



# Hydrogeological Assessment - 214 Ontario Street, Brighton, Ontario (Rev.1)

June 17, 2022

Prepared for:  
Bicorp Design Group Ltd.

Cambium Reference: 13654-001

CAMBIUM INC.

866.217.7900

[cambium-inc.com](http://cambium-inc.com)

Peterborough | Barrie | Oshawa | Kingston | Calgary



## Table of Contents

<b>1.0</b>	<b>Introduction.....</b>	<b>1</b>
1.1	Site Description .....	1
<b>2.0</b>	<b>Methodology .....</b>	<b>2</b>
2.1	Drilling Program.....	2
2.2	Physical Laboratory Testing .....	2
2.3	Hydrogeological Field Tasks .....	3
<b>3.0</b>	<b>Geological and Hydrogeological Setting .....</b>	<b>4</b>
3.1	Results of Subsurface Investigation .....	4
3.1.1	Grain Size Analyses .....	5
3.2	Water Well Records .....	5
3.3	Vulnerable and Regulated Areas.....	6
3.4	Hydrogeological Conditions.....	7
<b>4.0</b>	<b>Results.....</b>	<b>9</b>
4.1	Single Well Hydraulic Tests.....	9
4.2	Groundwater Quality .....	9
<b>5.0</b>	<b>Dewatering Estimates .....</b>	<b>12</b>
5.1	Operational Dewatering.....	14
5.1.1	Zone of Influence.....	14
<b>6.0</b>	<b>Closing .....</b>	<b>16</b>
6.1	Respectfully submitted, .....	17
<b>7.0</b>	<b>References .....</b>	<b>18</b>
<b>8.0</b>	<b>Standard Limitations.....</b>	<b>19</b>



## List of Tables

Table 1	Grain Size Analysis Results .....	5
Table 2	Water Well Record Information .....	6
Table 3	Water Level and Well Information .....	7
Table 4	SWHT Results (all results in m/s) .....	9
Table 5	BH106-21 Groundwater Quality – Initial Sample .....	11

## List of Appended Figures

Figure 1	Site Plan
Figure 2	Water Well Records within 500 m of Site
Figure 3	Zone of Influence – Construction Excavations

## List of Appendices

Appendix A	Land Information and Proposed Development Plan
Appendix B	Borehole Logs
Appendix C	Grain Size Analysis
Appendix D	AquiferTest Pro Results
Appendix E	Certificate of Laboratory Analysis
Appendix F	Ministry Water Well Records
Appendix G	Dewatering Calculations



## **1.0 Introduction**

Cambium Inc. (Cambium) was retained by Bicorp Design Group Ltd. (Client) to complete a hydrogeological assessment in support of the proposed residential development at 214 Ontario Street, Brighton, On (Site).

The Client intends to develop eighty-seven (87) townhouse units at the Site. This hydrogeological assessment was completed in support of the proposed development and includes a general review of available geological / hydrogeological information, hydraulic testing of installed monitoring wells, groundwater quality and construction dewatering estimates. As part of the scope of work, Cambium was also retained to complete a geotechnical investigation which was provided to the Client under a separate cover (Cambium Inc., 2021).

### **1.1 Site Description**

The Site is approximately 2.5 hectares (ha) in size and is currently developed with a greenhouse complex and associated gravel parking lot and driveways. The existing development occupies the eastern portion of Site. Undeveloped, forested land occupies the western portion of the Site. In addition, unevaluated wetlands have been mapped historically within the southwestern portion of the property. However, information provided by the Lower Trent Conservation Authority (LTCA) indicates that there are no wetlands present on-site, as per field verification. See Appendix A. Land use at the Site is designated as Agricultural Zone (A-2). The Site is bordered by Urban Residential Zone One (R1) to the north, undesignated lands to the west and south, and Ontario Street to the east. The proposed residential development includes a total of 87 townhouse units and associated infrastructure including, but not limited to, roads, sidewalks, and park space. Some of the buildings will be constructed with one (1) underground level (basement). The proposed development will be provided water and wastewater servicing from the Town of Brighton. Detailed design information was not available at the time this report was prepared. A Site plan is outlined on Figure 1; a proposed development plan is included in Appendix A.



## **2.0 Methodology**

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

### **2.1 Drilling Program**

A drilling program was completed at the Site which included six (6) boreholes advanced across the Site from August 30 to 31, 2021. Boreholes were advanced to depths ranging from 6.1 to 6.7 mbgs. The locations of the boreholes relative to the existing site conditions are provided on Figure 1. Records of the individual boreholes are provided in Appendix B.

Drilling and sampling was completed using a track mounted drill rig operating under the fulltime supervision of a Cambium technician. The boreholes were advanced to the sampling depths by means of continuous flight stem augers and 50 mm O.D. split spoon samplers. Standard Penetration Test (SPT) results (N-Values) were recorded for the sampled intervals as the number of blows required to drive a split spoon sampler 305 mm into the soil using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures.

Borehole samples were inspected and logged in the field using visual and tactile methods. Soil samples were placed in labelled plastic containers for transport and sent to our geotechnical laboratory for review by a senior geotechnical engineer, physical laboratory testing, and temporary storage. Open boreholes were checked for groundwater and stability prior to backfilling and were backfilled in accordance with O.Reg. 903, as amended. Three (3) groundwater monitoring wells was installed in select boreholes (BH102-21, BH104-21, and BH106-21) to measure stabilized groundwater levels.

Coordinates of each borehole were obtained using a handheld GPS device. Boreholes were surveyed using real-time kinematic (RTK) surveying equipment systems referenced to a site benchmark.

### **2.2 Physical Laboratory Testing**

Physical laboratory testing, including six sieve and hydrometer analyses (LS-702, 705), was completed on selected soil samples to confirm textural classification and to assess



geotechnical parameters. Natural 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.

### **2.3 Hydrogeological Field Tasks**

On September 14, 2021, Cambium staff visited the Site to complete Single Well Hydraulic Tests (SWHTs) on the three (3) 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 D and are discussed further in Section 4.1.

In addition (on September 14, 2021), a groundwater sample was collected from well BH106-21. The groundwater sample was compared against the parameters outlined in the Corporation of the Municipality of Brighton By-Law No. 013-2015 (by-law to control discharges to the municipal sewer system) and the Provincial Water Quality Objective (PWQO) (MOEE, 1994b). Prior to sample collection well BH106-21 was adequately developed. A re-sample of well BH106-21 was collected on November 10, 2021 due to adverse results of the initial sample. See section 4.2 for more details. The Certificates of Analysis are attached in Appendix E.



### **3.0 Geological and Hydrogeological Setting**

The topography of the Site exhibits a very gentle downwards slope extending towards the southwestern boundary of the Site. The topographic high at the Site is approximately 80 metres above sea level (mASL) in the northeastern corner, and the topographic low is approximately 77 mASL in the southwestern corner. Surface water drainage for the property drains towards the southwest, off-site.

Unevaluated wetlands were mapped historically in the southwestern corner of the property. However, as per field verification, the LTCA indicates that there are no wetlands found on-site. There were wetlands identified further offsite to the southwest of the property (at a distance of approximately 30 m). See Appendix A. Surface water flow off-site is assumed to be south, ultimately discharging into Lake Ontario, approximately 650 m south of the Site.

The Site is located within the physiographic region known as the Iroquois Plain, which is characterized by a band of beach deposits that form the shoreline of an ancestral lake and a plain of lake bottom deposits that have been smoothed by wave action (Chapman, L.J. and D.F. Putnam, 1984).

According to Miscellaneous Release – Data 128 from the Ontario Geological Survey (Ontario Geological Survey, 2010) the majority of the overburden and soils located in the in the area of the Site are coarse-grained glaciolacustrine deposits of foreshore and basinal deposits. These deposits are characterized by sand, gravel, minor silt and clay.

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

#### **3.1 Results of Subsurface Investigation**

The results of the geotechnical investigation indicate that subsurface conditions at the Site generally consists of topsoil, overlying sand fill, overlying brown to grey sand with trace silt and gravel, overlying clay and silt deposits. Select boreholes also encountered glacial till deposits

underlying the clay and silt horizon. In general, coarser grained sand deposits extended to depths of approximately 4 mbgs, beneath which finer grained clay and till sediments are encountered. All boreholes were terminated within overburden, bedrock was not encountered in the geotechnical investigation. For a more detailed description of the subsurface investigation, see the companion geotechnical investigation report (Cambium Inc., 2021).

### 3.1.1 Grain Size Analyses

Laboratory particle size distribution analyses were completed on six (6) 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	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt	% Clay
BH101-21 SS7	4.6 – 5.0	Clay and Silt trace Sand trace Gravel	1	6	45	48
BH101-21 SS8B	5.6 – 6.1	Silty Gravelly Sand some Clay	24	36	30	10
BH103-21 SS3	1.5 – 2.0	Sand some Silt	0	90	10	
BH103-21 SS4	2.3 – 2.7	Sand trace Silt trace Gravel	2	95	3	
BH104-21 SS9	2.3 – 2.7	Silty Gravelly Sand some Clay	21	44	23	12
BH106-21 SS5	3.0 – 3.5	Sand trace Silt	0	99	1	

### 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 11 water well records located within approximately 500 m of the Site (Appendix F; Figure 2), however no water well records were plotted within the property boundaries. The following water well records were identified:

- Eight (8) water well records for drilled wells
- Three (3) water well records for monitoring wells



As per the MECP records, the soil profile generally consisted of sand overlying clay sediments. Six (6) of the drilled wells were advanced into bedrock composed of limestone; the bedrock contact was found between 0.6 and 8.4 metres below ground surface (mbgs), average of 2.2 mbgs. Bedrock continued until well termination. Water bearing sediments were identified within well records with thicker overburden profiles at approximately 9 mbgs. Water bearing strata were also identified in the six (6) drilled bedrock well records; it was inferred that two aquifers were present within the bedrock: a shallow aquifer within 6 m of the bedrock contact, and a deeper aquifer encountered between 11.9 and 14.6 m below the bedrock contact.

The static water level of the drilled wells ranged between 0.6 to 4.9 mbgs, with an average static water level of 1.9 mbgs. The recommended flow rate ranged from 3 gallon per minute (gpm, assumed to be US gallons per minute) to 40 gpm, averaging 13 gpm. 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)	Depth Installed into Bedrock (m)	Static Water Level (mbgs)	Recommended Pumping Rate (gpm)
Drilled Wells Count:6	Min	5.49	5.49	0.76	0.61	3
	Max	15.85	15.54	14.93	4.88	40
	Avg.	10.74	10.40	8.71	1.98	13
Monitoring Wells Count: 7	Min	4.52	1.37	-	1.52	-
	Max	4.57	1.98	-	1.52	-
	Avg.	4.55	1.62	-	1.52	-

### 3.3 Vulnerable and Regulated Areas

As per the Ministry of the Environment, Conservation and Parks (Ministry) Source Water Protection Information Atlas (SPIA) the Site is within the following areas:

- Significant Groundwater Recharge Area
- Highly Vulnerable Aquifer

As per MNR Natural Heritage System database, the Site is not located in any significant natural areas or areas of natural and scientific interests (ANSIs). The database does identify the western portion of the Site as woodland and the southwestern portion is identified as an unevaluated wetland. Information provided by the LTCA indicates that there are no wetlands



found on-site, as per field verification. There were wetlands identified further off-site to the southwest of the property (at a distance of approximately 30 m). Further, there are no LTCA regulated areas located within Site boundaries.

The SPIA, ANSI, and LTCA mapping is attached in Appendix A.

### 3.4 Hydrogeological Conditions

Shallow overburden at the Site consists of topsoil overlying sand fill, brown to grey sand with trace silt and gravel, clay and silt, and sometimes glacial till. An unconfined aquifer exists within the shallow overburden. Additionally, a shallow bedrock aquifer and deeper bedrock aquifer have been identified in the area of the Site (as per MECP water well record information). 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.

Stabilized water levels were measured on September 14, 2021. Static water levels at the Site ranged from 0.98 mbgs to 1.27 mbgs. Water level, elevation and well information is summarized below in Table 3.

**Table 3 Water Level and Well Information**

Well		BH102-21	BH104-21	BH106-21
Top of Pipe Elevation (masl) <sup>(1)</sup>		80.21	80.07	80.18
Ground Surface Elevation (masl) <sup>(1)</sup>		79.26	78.81	78.86
Stick-up (m)		0.96	1.27	1.36
Sep 14, 2021	Water Level (mbgs) <sup>(2)</sup>	1.27	1.02	0.98
	Groundwater Elev.(masl) <sup>(1)</sup>	77.99	77.78	77.88

1. metres above sea level

2. metres below ground surface

In general, groundwater flow of the shallow overburden aquifer is towards the southwest. The hydraulic connection between the shallow overburden aquifer encountered on-site and the unevaluated wetland was not investigated as part of this assessment. Presumably the off-site wetlands are groundwater fed from the shallow overburden aquifer during at least some times of the year. Surface water flow through off-site wetlands will ultimately be directed south into Lake Ontario.



The proposed development will be provided potable water servicing and wastewater treatment by the municipality. Therefore, the only water withdrawal at the Site will be from construction dewatering activities and operational dewatering (to keep basements and other underground infrastructure dry). Presumably all other properties adjacent the Site are also provided water and wastewater servicing from the municipality.

The Site borders a regulated area according to the LTCA, which has the potential of being influenced by the proposed development (i.e., construction dewatering discharge, see Section 5.0). As such, an erosion and sediment control plan should be established prior to construction to ensure that dewatering discharge/runoff generated during construction does not negatively influence adjacent, off-site, wetlands.



## 4.0 Results

This section presents the results of the Single Well Head Tests (SWHTs) and the groundwater quality comparison against parameters outlined in The Corporation of the Municipality of Brighton By-Law No. 013-2015, and construction dewatering estimates.

### 4.1 Single Well Hydraulic Tests

SWHTs were completed on wells BH102-21, BH104-21, and BH106-21 on September 14, 2021. 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  $2.00 \times 10^{-5}$  m/s and  $3.50 \times 10^{-5}$  m/s. The hydraulic conductivity results are expected for the screened sediments at each well (and are reflective of published information (J.P.Powers, 2007)). Hydraulic testing results are attached in Appendix D.

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

Test #	Test 1	Test 2	Test 3
BH102-21	$3.06 \times 10^{-5}$	$3.50 \times 10^{-5}$	$2.00 \times 10^{-5}$
BH104-21	$3.06 \times 10^{-5}$	$3.50 \times 10^{-5}$	$2.00 \times 10^{-5}$
BH106-21	$3.25 \times 10^{-5}$	$3.25 \times 10^{-5}$	$2.00 \times 10^{-5}$

### 4.2 Groundwater Quality

A groundwater sample was collected from monitoring well BH106-21 was collected on September 14, 2021 and analyzed for those parameters outlined in The Corporation of the Municipality of Brighton By-Law No. 013-2015 (the Sewer Use By-Law) and the PWQO. Several parameters were reported at concentrations greater than the sanitary sewer discharge by-law, the storm sewer discharge by-law, and the PWQO. Exceedances are outlined in Table 5 below. Presumably water discharged from construction excavations will be disposed to ground surface or to local sewers. As such, water discharged from any construction excavations will require treatment depending on the receiver. Water quality results are attached in Appendix E.



Fluoranthene, total polycyclic aromatic hydrocarbons (PAH) and bis(2-ethylhexyl) phthalate were detected in the groundwater sampled from well BH106-21 at concentrations greater than at least one of the guidelines referenced herein. Total PAH and fluoranthene are associated with coal, crude oil, fossil fuels, asphalt products and incomplete burning of certain compounds. Bis(2-ethylhexyl) phthalate is a common plastic additive. Benzo(b+k)fluoranthene and pyrene were also detected in groundwater, however these two compounds do not have associated guideline criteria in either the Sewer Use By-Law, or the PWQO.

Benzo(b+k)fluoranthene and pyrene are associated with similar sources as the above mentioned semivolatile organic compounds (SVOCs). The presence of these SVOCs are not usually associated with greenhouse operation (i.e., the most recent land use at the Site).

On November 10, 2021 Cambium staff visited the Site to collect a resample from well BH106-21. The resample was analyzed for the metals and SVOCs included in the Municipality of Brighton By-Law No. 013-2015. The day prior to sampling 10 well bore volumes were purged from the well and stored on-site in drums. The resample was collected by low-flow sampling methods which did not induce a significant disturbance in the water column (as such the amount of sediment included in the water sample is significantly reduced). The results of the resample indicate that the concentration of all analyzed metals were less than detectable limits, or less than all applicable guideline criteria. Similarly, the concentration of all SVOCs (including those compounds reported at elevated concentrations in the initial sample) were reported less than detectable limits. Water quality results of the resample are attached in Appendix E.

The results of the resample indicate that water discharged from any construction excavations at the Site can be treated to the receiver standards (i.e., sewers or to the environment (PWQO standards)) with settling tanks and/or filtration media. A water sample should also be collected after treatment to confirm treatment efficacy.



**Table 5 BH106-21 Groundwater Quality – Initial Sample**

Parameter	Concentration – BH106-21 (mg/L)	Sanitary Sewer Discharge (mg/L)	Storm Sewer Discharge (mg/L)	PWQO (mg/L)
total suspended solids	2,580	<b>350</b>	<b>15</b>	-
total phosphorus	3.24	10	<b>0.4</b>	<b>0.030</b>
aluminum	32.6	50	<b>1</b>	<b>0.075</b>
chromium	0.06	2	0.08	<b>0.0089</b>
cobalt	0.026	5	-	<b>0.0009</b>
copper	0.056	2	<b>0.04</b>	<b>0.005</b>
iron	52	<b>50</b>	-	<b>0.3</b>
lead	0.03	1	0.12	<b>0.025</b>
manganese	1.23	5	<b>0.05</b>	-
nickel	0.05	2	0.08	<b>0.025</b>
vanadium	0.084	5	-	<b>0.006</b>
zinc	0.181	2	<b>0.04</b>	<b>0.02</b>
fluoranthene	0.0002	-	-	<b>8.0 x 10<sup>-7</sup></b>
total PAH	0.00267	0.005	<b>0.002</b>	-
bis(2-ethylhexyl) phthalate	0.069	<b>0.012</b>	<b>0.0088</b>	-

1. *Bolded and shaded values indicate the criteria that the specific parameter concentration exceeded.*



## 5.0 Dewatering Estimates

The proposed development will include residential townhouse units, some of which will be completed with a basement. Details pertaining to which structures will be built with basements were not available at the time this document was prepared, nor were any other details pertaining to the depth of potential basements. The dewatering calculations outlined herein assumed that basements would extend to 3 mbgs.

The footprints of the proposed residential townhouse units vary, with the largest being approximately 13.6 m long and 6.1 m wide. Individual residential townhouse units will be arranged into several common structures at the Site. The common structures will include between 5 to 9 individual townhouse units, each. The footprint of the largest common structure is approximately 50 m long and 20 m wide. The equivalent radius of the largest common structure is 22 m.

It was assumed the foundations of the individual townhouse units will be built together at the same time, within the footprint of a common structure. The water level during construction dewatering was assumed to be 1.0 mbgs based off the shallowest groundwater reading measured on September 14, 2021. To estimate daily dewatering rates it was assumed that the water level will be lowered 0.5 m below the floor of the excavation (to a depth of 3.5 mbgs); therefore, groundwater levels must be lowered by 2.5 m.

The proposed development will be provided water and wastewater servicing by the municipality. It was assumed that these services will be installed below grade in trench excavations. The trench excavations were assumed to be advanced to a depth of 1.5 mbgs (and dewatered to a depth of 2 mbgs). The maximum length of trench advanced at any one time was assumed to be 50 m.

The hydraulic conductivity of the shallow overburden soils is moderate and ranged from  $2.00 \times 10^{-5}$  m/s and  $3.50 \times 10^{-5}$  m/s. 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 estimated daily construction dewatering rate for excavation of a single common structure (approximately 20 m x 50 m) ranged between 81 m<sup>3</sup>/day to 119 m<sup>3</sup>/day. The estimated groundwater inflow rate into the construction of a 50 m length of trench ranged between 26 m<sup>3</sup>/day and 34 m<sup>3</sup>/day. Dewatering estimate calculations are included in Appendix G.

The information outlined herein indicates that construction dewatering should be registered on the Environmental Activity and Sector Registry (EASR). Registration of dewatering on the EASR allows for construction dewatering between 50 m<sup>3</sup>/day and 400 m<sup>3</sup>/day. If several excavations are dewatered simultaneously (and the construction dewatering rate exceeds 400 m<sup>3</sup>/day), then a Category 3 Permit To Take Water will be required.

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 daily dewatering rates be monitored (or the dewatering of stagnant water in the construction excavation estimated) to determine appropriate water taking permitting / registration requirements.

The method of disposal of water removed from the construction excavation should be determined prior to the commencement of water withdrawal. A dewatering and discharge plan is required for registration of construction dewatering activities on the EASR.

In addition, appropriate erosion and sediment controls should be put in place to protect sensitive receivers of discharge water (i.e., off-site wetland areas).



## 5.1 Operational Dewatering

Operational dewatering rates the structures are anticipated to be similar to construction dewatering rates. Basements may advance into the water table, as such dewatering of the basements is expected overtime. Actual dewatering rates measured during construction will determine if additional dewatering measures during operations are needed.

### 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 lengths to zero drawdown of each excavation (as determined from the highest hydraulic conductivity) are listed below:

- Single dwelling construction excavation: 44 m
- Trench excavation: 18 m

The ZOIs encompass residential land use north of the Site (south of Raglan Street), on Ontario Street and Cooper Court to the east of the Site. Available information indicates that there are no off-site private supply wells located within the ZOIs of the construction excavations. Further, all properties located adjacent the Site presumably receive water servicing from the municipality (and do not draw on a private well). During construction dewatering activities the areas adjacent the construction excavations should be monitored regularly for land settlement and stability.

The ZOI encompasses wetland areas located off-site to the southwest. Groundwater is interpreted to naturally discharge to surface in the area off-site. As such, groundwater withdrawal (and disposal to surface) will not significantly alter the existing hydrogeological regime of off-site wetland areas.



Off-site wetlands will be the final receiver of discharge water should water discharge water be disposed to surface, as such appropriate sediment and erosion control measures will be required (in addition to appropriate water quality treatment).

Perpetual dewatering of foundations/basements (if required) is not expected to influence the wetland, as discharge water will presumably be directed to surface and ultimately returned to off-site wetland areas.



## 6.0 Closing

Bicorp Design Group Ltd. (Client) retained Cambium Inc. to complete a hydrogeological assessment at 214 Ontario Street, Brighton, Ontario.

Shallow groundwater levels within the unconfined overburden aquifer ranged from 0.98 mbgs to 1.27 mbgs and was assumed to flow to the southwest where it discharges to surface into off-site wetland areas.

The information outlined herein indicates that construction dewatering should be registered on the EASR. Registration of dewatering on the EASR allows for construction dewatering between 50 m<sup>3</sup>/day and 400 m<sup>3</sup>/day. A dewatering and discharge plan is required for registration of construction dewatering activities on the EASR. If several excavations are dewatered simultaneously (and the construction dewatering rate exceeds 400 m<sup>3</sup>/day), then a Category 3 Permit To Take Water will be required.

Cumulative daily construction dewatering rates should be monitored on a daily basis to confirm appropriate water taking permitting.

Construction dewatering influences of the proposed development may intercept residential land use north of the Site (south of Raglan Street), on Ontario Street and Cooper Court to the east of the Site. Available information indicates that there are no private supply wells located within the ZOI. During construction dewatering activities the areas adjacent the construction excavations should be monitored regularly for land settlement and stability.

The ZOI encompasses wetland areas located off-site to the southwest. Groundwater is interpreted to naturally discharge to surface in the area off-site. As such, groundwater withdrawal (and disposal to surface) will not significantly alter the existing hydrogeological regime of off-site wetland areas. Off-site wetlands will be the final receiver of discharge water should water discharge water be disposed to surface, as such appropriate sediment and erosion control measures will be required.



Perpetual dewatering of foundations/basements (if required) is not expected to influence the wetland, as discharge water will presumably be directed to surface and ultimately returned to the watercourse.

Water quality results indicate that water discharged from construction excavations will require treatment before disposal. Discharge water can be treated to the receiver standards (i.e., sewers or to the environment (PWQO standards)) with settling tanks and/or filtration media. A water sample should also be collected after treatment to confirm treatment efficacy.

In summary, the proposed development is considered feasible at the Site. Local groundwater and surface water systems are not anticipated to be influenced from the development so long as appropriate sediment and erosion control procedures are in place, and discharge water is treated as needed during dewatering operations.

#### 6.1 Respectfully submitted,

Cambium Inc.

Nicole Heikoop, M.Sc., GIT  
Technician

Cameron McDougall, P.Geo  
Project Manager





## 7.0 References

- Cambium Inc. (2021). *Geotechnical Investigation - Proposed Residential Development, Ontario Street, Brighton, ON.*
- Chapman, L.J. and D.F. Putnam. (1984). *The Physiography of Southern Ontario: Ontario Geological Survey, Special Volume 2.*
- 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.
- MOEE. (1994b, July). *Water Management: Policies, Guidelines, Provincial Water Quality Objectives of the Ministry of the Environment and Energy.* Ministry of the Environment and Energy.
- Ontario Geological Survey. (2007). *Paleozoic Geology of Southern Ontario; Miscellaneous Release - Data 219.*
- Ontario Geological Survey. (2010). *Surficial geology of Southern Ontario; Miscellaneous Release - Data 128 - Revised.*



## 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**  
BICORP DESIGN GROUP LTD.  
214 Ontario Street  
Brighton, Ontario

**LEGEND**

-  Borehole
-  Unevaluated Wetlands
-  Site (approximate)

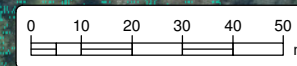
**Notes:**  
 - Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).  
 - Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.  
 - Cambium Inc. makes 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.



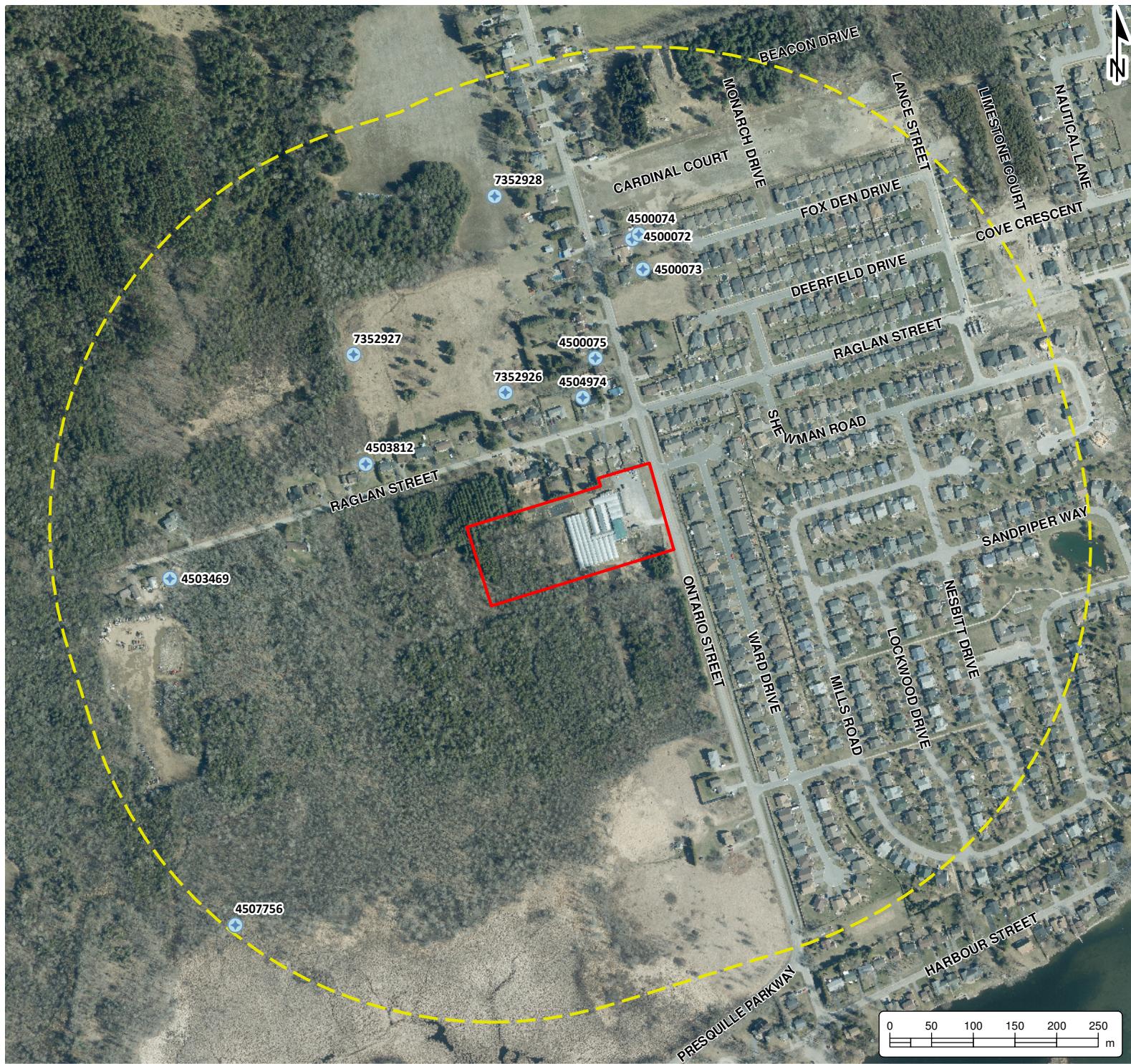
194 Sophia Street  
 Peterborough, Ontario, K9H 1E5  
 Tel: (705) 742.7900 Fax: (705) 742.7907  
 www.cambium-inc.com

**SITE PLAN**

Project No.:	13654-001	Date:	October 2021
Scale:	1:1,500	Rev.:	
Created by:	MAT	Checked by:	CM
		Figure:	<b>1</b>






O:\GIS\MXDs\13600-13699\13654-001\_Tomba Enterprises Ltd - GEO - 214 Ontario Street, Brighton\2021-10-20\_Hydro G.Fig. 2 - Water Well Records.mxd



**HYDROGEOLOGICAL ASSESSMENT**  
**BICORP DESIGN GROUP LTD.**  
 214 Ontario Street  
 Brighton, Ontario

**LEGEND**

-  MECP 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.



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



**WATER WELL RECORDS  
 WITHIN 500m OF SITE**

Project No.:	13654-001	Date:	October 2021
Scale:	1:6,500	Rev.:	
Created by:	MAT	Projection:	NAD 1983 UTM Zone 18N
Checked by:	CM	Figure:	<b>2</b>



**HYDROGEOLOGICAL  
ASSESSMENT**  
BICORP DESIGN GROUP LTD.  
214 Ontario Street  
Brighton, Ontario

**LEGEND**

-  44m Zone of Influence
-  Site (approximate)

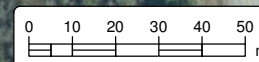
**Notes:**  
 - Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).  
 - Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.  
 - Cambium Inc. makes 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.



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

**ZONE OF INFLUENCE -  
CONSTRUCTION EXCAVATIONS**

Project No.:	13654-001	Date:	October 2021
Scale:	1:1,750	Rev.:	
Created by:	MAT	Projection:	NAD 1983 UTM Zone 18N
Checked by:	CM	Figure:	<b>3</b>

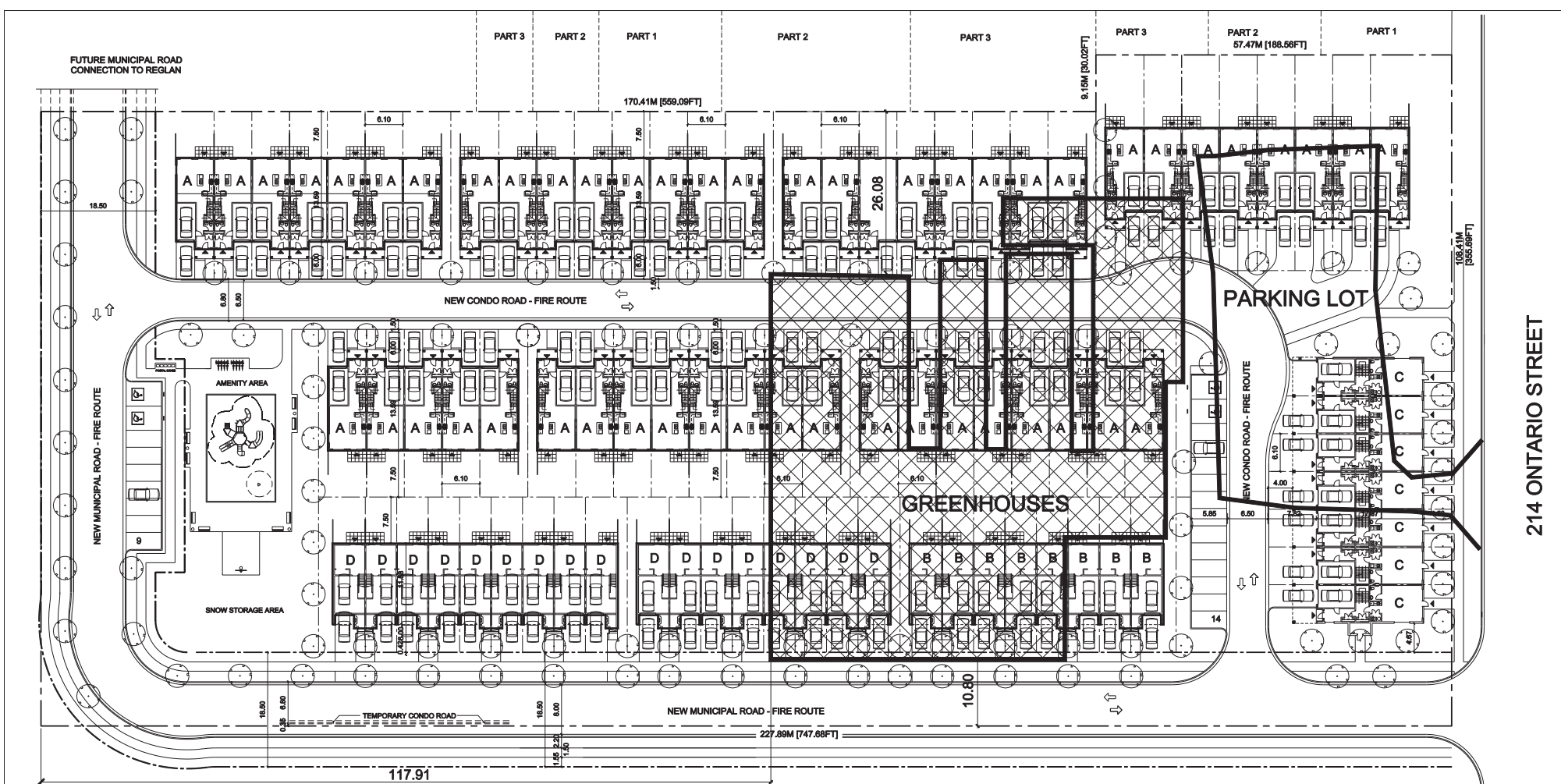




---

**Appendix A**  
**Land Information and Proposed Development Plan**

---



THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO BICORP DESIGN GROUP LTD. (B.D.G.). DRAWINGS MUST NOT BE SCALED. THIS DRAWING IS THE PROPERTY OF B.D.G. AND SHALL NOT BE REPRODUCED WITHOUT AUTHORIZATION.



**BICORP DESIGN GROUP LTD.**  
 1226 FAIRVIEW STREET, SUITE 200, BURLINGTON, ONTARIO L7R 2K0  
 TEL: 416-705-6629  
 bicorpdsgn@gmail.com

**BRIGHTON FREEHOLD TOWNHOUSE DEVELOPMENT**

REVISIONS			
1	07-08-2020	PRE-COMBINATION APPLICATION	
2	08-27-2019	PLAN UPDATE	
3	08-06-2021	PLAN UPDATE	
4	07-07-2021	PLAN UPDATE	
5	08-14-2021	PLAN UPDATE	
6	08-19-2021	PLAN UPDATE	

PROJECT: BRIGHTON FREEHOLD TOWNHOUSE DEVELOPMENT			
214 ONTARIO STREET, BURLINGTON, ONTARIO			
THIS SITE PLAN - DESIGN H5			
DESIGNED BY: R.A.	DRAWN BY: D.B.	APPROVED BY: D.B.	
DATE: 12/20	SCALE:	ISSUE DATE: JULY 2020	PROJECT CODE: 08-19-2021






**A1-H5**  
2020-20

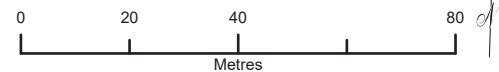


**GD-19-069**

214 Ontario Street  
Brighton  
Con BF, Lot 3

**Legend**

-  Parcels
- Floodlines**
-  Butler Creek - Regional
- Wetlands**
-  Unevaluated wetlands
- Field Verified Wetland**
-  Yes (Present)
-  No (Not Present)



Map produced by Lower Trent Conservation  
Includes material copyright 2019 of the Queen's Printer for Ontario



**LOWER TRENT CONSERVATION**

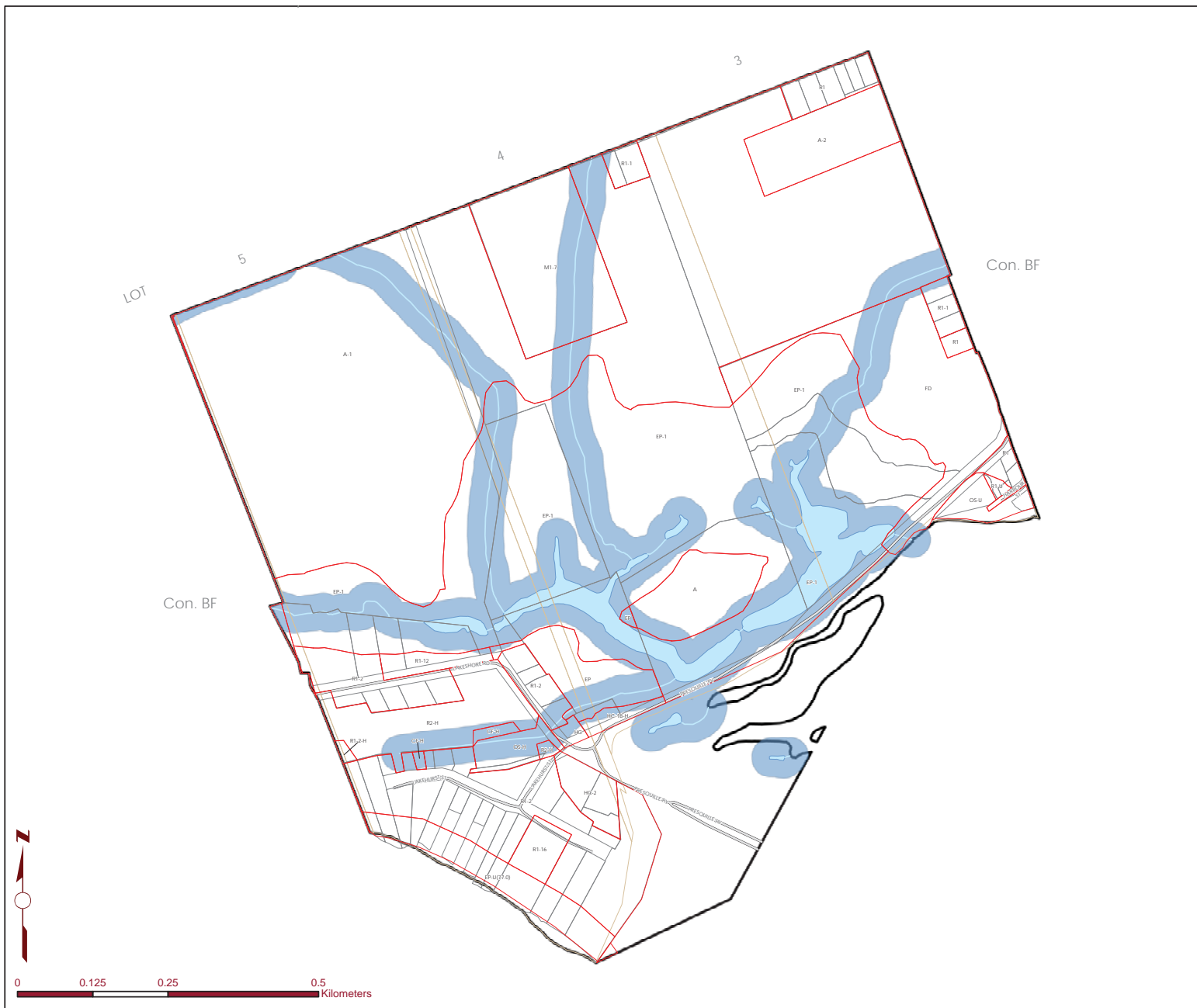
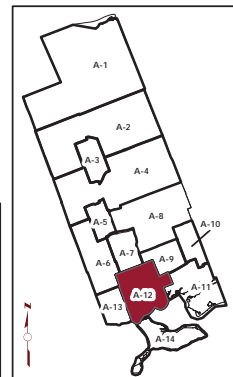
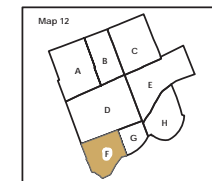
User: planning3 June 17, 2019 1:07 PM

  
**Municipality of Brighton, Ontario**  
**Zoning By- Law**  
**Schedule A Map 12 F**

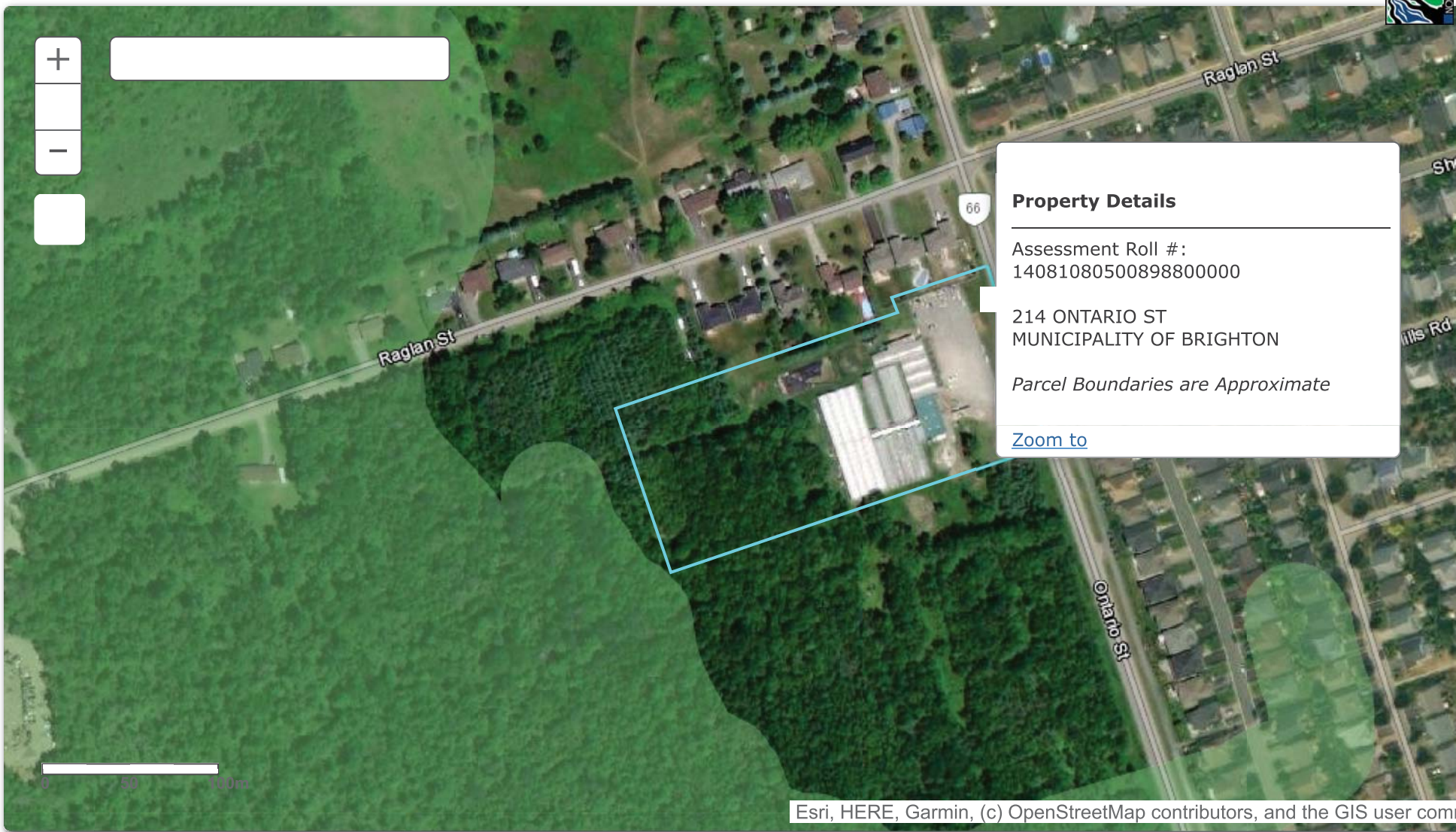
**Zone Description**

- R1 - Urban Residential One Zone
- R2 - Urban Residential Two Zone
- R3 - Urban Residential Three Zone
- RR - Rural Residential
- HR - Hamlet Residential
- SHR - Shoreline Residential
- LC - Local Commercial
- CA - Core Area Zone
- HC - Highway Commercial Zone
- RC - Recreational Commercial
- M1 - General Industrial
- M2 - Rural Industrial
- EM - Extractive Industrial
- RU - Rural
- A - Agricultural Zone
- OS - Open Space
- CF - Community Facility
- EP - Environmental Protection
- FD - Future Development
  
- H - Holding
- U - Wave Uprush Requirement
- F() - Flood Proofing Elevation Requirement

-  Floodplain Area Zone
-  Well Head Protection Area Zone
-  Floodprone Area Zone
-  Resource Reserve Area Zone
-  Water Features



# Lower Trent Conservation Map Viewer



**Property Details**

Assessment Roll # :  
14081080500898800000

214 ONTARIO ST  
MUNICIPALITY OF BRIGHTON

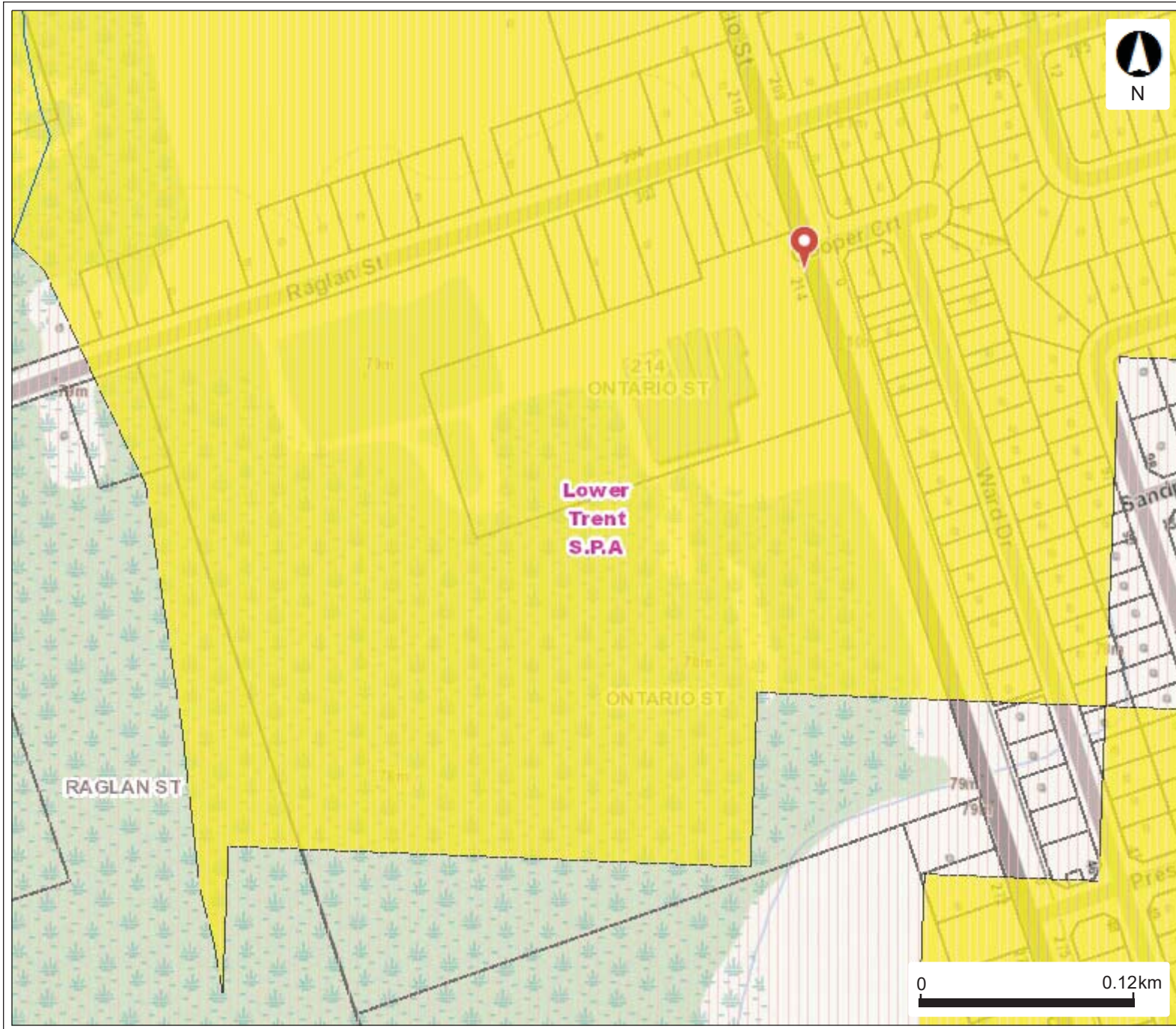
*Parcel Boundaries are Approximate*

[Zoom to](#)

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Green represents mapped areas adjacent to wetlands, waterbodies, and watercourse:

# SPIA Map



## Legend

- Source Protection Areas
- Watercourse Direction
- Highly Vulnerable Aquifers
- Significant Groundwater Recharge Area
  - 0
  - 2
  - 4
  - 6
- Assessment Parcel

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.



# ANSI Map

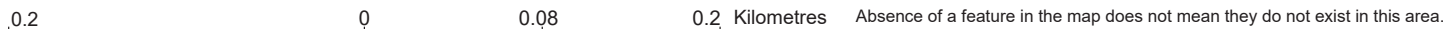
Map created:9/7/2021



### Legend

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

Notes:  
Enter map notes



This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Natural Resources and Forestry(OMNRF) shall not be liable in any way for the use of, or reliance upon, this map or any information on this map.  
© Copyright for Ontario Parcel data is held by Queen's Printer for Ontario and its licensors and may not be reproduced without permission. THIS IS NOT A PLAN OF SURVEY.



Imagery Copyright Notices: DRAPE © Aéro-Photo (1961) Inc., 2008 - 2009  
GTA 2005 / SWOOP 2006 / Simcoe-Muskoka-Dufferin © FirstBase Solutions, 2005 / 2006 / 2008  
© Queen's Printer for Ontario, 2021





---

## **Appendix B**

### **Borehole Logs**

---



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

# Log of Borehole:

BH101-21

Page 1 of 1

**Client:** Tomba Enterprises Ltd.  
**Contractor:** Canadian Environmental Drilling  
**Location:** 214 Ontario Street, Brighton, Ontario

**Project Name:** 214 Ontario Street, Brighton, Ontario  
**Method:** Hollow Stem Augers  
**UTM:** 18T, 4877790.50 m N, 280531.69 m E

**Project No.:** 13654-001  
**Date Completed:** August 30, 2021  
**Elevation:** 78.79 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture			SPT (N)	Well Installation	Remarks			
								25	50	75	20	40	60	80		
0		TOPSOIL: 50 mm		1A												
		FILL: Grey brown sand and gravel, trace silt, moist		1B	SS	71	13									
				1C												
78		SAND: Grey brown, trace silt, trace gravel, very loose to loose, moist														
	1	-wet below		2	SS	72	8									
77				3	SS	89	2									
	2															
76				4	SS	72	2									
	3															
75				5	SS	79	6									
	4															
				6A												
		CLAY and SILT: Grey, trace sand, trace gravel, stiff, moist		6B	SS	100	10									
74				7	SS	67	11									
	5															
73				8A												
		TILL: Grey silty sand, gravelly, some clay, compact, wet		8B	SS	67	23									
	6															
72			Borehole terminated at 6.1 mbgs.													
	7															

SS7 GSA  
 Gravel 1%  
 Sand 6%  
 Silt 45%  
 Clay 48%

SS8B GSA  
 Gravel 24%  
 Sand 36%  
 Silt 30%  
 Clay 10%

BH caved to 0.9 mbgs upon completion.





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

# Log of Borehole:

BH103-21

Page 1 of 1

**Client:** Tomba Enterprises Ltd.  
**Contractor:** Canadian Environmental Drilling  
**Location:** 214 Ontario Street, Brighton, Ontario

**Project Name:** 214 Ontario Street, Brighton, Ontario  
**Method:** Hollow Stem Augers  
**UTM:** 18T, 4877810.38 m N, 280455.32 m E

**Project No.:** 13654-001  
**Date Completed:** August 30, 2021  
**Elevation:** 79.14 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture			SPT (N)				Well Installation	Remarks
								25	50	75	20	40	60	80		
79	0	[Pattern: irregular shapes]	FILL: Brown silty sand, trace gravel, with organics and rootlets, loose, moist	1	SS	67	5									
			-Black [Probable buried topsoil]	2A	SS	100	4									
78	1	[Pattern: small circles]	SAND: Brown, some silt, very loose, wet	2B												
				3	SS	50	3									
77	2	[Pattern: small circles]	-grey brown, trace silt, trace gravel, compact below	4	SS	94	13									
				5	SS	100	14									
76	3	[Pattern: small circles]		6A	SS	100	9									
				6B												
75	4	[Pattern: horizontal lines]	CLAY and SILT: Grey, trace sand, firm to soft, moist	7	SS	50	5									
				-some sand, trace gravel	8	SS	17	2								
73	6		Borehole terminated at 6.1 mbgs.													
72	7															

SS3 GSA  
 Gravel 0%  
 Sand 90%  
 Silt and Clay 10%

SS4 GSA  
 Gravel 2%  
 Sand 95%  
 Silt and Clay 3%

Water level at 1.2 mbgs and cave to 1.5 mbgs upon completion.

Logged By: FI

Input By: FI



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

# Log of Borehole:

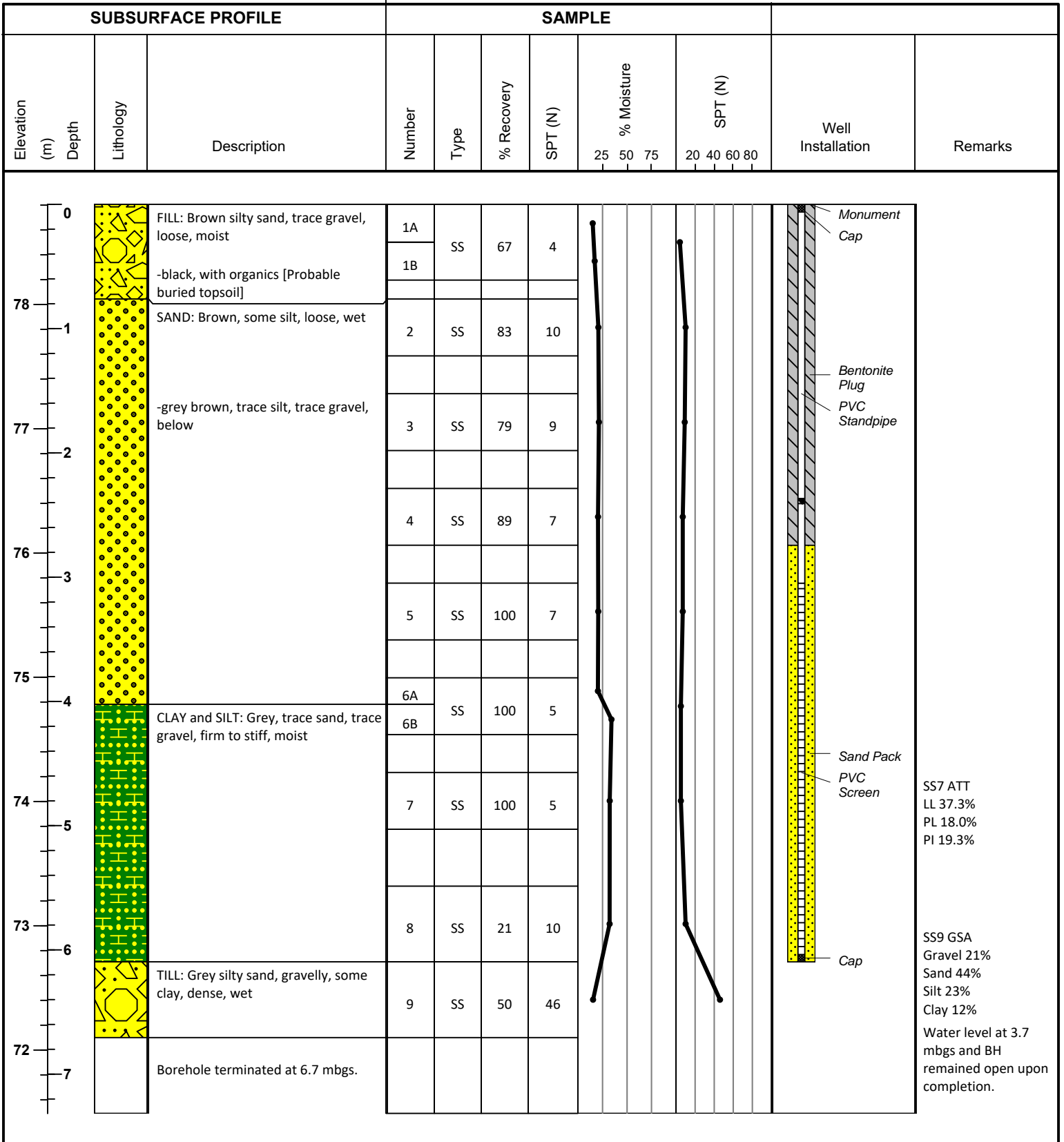
BH104-21

Page 1 of 1

**Client:** Tomba Enterprises Ltd.  
**Contractor:** Canadian Environmental Drilling  
**Location:** 214 Ontario Street, Brighton, Ontario

**Project Name:** 214 Ontario Street, Brighton, Ontario  
**Method:** Hollow Stem Augers  
**UTM:** 18T, 4877757.28 m N, 280447.14 m E

**Project No.:** 13654-001  
**Date Completed:** August 31, 2021  
**Elevation:** 78.81 mASL



Logged By: FI

Input By: FI



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

# Log of Borehole:

BH105-21

Page 1 of 1

**Client:** Tomba Enterprises Ltd.  
**Contractor:** Canadian Environmental Drilling  
**Location:** 214 Ontario Street, Brighton, Ontario

**Project Name:** 214 Ontario Street, Brighton, Ontario  
**Method:** Hollow Stem Augers  
**UTM:** 18T, 4877819.09 m N, 280387.41 m E

**Project No.:** 13654-001  
**Date Completed:** August 31, 2021  
**Elevation:** 79.06 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture			SPT (N)				Well Installation	Remarks
								25	50	75	20	40	60	80		
79	0		TOPSOIL: 230 mm	1A												
			SAND: Brown, some silt, compact, moist	1B	SS	67	5									
			-grey brown, trace silt, trace gravel, wet below	2	SS	72	15									
				3	SS	67	18									
				4	SS	100	19									
				5	SS	100	17									
				6A												
			CLAY and SILT: Grey, trace sand, trace gravel, stiff, moist	6B	SS	100	5									
				7	SS	100	14									
				8A												
			TILL: Grey silty sand, gravelly, some clay, compact, wet	8B	SS	67	12									
				9	SS	58	17									
			Borehole terminated at 6.7 mbgs.													

Water level at 2.4 mbgs and BH remained open upon completion.

Logged By: FI

Input By: FI



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

# Log of Borehole:

BH106-21

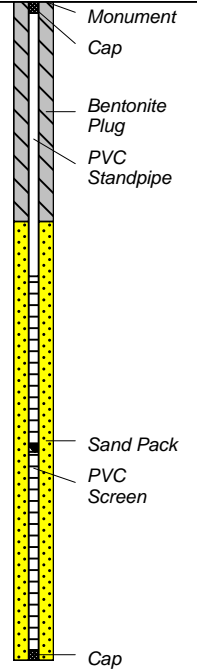
Page 1 of 1

**Client:** Tomba Enterprises Ltd.  
**Contractor:** Canadian Environmental Drilling  
**Location:** 214 Ontario Street, Brighton, Ontario

**Project Name:** 214 Ontario Street, Brighton, Ontario  
**Method:** Hollow Stem Augers  
**UTM:** 18T, 4877793.66 m N, 280349.65 m E

**Project No.:** 13654-001  
**Date Completed:** August 31, 2021  
**Elevation:** 78.86 mASL

SUBSURFACE PROFILE				SAMPLE												
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture			SPT (N)	Well Installation	Remarks			
								25	50	75	20	40	60	80		
0			TOPSOIL: 300 mm	1A												
			SAND: Brown, trace silt, compact, moist	1B	SS	67	9									
78	1		-grey brown, wet below	2	SS	56	11									
				3	SS	100	14									
77	2		-loose below	4	SS	89	9									
				5	SS	100	8									
76	3			6A	SS	100	9									
			CLAY and SILT: Grey, trace sand, trace gravel, stiff, moist	6B												
75	4			7	SS	100	9									
				8A												
74	5			8B	SS	63	7									
			TILL: Grey silty sand, gravelly, some clay, dense, moist	9	SS	42	49									
73	6															
72	7		Borehole terminated at 6.7 mbgs.													



SS5 GSA  
 Gravel 0%  
 Sand 99%  
 Silt and Clay 1%

Water level at 2.1 mbgs and BH remained open upon completion.

Logged By: FI

Input By: FI



---

## **Appendix C**

### **Grain Size Analysis**

---















---

## **Appendix D**

# **AquiferTest Pro Results**

---



194 Sophia St.  
Peterborough, ON  
K9H1E5

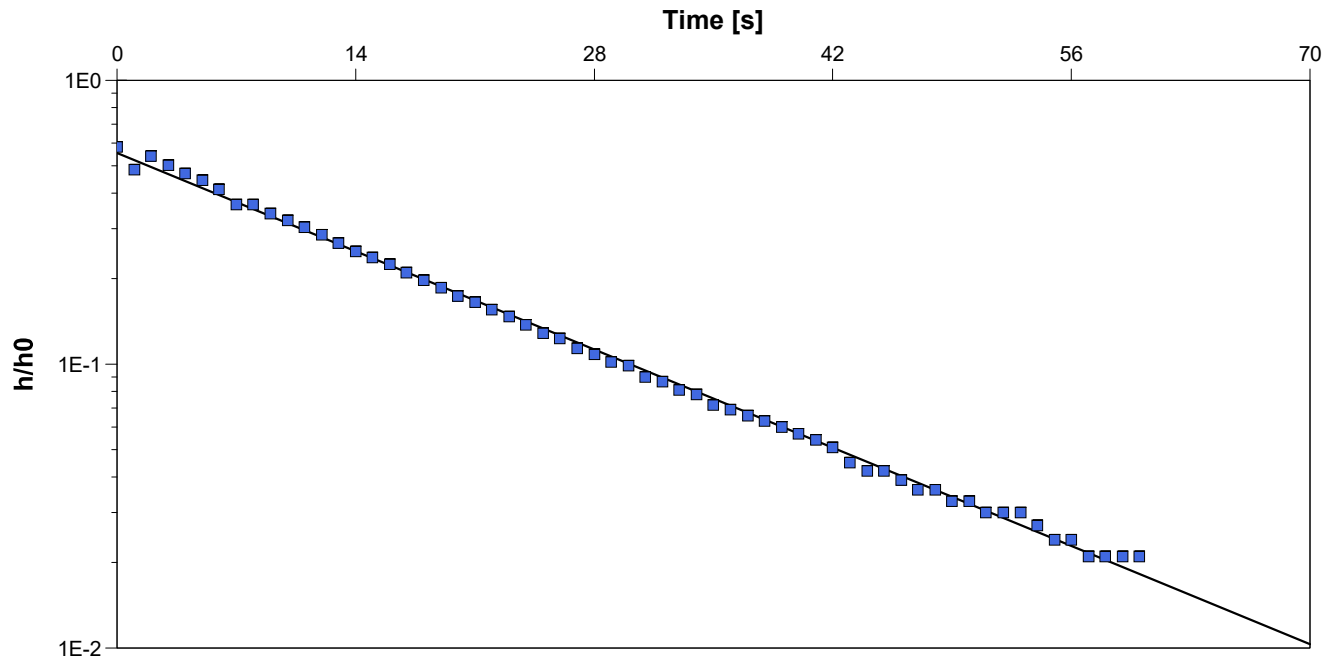
**Slug Test Analysis Report**

Project: Hydrogeological Assessment, 214 Ontario St.

Number: 13654-001

Client: Bicorp Design Group Ltd.

Location: Brighton, Ontario	Slug Test: BH102-21 Test 1	Test Well: BH102-21
Test Conducted by: J. Munro		Test Date: 9/16/2021
Analysis Performed by: N. Heikoop	BH102-21 Test 1	Analysis Date: 9/29/2021
Aquifer Thickness: 4.23 m		



Calculation using Hvorslev		
Observation Well	Hydraulic Conductivity [m/s]	
BH102-21	$3.06 \times 10^{-5}$	



194 Sophia St.  
Peterborough, ON  
K9H1E5

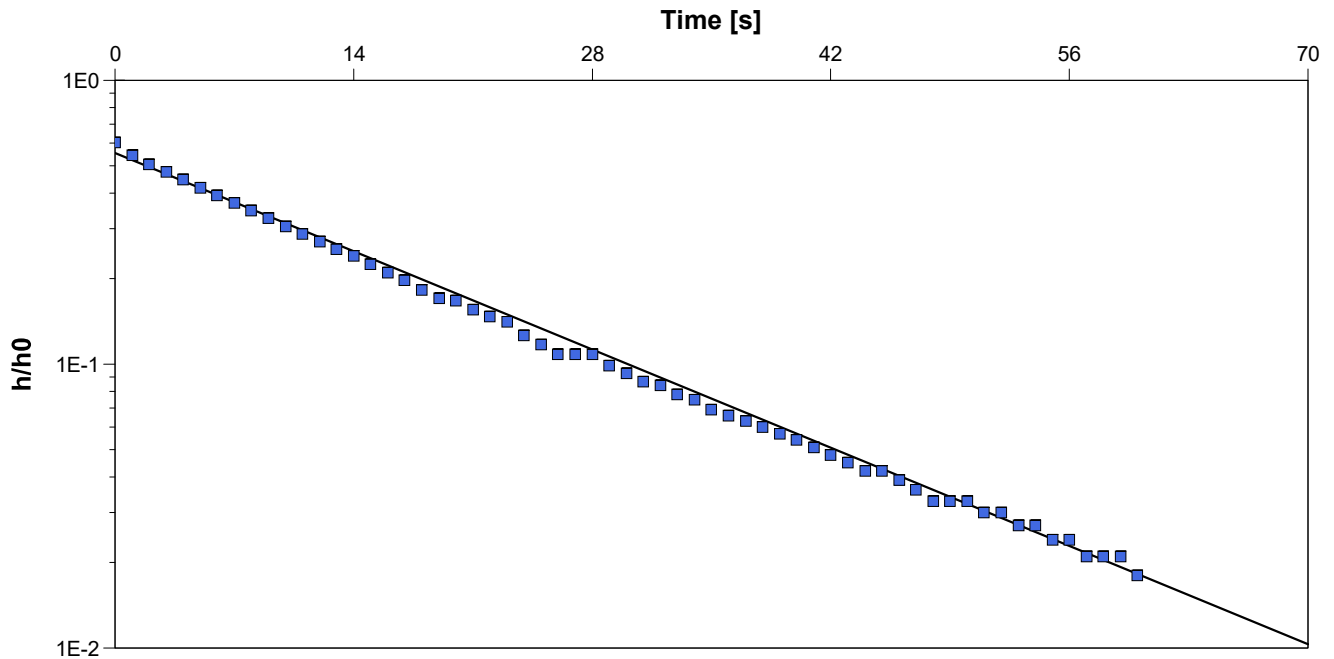
**Slug Test Analysis Report**

Project: Hydrogeological Assessment, 214 Ontario St.

Number: 13654-001

Client: Bicorp Design Group Ltd.

Location: Brighton, Ontario	Slug Test: BH102-21 Test 2	Test Well: BH102-21
Test Conducted by: J. Munro		Test Date: 9/16/2021
Analysis Performed by: N. Heikoop	BH102-21 Test 2	Analysis Date: 9/29/2021
Aquifer Thickness: 4.23 m		



Calculation using Hvorslev		
Observation Well	Hydraulic Conductivity [m/s]	
BH102-21	$3.06 \times 10^{-5}$	



194 Sophia St.  
Peterborough, ON  
K9H1E5

**Slug Test Analysis Report**

Project: Hydrogeological Assessment, 214 Ontario St.

Number: 13654-001

Client: Bicorp Design Group Ltd.

Location: Brighton, Ontario

Slug Test: BH102-21 Test 3

Test Well: BH102-21

Test Conducted by: J. Munro

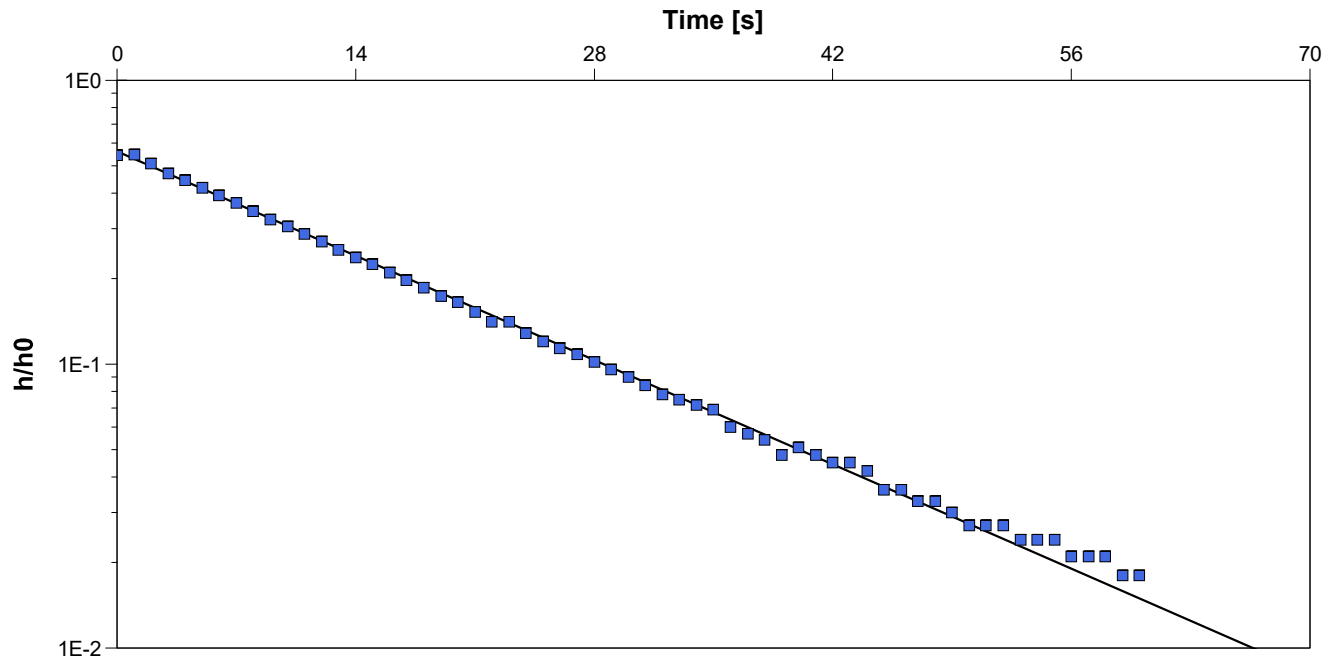
Test Date: 9/16/2021

Analysis Performed by: N. Heikoop

BH102-21 Test 3

Analysis Date: 9/29/2021

Aquifer Thickness: 4.23 m



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]
------------------	------------------------------

BH102-21	$3.25 \times 10^{-5}$
----------	-----------------------



194 Sophia St.  
Peterborough, ON  
K9H1E5

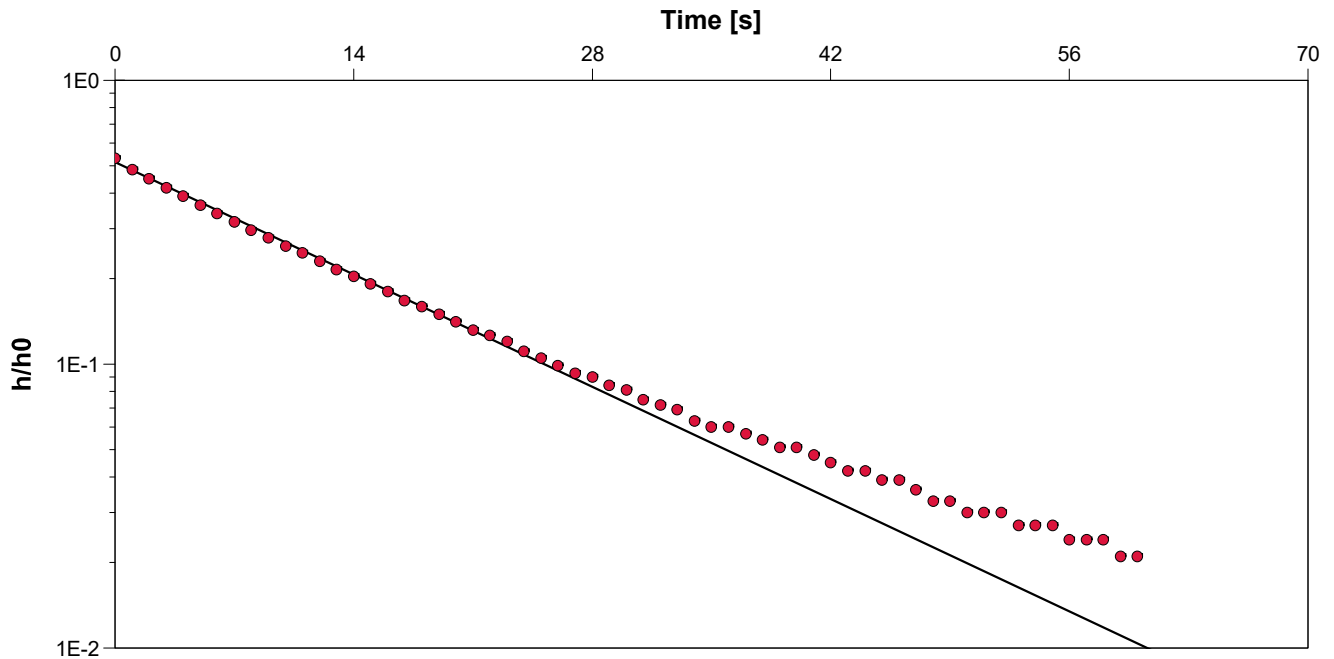
**Slug Test Analysis Report**

Project: Hydrogeological Assessment, 214 Ontario St.

Number: 13654-001

Client: Bicorp Design Group Ltd.

Location: Brighton, Ontario	Slug Test: BH104-21 Test 1	Test Well: BH104-21
Test Conducted by: J. Munro		Test Date: 9/16/2021
Analysis Performed by: N. Heikoop	BH104-21 Test 1	Analysis Date: 9/29/2021
Aquifer Thickness: 4.79 m		



Calculation using Hvorslev		
Observation Well	Hydraulic Conductivity [m/s]	
BH104-21	$3.50 \times 10^{-5}$	



194 Sophia St.  
Peterborough, ON  
K9H1E5

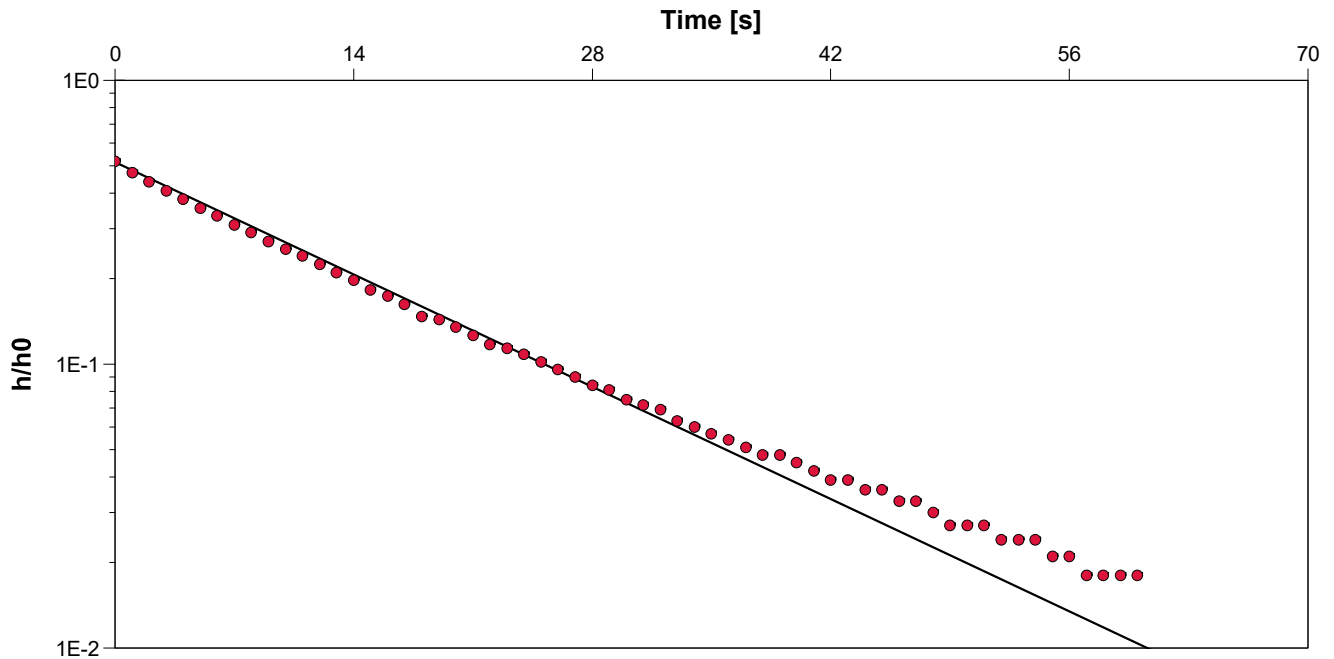
**Slug Test Analysis Report**

Project: Hydrogeological Assessment, 214 Ontario St.

Number: 13654-001

Client: Bicorp Design Group Ltd.

Location: Brighton, Ontario	Slug Test: BH104-21 Test 2	Test Well: BH104-21
Test Conducted by: J. Munro		Test Date: 9/16/2021
Analysis Performed by: N. Heikoop	BH104-21 Test 2	Analysis Date: 9/29/2021
Aquifer Thickness: 4.79 m		



Calculation using Hvorslev		
Observation Well	Hydraulic Conductivity [m/s]	
BH104-21	$3.50 \times 10^{-5}$	



194 Sophia St.  
Peterborough, ON  
K9H1E5

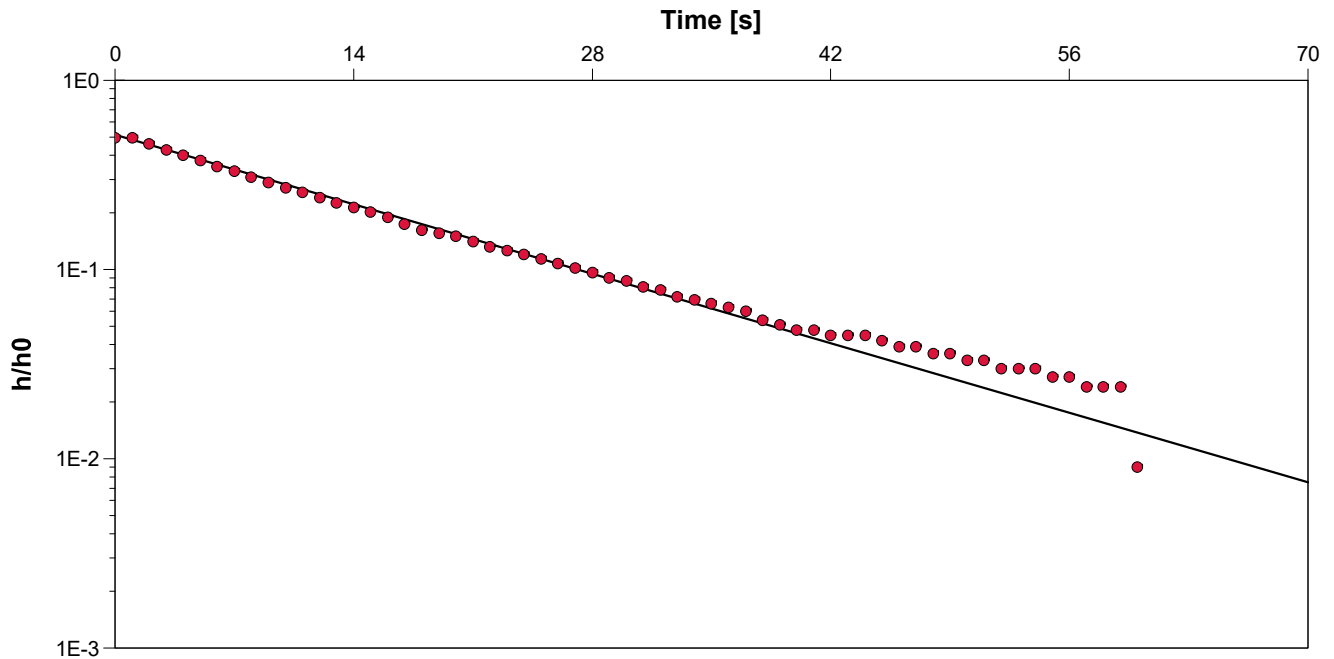
**Slug Test Analysis Report**

Project: Hydrogeological Assessment, 214 Ontario St.

Number: 13654-001

Client: Bicorp Design Group Ltd.

Location: Brighton, Ontario	Slug Test: BH104-21 Test 3	Test Well: BH104-21
Test Conducted by: J. Munro		Test Date: 9/16/2021
Analysis Performed by: N. Heikoop	BH104-21 Test 3	Analysis Date: 9/29/2021
Aquifer Thickness: 4.79 m		



Calculation using Hvorslev		
Observation Well	Hydraulic Conductivity [m/s]	
BH104-21	$3.25 \times 10^{-5}$	



194 Sophia St.  
Peterborough, ON  
K9H1E5

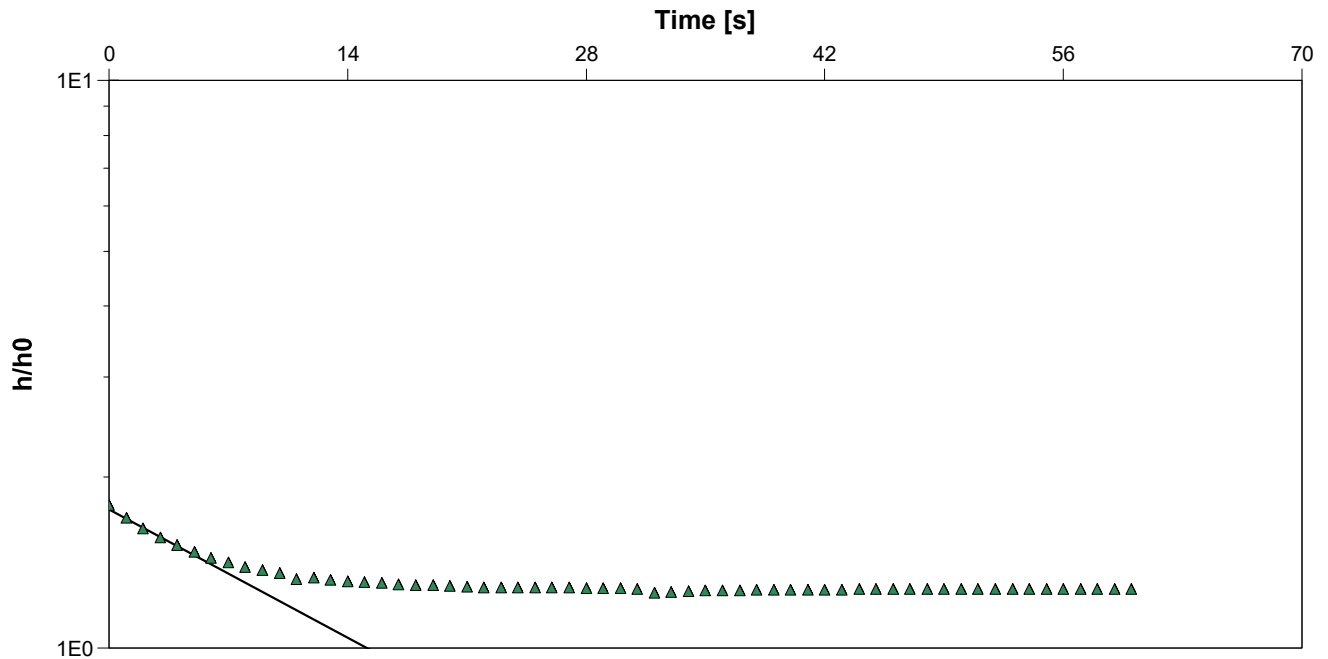
**Slug Test Analysis Report**

Project: Hydrogeological Assessment, 214 Ontario St.

Number: 13654-001

Client: Bicorp Design Group Ltd.

Location: Brighton, Ontario	Slug Test: BH106-21 Test 1	Test Well: BH106-21
Test Conducted by: J. Munro		Test Date: 9/16/2021
Analysis Performed by: N. Heikoop	BH106-21 Test 1	Analysis Date: 9/29/2021
Aquifer Thickness: 2.35 m		



Calculation using Hvorslev		
Observation Well	Hydraulic Conductivity [m/s]	
BH106-21	$2.00 \times 10^{-5}$	



194 Sophia St.  
Peterborough, ON  
K9H1E5

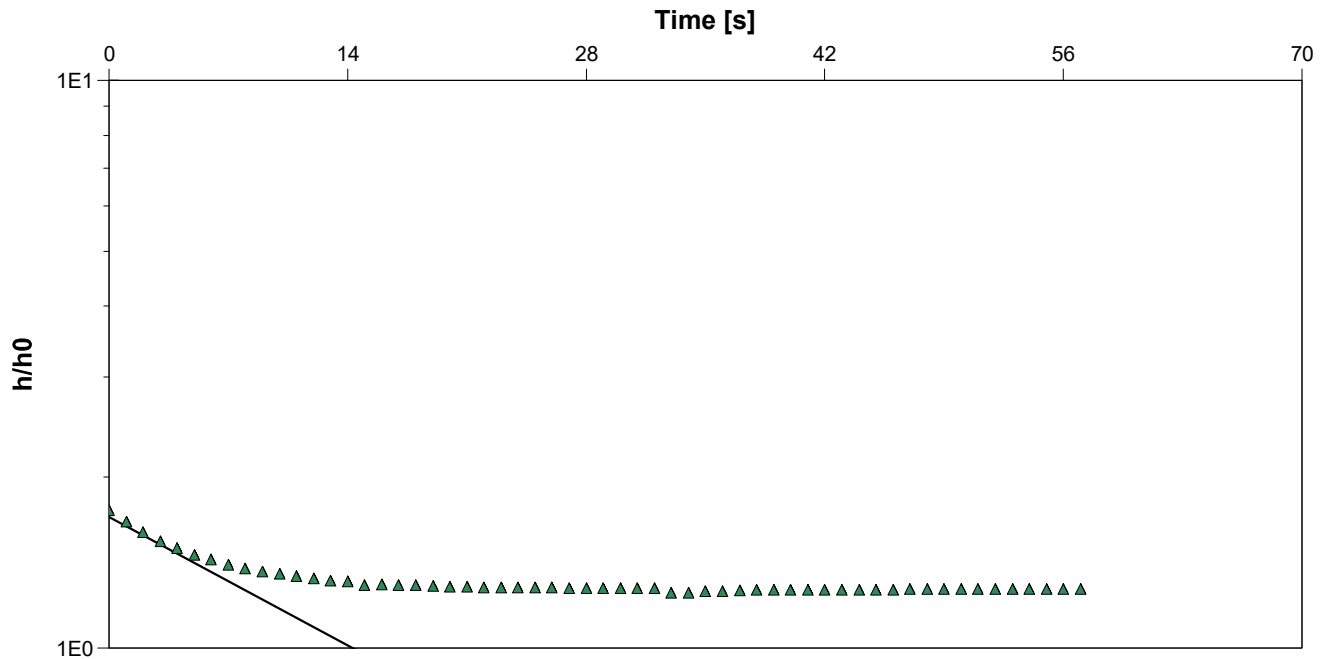
**Slug Test Analysis Report**

Project: Hydrogeological Assessment, 214 Ontario St.

Number: 13654-001

Client: Bicorp Design Group Ltd.

Location: Brighton, Ontario	Slug Test: BH106-21 Test 2	Test Well: BH106-21
Test Conducted by: J. Munro		Test Date: 9/16/2021
Analysis Performed by: N. Heikoop	BH106-21 Test 2	Analysis Date: 9/29/2021
Aquifer Thickness: 2.35 m		



Calculation using Hvorslev		
Observation Well	Hydraulic Conductivity [m/s]	
BH106-21	$2.00 \times 10^{-5}$	



194 Sophia St.  
Peterborough, ON  
K9H1E5

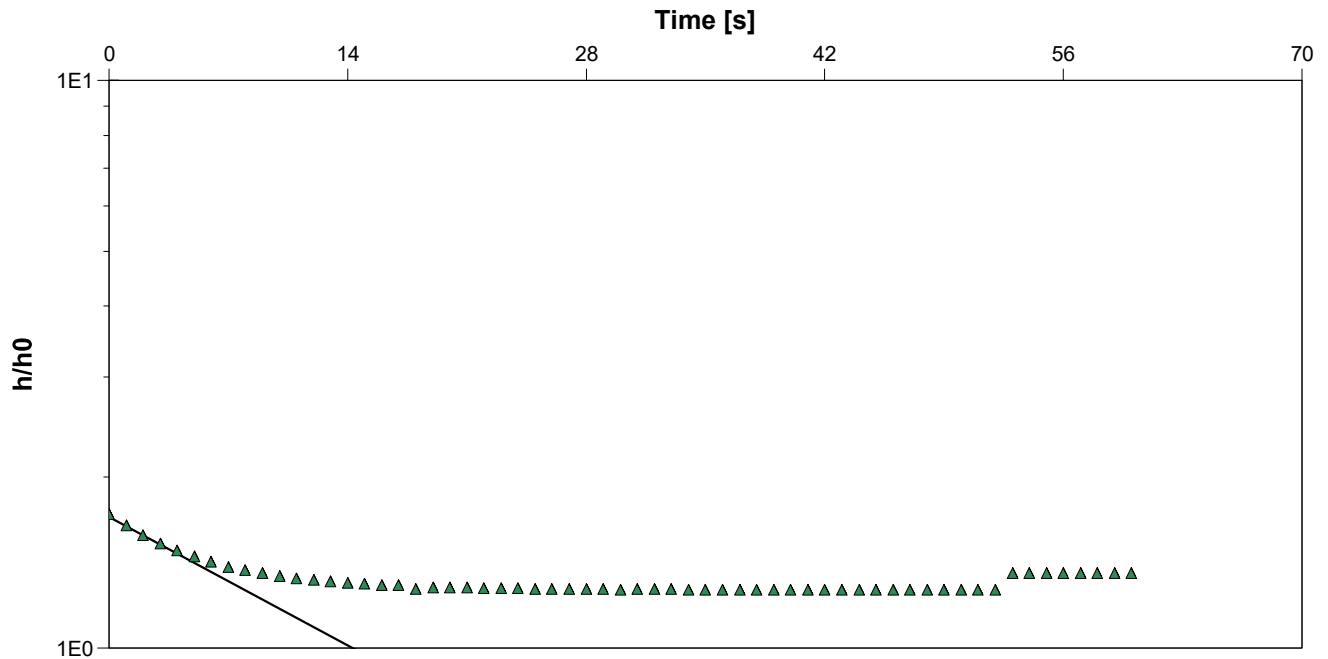
**Slug Test Analysis Report**

Project: Hydrogeological Assessment, 214 Ontario St.

Number: 13654-001

Client: Bicorp Design Group Ltd.

Location: Brighton, Ontario	Slug Test: BH106-21 Test 3	Test Well: BH106-21
Test Conducted by: J. Munro		Test Date: 9/16/2021
Analysis Performed by: N. Heikoop	BH106-21 Test 3	Analysis Date: 9/29/2021
Aquifer Thickness: 2.35 m		



Calculation using Hvorslev		
Observation Well	Hydraulic Conductivity [m/s]	
BH106-21	$2.00 \times 10^{-5}$	



---

**Appendix E**  
**Certificate of Laboratory Analysis**

---

C.O.C.: G101764

REPORT No. B21-29685

**Report To:**

**Cambium Environmental**  
 194 Sophia St.,  
 Peterborough ON K9H 1E5 Canada

**Attention:** Cameron MacDougall

**Caduceon Environmental Laboratories**

285 Dalton Ave  
 Kingston Ontario K7K 6Z1  
 Tel: 613-544-2001  
 Fax: 613-544-2770

DATE RECEIVED: 15-Sep-21

JOB/PROJECT NO.:

DATE REPORTED: 29-Sep-21

P.O. NUMBER: 13654-001

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

<b>Client I.D.</b>	BH206		
<b>Sample I.D.</b>	B21-29685-1		
<b>Date Collected</b>	14-Sep-21		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Fluoride	mg/L	0.1	SM4110C	17-Sep-21/O	< 0.1		
Chloride	mg/L	0.5	SM4110C	17-Sep-21/O	15.0		
Sulphate	mg/L	1	SM4110C	17-Sep-21/O	6		
BOD(5 day)	mg/L	3	SM 5210B	15-Sep-21/K	< 3		
Total Suspended Solids	mg/L	3	SM2540D	16-Sep-21/K	2580		
Phosphorus-Total	mg/L	0.01	E3199A.1	17-Sep-21/K	3.24		
Cyanide (Total)	mg/L	0.005	SM 4500CN	16-Sep-21/K	< 0.005		
Phenolics	mg/L	0.002	MOEE 3179	16-Sep-21/K	< 0.002		
Oil and Grease-Anim/Veg.	mg/L	1.0	SM 5520	20-Sep-21/K	2.6		
Oil and Grease-Mineral	mg/L	1.0	SM 5520	20-Sep-21/K	< 1.0		
Aluminum	mg/L	0.01	SM 3120	17-Sep-21/O	32.6		
Antimony	mg/L	0.0001	EPA 200.8	17-Sep-21/O	< 0.001		
Arsenic	mg/L	0.0001	EPA 200.8	17-Sep-21/O	0.0039		
Cadmium	mg/L	0.005	SM 3120	17-Sep-21/O	< 0.005		
Chromium	mg/L	0.002	SM 3120	17-Sep-21/O	0.060		
Chromium (VI)	mg/L	0.01	MOE E3056	21-Sep-21/O	< 0.01		
Cobalt	mg/L	0.005	SM 3120	17-Sep-21/O	0.026		
Copper	mg/L	0.002	SM 3120	17-Sep-21/O	0.056		
Iron	mg/L	0.005	SM 3120	17-Sep-21/O	52.0		
Lead	mg/L	0.02	SM 3120	17-Sep-21/O	0.03		
Manganese	mg/L	0.001	SM 3120	17-Sep-21/O	1.23		
Mercury	mg/L	0.00002	SM 3112 B	20-Sep-21/O	0.00002 <sup>3</sup>		
Molybdenum	mg/L	0.01	SM 3120	17-Sep-21/O	< 0.01		
Nickel	mg/L	0.01	SM 3120	17-Sep-21/O	0.05		
Selenium	mg/L	0.001	EPA 200.8	17-Sep-21/O	< 0.01		
Silver	mg/L	0.0001	EPA 200.8	17-Sep-21/O	< 0.0002		
Tin	mg/L	0.05	SM 3120	17-Sep-21/O	< 0.05		



Michelle Dubien  
 Lab Manager

R.L. = Reporting Limit

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

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

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

C.O.C.: G101764

REPORT No. B21-29685

**Report To:**

**Cambium Environmental**  
194 Sophia St.,  
Peterborough ON K9H 1E5 Canada

**Attention:** Cameron MacDougall

**Caduceon Environmental Laboratories**

285 Dalton Ave  
Kingston Ontario K7K 6Z1  
Tel: 613-544-2001  
Fax: 613-544-2770

DATE RECEIVED: 15-Sep-21

JOB/PROJECT NO.:

DATE REPORTED: 29-Sep-21

P.O. NUMBER: 13654-001

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

<b>Client I.D.</b>	BH206		
<b>Sample I.D.</b>	B21-29685-1		
<b>Date Collected</b>	14-Sep-21		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Titanium	mg/L	0.005	SM 3120	17-Sep-21/O	3.15		
Vanadium	mg/L	0.005	SM 3120	17-Sep-21/O	0.084		
Zinc	mg/L	0.005	SM 3120	17-Sep-21/O	0.181		
Aldrin	mg/L	0.00001	EPA 8080	23-Sep-21/K	< 0.00001		
Dieldrin	mg/L	0.00001	EPA 8080	23-Sep-21/K	< 0.00001		
Aldrin + Dieldrin	mg/L	0.00002	EPA 8080	23-Sep-21/K	< 0.00002		
Hexachlorobenzene	mg/L	0.00001	EPA 8080	23-Sep-21/K	< 0.00001		
Mirex	mg/L	0.001	EPA 8080	23-Sep-21/K	< 0.001		
Poly-Chlorinated Biphenyls (PCB's)	mg/L	0.00005	EPA 8080	23-Sep-21/K	< 0.00005		
Lindane (Hexachlorocyclohexane, Gamma)	mg/L	0.00001	EPA 8080	23-Sep-21/K	< 0.00001		
Acenaphthene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0003		
Acenaphthylene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0003		
Anthracene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0002		
Benzo(a)anthracene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0006		
Benzo(a)pyrene	mg/L	0.00001	EPA 8270	20-Sep-21/K	< 0.0001		
Benzo(b+k)fluoranthene	mg/L	0.0001	EPA 8270	20-Sep-21/K	0.00020		
Benzo(g,h,i)perylene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0002		
Chrysene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0002		
Dibenzo(a,h)anthracene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0002		
Indeno(1,2,3,-cd)pyrene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0003		
Fluoranthene	mg/L	0.00005	EPA 8270	20-Sep-21/K	0.00020		
Fluorene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0002		
Methylnaphthalene,1-	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0003		
Methylnaphthalene,2-	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0003		
Naphthalene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0006 <sup>2</sup>		



R.L. = Reporting Limit

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

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

Michelle Dubien  
Lab Manager

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

**C.O.C.: G101764**

**REPORT No. B21-29685**

**Report To:**

**Cambium Environmental**  
 194 Sophia St.,  
 Peterborough ON K9H 1E5 Canada

**Attention:** Cameron MacDougall

**Caduceon Environmental Laboratories**

285 Dalton Ave  
 Kingston Ontario K7K 6Z1  
 Tel: 613-544-2001  
 Fax: 613-544-2770

DATE RECEIVED: 15-Sep-21

JOB/PROJECT NO.:

DATE REPORTED: 29-Sep-21

P.O. NUMBER: 13654-001

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

<b>Client I.D.</b>	BH206
<b>Sample I.D.</b>	B21-29685-1
<b>Date Collected</b>	14-Sep-21

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Phenanthrene	mg/L	0.00005	EPA 8270	20-Sep-21/K	< 0.0003		
Pyrene	mg/L	0.00005	EPA 8270	20-Sep-21/K	0.00020		
Total PAH	mg/L	0.0001	EPA 8270	20-Sep-21/K	0.00267		
Pentachlorophenol	mg/L	0.0002	EPA 8270	20-Sep-21/K	< 0.002	1	
Dichlorobenzidine, 3,3'	mg/L	0.0005	EPA 8270	20-Sep-21/K	< 0.001		
Bis(2-ethylhexyl) Phthalate	mg/L	0.005	EPA 8270	20-Sep-21/K	0.069		
Di-n-butyl Phthalate	mg/L	0.001	EPA 8270	20-Sep-21/K	< 0.01		
Nonylphenol Ethoxylates	mg/L	0.01	Subcontract	24-Sep-21	< 0.01	4	
Nonylphenol Monoethoxylate	mg/L	0.01	Subcontract	24-Sep-21	< 0.01	4	
Nonylphenol Diethoxylate	mg/L	0.01	Subcontract	24-Sep-21	< 0.01	4	
Nonylphenols	mg/L	0.001	Subcontract	24-Sep-21	< 0.001	4	
Poly-Chlorinated Biphenyls (PCB's)	mg/L	0.00005	EPA 8082	21-Sep-21/K	< 0.00005		
Aroclor	-		-	21-Sep-21	-		
Benzene	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Ethylbenzene	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Dichloropropene, trans-1,3-	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Dichlorobenzene, 1,2-	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Dichlorobenzene, 1,4-	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Dichloromethane (Methylene Chloride)	mg/L	0.005	EPA 8260	16-Sep-21/R	< 0.005		
Dichloroethene, cis-1,2-	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Chloroform	mg/L	0.001	EPA 8260	16-Sep-21/R	< 0.001		
Tetrachloroethane, 1,1,2,2-	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Tetrachloroethylene	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Trichloroethylene	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Toluene	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		



R.L. = Reporting Limit

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

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

Michelle Dubien  
 Lab Manager

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

C.O.C.: G101764

REPORT No. B21-29685

**Report To:**

**Cambium Environmental**  
 194 Sophia St.,  
 Peterborough ON K9H 1E5 Canada

**Attention:** Cameron MacDougall

**Caduceon Environmental Laboratories**

285 Dalton Ave  
 Kingston Ontario K7K 6Z1  
 Tel: 613-544-2001  
 Fax: 613-544-2770

DATE RECEIVED: 15-Sep-21

JOB/PROJECT NO.:

DATE REPORTED: 29-Sep-21

P.O. NUMBER: 13654-001

SAMPLE MATRIX: Groundwater

WATERWORKS NO.

<b>Client I.D.</b>	BH206			
<b>Sample I.D.</b>	B21-29685-1			
<b>Date Collected</b>	14-Sep-21			

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Xylene, m,p-	mg/L	0.0010	EPA 8260	16-Sep-21/R	< 0.0010		
Xylene, o-	mg/L	0.0005	EPA 8260	16-Sep-21/R	< 0.0005		
Xylene, m,p,o-	mg/L	0.0011	EPA 8260	16-Sep-21/R	< 0.0011		
Vinyl Chloride	mg/L	0.0002	EPA 8260	16-Sep-21/R	< 0.0002		

1. Low TBP surrogate recovery
2. Note: Elevated RLs due to sample matrix interferences
3. Solids present in Hg bottle
4. Subcontracted to SGS Lakefield



Michelle Dubien  
 Lab Manager

R.L. = Reporting Limit

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

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

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



---

**Appendix F**  
**Ministry Water Well Records**

---

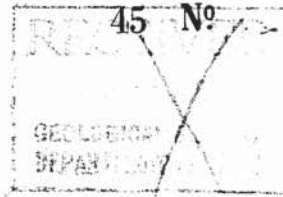




UTM 18 Z 380487 E  
9 R 4877936 N  
 Elev. 9 R 0270  
 Basin 24



The Well Drillers Act  
 Department of Mines, Province of Ontario



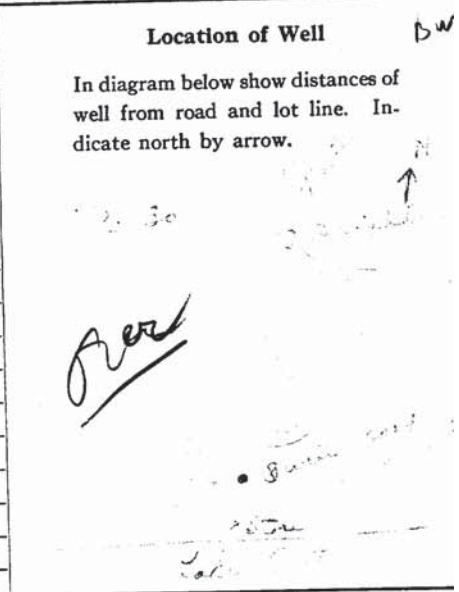
# Water Well Record

Owner [REDACTED], Village, Town or City Village Brighton  
 Date Completed 11 (day) March (month) 1955 (year) Cost of Well (excluding pump) \$198.00

Pipe and Casing Record	Pumping Test
Casing diameter(s) <u>5"</u>	Date
Length(s) of casing(s) <u>3'</u>	Static level <u>14</u>
Type of screen	Pumping level <u>16</u>
Length of screen	Pumping rate <u>200 GPH</u>
Distance from top of screen to ground level	Duration of test <u>1/2 HR</u>
Is well a gravel-wall type? <u>Loam &amp; Rock</u>	Distance from cylinder or bowls to ground level

Water Record			
Kind (fresh or mineral)	Depth(s) to Water Horizon(s)	Kind of Water	No. of Feet Water Rises
<u>Fresh</u>	<u>44</u>	<u>Fresh</u>	<u>30'</u>
Quality (hard, soft, contains iron, sulphur, etc.) <u>Hard</u>			
Appearance (clear, cloudy, coloured) <u>Clear</u>			
For what purpose(s) is the water to be used? <u>Household</u>			
How far is well from possible source of contamination? <u>60 feet</u>			
What is the source of contamination? <u>Privy</u>			
Enclose a copy of any mineral analysis that has been made of water			

Well Log		
Overburden and Bedrock Record	From	To
<u>Loam</u>	0 ft.	5'
<u>Rock Limestone</u>	5'	44'



Situation: Is well on upland, in valley, or on hillside? Hillside  
 Drilling Firm Bailey & Lloyd  
 Address Campbellford Ont.  
 Name of Driller Joseph Bailey Address Campbellford Ont.  
 Date March 21 1955 Licence Number 995  
 Signature of Licensee Joe Bailey





Ontario

# The Ontario Water Resources Act WATER WELL RECORD

31C/4B

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

11

45034699

MUNICIPALITY 45701

CON.

COUNTY OR DISTRICT: Northumberland TOWNSHIP, BOROUGH, CITY, VILLAGE: Uxbridge ADDRESS: 10 Ontario Street, Brighton, Ontario CON., BLOCK, TRACT, SURVEY, ETC.: ONTARIO ST. DATE COMPLETED: DAY 05 MO 06 YR 73

OWNER (SURNAME FIRST): [REDACTED] ADDRESS: [REDACTED]

NG: 77.522 RC: 44 ELEVATION: 0.260 RC: 5 BASIN CODE: 2.4

### LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
brown	clay			0	3
brown	sand			3	27
grey	limestone			27	30

OWRC  
P. 7

OWRC  
5

31: 0903609 32: 0027428 33: 0030219

41 WATER RECORD

WATER FOUND AT - FEET: 0030

KIND OF WATER: untested

10-13:  FRESH  SALTY  SULPHUR  MINERAL

15-18:  FRESH  SALTY  SULPHUR  MINERAL

20-23:  FRESH  SALTY  SULPHUR  MINERAL

25-28:  FRESH  SALTY  SULPHUR  MINERAL

30-33:  FRESH  SALTY  SULPHUR  MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
<u>0.62</u>	<input checked="" type="checkbox"/> STEEL	<u>188W</u>	<u>0</u>	<u>0028</u>
<u>0.61</u>	<input checked="" type="checkbox"/> GALVANIZED		<u>28</u>	<u>30</u>
<u>0.6</u>	<input checked="" type="checkbox"/> OPEN HOLE		<u>28</u>	<u>0030</u>

SCREEN

SIZE(S) OF OPENING (SLOT NO.):

DIAMETER: 31-33 INCHES

LENGTH: 34-40 FEET

MATERIAL AND TYPE: 41-44 FEET

DEPTH TO TOP OF SCREEN: 45-48 FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST METHOD

1  PUMP 2  BAILER

PUMPING RATE: 0040 GPM

DURATION OF PUMPING: 02 HOURS 30 MINS

STATIC LEVEL: 002 FEET

WATER LEVEL END OF PUMPING: 015 FEET

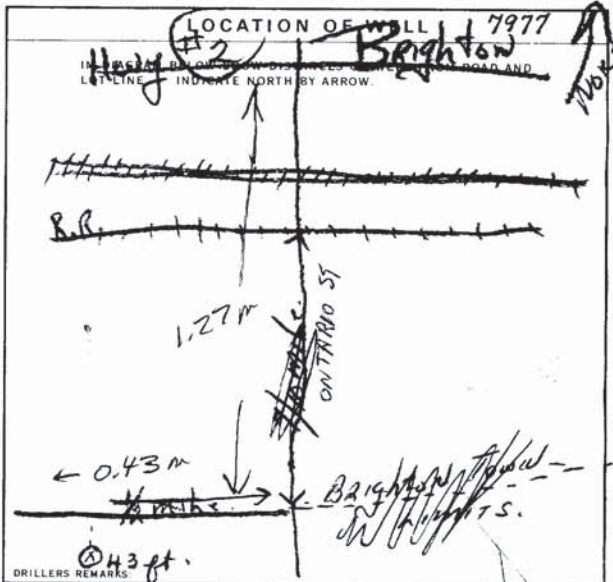
WATER LEVELS DURING:

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
<u>015</u>			

RECOMMENDED PUMP TYPE:  SHALLOW  DEEP

RECOMMENDED PUMP SETTING: 025 FEET

RECOMMENDED PUMPING RATE: 0040 GPM



FINAL STATUS OF WELL:  WATER SUPPLY

WATER USE: OS (DOMESTIC)

METHOD OF DRILLING: 1 (CABLE TOOL)

CONTRACTOR: **Mansel Donaldson**, 1805, 274 Main Street, Foxboro, Ontario

DRILLER OR BORER: **Floyd Taylor**

SUBMISSION DATE: 5 MO 6 YR 73

DATA SOURCE: 1

CONTRACTOR: 1805

DATE RECEIVED: 090773

DATE OF INSPECTION: July 17/75

INSPECTOR: [Signature]

REMARKS: **APL**



MINISTRY OF THE ENVIRONMENT  
The Ontario Water Resources Act  
**WATER WELL RECORD**

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

4503812

45701

31C/4C

COUNTY OR DISTRICT: **Northumberland**  
 TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: **Brighton & Village**  
 CON., BLOCK, TRACT, SURVEY, ETC.: **Conn. 1**  
 R.R.3 Brighton Ont.  
 ELEVATION: **776.0** **4** **0265** **5** **24**

**LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)**

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
Brown	Sand		Loose	0	16
Grey	Clay		Dense	16	28
Grey	Gravel	Sand	Loose	28	35

31 **001642877** **003820566** **00352112877**  
 32

**47 WATER RECORD**

WATER FOUND AT FEET	KIND OF WATER
10-13	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
15-18	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL

**51 CASING & OPEN HOLE RECORD**

INSIDE DIAMETER INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
4	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	1.88	0	35
6	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE			0035
24-25	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE			27-30

**SCREEN**

SIZE (S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE: \_\_\_\_\_ DEPTH TO TOP OF SCREEN: \_\_\_\_\_

**61 PLUGGING & SEALING RECORD**

DEPTH SET AT - FEET	MATERIAL AND TYPE	CEMENT SHOULDER LEAD PACKER, ETC.
10-15		
18-21		
26-29		

**71 PUMPING TEST**

PUMPING TEST METHOD: 1  PUMP 2  BAILER

PUMPING RATE: **0025** GPM

DURATION OF PUMPING: **01** HOURS **00** MINS

STATIC LEVEL: **004** FEET

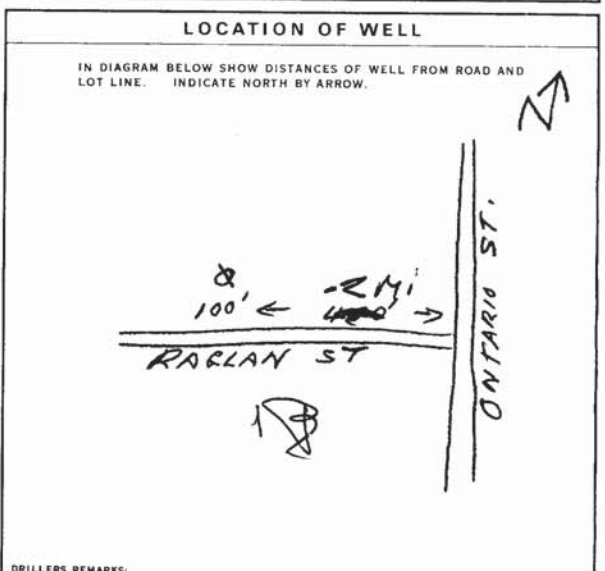
WATER LEVELS DURING PUMPING:

WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
<b>014</b>				

RECOMMENDED PUMP TYPE:  SHALLOW  DEEP

RECOMMENDED PUMP SETTING: **020** FEET

RECOMMENDED PUMPING RATE: **0080** GPM



**FINAL STATUS OF WELL**

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

**WATER USE**

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

**METHOD OF DRILLING**

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

**CONTRACTOR**

NAME OF WELL CONTRACTOR: **H.R. Coebel** LICENCE NUMBER: **2334**

ADDRESS: **R.R.1 Marysville Ont.**

NAME OF DRILLER OR BORER: **H.R. Coebel** LICENCE NUMBER: \_\_\_\_\_

SIGNATURE OF CONTRACTOR: \_\_\_\_\_ SUBMISSION DATE: DAY **24** NO. **7** YR. **74**

**OFFICE USE ONLY**

DATA SOURCE: **1** CONTRACTOR: **2334** DATE RECEIVED: **290774**

DATE OF INSPECTION: \_\_\_\_\_ INSPECTOR: \_\_\_\_\_

REMARKS: \_\_\_\_\_

P  
WI





Ontario is now in Step Three of the [Roadmap to Reopen \(/page/reopening-ontario\)](/page/reopening-ontario). Follow the [restrictions and public health measures \(https://covid-19.ontario.ca/public-health-measures\)](https://covid-19.ontario.ca/public-health-measures).



## Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the [Open Data catalogue \(https://data.ontario.ca/dataset/well-records\)](https://data.ontario.ca/dataset/well-records).

---

[Go Back to Map \(\)](#)

### Well ID

Well ID Number: 7352926

Well Audit Number: Z322955

Well Tag Number: A268576

*This table contains information from the original well record and any subsequent updates.*

### Well Location

Address of Well Location	NORTHWEST CORNER OF ONTARIO REGLON ST
--------------------------	---------------------------------------

<b>Township</b>	BRIGHTON VILLAGE
<b>Lot</b>	
<b>Concession</b>	
<b>County/District/Municipality</b>	NORTHUMBERLAND
<b>City/Town/Village</b>	Brighton
<b>Province</b>	ON
<b>Postal Code</b>	n/a
<b>UTM Coordinates</b>	NAD83 — Zone 18 Easting: 280357.00 Northing: 4877967.00
<b>Municipal Plan and Sublot Number</b>	
<b>Other</b>	

## Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
BRWN	SAND			0 m	1.98 m
GREY	SAND			1.98 m	4.52 m

## Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
0 m	1.22 m	BENTONITE CHIPS	

1.22 m	4.57 m	SAND
--------	--------	------

## Method of Construction & Well Use

Method of Construction	Well Use
Boring	
	Test Hole

## Status of Well

Observation Wells

## Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
10.16 cm	STEEL	-.76 m	.76 m
5.08 cm	PLASTIC	-.76 m	1.52 m

## Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To
6.03 cm	PLASTIC	1.52 m	4.57 m

## Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7085

# Results of Well Yield Testing

<b>After test of well yield, water was</b>
<b>If pumping discontinued, give reason</b>
<b>Pump intake set at</b>
<b>Pumping Rate</b>
<b>Duration of Pumping</b>
<b>Final water level</b>
<b>If flowing give rate</b>
<b>Recommended pump depth</b>
<b>Recommended pump rate</b>
<b>Well Production</b>
<b>Disinfected?</b>

## Draw Down & Recovery

<b>Draw Down Time(min)</b>	<b>Draw Down Water level</b>	<b>Recovery Time(min)</b>	<b>Recovery Water level</b>
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	

15	15
20	20
25	25
30	30
40	40
45	45
50	50
60	60

## Water Details

Water Found at Depth	Kind
1.98 m	Untested

## Hole Diameter

Depth From	Depth To	Diameter
0 m	.76 m	25.4 cm
.76 m	4.57 m	16.51 cm

**Audit Number:** Z322955

Ontario is now in Step Three of the [Roadmap to Reopen \(/page/reopening-ontario\)](/page/reopening-ontario). Follow the [restrictions and public health measures \(https://covid-19.ontario.ca/public-health-measures\)](https://covid-19.ontario.ca/public-health-measures).



## Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the [Open Data catalogue \(https://data.ontario.ca/dataset/well-records\)](https://data.ontario.ca/dataset/well-records).

---

[Go Back to Map \(\)](#)

### Well ID

Well ID Number: 7352927

Well Audit Number: Z322954

Well Tag Number: A268575

*This table contains information from the original well record and any subsequent updates.*

### Well Location

Address of Well Location
NORTHWEST CORNER OF ONTARIO REGLON STREET

<b>Township</b>	BRIGHTON VILLAGE
<b>Lot</b>	
<b>Concession</b>	
<b>County/District/Municipality</b>	NORTHUMBERLAND
<b>City/Town/Village</b>	Brighton
<b>Province</b>	ON
<b>Postal Code</b>	n/a
<b>UTM Coordinates</b>	NAD83 — Zone 18 Easting: 280175.00 Northing: 4878012.00
<b>Municipal Plan and Sublot Number</b>	
<b>Other</b>	

## Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
BRWN	SAND			0 m	1.22 m
GREY	SAND			1.22 m	3.66 m
GREY	CLAY			3.66 m	4.57 m

## Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
------------	----------	--	---------------

0 m	1.22 m	BENTONITE CHIPS
1.22 m	4.57 m	SAND

## Method of Construction & Well Use

Method of Construction	Well Use
Boring	
	Test Hole

## Status of Well

Observation Wells

## Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
10.16 cm	STEEL	-.76 m	.76 m
5.08 cm	PLASTIC	-.76 m	1.52 m

## Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To
6.03 cm	PLASTIC	1.52 m	4.57 m

## Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7085

## Results of Well Yield Testing

<b>After test of well yield, water was</b>
<b>If pumping discontinued, give reason</b>
<b>Pump intake set at</b>
<b>Pumping Rate</b>
<b>Duration of Pumping</b>
<b>Final water level</b>
<b>If flowing give rate</b>
<b>Recommended pump depth</b>
<b>Recommended pump rate</b>
<b>Well Production</b>
<b>Disinfected?</b>

## Draw Down & Recovery

<b>Draw Down Time(min)</b>	<b>Draw Down Water level</b>	<b>Recovery Time(min)</b>	<b>Recovery Water level</b>
SWL			
1		1	
2		2	
3		3	
4		4	

5	5
10	10
15	15
20	20
25	25
30	30
40	40
45	45
50	50
60	60

## Water Details

Water Found at Depth	Kind
1.37 m	Untested

## Hole Diameter

Depth From	Depth To	Diameter
0 m	.76 m	25.4 cm
.76 m	4.57 m	16.51 cm

Ontario is now in Step Three of the [Roadmap to Reopen \(/page/reopening-ontario\)](/page/reopening-ontario). Follow the [restrictions and public health measures \(https://covid-19.ontario.ca/public-health-measures\)](https://covid-19.ontario.ca/public-health-measures).



## Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the [Open Data catalogue \(https://data.ontario.ca/dataset/well-records\)](https://data.ontario.ca/dataset/well-records).

---



[Go Back to Map \(\)](#)

### Well ID

Well ID Number: 7352928

Well Audit Number: Z322953

Well Tag Number: A268574

*This table contains information from the original well record and any subsequent updates.*

### Well Location

Address of Well Location	Northwest Corner of Ontario + Reglon
--------------------------	--------------------------------------

<b>Township</b>	BRIGHTON VILLAGE
<b>Lot</b>	
<b>Concession</b>	
<b>County/District/Municipality</b>	NORTHUMBERLAND
<b>City/Town/Village</b>	Brighton
<b>Province</b>	ON
<b>Postal Code</b>	n/a
<b>UTM Coordinates</b>	NAD83 — Zone 18 Easting: 280344.00 Northing: 4878203.00
<b>Municipal Plan and Sublot Number</b>	
<b>Other</b>	

## Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
BRWN	SAND			0 m	1.52 m
GREY	SAND			1.52 m	4.57 m

## Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
0 m	1.22 m	BENTONITE CHIPS	

1.22 m	4.57 m	SAND #3
--------	--------	---------

## Method of Construction & Well Use

Method of Construction	Well Use
Boring	
	Test Hole

## Status of Well

Observation Wells

## Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
10.16 cm	STEEL	-.76 m	.76 m
5.08 cm	PLASTIC	-.76 m	1.52 m

## Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To
6.03 cm	PLASTIC	1.52 m	4.57 m

## Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7085

# Results of Well Yield Testing

<b>After test of well yield, water was</b>
<b>If pumping discontinued, give reason</b>
<b>Pump intake set at</b>
<b>Pumping Rate</b>
<b>Duration of Pumping</b>
<b>Final water level</b>
<b>If flowing give rate</b>
<b>Recommended pump depth</b>
<b>Recommended pump rate</b>
<b>Well Production</b>
<b>Disinfected?</b>

## Draw Down & Recovery

<b>Draw Down Time(min)</b>	<b>Draw Down Water level</b>	<b>Recovery Time(min)</b>	<b>Recovery Water level</b>
SWL	1.52 m		
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	

15	15
20	20
25	25
30	30
40	40
45	45
50	50
60	60

## Water Details

Water Found at Depth	Kind
1.52 m	Untested

## Hole Diameter

Depth From	Depth To	Diameter
0 m	.76 m	25.4 cm
.76 m	4.57 m	16.51 cm

**Audit Number:** Z322953



---

## **Appendix G**

# **Dewatering Calculations**

---



CAMBIUM

Trench Excavation Dewatering

Scenario (assumed)	Depth (mbgs)	Length (x) (m)	Static (m)	Dewatered level (m)	Drawdown (m)	Conductivity (K) (m/s)	Length to Zero Drawdown (R <sub>0</sub> ) (m)	Estimated Inflow L/min	Inflow per day (m3/day)
High K	1.5	50	1	2	1	3.50E-05	18	24	34
Low K	1.5	50	1	2	1	2.00E-05	13	18	26

High Hydraulic Conductivity	3.50E-05
Low Hydraulic Conductivity	2.00E-05

<b>Length to Zero Drawdown</b>	$3000 * ((\text{DRAWDOWN})) * (\text{HYDRAULIC CONDUCTIVITY}^{0.5})$
<b>(H<sup>2</sup>-h<sup>2</sup>)</b>	$((\text{AQUIFER THICKNESS}-\text{STATIC LEVEL})^2) - ((\text{AQUIFER THICKNESS}-\text{DEWATERED LEVEL})^2)$
<b>Estimated Inflow</b>	$(\text{LENGTH OF TRENCH}) \times (((\text{HYDRAULIC CONDUCTIVITY}(\text{H}^2-\text{h}^2)) / ((3.34 \times 10^{-5})) \times (\text{LENGTH OF 0m DRAWDOWN}))$



**Construction Dewatering Estimates - Common Townhouse Structure**

Scenario	Depth (mbgs)	Equivalent Radius (m)	Static Level (m)	Dewatered level (m)	Aquifer Thickness (m)	Drawdown (m)	Conductivity (K) (m/s)	Length to Zero Drawdown (R <sub>0</sub> ) (m)	Est. Inflow	
									(L/min)	(m <sup>3</sup> /day)
High Hydraulic Conductivity	3	22.3	1	3.5	5	2.5	3.50E-05	44	83	119
Low Hydraulic Conductivity	3	22.3	1	3.5	5	2.5	2.00E-05	34	56	81

ln(R<sub>0</sub>/r<sub>w</sub>) (high) 1.10  
 ln(R<sub>0</sub>/r<sub>w</sub>) (low) 0.92  
 Hydraulic Conductivity (m/s) (high) 3.50E-05  
 Hydraulic Conductivity (m/s) (low) 2.00E-05

<b>Length to Zero Drawdown</b>	3000*(DRAWDOWN)*(HYDRAULIC CONDUCTIVITY^0.5)
<b>(H<sup>2</sup>-h<sup>2</sup>)</b>	((AQUIFER THICKNESS-STATIC LEVEL)^2)-((AQUIFER THICKNESS-DEWATERED LEVEL)^2)
<b>Estimated Inflow</b>	((K(H <sup>2</sup> -h <sup>2</sup> ))/(5.31E-6(ln(R <sub>0</sub> /Equivalent Radius)))