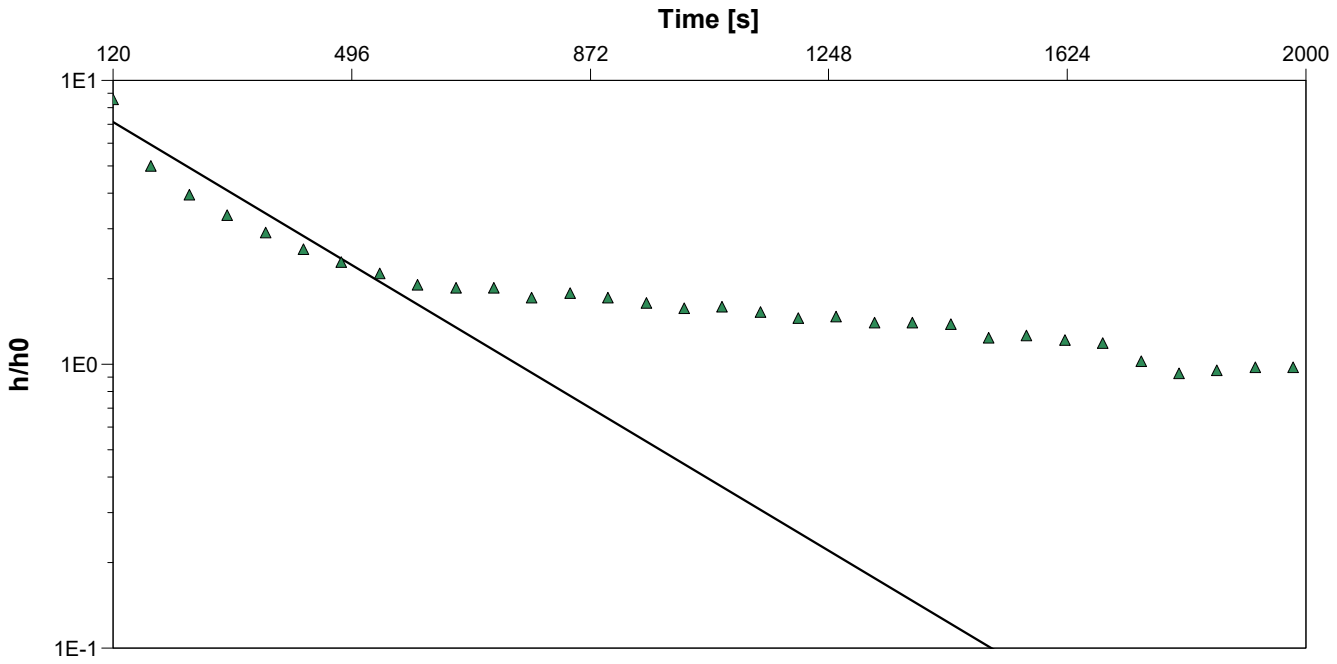


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW115-22	5.95×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	

Location: 52 Mill Street, Norwood	Slug Test: MW115-22 - Slug Test 2	Test Well: MW115-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW115-22 - Slug Test 2	Analysis Date: 6/16/2022
Aquifer Thickness: 0.57 m		

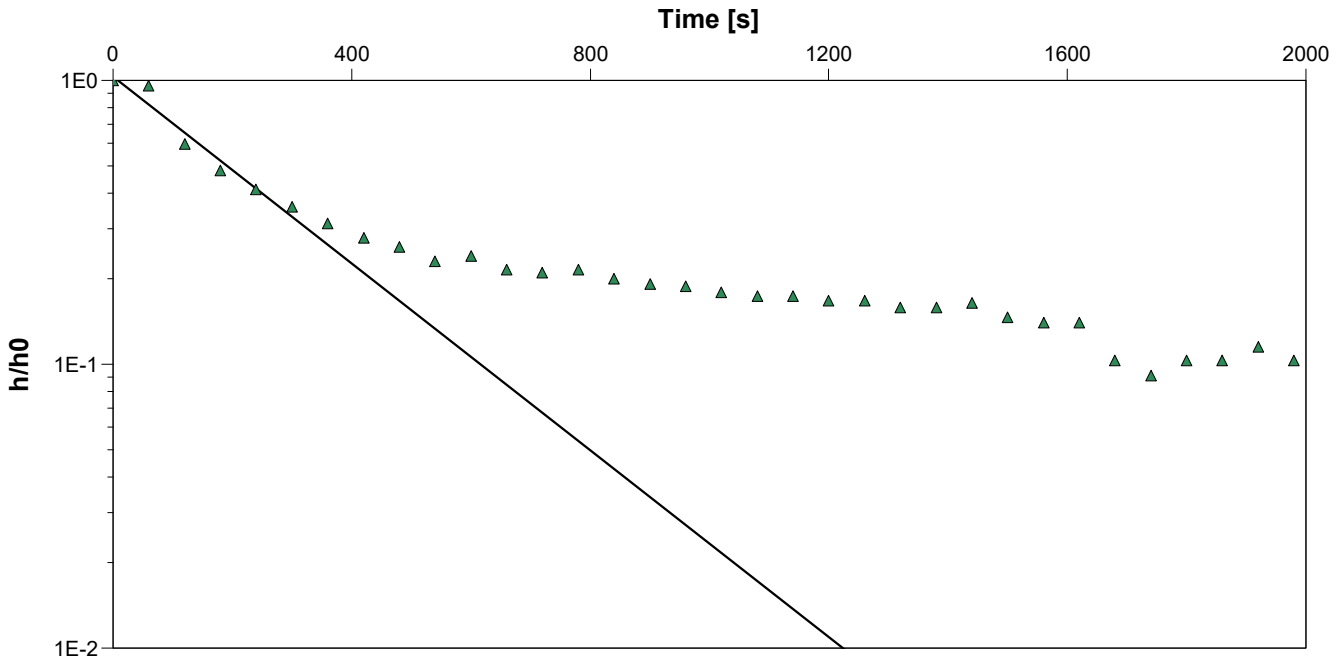


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW115-22	2.64×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	

Location: 52 Mill Street, Norwood	Slug Test: MW115-22 - Slug Test 3	Test Well: MW115-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW115-22 - Slug Test 3	Analysis Date: 6/16/2022
Aquifer Thickness: 0.57 m		

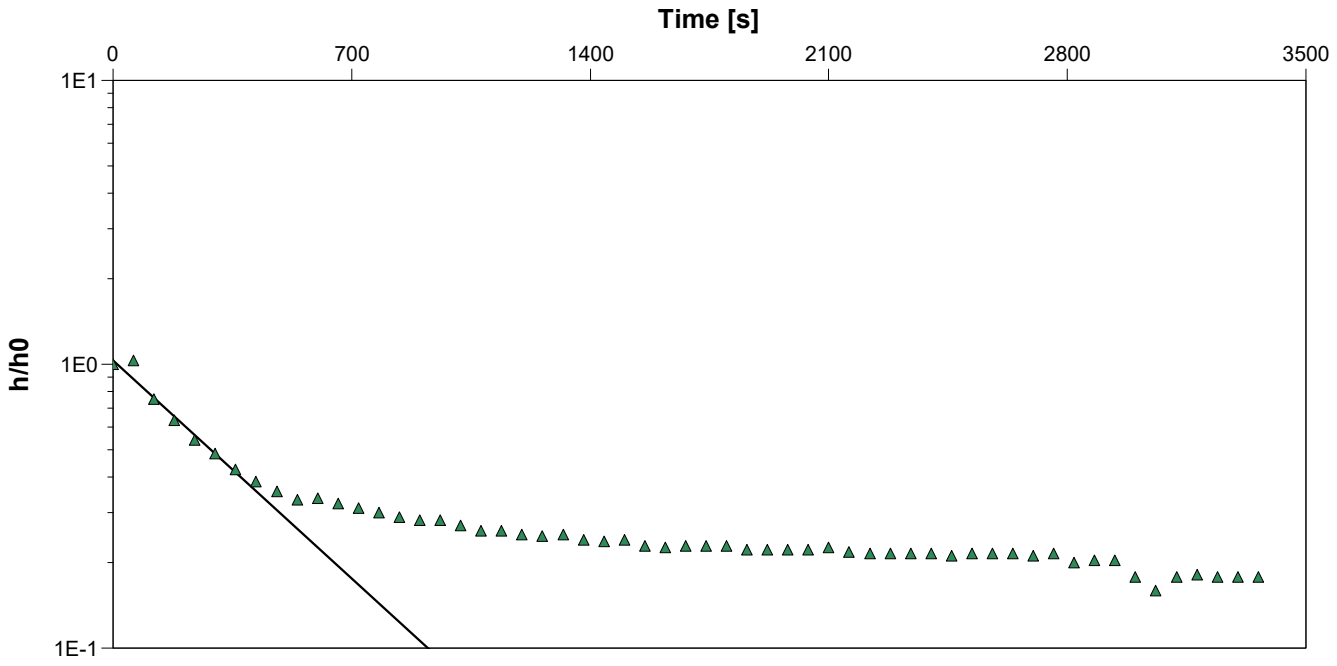


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW115-22	3.25×10^{-6}	

194 Sophia St. Peterborough, ON K9H1E5	**Slug Test Analysis Report**	
	Project: Hydrogeological Assessment	
	Number: 14288-003	
	Client: CAP Norwood Development	

Location: 52 Mill Street, Norwood	Slug Test: MW115-22 - Slug Test 4	Test Well: MW115-22
Test Conducted by: J. Munro		Test Date: 5/4/2022
Analysis Performed by: N. Heikoop	MW115-22 - Slug Test 4	Analysis Date: 6/16/2022
Aquifer Thickness: 0.57 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW115-22	2.17×10^{-6}	

Appendix G

MECP Well Record Summary

Water Well Records Summary Report

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

All units in meters unless otherwise specified

Well ID: 5100148
Construction Date: 12/3/1959
Easting: 263546
Northing: 4919090
UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	12.2	**Water Kind**	FRESH	**Pump Rate (LPM):**	0
Water First Found:	9.75	**Final Status**	Water Supply	**Recommended Pump Rate:**	0
Static Level:	6	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	5 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	CLAY	0	7.92
2	LIMESTONE	7.92	12.2

Well ID: 5100151
Construction Date: 5/19/1952
Easting: 263282
Northing: 4920013
UTM Zone 18
Positional Accuracy: unknown UTM

Well Depth:	11	**Water Kind**	FRESH	**Pump Rate (LPM):**	0
Water First Found:	10.7	**Final Status**	Water Supply	**Recommended Pump Rate:**	
Static Level:	8	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	24 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	MEDIUM SAND	0	11

Well ID: 5100152
Construction Date: 9/19/1952
Easting: 263040
Northing: 4919685
UTM Zone 18
Positional Accuracy: unknown UTM

Well Depth:	12.2	**Water Kind**	FRESH	**Pump Rate (LPM):**	23
Water First Found:	10.7	**Final Status**	Water Supply	**Recommended Pump Rate:**	
Static Level:	3	**Primary Water Use:**	Public	**Pumping Duration (h:m):**	3 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	MEDIUM SAND	0	10.7
2	GRAVEL	10.7	12.2

Well ID: 5100153
Construction Date: 12/28/1954
Easting: 263222
Northing: 4919869
UTM Zone 18
Positional Accuracy: unknown UTM

Well Depth:	12.8	**Water Kind**	FRESH	**Pump Rate (LPM):**	23
Water First Found:	12.8	**Final Status**	Water Supply	**Recommended Pump Rate:**	
Static Level:	10	**Primary Water Use:**	Commerical	**Pumping Duration (h:m):**	2 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	MEDIUM SAND	0.30	11.6
3	CLAY	11.6	12.8

Well ID: 5100154
Construction Date: 11/14/1955
Easting: 263344
Northing: 4920056
UTM Zone 18
Positional Accuracy: unknown UTM

Well Depth:	6.4	**Water Kind**	FRESH	**Pump Rate (LPM):**	14
Water First Found:	5.79	**Final Status**	Water Supply	**Recommended Pump Rate:**	
Static Level:	3	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	0 : 45

Layer:	Driller's Description:	Top:	Bottom:
1	MEDIUM SAND	0	3.66
2	LIMESTONE	3.66	6.40

Well ID: 5100156
Construction Date: 6/2/1959
Easting: 263343
Northing: 4920026
UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	16.5	**Water Kind**	FRESH	**Pump Rate (LPM):**	27
Water First Found:	15.2	**Final Status**	Water Supply	**Recommended Pump Rate:**	
Static Level:	10	**Primary Water Use:**	Commerical	**Pumping Duration (h:m):**	3 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.91
2	GRAVEL	0.91	10.7
3	MEDIUM SAND	10.7	11.9
4	LIMESTONE	11.9	16.5

Well ID: 5100157
Construction Date: 6/6/1960
Easting: 263053
Northing: 4919765
UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	51.8	**Water Kind**	SALTY	**Pump Rate (LPM):**	23
Water First Found:	51.8	**Final Status**	Water Supply	**Recommended Pump Rate:**	23
Static Level:	29	**Primary Water Use:**	Commerical	**Pumping Duration (h:m):**	1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	MEDIUM SAND	0	13.4
2	LIMESTONE	13.4	51.8

Well ID: 5100158
Construction Date: 1/3/1966
Easting: 263159
Northing: 4919796
UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	12.2	**Water Kind**	FRESH	**Pump Rate (LPM):**	23
Water First Found:	11.6	**Final Status**	Water Supply	**Recommended Pump Rate:**	23
Static Level:	8	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	1.22
2	MEDIUM SAND	1.22	11
3	LIMESTONE	11	12.2

Well ID: 5100159
Construction Date: 2/14/1967
Easting: 262857
Northing: 4919335
UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	7.92	**Water Kind**	FRESH	**Pump Rate (LPM):**	23
Water First Found:	7.62	**Final Status**	Water Supply	**Recommended Pump Rate:**	23
Static Level:	2	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	2 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	CLAY	0.30	7.62
3	GRAVEL	7.62	7.92

Well ID: 5100160
Construction Date: 8/29/1967
Easting: 263210
Northing: 4919815
UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	11	**Water Kind**	FRESH	**Pump Rate (LPM):**	23
Water First Found:	10.7	**Final Status**	Water Supply	**Recommended Pump Rate:**	23
Static Level:	8	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	0 : 30

Layer:	Driller's Description:	Top:	Bottom:
1	PREVIOUSLY DUG	0	4.88
2	MEDIUM SAND	4.88	11

Well ID: 5100163
Construction Date: 9/6/1966

Easting: 263981
Northing: 4919757

UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	18.3	**Water Kind**	FRESH	**Pump Rate (LPM):**	5
Water First Found:	10.7	**Final Status**	Water Supply	**Recommended Pump Rate:**	5
Static Level:	6	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	1 : 30

Layer:	Driller's Description:	Top:	Bottom:
1	MEDIUM SAND	0	5.18
2	LIMESTONE	5.18	16.8
3	GRANITE	16.8	18.3

Well ID: 5109119
Construction Date: 8/16/1978

Easting: 263080
Northing: 4920072

UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	12.2	**Water Kind**	FRESH	**Pump Rate (LPM):**	45
Water First Found:	12.2	**Final Status**	Water Supply	**Recommended Pump Rate:**	45
Static Level:	9	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	3 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	11
2	LIMESTONE	11	12.2

Well ID: 5109754
Construction Date: 6/2/1980

Easting: 264030
Northing: 4919322

UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	21.3	**Water Kind**	FRESH	**Pump Rate (LPM):**	23
Water First Found:	19.8	**Final Status**	Water Supply	**Recommended Pump Rate:**	23
Static Level:	5	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	:

Layer:	Driller's Description:	Top:	Bottom:
1	PREVIOUSLY DUG	0	3.66
2	LIMESTONE	3.66	21.3

Well ID: 5110843
Construction Date: 9/28/1983

Easting: 263230
Northing: 4919922

UTM Zone 18
Positional Accuracy: margin of error : 100 m - 300 m

Well Depth:	12.2	**Water Kind**	Not stated	**Pump Rate (LPM):**	45
Water First Found:	11.9	**Final Status**	Water Supply	**Recommended Pump Rate:**	36
Static Level:	9	**Primary Water Use:**	Commerical	**Pumping Duration (h:m):**	10 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	GRAVEL	0	11.3
1	GRAVEL	0	11.3
2	LIMESTONE	11.3	12.2
2	LIMESTONE	11.3	12.2

Well ID: 5111528
Construction Date: 11/1/1985

Easting: 263075
Northing: 4919905

UTM Zone 18
Positional Accuracy: unknown UTM

Well Depth:	25.6	**Water Kind**	Not stated	**Pump Rate (LPM):**	5
Water First Found:	22.9	**Final Status**	Water Supply	**Recommended Pump Rate:**	5
Static Level:	5	**Primary Water Use:**	Domestic	**Pumping Duration (h:m):**	3 :

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.61
2	SAND	0.61	9.14
3	LIMESTONE	9.14	25.6

Well ID: 5115821
Construction Date: 5/5/1992
Easting: 263264
Northing: 4919324
UTM Zone 18
Positional Accuracy: unknown UTM

Well Depth: 27.1
Water First Found: 26.5
Static Level: 23
Water Kind FRESH
Final Status Test Hole
Primary Water Use: Commerical
Pump Rate (LPM): 364
Recommended Pump Rate: 364
Pumping Duration (h:m): 11 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	FILL	0	7.62
2	GRAVEL	7.62	13.7
3	GRAVEL	13.7	26.5
4	GRAVEL	26.5	26.8
5	SHALE	26.8	27.1

Well ID: 5116541
Construction Date: 3/8/1994
Easting: 263451
Northing: 4918748
UTM Zone 18
Positional Accuracy: unknown UTM

Well Depth: 11
Water First Found: 3.35
Static Level: 3
Water Kind FRESH
Final Status Abandoned-Su
Primary Water Use: Municipal
Pump Rate (LPM): 227
Recommended Pump Rate:
Pumping Duration (h:m): 24 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	FINE SAND	0	2.44
2	GRAVEL	2.44	3.66
3	COARSE GRAVEL	3.66	9.75
4	GRAVEL	9.75	11

Well ID: 5116818
Construction Date: 2/15/1995
Easting: 263075
Northing: 4919905
UTM Zone 18
Positional Accuracy: unknown UTM

Well Depth: 22
Water First Found: 21.3
Static Level: 8
Water Kind FRESH
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 27
Recommended Pump Rate: 23
Pumping Duration (h:m): 1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
1	TOPSOIL	0	0.30
2	CLAY	0.30	9.14
2	CLAY	0.30	9.14
3	SHALE	9.14	9.45
3	SHALE	9.14	9.45
4	LIMESTONE	9.45	22
4	LIMESTONE	9.45	22

Well ID: 7047958
Construction Date: 8/9/2007
Easting: 263996
Northing: 4919669
UTM Zone 18
Positional Accuracy: margin of error : 10 - 30 m

Well Depth: 25.9
Water First Found: 24.7
Static Level: 6
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	0.15
1	TOPSOIL	0	0.15
2	SAND	0.15	1.22

2	SAND	0.15	1.22
3	CLAY	1.22	7.92
3	CLAY	1.22	7.92
4	SHALE	7.92	9.14
4	SHALE	7.92	9.14
5	LIMESTONE	9.14	25.9
5	LIMESTONE	9.14	25.9

Well ID: 7110601
Construction Date: 8/28/2008
Easting: 263366
Northing: 4919140
UTM Zone 18
Positional Accuracy: margin of error : 10 - 30 m

Well Depth: 42.7
Water First Found: 41.2
Static Level: 7
Water Kind Untested
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	SAND	0	5.49
1	SAND	0	5.49
2	LIMESTONE	5.49	42.7
2	LIMESTONE	5.49	42.7

Well ID: 7186311
Construction Date: 9/4/2012
Easting: 262998
Northing: 4918956
UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 4.57
Water First Found:
Static Level:
Water Kind
Final Status Observation W
Primary Water Use: Monitoring an
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:
1	FILL	0	0.61
2	SAND	0.61	2.44
3	SAND	2.44	4.57

Well ID: 7186312
Construction Date: 9/4/2012
Easting: 262886
Northing: 4919051
UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 4.57
Water First Found:
Static Level:
Water Kind
Final Status Observation W
Primary Water Use: Monitoring an
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:
1	GRAVEL	0	1.5
2	FILL	1.5	3.1
3	SAND	3.1	4.57

Well ID: 7186313
Construction Date: 9/4/2012
Easting: 262855
Northing: 4919091
UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 4.57
Water First Found:
Static Level:
Water Kind
Final Status Test Hole
Primary Water Use: Monitoring an
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:
1	GRAVEL	0	1.5
2	FILL	1.5	3.1
3	SAND	3.1	4.57

Well ID: 7189653
Construction Date: 10/16/2012
Easting: 263990
Northing: 4919241
UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 30.5
Water First Found: 27.4
Static Level: 4
Water Kind Untested
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 16
Recommended Pump Rate: 16
Pumping Duration (h:m): 1 :

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	3.05
2	LIMESTONE	3.05	30.5

Well ID: 7189660
Construction Date: 10/16/2012
Easting: 263875
Northing: 4919869
UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 18.3
Water First Found: 12.2
Static Level: 4
Water Kind Untested
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 16
Recommended Pump Rate: 16
Pumping Duration (h:m): 1 :

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	8.53
1	SAND	0	8.53
2	LIMESTONE	8.53	18.3
2	LIMESTONE	8.53	18.3

Well ID: 7281327
Construction Date: 2/17/2017
Easting: 263300
Northing: 4919946
UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 10.7
Water First Found: 7.62
Static Level:
Water Kind Untested
Final Status Monitoring an
Primary Water Use: Test Hole
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	0.61
2	SAND	0.61	10.7

Well ID: 7294205
Construction Date: 9/6/2017
Easting: 263944
Northing: 4919330
UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 30.5
Water First Found: 26.8
Static Level: 5
Water Kind Untested
Final Status Water Supply
Primary Water Use: Domestic
Pump Rate (LPM): 16
Recommended Pump Rate: 16
Pumping Duration (h:m): 1 : 0

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	3.66
2	LIMESTONE	3.66	30.5

Well ID: 7294797
Construction Date: 9/15/2017
Easting: 263042
Northing: 4919872
UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 26.5
Water First Found:
Static Level:
Water Kind
Final Status Test Hole
Primary Water Use: Test Hole
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	1.22
2	BOULDERS	1.22	22.9
3	SHALE	22.9	25.3
4	LIMESTONE	25.3	26.5

Well ID: 7294798
Construction Date: 9/15/2017

Easting: 263010
Northing: 4919733

UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:
Water First Found:
Static Level:

Water Kind
Final Status Observation W
Primary Water Use: Test Hole

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

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	
2	SHALE		
3	LIMESTONE		

Well ID: 7294799
Construction Date: 9/15/2017

Easting: 262944
Northing: 4919693

UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:
Water First Found:
Static Level:

Water Kind
Final Status Observation W
Primary Water Use: Test Hole

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

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	
2	SHALE		
3	LIMESTONE		

Well ID: 7294800
Construction Date: 9/15/2017

Easting: 262818
Northing: 4919738

UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:
Water First Found:
Static Level:

Water Kind
Final Status Test Hole
Primary Water Use: Test Hole

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

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	
2	SHALE		
3	LIMESTONE		

31 c SW

UTM 18Z 263481E
5R 4918875N
Elev. 5R 0700
Basin 24

51 No 149

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District Peterborough
Township, ~~Village, Town or City~~ Asphodel
Con. 9 Lot ~~18~~ 17 (from owner) Date completed 19 (day) October (month) 1959 (year)
[redacted] Address NORWOOD, Ontario.

Casing and Screen Record

Inside diameter of casing 6¼ I.D.
Total length of casing 28'
Type of screen -----
Length of screen -----
Depth to top of screen -----
Diameter of finished hole 6¼ I.D.

Pumping Test

Static level None
Test-pumping rate ----- G.P.M.
Pumping level ----- DRY
Duration of test pumping
Water clear or cloudy at end of test No water.
Recommended pumping rate None G.P.M.
with pumping level of -----

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
Sandy Clay and Boulders	0	26			
Limestone	26	100	No water		
Letter of Dec 1/59 from drilling firm says casing was pulled.					

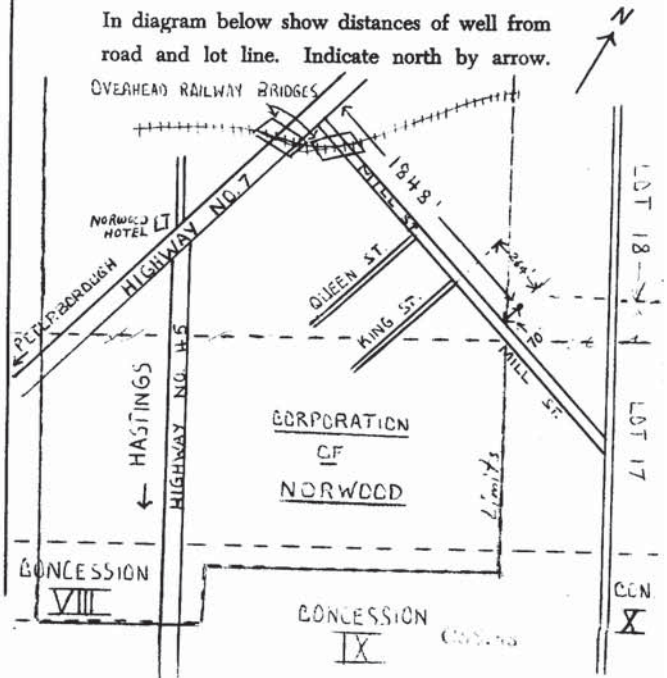
Water Record

For what purpose(s) is the water to be used?
Domestic
Is well on upland, in valley, or on hillside?
Upland
Drilling Firm OTONABEE WATER WELLS LTD.
Address INDIAN RIVER, ONTARIO
Licence Number 378
Name of Driller Paul Berthelot
Address Indian River, Ont.
Date October 27, 1959
Percy W. Blankhurst
(Signature of Licensed Drilling Contractor)

Form 5

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



31C54

UTM 18 263948 E
Con 15 R/R 4918727 N
Elev. Lot 15 R/R 70700

The Ontario Water Resources Commission Act

WATER WELL RECORD

WATER RESOURCES DIVISION
51 No. 150
OCT 19 1964
ONTARIO WATER RESOURCES COMMISSION

Basin 2A Peterborough
County or District ..... Township, Village, Town or City Asphodel

Con. 9 ✓ Lot 17 ✓ Date completed 31 st (day) July (month) 64 (year)

[redacted] ess R.R. 2 Norwood, Ont

Casing and Screen Record

Inside diameter of casing 6 1/4"
Total length of casing 11 1/2'
Type of screen —
Length of screen —
Depth to top of screen —
Diameter of finished hole 6"

Pumping Test

Static level .....
Test-pumping rate ..... G.P.M.
Pumping level N/A.
Duration of test pumping .....
Water clear or cloudy at end of test dry hole
Recommended pumping rate ..... G.P.M.
with pump setting of ..... feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Water Record: Kind of water (fresh, salty, sulphur)
Loam + boulders	0	11		
Shale	11	13		
Limestone	13	114	N/A	

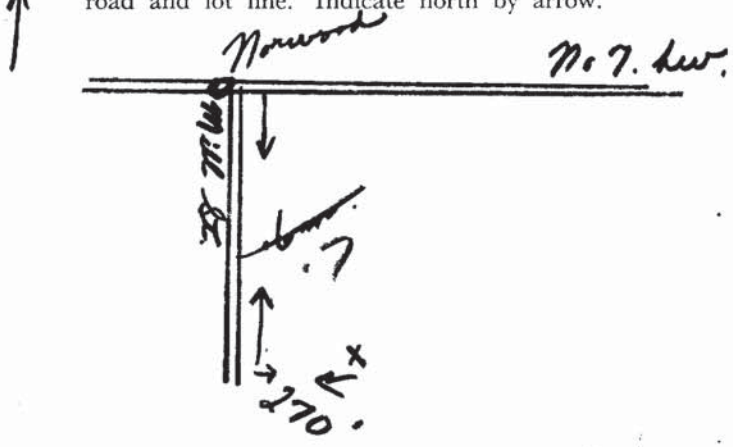
For what purpose(s) is the water to be used?
DA N/A.
Is well on upland, in valley, or on hillside? Upland
Drilling or Boring Firm Raycraft + Lloyd
Address Campbellford, Ont.
Licence Number 1388
Name of Driller or Borer Harry Raycraft
Address Campbellford, Ont.
Date July 31 st 64
Donald H. Lloyd
(Signature of Licensed Drilling or Boring Contractor)

Form 7 10M-62-1152

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



large brick farm house.

The Ontario Water Resources Commission Act

WATER WELL RECORD

3105'

Water management in Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 5105780 | MUNICIP. 51002 | CON. CGN | 10

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Peterbow	Asphodel	10	018

[redacted] n # 2 Norwood

DATE COMPLETED: DAY 20 MO. 09 YR. 71

RC. 19520 | RC. 4 | ELEVATION 01700 | RC. 5 | BASIN CODE 24

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
		top soil		0	4
		Hard pan		4	47
		limestone rock		47	65
			Dry		
			hole.		

31 | 0004 | 02 | 0007 | 14 | 0065 | 65

32

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
10-13	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
15-16	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
20-23	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
25-28	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
30-33	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
10-11	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	~~0070~~ 72
06				
17-18	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☐ PUMP 2 ☐ BAILER	GPM	HOURS MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	1 ☐ PUMPING 2 ☐ RECOVERY
FEET	FEET	15 MINUTES / 30 MINUTES / 45 MINUTES / 60 MINUTES	FEET

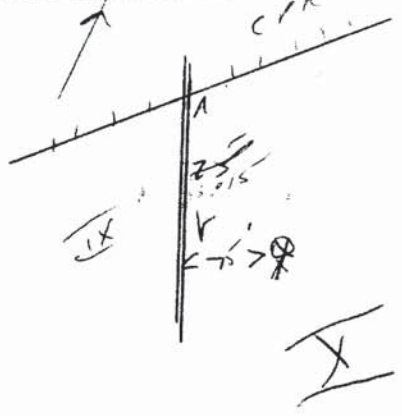
IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM.	FEET	1 ☐ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☐ DEEP	FEET	GPM.

GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS: FARM.

FINAL STATUS OF WELL

1 ☐ WATER SUPPLY 5 ☐ ABANDONED, INSUFFICIENT SUPPLY
2 ☐ OBSERVATION WELL 6 ☐ ABANDONED, POOR QUALITY
3 ☐ TEST HOLE ☒ UNFINISHED
4 ☐ RECHARGE WELL

WATER USE

1 [redacted] 5 ☐ COMMERCIAL
2 ☐ STOCK 6 ☐ MUNICIPAL
3 ☐ IRRIGATION 7 ☐ PUBLIC SUPPLY
4 ☐ INDUSTRIAL 8 ☐ COOLING OR AIR CONDITIONING
☐ OTHER 9 ☐ NOT USED

METHOD OF DRILLING

1 ☒ CABLE TOOL 6 ☐ BORING
2 ☐ ROTARY (CONVENTIONAL) 7 ☐ DIAMOND
3 ☐ ROTARY (REVERSE) 8 ☐ JETTING
4 ☐ ROTARY (AIR) 9 ☐ DRIVING
5 ☐ AIR PERCUSSION

CONTRACTOR

NAME OF WELL CONTRACTOR: B Summers — LICENCE NUMBER: 4811

ADDRESS: B Summers

NAME OF DRILLER OR BORER — LICENCE NUMBER

SIGNATURE OF CONTRACTOR: B Summers — SUBMISSION DATE DAY MO. YR.

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 4811 | DATE RECEIVED 190172

DATE OF INSPECTION | INSPECTOR

REMARKS:

P K

WI

OWRC COPY

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 — 5116542 — MUNICIP 5,1,7,0,3 — CON.

COUNTY OR DISTRICT: PETERBOROUGH
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: VILLAGE OF NORWOOD
CON: ASPHODEL
BLOCK, TRACT, SURVEY, ETC: IX
LOT: 17
OWNER (SURNAME FIRST): P.U.C.
ADDRESS: NORWOOD, ONTARIO.
DATE COMPLETED: DAY 5 MO 7 YR 89

21 — UTM — ZONE — EASTING — NORTHING — RC — ELEVATION — RC — BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
BROWN	SAND		FINE	0	4
	BOULDERS	GRAVEL, SAND	COARSE	4	19
	GRAVEL	SAND	COARSE, LOOSE	19	24
	GRAVEL	SAND	COARSE, PACKED	24	26
	GRAVEL	SAND (FINE.)		26	31
	GRAVEL	SAND (FINE) MARL		31	35

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
10-11 / 12	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			13-16
2"			0	25'
17-18 / 19	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			20-23
24-25 / 26	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33: TORCH SLOT
DIAMETER 34-38: 2" INCHES
LENGTH 39-40: 10 FEET
MATERIAL AND TYPE: STEEL
DEPTH TO TOP OF SCREEN 41-44: 25' FEET

61 PLUGGING & SEALING RECORD

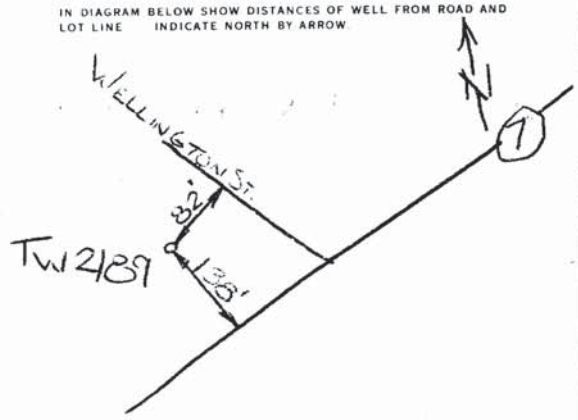
DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	80

71 PUMPING TEST

PUMPING TEST METHOD 10: 1 ☐ PUMP 2 ☐ BAILER
PUMPING RATE 11-14: GPM
DURATION OF PUMPING 15-16 HOURS 17-18 MINS
STATIC LEVEL 19-21: 9.87 FEET
WATER LEVEL END OF PUMPING 22-24: FEET
WATER LEVELS DURING 25: 1 ☐ PUMPING 2 ☐ RECOVERY
15 MINUTES 26-28: FEET
30 MINUTES 29-31: FEET
45 MINUTES 32-34: FEET
60 MINUTES 35-37: FEET
IF FLOWING, GIVE RATE 38-41: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST 42: 1 ☐ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING 43-45: FEET
RECOMMENDED PUMPING RATE 46-49: GPM
50-53

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



88726

DRILLERS REMARKS

FINAL STATUS OF WELL 54

1 ☐ WATER SUPPLY
2 ☒ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED
☐ DEWATERING

WATER USE 55-56

1 ☐ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
5 ☐ COMMERCIAL
6 ☒ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
☐ OTHER
9 ☐ NOT USED

METHOD OF CONSTRUCTION 57

1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING
☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: INT'L WATER SUPPLY LTD
WELL CONTRACTOR'S LICENCE NUMBER: 2001
ADDRESS: BOX 310 BARRIE.
NAME OF WELL TECHNICIAN: F. PANEY
WELL TECHNICIAN'S LICENCE NUMBER:
SIGNATURE OF TECHNICIAN/CONTRACTOR:
SUBMISSION DATE: DAY 3 MO 1 YR 92

OFFICE USE ONLY

DATA SOURCE 58
CONTRACTOR 59-62: 2801
DATE RECEIVED 63-68: MAR 08 1994
DATE OF INSPECTION
INSPECTOR
REMARKS

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ontario — Ministry of the Environment

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. (Place Sticker and/or Print Below)

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	THE CORPORATION OF THE TOWNSHIP OF Asphodel-Norwood		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
4440 HIGHWAY 7	Norwood	ONT	K0L2V0	7056395343

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
4440 HIGHWAY 7	Asphodel	19	9

County/District/Municipality	City/Town/Village	Province	Postal Code
Peterborough	Norwood	Ontario	K0L2V0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	263010	4919464		

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
	Abandonment of well record # 152				
	Bentonite chips			40	28
	Bentonite slurry			28	6
	Bentonite chips			6	5
	LIMESTONE Screenings.			5	0

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)

Method of Construction

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

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

Construction Record - Screen

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

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

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

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)

Pumping rate (l/min / GPM)

Duration of pumping ____ hrs + ____ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

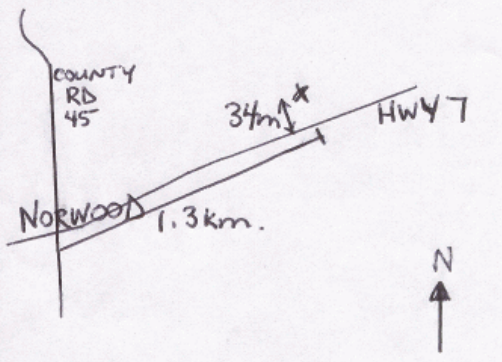
Well production (l/min / GPM)

Disinfected? ☐ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level				
1			1	
2			2	
3			3	
4			4	
5			5	
10			10	
15			15	
20			20	
25			25	
30			30	
40			40	
50			50	
60			60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Fleming College	7125

Business Address (Street Number/Name)	Municipality
200 Albert. St. South	LINDSAY

Province	Postal Code	Business E-mail Address
ONT	K9V5E6	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
7053249144	Wilkinson Steve

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
1107		2010 05 21

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☒ No		20100428

Ministry Use Only

Audit No. Z109213

JUN 10 2010

Received

0506E (12/2007)

Ministry's Copy

31C5W

UTM 18 Z 263431 E
5 R 4920011 N
Elev. ~~ZR~~ 0690
Basin ~~Lot~~ 24

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

51 No. 155

Water-Well Record

[redacted] ...hip, Village, Town or City ASPHODEL
...n Village, Town or City)
Address Norwood Ont.

Date completed 10 (day) Sept. (month) 58 (year)

Pipe and Casing Record

Casing diameter(s) 6"
Length(s) 35'
Type of screen no screen
Length of screen

Pumping Test

Static level 36'
Pumping rate 200 gal per hr.
Pumping level 85'
Duration of test 2 hrs.

Well Log

Overburden and Bedrock Record	From ft.	To ft.
Dr. previous to	0	42'
grey limestone	42'	92'

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
42' To 92'	56'	fresh

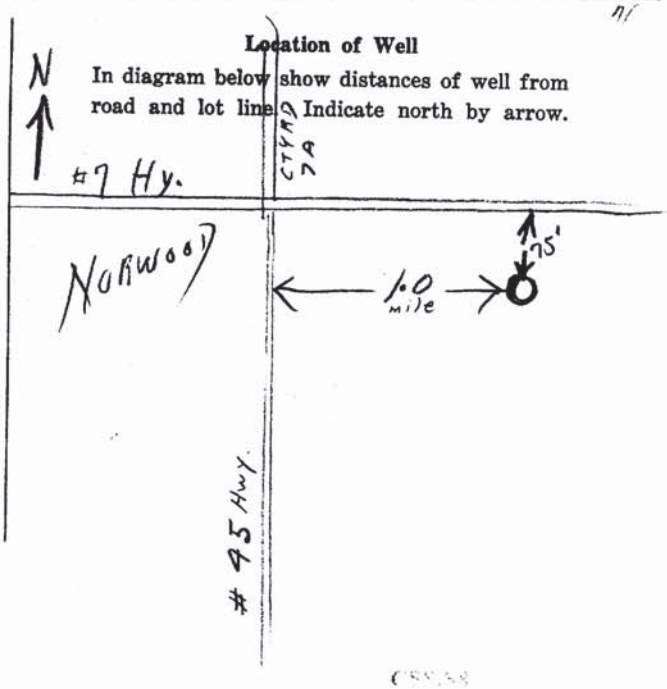
For what purpose(s) is the water to be used? house
Is water clear or cloudy? clear
Is well on upland, in valley, or on hillside? upland
Drilling firm N. N. Faulkner
Address 687 Water St. Peterboro
Name of Driller F. G. Long
Address R.R. #1 Omemee
Licence Number 456

I certify that the foregoing statements of fact are true.

Date Sept 10 F. G. Long
Signature of Licensee

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



Form 5

Appendix H
Preliminary Dewatering Calculations

DEWATERING CALCULATIONS

Modified Dupuit-Forchheimer Equation: unconfined flow into a linear excavation.
Calculations assume no flow boundary at aquifer base

Excavation Area		Initial depth to groundwater	Target Depth to groundwater	Depth to Base of Aquifer	Unit length of trench (a)	Width of Trench (b)	Hydraulic Conductivity (K)	s	R_o	$L = R_o/2$	$r_s = b/2$	$\ln(R_o/r_s)$ [If $r_s<R_o$] or $\ln((R_o+r_s)/r_s)$ [If $r_s>=R_o$]	H	h = H-s	Q_{ends}	Q_{trench}	Q_{total}		
		mbgs	mbgs	mbgs	m	m	m/s	m	m	m	m	-	m	m	m^3/s	m^3/s	m^3/s	L/s	L/d
Elongated Trench @ 50 m Increments	Min	0.88	3.5	5.0	50	2	4.88E-08	2.62	1.74	0.87	1.00	0.55	4.12	1.50	0.000004	0.000041	**0.000045**	**0.05**	**3,929**
	Max	0.88	3.5	5.0	50	2	5.95E-06	2.62	19.17	9.59	1.00	2.95	4.12	1.50	0.000093	0.000457	**0.000550**	**0.55**	**47,533**
	Avg	0.88	3.5	5.0	50	2	2.75E-07	2.62	4.12	2.06	1.00	1.42	4.12	1.50	0.000009	0.000098	**0.000107**	**0.11**	**9,264**

s = target drawdown (initial - target depth to groundwater) (m)
R_o = radius of influence of construction dewatering/pumping (m)
L = distance to line source (m)
r_s = equivalent single well radius (m)
H = Initial hydraulic head in aquifer (m)
h = hydraulic head at radius of well (m)
Q = construction dewatering rate (m^3/s)

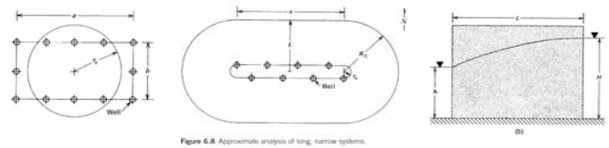


Figure 6.8 Approximate analysis of long, narrow systems.

$$Q = \frac{\pi K(H^2 - h^2)}{\ln R_o/r_s} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right] \quad (6.10b)$$

x = unit length of trench

$R_o = 3000*s*\sqrt{K}$

Source: Kyrieleis, W. and Sichardt, W. "Grundwasserabsenkung bei Fundierungsarbeiten" Springer, Berlin, 1930

Source: Powers, J. Patrick, et al. "Construction dewatering and groundwater control." (2007)