

Hydrogeological Assessment Report 1386 & 1394 Greely Lane, Ottawa, Ontario

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Prepared for:
Cassidy EW Construction Consultant Ltd.

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1.0 Introduction

Cambium Inc. (Cambium) was retained by Cassidy EW Construction Consultant Ltd. (the Client) to complete a hydrogeological assessment and terrain analysis for the proposed redevelopment of the land located at 1386 and 1394 Greely Lane, Ottawa, Ontario (the Site).

The purpose of the field work and testing was to obtain information on the general subsurface and groundwater conditions at the Site by means of groundwater monitoring well measurements, as well as field and laboratory tests. This report addresses the hydrogeological aspects of the subsurface conditions at the Site. Cambium has also completed a Geotechnical Investigation (Cambium, 2023a) and a Phase Two Environmental Site Assessment (Cambium, 2023b) prior to the hydrogeological assessment and relevant details of these investigations have been incorporated into this report. Detailed information from the Geotechnical Investigation and the Phase Two Environmental Site Assessment were provided under separate cover.

This report provides the results of the hydrogeological assessment and should be read in conjunction with the “Standard Limitations” in Section 12.0, which forms an integral part of this document. The reader’s attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report. The data, interpretations, and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in concept, location, or elevation, or if the project is not initiated within eighteen months of the date of the report, Cambium should be given an opportunity to confirm that the recommendations in this report are still valid.

1.1 Site Description

The Site is an irregularly shaped 0.47 ha (1.15 acres) property that is developed for commercial use. It contains a single-storey commercial car wash building, two temporary sea-can storage units, and an additional single storey metal storage building adjacent to the commercial building. A driveway connects to the adjacent Greely Lane at two locations on the north side of the site. The remainder of the property is landscaped, with the southern portion of



the Site predominantly occupied by a septic bed raised at a higher elevation than the grade. The Site is bound by Greely Lane to the east, Parkway Road to the south, and commercial/light industrial use to the north and west.

Based on discussions with the Client and preliminary site sketches provided to Cambium, it understood that the proposed plan is to construct one 1,110 m² (12,000 ft²) building for light industrial use which will be divided in three 370 m² (4,000 ft²) units with two loading bays, two washrooms, and an estimated five employees for each unit. The building will be constructed slab-on-grade with perimeter foundations that will extend to below the local frost penetration depths. The development will include at grade parking and driveways to access delivery doors at the backs of each building.

The proposed finished floor elevations (FFE) have not yet been determined; however, it is anticipated that the grades of the Site will not differ significantly from the current grades of the property, exclusive of the raised septic bed on the southern property. The grade there will be lowered as a result of removal of the septic bed.

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



2.0 Physical Setting

2.1 Topography and Drainage

Based on regional topographic maps the Site area is relatively flat with a gentle slope to the east-southeast towards the North Castor River. The Site has a raised septic bed located in the southern portion of the property with a topographic high of approximately 100 meters above sea level (masl).

The Site is located within the Castor River quaternary watershed and the North Castor River is located approximately 250 m south-southeast of the Site. North Castor River subsequently flows eastward into South Nation River, which is a tributary to Ottawa River.

Regionally, surface elevation decreases to the east toward Ottawa River. It is assumed that local drainage will follow the local surficial topography and flow towards the south-southeast ultimately discharging into the North Castor River. Based on the location of the nearest water bodies and topographic relief, the inferred that the regional groundwater flow direction is easterly.

2.2 Physiography

The Site is located in the physiographic region known as the Russell and Prescott Sand Plains (Chapman & Putnam, 1984). The Russell and Prescott Sand Plains region covers an area of approximately 1,490 km² extending from Ottawa to Hawkesbury. The Sand Plains are a relatively flat region with a clay valley located to the south, which was formed as a delta by the Ottawa River and tributaries of the Champlain Sea. The sand deposits have a thickness of 5 m to 10 m in the northern region of the plains and thin towards the clay plains of the south. The sand plains consist of coarser grained sands to the north grading into fine sand to silt in the south. The region is underlain by stratified red and grey clays (Appendix A).

2.3 Overburden Geology

According to Miscellaneous Release – Data 128 from the Ontario Geological Survey (2010) the predominant overburden of the Site consists of coarse-textured glaciomarine deposits (sand, gravel, minor silt and clay) (Appendix A).



2.4 Bedrock Geology

According to Miscellaneous Release – Data 219 from the Ontario Geological Survey (2007), the bedrock in the area of the Site consists of the Beekmantown Group. The Beekmantown Group consists of two formations: the March and Oxford Formations. The bedrock of the Site consists of the Oxford Formation and is described as dolostone, minor shale and sandstone (Appendix A).

2.5 Vulnerable and Regulated Areas

The Site is situated within the South Nation Source Protection Area, under jurisdiction of the South Nation Conservation Authority, as per the Source Water Protection Information Atlas (SPIA) from the Ministry of the Environment, Conservation and Parks (MECP) (2024a). The Site is within the following areas:

- Intake Protection Zone 3 (IPZ-3) with a vulnerability score of 7
- Significant Ground Water Recharge Area (SGRA) with a vulnerability score of N/A
- Highly Vulnerable Aquifer (HVA) with a vulnerability score of 6

IPZs are areas surrounding water courses and lakes which have surface water intakes for water supply. There is potential that contaminants spilled within IPZs may reach intakes more quickly than the ability to take appropriate action to shut down the intake should a spill occur. IPZ-3s are defined as event-based areas only. They are areas that can contribute contaminants under an extreme event (e.g., high winds or heavy rain) at a concentration that would result in deterioration of untreated source water. Best management practices should be used to minimize the potential for the release of chemicals to the environment during future operations at the Site.

SGRAs are landscape surfaces which allow a high volume of water to infiltrate into the ground. A recharge area is classified as significant if the recharge rate for a particular area is greater than the average watershed recharge rate by 15% or more and the area has a hydrological connection to a surface water body or to an aquifer that is a source of groundwater for a drinking water system (Ministry of the Environment, Conservation and Parks, 2021). SGRAs



are delineated using models which consider topography, surficial soil, land cover and climate. The SGRA in the vicinity of the Site does not have a vulnerability score associated with it. Efforts should be made to maintain the Site pre-development water balance as much as practicable following redevelopment. Water balance information is presented in Section 7.0.

HVAs are aquifers that are more sensitive to contamination as a result of the proximity to surface (shallow aquifers). By default, all HVA's have a vulnerability score of 6. Best management practices should be used to minimize the potential for the release of chemicals to the subsurface environment during future operations at the Site.

A review of the Natural Heritage System database from the Ministry of Natural Resources and Forestry (2024) indicates the Site is not located within any Areas of Natural and Scientific Interest.

The Site does not fall under a regulated area, as per the South Nation Conservation Authority or O.Reg. 41/24.

The source protection, natural heritage, and conservation area mapping is attached in Appendix A.



3.0 Subsurface Investigation

Cambium staff completed a borehole investigation at the Site on March 7th to 8th, 2023, to assess subsurface conditions. A total of nine boreholes, designated as BH101-23 through BH109-23, were advanced at the Site to depths ranging from approximately 3.7 to 6.7 meters below ground surface (mbgs). Test pit locations are shown in Figure 4 and test pit logs are included in Appendix B.

3.1 Borehole Logs

Subsurface conditions generally consist of surficial deposits of pavements or topsoil overlying a relatively thin deposit of fill overlying native deposits of clays and silts.

A summary of general lithological details obtained from the investigation is presented below.

Topsoil

Topsoil was encountered from the surface of all boreholes with the exception BH101-23 and BH108-23. The thickness of the topsoil ranges from 0.10 to 0.91 m.

Asphaltic Concrete

Asphaltic concrete was encountered from the surface of BH101-23 and BH108-23 that were advanced in the existing paved areas. The thickness of the asphalt measures 0.08 and 0.05 m in BH101-23 and BH108-23, respectively.

Base Material

Pavement base material was encountered underlying the asphaltic concrete. The base material is composed of brown gravelly sand with some silt. The thickness of the material measures 380 and 560 mm in BH101-23 and BH108-23, respectively.

Fill Material

Fill material other than the pavement structure was encountered at all borehole locations. The fill material varies slightly in composition between borehole locations but is predominantly composed of silty sandy. The material ranges from trace gravel to gravelly, and trace clay was



noted in BH105-23 and BH107-23. Roots were noted within the fill material in BH102-23. The fill material varies in colour between brown and grey depending on location.

The thickness of the fill material ranges from 0.1 to 1.4 m and extends to depth ranging from 0.3 to 1.5 mbgs.

Clayey Silt

Native deposits of grey, sandy, clayey silt were encountered underlying the fill material at all borehole locations at depths ranging from 0.3 to 1.5 mbgs. A notable decrease in clay content was observed in BH103-23 and BH104-23 at a depth of 2.3 mbgs as the material transitions to the non-cohesive underlying deposits.

Boreholes BH108-23 and BH109-23 terminated within the clayey silt deposits at depths of 1.5 mbgs. The deposit was fully penetrated at all other borehole locations. The thickness of the deposits at these locations ranges from 0.9 to 2.3 m, and the deposits extend to depths ranging from 2.3 to 3.2 mbgs.

Silty Sand

A native deposit of grey silty sand was observed in BH101-23 underlying the clayey silt deposit at a depth of 2.6 mbgs. The deposit measures 0.5 m in thickness and extends to a depth of 3.1 mbgs. A seam similar in composition was noted in BH104-23 at a depth of 3.1 mbgs. The seam measured 0.10 m.

Silt

Native deposits of silt were encountered underlying the clayey silt and silty sand in boreholes BH101-23 through BH107-23. The deposit is grey in colour and contains some sand to sandy and trace clay.

The silt deposits were encountered at depths ranging from 2.3 to 3.2 mbgs. Where encountered, all boreholes terminated within the silt at depths ranging from 3.7 to 6.7 mbgs.



Groundwater

Groundwater was observed at all borehole locations during drilling. Unstabilized groundwater level measurements were recorded upon completion of drilling and monitoring wells were installed in three locations (BH105-23, BH106-23, and BH107-23) to enable further characterization. A subsequent monitoring event was completed as part of Phase II ESA work, as well as during hydraulic testing detailed later in this report (Section 4.3). As demonstrated in Table 1, there is significant variability in groundwater levels, which is expected within shallow unconfined aquifers. A figure illustrating the approximate groundwater flow direction based on water levels measured April 19, 2024 is provided in Figure 3.

Table 1 Summary of Measured Water Levels

Borehole ID	Water Level (mbgs)			Water Level (masl)		
	Post-drilling	March 15, 2023*	April 19, 2024	Post-drilling	March 15, 2023*	April 19, 2024
BH101-23	1.1	-	-	97.9	-	-
BH102-23	1.5	-	-	97.2	-	-
BH103-23	0.9	-	-	97.8	-	-
BH104-23	0.6	-	-	98.2	-	-
BH105-23	2.0	1.30	0.62	96.9	98.91	98.29
BH106-23	1.5	0.89	0.30	97.1	98.64	98.34
BH107-23	1.8	1.14	0.36	96.3	98.12	97.76
BH108-23	0.8	-	-	98.3	-	-
BH109-23	1.1	-	-	97.5	-	-

* water level measured prior to well development

Further well construction details for the three monitoring wells are provided in Table 2.

**Table 2 Monitoring Well Construction Details**

Well ID	Surface Elevation (masl)	Well Depth (mbgs)	Well Casing Stick-up (mags ¹)	Screen Details	
				Top of Screen (mbgs)	Bottom of Screen (mbgs)
BH105-23	98.91	3.06	0.92	0.62	3.06
BH106-23	98.64	2.75	1.00	0.31	2.75
BH107-23	98.12	3.05	0.75	0.61	3.05

¹ meters above ground surface

All monitoring wells with water were developed after installation. Development involved purging ten well volumes of groundwater or three times dry from the wells by hand pumping with Waterra tubing and a foot valve.

3.2 Physical Laboratory Testing

Physical laboratory testing, including grain size distribution analysis, was completed on four soil samples to confirm textural classification identified during field logging and obtain percolation rate estimates. Analysis results are based on the Unified Soil Classification System (USCS) scale. A summary of results is provided in Table 3. Complete laboratory analysis reports are provided in Appendix C.

Table 3 Grain Size Distribution Analysis Results

Sample Location	Depth (mbgs)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	T-time (min/cm)
BH101-23 SS3	1.5 to 2.1	Sandy Clayey Silt	0	22	57	21	40
BH101-23 SS6	3.8 to 4.4	Silt some Sand trace Clay	0	19	77	4	20
BH104-23 SS4	2.3 to 2.9	Sandy Silt some Clay	0	25	57	18	35
BH104-23 SS6	3.8 to 4.4	Sandy Silt trace Clay	0	22	74	4	20



4.0 Hydrogeological Assessment

The results obtained for the shallow groundwater assessment are discussed in the following subsections.

4.1 MECP Well Records Assessment

Cambium accessed the MECP Water Well Information System (WWIS) to review water well records within 500 m of the Site (Ministry of the Environment, Conservation and Parks, 2024b). A total of 73 records were identified, 64 of which describe wells installed into bedrock and 9 installed into overburden. The records identified two monitoring/test wells, two abandoned wells, three recharge well and the remaining wells were either water supply wells or unknown use. The locations of wells records identified within 500 m of the Site are illustrated in

Figure 4. A summary of water well information, including total depth, static water level, and recommended pumping rate, is presented in Table 4. Further details are provided Appendix D.

One well with well record ID 7448964 is identified to be present at the Site by the WWIS. No details are provided on the record, however.

Table 4 MECP Water Well Information Summary

		Depth (mbgs)	Depth Water Found (mbgs)	Static Water Level (mbgs)	Recommended Pumping Rate (L/min)
Bedrock Wells Count = 64	Minimum	10.67	9.75	1.00	18.00
	Maximum	101.50	100.58	15.00	182.00
	Average	32.18	27.79	4.41	55.90
Overburden Wells Count = 9	Minimum	4.88	13.11	4.00	23.00
	Maximum	50.00	16.76	5.00	46.00
	Average	15.90	14.66	4.23	38.26

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

- The general lithology described by the well records is a sequence of overburden overlying limestone which is subsequently underlain by sandstone.



- The overburden is described as predominantly sand which is overlain by a clay layer in some locations. Gravel is also present at depth at some wells.
- The average contact depth between overburden materials and limestone bedrock is 16.5 mbgs (4.0 to 63.4 mbgs).
- Water supply in the area surrounding the Site is primarily derived from the bedrock aquifer. Based on the high static water level recorded compared to the depth that water was found, it is inferred that the bedrock aquifer is at least partially confined.
- The bedrock aquifer is productive, with a geometric mean recommended pumping rate of approximately 56 L/min for bedrock wells.

4.2 Door-to-Door Well Survey

A door-to-door survey of all accessible properties within 500 m of the property was conducted by Cambium staff on April 22nd, 2024, to confirm details in the public record and to identify any wells not included in the MECP records assessment. Due to the commercial and industrial development of the surrounding area, a number of properties were not accessible to the general public. Five properties were visited, and in-person interviews were conducted with available office workers regarding the condition and details of their water supply well(s), including the method of construction, water level, pump intake, well, and water level depths, water use, and general water quality and well yield.

If the property was accessible but a representative was not available, a letter was left in the mailbox with a pre-paid return envelope. The letter explained the nature of the proposed project and the survey and provided direct contact information for Cambium's project manager.

Details and responses from the well use survey are provided in Appendix D. Generally, workers indicated that the water supply for the surrounding area is not good quality due to hardness and suspect iron and sulphur.

4.3 Groundwater Quality

Groundwater quality samples were collected BH106-24 during hydraulic testing activities on April 19, 2024.



Samples were submitted for analysis of general organic and inorganic chemistry to Caduceon Environmental Laboratories in Ottawa, which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Samples were stored at a temperature between 0°C and 10°C prior to and during transport.

Water quality results were compared against Provincial Water Quality Objectives (PWQO) and City of Ottawa Sewer Discharge Bylaw 2003-514 guidelines. Certificates of Analysis for the samples are included in Appendix E. A summary of parameters exceeding the PWQO and Sewer By-law criteria is provided in Table 5, Table 6, and Table 7.

Table 5 Summary of Results Exceeding PWQO Criteria

Parameter	Units	PWQO Criteria	BH106-23	
			2024/04/22 (Total)	2024/08/10 (Dissolved)
Phosphorus	ug/L	10	8,720	<10
Arsenic	ug/L	5	27.5	1.0
Cadmium	ug/L	0.1	1.12	0.211
Cobalt	ug/L	0.9	103	1.1
Copper	ug/L	5	301	5.4
Lead	ug/L	1	76.8	0.08
Thallium	ug/L	0.3	1.82	<0.05
Uranium	ug/L	5	11.4	4.68
Vanadium	ug/L	6	327	0.3
Benzo[a]anthracene	ug/L	0.0004	<0.05*	-
Benzo(g,h,i)perylene	ug/L	0.00002	<0.05*	-
Butyl Benzyl Phthalate	ug/L	0.2	<1*	-
Chrysene	ug/L	0.0001	<0.05*	-
Dibenzo(a,h)anthracene	ug/L	0.002	<0.05*	-
Fluoranthene	ug/L	0.0008	<0.05*	-
Phenanthrene	ug/L	0.03	<0.05*	-
Formaldehyde	ug/L	0.8	<8*	-
Nonylphenols	ug/L	0.04	<1*	-

Bolded numbers indicate exceedance with respect to applicable guideline value

* Laboratory Reporting Limit exceeds PWQO value



Table 6 Summary of Results Exceeding Storm Sewer By-law Criteria

Parameter	Units	Storm Sewer Criteria	BH106-23	
			2024/04/22 (Total)	2024/08/10 (Filtered/Dissolved)
Total Suspended Solids	mg/L	15	9,480	<3
Phosphorus	mg/L	0.4	8.72	<0.01
Arsenic	mg/L	0.02	0.0275	0.001
Chromium	mg/L	0.08	0.249	<0.0011
Copper	mg/L	0.04	0.301	0.054

Bolded numbers indicate exceedance with respect to applicable guideline value

Table 7 Summary of Results Exceeding Sanitary Sewer By-law Criteria

Parameter	Units	Sanitary Sewer Criteria	BH106-23	
			2024/04/22 (Total)	2024/08/10 (Filtered/Dissolved)
Total Suspended Solids	mg/L	350	9,480	<3

Bolded numbers indicate exceedance with respect to applicable guideline value

Based on the results of the chemical analysis, the following comments on groundwater quality are made.

- Both the unfiltered and filtered samples had numerous parameters measured at concentrations in excess of PWQO criteria. Treatment of excavation water would be required prior to discharge to off-site surface receiving environments.
- The method detection limit concentrations for many total metals and semi-volatile organics were greater than some of the PWQO criteria for these parameters. This is a limitation of laboratory analysis and is not confirmation that the guideline value was exceeded.
- Total suspended solids (TSS), phosphorus, arsenic, chromium, and copper concentrations were above City of Ottawa Storm Sewer Discharge guidelines in the unfiltered sample. The filtered sample had concentrations less than guideline values for all parameters, indicating that filtration is a suitable treatment method to enable discharge to this receptor.



- The filtered water quality sample had concentrations less than City of Ottawa Sanitary Sewer Discharge guideline values for all parameters, indicating that filtration is a suitable treatment method to enable discharge to this receptor.
- It is recommended that a water quality sample of treated water be submitted for laboratory analysis prior to discharge during construction activities to confirm the treatment system adequately reduces elevated parameters to acceptable concentrations.

4.4 Single Well Hydraulic Tests

Cambium staff visited the Site on April 19th, 2024, to perform in-situ single well hydraulic tests (SWHTs) on select monitoring wells.

Rising head tests were conducted in each well by inducing an instantaneous change in head (water level) in the monitoring wells. Water level changes were achieved by introducing/removing a solid slug.

Water level recovery was monitored using a Solinst Levelogger pressure transducer data logger, with manual measurements collected simultaneously at regular intervals.

The hydraulic conductivity of the geological formations adjacent to the screened portion of each well was estimated via the AquiferTest Pro software using the Hvorslev method (Hvorslev, 1951). A summary of results is presented in Table 8. Detailed analytical reports are provided in Appendix F.

Estimated hydraulic conductivities for the tested wells screened within the silty clay unit ranged between 1.9×10^{-9} and 2.2×10^{-7} m/s, with an overall geometric mean value of 1.2×10^{-8} m/s. These values are consistent with published values for the tested materials (unconsolidated silt) (Freeze & Cherry, 1979).



Table 8 Hydraulic Conductivity Estimates derived via SWHTs

Monitoring Well	Screened Lithology	Hydraulic Conductivity, K (m/s)			
		Test 1	Test 2	Test 3	Geometric Mean
BH105-24	Silty sand to Sandy clayey silt	6.4×10^{-9}	3.4×10^{-9}	-	4.6×10^{-9}
BH106-24	Sandy clayey silt	2.2×10^{-7}	1.9×10^{-7}	2.1×10^{-7}	2.1×10^{-7}
BH107-24	Sandy clayey silt to silt	1.9×10^{-9}	-	-	1.9×10^{-9}
Geometric Mean					1.2×10^{-8}



5.0 Dewatering Assessment

The requirements for construction dewatering generally depend on the Site's soil and groundwater conditions including soil type, soil permeability or hydraulic conductivity, local groundwater levels, and the design of the proposed works, such as the foundation/basement elevation or pipe invert level, as well as the size of proposed structure/excavation. The following subsections detail the specific excavation parameters and anticipated dewatering rates for the Site.

5.1 Excavation Design Parameters

It is understood that the footprint of the proposed slab-on-grade building will be approximately 1,110 m².

For construction purposes, it is assumed that excavation for footings will occur along a linear perimeter with dimensions of 23 m by 55 m. It is further assumed that during footing emplacement, groundwater will be temporarily lowered to a minimum of 1 m below the frost line to ensure dry conditions during footing construction, to a total depth of 2.5 mbgs.

For permanent operations, due to the high-water levels at the Site, permanent dewatering will be required to ensure water levels beneath the building remain below the frost line level (approximately 1.5 mbgs) throughout the year. A maximum water level of 0.30 mbgs was measured in BH106-23 on April 19, 2024.

5.2 Estimated Dewatering Rate – Construction Phase

An estimated dewatering rate for the construction phase of the proposed development was calculated a modified Dupuit-Forchheimer equation developed for linear excavations according to Powers, Corwin, Schmall, & Kaeck (2007):

$$Q = \frac{\pi K (H^2 - h^2)}{\ln(R_0/r_s)} + 2 \left[\frac{x K (H^2 - h^2)}{2L} \right]$$



Where:

Q = dewatering rate (m^3/s)

K = hydraulic conductivity (m/s)

H = initial hydraulic head in aquifer (m)

h = target hydraulic head (initial hydraulic head – target drawdown) (m)

R_0 = distance to radial source (from excavation center)

r_s = equivalent single well radius = width of trench/2 (m)

x = unit length of trench (m)

L = distance to line source (from excavation center) = $R_0/2$ (m)

A summary of calculated dewatering rates for per 50 m linear excavation, given a target depth to water of 2.5 mbgs, is provided in Table 9. Detailed calculations are provided in Appendix G.

Table 9 Calculated Construction Dewatering Rates

	Hydraulic Conductivity (K)	Radius of Influence (from excavation edge)	Dewatering Rate (Q)	
	m/s	m	m ³ /day	L/s
Minimum	1.9 x10 ⁻⁹	0.3	0.14	0.002
Maximum	2.1 x10 ⁻⁷	3.0	4.70	0.05
Geometric Mean	1.2 x10 ⁻⁸	0.7	0.65	0.01

Using the hydraulic conductivity estimates presented in Table 9, the estimated radius of influence from the edge of the excavation ranges from 0.3 to 3.0 m (average 0.7 m). The estimated dewatering rate ranges from 0.14 m³/day (140 L/day, or 0.002 L/s) to 4.70 m³/day (4,700 L/day, or 0.05 L/s), with a geometric mean average value of 0.65 m³/day (650 L/day, or 0.01 L/s).

Applying a safety factor of 2 to account for uncertainty resulting from heterogeneity of subsurface materials and other unknown factors, the estimated dewatering rate for 50 m sections of footing excavation ranges from 0.28 m³/day (280 L/day, or 0.004 L/s) to 9.4 m³/day (9,400 L/day, or 0.10 L/s), with a geometric mean average value of 1.30 m³/day (1,300 L/day, or 0.02 L/s).



It is noted that the above equation is designed to represent steady state pumping conditions. In general, at the beginning of the pumping, the pumping rate required to lower Site water levels to acceptable levels may be greater than the rate estimated for steady state conditions as incoming water replaces the volume of excavated soils. Additionally, the above equation does not account for any precipitation that may occur during the construction process.

5.3 Estimated Dewatering Rate – Operational Phase

An estimated dewatering rate for the operational phase of the proposed development was calculated using a modified Dupuit-Forchheimer equation (Powers, Corwin, Schmall, & Kaeck, 2007). Calculations for a square dewatering area with an equivalent radius were employed.

$$Q = \frac{\pi K (H^2 - h^2)}{\ln(R_0/r_s)}$$

Where:

Q = dewatering rate (m^3/s)

K = hydraulic conductivity (m/s)

H = initial hydraulic head in aquifer (m)

h = target hydraulic head (initial hydraulic head – target drawdown) (m)

R_0 = zone of influence (from excavation center) = $3000(H - h)\sqrt{K}$ (m)

r_s = equivalent single well radius

For square excavations, the equivalent radius (r_s) can be determined as the radius of a circle with the same area as the excavation, or with the same perimeter as the excavation.

Here, the equivalent area method was used such that

$$r_s = \sqrt{\frac{\text{excavation area}}{\pi}}$$

A summary of calculated dewatering rates for per 50 m linear excavation, given a target depth to water of 2.5 mbgs, is provided in Table 10. Detailed calculations are provided in Appendix G



Table 10 Calculated Permanent Dewatering Rate

	Hydraulic Conductivity (K)	Radius of Influence (from excavation edge)	Dewatering Rate (Q)	
	m/s	m	m ³ /day	L/s
Minimum	1.9 x10 ⁻⁹	0.2	0.4	0.005
Maximum	2.1 x10 ⁻⁷	1.6	4.6	0.05
Geometric Mean	1.2 x10 ⁻⁸	0.4	1.1	0.01

Using the hydraulic conductivity estimates presented in Table 10, the estimated radius of influence from the edge of the building footprint ranges from 0.2 to 1.6 m (average 0.4 m). The estimated dewatering rate ranges from 0.4 m³/day (400 L/day, or 0.005 L/s) to 4.6 m³/day (4,600 L/day, or 0.05 L/s), with a geometric mean average value of 1.1 m³/day (1,100 L/day, or 0.01 L/s).

Applying a safety factor of 2 to account for uncertainty resulting from heterogeneity of subsurface materials and other unknown factors, the estimated permanent dewatering rate for the building footprint ranges from 0.8 m³/day (800 L/day, or 0.01 L/s) to 9.2 m³/day (9,200 L/day, or 0.10 L/s), with a geometric mean average value of 2.2 m³/day (2,200 L/day, or 0.02 L/s).

It is noted that the above calculations are an approximation only, which can be further refined based on results observed during the construction phase of the proposed development. Cambium recommends reassessment of dewatering rates once construction nears the completion stage.

5.4 Assessment of Required Regulatory Permits or Registration

Any construction dewatering or other water taking in Ontario is governed by the Ontario Water Resources Act (OWRA) (Ontario Regulation 387/04 and/or Ontario Regulation 63/16) and/or the Environmental Protection Act (Registrations under Part II.2).

As of July 1, 2025, O.Reg. 63/16 will be amended such that temporary construction dewatering greater than 50,000 L/day registration of the water taking must be completed through the



Environmental Activity and Sector Registry (EASR) prior to the start of dewatering. Additionally, O.Reg. 387/04 will be amended such that low-risk foundation drainage systems, used primarily for residential purposes, that take less than 379,000 L/day of groundwater will be exempt from requiring environmental permissions.

As the maximum estimated dewatering rate for both construction activities and long-term building operation is less than 9,500 L/day, neither a PTTW nor an EASR registration will be required for the proposed development.



6.0 Water Supply Assessment

6.1 Test Well Installation and Inspection

Test Well 1 (TW1; Well Tag No. A379053, Appendix D) was installed by Air Rock Drilling Company on May 21, 2025. TW1 was completed in a landscaped area in the southeast corner of the Site to a depth of 55 mbgs. The identified lithology is clay from 0 to 11.6 mbgs, boulders/hardpan from 11.6 to 14.7 mbgs, and limestone bedrock to completion depth. Three water bearing units of indeterminate thickness were identified at 22.6, 38.2, and 53 mbgs.

The borehole has a 0.025 m diameter from ground surface to 16.5 mbgs, and a diameter of 0.016 m from 16.5 to 55 mbgs. A 0.016 m inside diameter steel casing was installed from 0.6 m above ground surface to a depth of 16.5 mbgs. Grout was emplaced in the annular space around the casing. A Cambium technician, under the supervision of the hydrogeologist who signed this report, observed the installation and grouting of the well casing (no well screen was installed). The signed and sealed well inspection report certifying that the well meets the minimum well construction requirements in the Wells Regulation and recommendations in this report is provided in Appendix D.

The remaining borehole was then completed and left as open hole in limestone bedrock. All three water bearing zones are below the bottom of the casing. The driller's well yield test provided an estimated pumping rate of 57 L/min, and the recommended pump depth was 30 mbgs.

6.2 Hydraulic Pumping Test

An 8-hour hydraulic pumping test was completed on TW1 by Cambium staff on May 29, 2025. Prior to the test, a Solinst Levelogger (logger) was installed in TW1 and OW1 (the pre-existing water supply well on the site) to monitor water levels before, during, and after the pumping test. Manual measurements were also recorded during the pumping tests to mitigate the possibility of equipment failure. Well water levels measured during pumping test activities are provided in Appendix H. OW1 was not used for at least 12 hours prior to the start of the pumping test, nor was it used during the test or subsequent recovery period.



TW1 was chlorinated by Air Rock Drillers 48 hours prior to testing. The static water level in TW1 prior to the pumping test was 1.73 mbgs and the pump was installed at approximately 50 mbgs, resulting an available drawdown of approximately 48.21 m (height of static water level above pump).

Water from the pumping test was discharged to the drainage ditch at the perimeter of the site, in a downslope direction approximately 15 m from the test well. The pumping rate for the test was controlled by a valve on the discharge line.

Hydraulic testing began at 8:03 a.m. for a duration of 8 hours. The total sewage design flow for the proposed development is 1,800 L/day (Section 8.1.1). Assuming water use is limited to a standard (8-hour) working day, this corresponds to an average rate of 225 L/hour (3.75 L/min).

To account for periods of peak demand, the flow rate during the initial 15 minutes of the test was set to 5 times the average demand (approximately 19 L/min). The pumping rate was then increased and maintained at approximately 10 times the average demand (38 L/min) for the remainder of the test. The total volume of water discharged from TW1 during the pumping test was approximately 17,955 L.

Rainfall of 11.6 mm was recorded at the Ottawa Airport Climate Station (ID # 6106001) on the day of the pumping test (Appendix H). This is reflected in monitoring data collected in TW1 and OW1 during the pumping test. After an initial water level decrease up to 0.25 m within the first hour following the start of pumping, the water level in TW1 gradually increased for the duration of the test. A similar trend was observed in OW1, which experienced a maximum drawdown of approximately 0.1 m within the first hour before progressively increasing throughout the day. Water level fluctuations in TW1 and OW1 mirrored each other, both in terms of timing and magnitude (Appendix H).

The pump in TW was shut off at 4:03 pm. At this time, the water level in TW1 was 1.79 mbgs, which is equivalent to a water level increase of 0.06 m since the start of testing and represents approximately 0.1% of the total available drawdown in the well.



Following pump cessation, water levels were measured for 60 minutes. The water level recovered to greater than 100% of the initial water level in both TW1 and OW1 immediately upon termination of the pumping test.

6.3 Aquifer Parameter Analysis

Drawdown measurements recorded for TW1 during the pumping test were analyzed with Aqtesolv software to obtain an estimate of transmissivity for the water supply aquifer using the Theis method. Although transmissivity of the aquifer is inferred to be very high due to the negligible drawdown over the course of the pumping test, concurrent recovery of the aquifer(s) during the test precludes a reliable estimate of the precise value. A report for the aquifer analysis illustrating the recharge trend in the data is included in Appendix H. Although results are presented based on a Theis analysis of the results, they are considered highly uncertain.

6.4 Groundwater Quality Analysis

Field water quality parameters were measured regularly during pumping to ensure baseline aquifer water qualities were established prior to sampling. Field parameter measurements are summarized in Table 11. All water testing equipment was calibrated prior to use as per manufacturer's instructions; further details about equipment type. Residual chlorine was monitored during the supplemental sampling event and was confirmed to be less than 0.01 ppm before sample collection occurred.

Two sets of water quality samples were collected from TW1 and analyzed for the subdivision suite as well as trace metals and volatile organic compounds. The first sample (TW1-1) was collected three hours into the pumping test, and the second sample (TW1-2) within the final hour of the test.

Samples were collected in laboratory supplied containers which included preservatives as required. They were subsequently stored at a temperature between 0 and 10 °C prior to and during transport. Samples were submitted along with laboratory supplied COC forms to Caduceon Environmental Laboratories in Ottawa, Ontario, which is accredited by the Canadian Association for Laboratory Accreditation Inc. All samples were submitted within the required hold-time period.

**Table 11 Pumping Test Field Parameter Measurements**

Test Hour	Temperature (°C)	Dissolved Oxygen (mg/L)	Electrical Conductivity (µs/cm)	pH	Oxygen Reduction Potential (mV)	Turbidity (NTU)	Chlorine (mg/L)
1	11.2	1.69	663	7.37	-9.4	4.44	<0.01
2	11.5	1.82	669	7.34	-9.4	5.89	<0.01
3	11.6	1.99	682	7.33	-9.3	7.05	<0.01
4	11.4	1.94	684	7.31	-9.6	5.21	<0.01
5	11.3	1.92	688	7.32	-12.8	3.95	<0.01
6	11.7	1.92	690	7.36	-28.2	2.83	<0.01
7	11.8	1.91	691	7.42	-46.1	2.62	<0.01

Water quality results were compared against the Ontario Drinking Water Quality Standards (ODWQS) criteria for parameters outlined in Procedure D-5-5 Tables 1, 2, and 3 (Ministry of the Environment, 1996a). A complete summary of water quality results and certificate of lab analyses are provided in Appendix E. Parameters reported at concentrations exceeding ODWQS criteria are outlined in Table 12.

Table 12 Summary of Results Exceeding ODWQS Standards

Parameter	Units	ODWQS Criteria	TW Concentration	
			TW1-1	TW1-2
Hardness (as CaCO ₃)	mg/L	80-100	389	394
Total Dissolved Solids (Ion Sum)	mg/L	500	510	522
Turbidity	NTU	5	8.4	3.4
Total Iron	mg/L	0.3	0.205	0.326
Sodium	mg/L	20 / 200	38.9	40.0

As suggested by the field parameter measurements, water quality was consistent between samples. All measured parameters were less than the corresponding health related criteria. Hardness, total dissolved solids, turbidity, and total iron exceeded their respective aesthetic/operational guidelines but are below the corresponding Maximum Concentration



Considered Reasonably Treatable (MCCRT). Turbidity decreased significantly between sampling events, suggesting well development during pumping resolved the issue.

Sodium exceeded the "warning level" concentration of 20 mg/L for people on sodium-reduced diets. As water softening is required to address hardness, a sodium-free softener is recommended. Alternatively, a separate tap supplying unsoftened water could be used for drinking purposes.

A detailed assessment of surrounding land use was completed during the Phase Two ESA (Cambium, 2023b). All contaminants of potential concern were less than the Table 6 Site Characterization Standards in all soil and groundwater samples. All VOC concentrations measured during the pumping test were below the project laboratory's limit of reporting and indicate there are no significant impacts to the quality of the water supply aquifer from historical activities at the Site or surrounding lands.



7.0 Water Balance Assessment

A water balance assessment was completed to determine the potential change in groundwater recharge that could occur due to the proposed development. Generally, any property can be categorized into three broad types of areas: paved, roof, and landscape/vegetated. Currently, the Site is developed as a car wash, with paved roadways and parking and landscaping around the existing septic bed. In the post-development scenario, the amount of paved and roof areas at the Site will increase and the amount of landscape/vegetated area will decrease. This has the potential to impact the amount of water that infiltrates into the ground and is available to replenish natural ground- and surface-water systems, which must be considered as part of the development process.

To compare the difference in infiltration that may result from the proposed development, a water balance calculation was completed to determine the amount of surplus water that is currently generated at the Site. Site characteristics such as surficial soil type, topography, and the amount of pervious and impervious areas were then used to estimate the volume of water infiltrating at the Site. Calculations were completed for both pre-and post-development scenarios, so that a comparison could be made to identify potential changes in infiltration as well as mitigation measures which could be employed to reduce development impacts.

Figure 6 presents the post-development plans of the proposed development. As a detailed breakdown of landscape and building details are yet to be determined, the paved, roof, and landscape areas for the developed lots were calculated based on an assumption that each surface type comprises 10%, 50%, and 40% of the total developed lot area, respectively. Table 13 provides a summary of statistics for the total areas for each type of surface at the Site for both pre- and post-development scenarios. Further discussion of each component completed for the water balance assessment is provided in the following subsections.



Table 13 Summary of Pre- and Post-Development Areas

Type of Land Coverage	Pre-Development Areas (m ²)	Post-Development Areas (m ²)
Paved Area	811	2,246
Roof Area	365	1,261
Landscape/Vegetated Area	3,502	1,171
Total (m²)	4,678	4,678

7.1 Water Budget and Total Water Surplus

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

The annual water budget can be expressed as:

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

Where:

P = Precipitation (mm/yr)

R = Run-off (mm/yr)

I = Infiltration (mm/yr)

ET = Evapotranspiration (mm/yr)

ΔS = Change in soil water storage (mm/yr)

Total water surplus is defined as the difference between precipitation and evapotranspiration. It is the amount of water per unit area that can either infiltrate into on-site soils or be directed off-site as runoff. An assumption for the calculation of water surplus is that changes in soil water storage are negligible over the course of a year. It is also assumed that the catchment area for the water balance described above is completely contained within Site boundaries (i.e. the model does not account for catchment areas that extend off-site).



An annual water budget for the Site was calculated using the thirty-year climate normal data (1981-2010) provided by Environment Canada for the Ottawa MacDonald-Cartier International Airport (Climate ID 6106000), located approximately 114 km north (Environment Canada, 2024). A detailed table outlining the calculations is provided in Appendix I. In summary, the average annual precipitation and evapotranspiration at the Site is estimated to be 944 mm/yr and 547 mm/yr, respectively. Therefore, the water surplus at the Site is estimated to be 397 mm/yr.

7.2 Annual Infiltration and Runoff

To determine the amount of water infiltrated into on-site soils annually, the total volume of water available is multiplied by an infiltration factor (IF). The total volume of water available is obtained by multiplying the water surplus value determined from the water balance described above by the total permeable landscape area at the Site. The infiltration factor, which ranges from 0 to 1, is estimated based on topography, soils and cover as per the Stormwater Management Planning and Design Manual (Ministry of the Environment, 2003). As outlined in Table 14, the infiltration factor at the Site was assigned a value of 0.6.

Table 14 Determination of Infiltration Factor

Factor	Value
Topography	Flat land, avg. slope < 0.6 m/km = 0.3
Soil	Silty Loam = 0.2
Cover	Cultivated Land = 0.1
Infiltration Factor (IF)	0.6

The annual volume of water that infiltrates at the site is calculated as follows:

$$I (m^3/yr) = \text{Water Surplus (m/yr)} * \text{Total landscape area}(m^2/yr) * \text{Infiltration Factor}$$

The annual infiltration at the Site is expected to vary based on a number of factors (i.e. actual precipitation, variation in soil composition, soil compaction, etc.).

The annual runoff that occurs at the Site varies between permeable and impermeable surfaces. On permeable landscape surfaces, the runoff is calculated as the difference between total precipitation and annual infiltration. On impermeable surfaces where there is no



infiltration, the runoff is calculated as 90% of precipitation, with the remaining 10% of precipitation lost directly to evaporation.

Annual infiltration and runoff volumes were calculated for the Site for both pre- and post-development scenarios. Details of the calculations are provided in Appendix I. A discussion of the water balance used to calculate the infiltration and runoff volumes for each scenario is provided in Section 7.3 and Section 7.4.

7.3 Pre-Development Water Balance

The water balance for existing conditions at the Site is summarized in Table 15. The pre-development infiltration rate and runoff rate was calculated to be 834 m³/yr and 1,555 m³/yr, respectively.

Table 15 Pre-Development Water Balance

Land Use		Area (m ²)	Precipitation (m ³)	Evapotranspiration (m ³)	Infiltration (m ³)	Run-off (m ³)
Impervious Areas	Paved Area	811	766	77	-	689
	Roof Area	365	345	34	-	310
Pervious Areas	Landscape Area	3,502	3,306	1,916	834	556
Total		4,678	4,416	2,027	834	1,555

7.4 Post-Development Water Balance

A comparison of water balances for the pre-development and post-development scenarios is summarized in Table 17. There is a net infiltration deficit of approximately 555 m³/yr, compared to the pre-development infiltration. The run-off rate upon development of the Site is projected to increase by 1,610 m³/yr.

**Table 16 Post-Development Water Balance**

Land Use		Area (m ²)	Precipitation (m ³)	Evapotranspiration (m ³)	Infiltration (m ³)	Run-off (m ³)
Impervious Areas	Paved Area	2,246	2,120	212	-	1,908
	Roof Area	1,261	1,190	119	-	1,071
Pervious Areas	Landscape Area	1,171	1,105	641	279	186
	Total	4,678	4,416	972	279	3,166

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

7.5 Water Balance Comparison

A comparison of water balances for the pre-development and post-development scenarios is summarized in Table 17. There is a net infiltration deficit of approximately 555 m³/yr, compared to the pre-development infiltration. The run-off rate upon development of the Site is projected to increase by 1,610 m³/yr.

Table 17 Water Balance Comparison

	Precipitation (m ³)	Evapotranspiration (m ³)	Infiltration (m ³)	Run-off (m ³)
Pre-Development	4,416	2,027	834	1,555
Post-Development	4,416	972	279	3,166
Change in Volume	-	-1,055	-555	1,610
Change in %	-	-52	-67	104

7.6 Required Infiltration from Roof Runoff

To compensate for the post-development infiltration deficit, a portion of roof run-off water can be captured and directed towards infiltration. As the infiltration deficit volume is 555 m³/yr and the total roof run-off volume is projected to be 1,071 m³/yr, the percentage of roof run-off that is required to be redirected to maintain pre-development infiltration volumes is 52%. These details are summarized in Table 18.



Table 18 Requirement of Infiltration from Roof Runoff

Volume of Pre-Development Infiltration (m³/yr)	834
Volume of Post-Development Infiltration (m³/yr)	279
Deficit from Pre to Post Development Infiltration (m³/yr)	555
Percentage of Roof Runoff required to match the pre-development infiltration (%)	52

7.7 Water Balance Assessment Summary

Based on the calculations detailed in the preceding subsections, a summary of the water balance assessment is as follows:

- Impervious post-development area (roof and pavement) is projected to increase by approximately 2,331 m² when compared to pre-development conditions.
- Without implementing any mitigation measures, it is estimated that the reduction of pervious surfaces at the Site will create a net deficit in infiltration of approximately 555 m³/yr.
- To regain the lost volume of water infiltrated, a diversion of approximately 52% of roof runoff would be required to maintain pre-development water balance conditions (assuming 100% of diverted water is infiltrated).
- Implementation of Low Impact Development measures would enhance the Site's ability to infiltrate diverted roof run-off water into pervious areas. Due to the high groundwater levels however, a civil design engineer should be involved in designing any suitable infiltration measures across the Site.



8.0 Wastewater Assessment

8.1 Conceptual Wastewater Design

Part 8 of the Ontario Building Code (OBC) details the design, construction, operation, and maintenance of sewage systems. A conceptual peak sewage design flow was calculated following a review of OBC Table 8.2.1.3.B is summarized as follows:

- Warehouse: 150 L/day/loading bay x 4 loading bays = 600 L/day
- Factory: 75 L/employee per 8 hr shift x 16 person occupancy = 1,200 L/day
 - Total sewage design flow = **1,800 L/day**

8.1.1 Concept Design Details

A daily sewage design flow volume of 1,800 L/day is calculated for the proposed light industrial building.

8.1.2 Treatment Unit

It is understood the client is proposing to use a Waterloo Biofilter advanced treatment system which includes:

- Anaerobic Digestor with Internal Pump Chamber (Model ADIPC-6000)
- Biofilter Tank (Model BFCN-4800)
- WaterNOx-LS Tank (for nitrogen removal)

8.1.3 Leaching Bed

Following the subsurface investigation, native soils were observed to be similar, consisting of a surficial layer of topsoil and silty sand fill to depths ranging from 0.3 to 1.0 mbgs overlying sandy clayey silt and sandy silt. Groundwater was encountered between 0.6 and 2.0 mbgs across all boreholes. Soil sample results are summarized in Section 3.2 above and have estimated percolation rates between 20 and 40 min/cm.



Considering the available land constraints and using a conservative estimated percolation rate of 40 min/cm, a partially raised Type A area bed has been conceptually designed below using the following information and calculations:

- Design flow (Q) = 1,800 L/day
- Native Soil T-time (T) = 40 min/cm
- Configuration: partially raised
- Stone area = $Q/75$ when $Q < 3,000$ L/day = $1,800/75 = 24 \text{ m}^2$
 - Proposed concept design: $5.6 \text{ m} \times 4.5 \text{ m} = 25.2 \text{ m}^2$
- Mantle area (imported sand fill) = $QT/400 = 1,800 \times 40 / 400 = 180 \text{ m}^2$
 - Proposed concept design: $21.6 \text{ m} \times 8.5 \text{ m} = 183.6 \text{ m}^2$

Based on the filter bed mantle requirement, the total bed footprint would be approximately 21.6 m by 8.5 m, as shown on Figure 7.

The Type A Area Bed will likely require to be raised above original grade. Assuming a raised height of 1.0 m, setback distances shown on Figure 7 were increased accordingly.

The area of the Site appears to provide adequate space for the installation of an on-site sewage system and appears to meet the required setback distances outlined in OBC Tables 8.2.1.6.A and 8.2.1.6.B. However, this should be considered and evaluated during the detailed sewage system design stage. The Site conditions appear feasible to install an on-site sewage system.

8.2 Septic System Impact Assessment

Guideline D-5-4 (Ministry of the Environment, 1996b) outlines a three-step process for assessing potential groundwater impact from individual on-site sewage systems. The first two steps involve lot size and system isolation considerations. If risk is identified through either of these two steps, the assessment must progress to the third step, which is detailed consideration of nitrate loading and contaminant attenuation.



8.3 Step One: Lot Size Consideration

As the Site size is less than 1 ha, the assessment automatically progresses to Step Two.

8.4 Step Two: System Isolation Considerations

Water supply at the Site and surrounding area is predominately sourced from a bedrock aquifer which is overlain by a significant layer of overburden material (Section 4.1). Given this information, it is expected that the water supply aquifer will be hydraulically isolated from the proposed septic system at the Site. Regardless of the potential isolation, based on the small lot site size and the large amount of impermeable ground surface, nitrate loading is a consideration for the Site. As such, the assessment progresses to Step Three.

8.4.1 Step Three: Assessment of Nitrate Loading and Contaminant Attenuation

A daily flow of 1,800 L/day of sewage effluent is anticipated at the Site. Total nitrogen (all species) ultimately converts to nitrate through the wastewater treatment process. Nitrate is considered to be the critical contaminant in sewage effluent. A nitrate loading of 40 grams/lot/day is typically used to determine the effluent loading from conventional septic systems on the receiving groundwater system. The proposed Waterloo Biofilter advanced treatment system, (Section 8.1.2), has an add-on nitrate reduction tank (WaterNOx-LS) which takes a nominal amount of additional space and can achieve between 80.3% and 91.6% reduction in total nitrogen (Appendix J). Provided the WaterNOx-LS tank is installed and using the conservative 80.3% total nitrogen reduction, the system will have a theoretical nitrate loading of 7.88 g/day. This value is used in the following equations.

A mass balance calculation is used to determine the sewage loading for nitrate on the property boundary:

$$C_t = \frac{Q_e C_e + Q_i C_i}{Q_t}$$

Where:

Q_t = Total volume ($Q_e + Q_i$)

C_t = Total concentration of nitrate at the property boundary



Q_e = Volume of septic effluent
 C_e = Concentration of nitrate in effluent (7.88 mg/L)
 Q_i = Volume of available dilution water
 C_i = Concentration of nitrate in infiltration water (0.1 mg/L)

8.4.2 Estimate of Nitrate Concentrations at Lot Boundaries

The predictive assessment indicates the proposed development will result in an estimated nitrate concentration of 5.3 mg/L at lot boundaries if wastewater is treated via the proposed Waterloo Biofilter advanced treatment system and only dilution water from infiltration within permeable areas is considered. The treatment system capable of 80.3% or greater nitrate reduction is well below the ODWQS criteria of 10 mg/L using only dilution water from infiltration within permeable areas.

A summary of these results is provided in Table 19. Detailed calculations are included in Appendix I.

Table 19 Predictive Assessment of Nitrate Concentration

Variable	Waterloo Biofilter Advanced Treatment System
Q_e (L/day)	1,800
C_e (mg/L)	7.88
Q_i (L/day)	891
C_i (mg/L)	0.1
Q_t (L/day)	2,691
C_t (mg/L)	5.3



9.0 Conclusions and Recommendations

Cambium was retained by the Client to complete a hydrogeological assessment for proposed redevelopment of the land located at 1386 and 1394 Greely Lane, Ottawa, Ontario.

Development plans include construction of one 1,110 m² (12,000 ft²) slab-on grade building which will be divided in three 370 m² (4,000 ft²) light industrial use units.

The subsurface investigation completed at the site indicates the lithology is comprised primarily of surficial deposits of pavements or topsoil overlying a relatively thin deposit of fill overlying native deposits of clays and silts. T-times estimated from laboratory analysis of soil samples collected from the native deposits range from 20 to 40 min/cm.

Monitoring wells installed in three locations (BH105-23, BH106-23, and BH107-23) indicate water levels vary across the site and fluctuate seasonally. A minimum water level of 1.3 mbgs was measured in BH105-23 on March 15, 2023, and a maximum water level of 0.30 mbgs was measured in BH106-23 on April 19, 2024. Hydraulic testing (rising head slug tests) provided hydraulic conductivity estimates for the shallow aquifer ranging from 1.9×10^{-9} to 2.2×10^{-7} m/s with a geometric mean estimate of 1.2×10^{-8} m²/s.

9.1 Construction Dewatering

Water Quality Analysis

Analysis of water quality samples from BH106-23 identified a number of parameters with concentrations exceeding PWQO criteria in both unfiltered and filtered samples. All parameters had concentrations below City of Ottawa storm and sanitary sewer discharge guidelines, indicating that filtration is a suitable treatment method to enable discharge to these receptors. Should on-site treatment and discharge to surface (i.e. drainage ditch) be the preferred option for dewatering, it is recommended that a water quality sample of treated water be submitted for laboratory analysis prior to discharge during construction activities to confirm the treatment system adequately reduces elevated parameters to acceptable concentrations.



Dewatering Assessment

Due to the high groundwater levels at the Site, dewatering during both the construction phase and permanent building operation will be required. During construction, it is estimated than an average dewatering rate of 1.30 m³/day (1,300 L/day, or 0.02 L/s) will be needed to achieve dry conditions per 50 m section of footing excavation. This rate represents steady state pumping conditions and higher volumes may be required to lower Site water levels to acceptable levels during the initial stage of pumping. Additionally, the estimate does not account for any precipitation that may occur during the construction process.

For permanent operations, it is estimated that an estimated average dewatering rate of 2.2 m³/day (2,200 L/day, or 0.02 L/s) will be required to ensure water levels beneath the building remain below the frost line level (approximately 1.5 mbgs) throughout the year. It is recommended that dewatering rates be reassessed however, once building construction nears the completion stage.

The maximum estimated dewatering rate for both construction activities and long-term building operation are less than 9,500 L/day. As such, neither a PTTW nor an EASR registration will be required for the proposed development.

The monitoring wells installed for the hydrogeological assessment should be decommissioned in accordance with O.Reg. 903 prior to redevelopment of the Site.

9.2 Private Servicing

Water Supply

Test Well 1 was installed on May 21, 2025, in a landscaped area in the southeast corner of the Site to a depth of 55 mbgs. The identified lithology is clay from 0 to 11.6 mbgs, boulders/hardpan from 11.6 to 14.7 mbgs, and limestone bedrock to completion depth. Three water bearing units of indeterminate thickness were identified at 22.6, 38.2, and 53 mbgs. A Cambium technician observed the installation and grouting of the well casing (no well screen was installed).



An 8-hour hydraulic pumping test was completed on TW1 by Cambium staff on May 29, 2025 and the pre-existing water supply well on the Site was used to monitor water levels before, during, and after the pumping test. OW1 was not used for at least 12 hours prior to the start of the pumping test, nor was it used during the test or subsequent recovery period.

The total sewage design flow for the proposed development is 1,800 L/day corresponds to an average rate of 3.75 L/min for an 8-hour business day. To account for periods of peak demand, the flow rate during the initial 15 minutes of the test was set to 5 times the average demand (approximately 19 L/min). The pumping rate was then increased and maintained at approximately 10 times the average demand (38 L/min) for the remainder of the test. The total volume of water discharged from TW1 during the pumping test was approximately 17,955 L.

Rainfall of 11.6 mm was recorded on the day of the pumping test and resulted in a gradual increase in water level in both TW1 and OW1 over the duration of the test. Water level fluctuations in TW1 and OW1 mirrored each other, both in terms of timing and magnitude.

Following pump cessation, water levels were measured for 60 minutes. The water level recovered to greater than 100% of the initial water level in both TW1 and OW1 immediately upon termination of the pumping test.

Cambium notes that the pre-existing water supply well must be appropriately abandoned with consideration to Wells Regulation when it is no longer in use.

Water Balance

It is projected that impervious post-development area (roof and pavement) will increase by approximately 2,331 m² when compared to pre-development conditions, which will create a net deficit in infiltration to groundwater of approximately 555 m³/yr if no mitigation measures are implanted.

To regain the lost volume of water infiltrated, a diversion of approximately 52% of roof run-off would be required to maintain pre-development water balance conditions (assuming 100% of diverted water is infiltrated).

Implementation of Low Impact Development measures would enhance the Site's ability to infiltrate diverted roof run-off water into pervious areas. Due to the high groundwater levels



however, a civil design engineer should be involved in designing any suitable infiltration measures across the Site.

Conceptual Wastewater Design

A daily sewage design flow volume of 1,800 L/day was calculated for the proposed light industrial building. Given the site lithology and estimated T-times, a total septic bed footprint of approximately 21.6 m by 8.5 m, with a 6,000 L septic tank and a Waterloo Biofilter advanced treatment system, will be required. The bed will be at least partially raised due to Site conditions, with the specific height to be determined during the final building design.

The predictive assessment indicates the proposed development will result in an estimated nitrate concentration of 5.3 mg/L at lot boundaries if wastewater is treated via the proposed Waterloo Biofilter advanced treatment system and only dilution water from infiltration within permeable areas is considered.

Overall, the Site conditions appear feasible to install an on-site sewage system, and there is adequate space for the installation which appears to meet the required OBC setback distances. However, this should be considered and evaluated during the detailed sewage system design stage.

It is noted that the existing septic system at the Site must be appropriately decommissioned in line with guidelines provided by the Ottawa Septic System Office.



10.0 Closing

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

Respectfully submitted,

Cambium Inc.

DocuSigned by:

C9F8935E96D14CC...

Jeremy Tracey, P.Eng.
Project Manager

DocuSigned by:

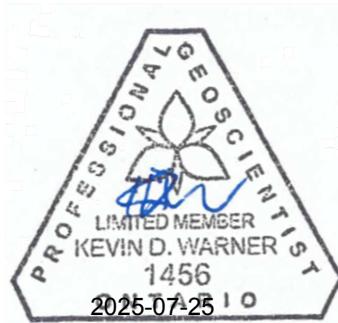
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Warren Young, P.Eng.
Coordinator, Hydrogeologist

DocuSigned by:

677F3F2E4427404...

Kevin Warner, M.Sc., P.Geo. (Ltd), BCIN
Group Manager – Water & Wastewater



\\cambiumincstorage.file.core.windows.net\\projects\\17200 to 17299\\17281-002 Cassidy EW Construction Consultant Ltd - HydroG - Greely Lane\\Deliverables\\REPORT - HydroG\\Final\\2025-07-25 RPT HydroG Greely Ln - Rev1.docx



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12.0 Standard Limitations

Limited Warranty

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

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Site Assessments

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

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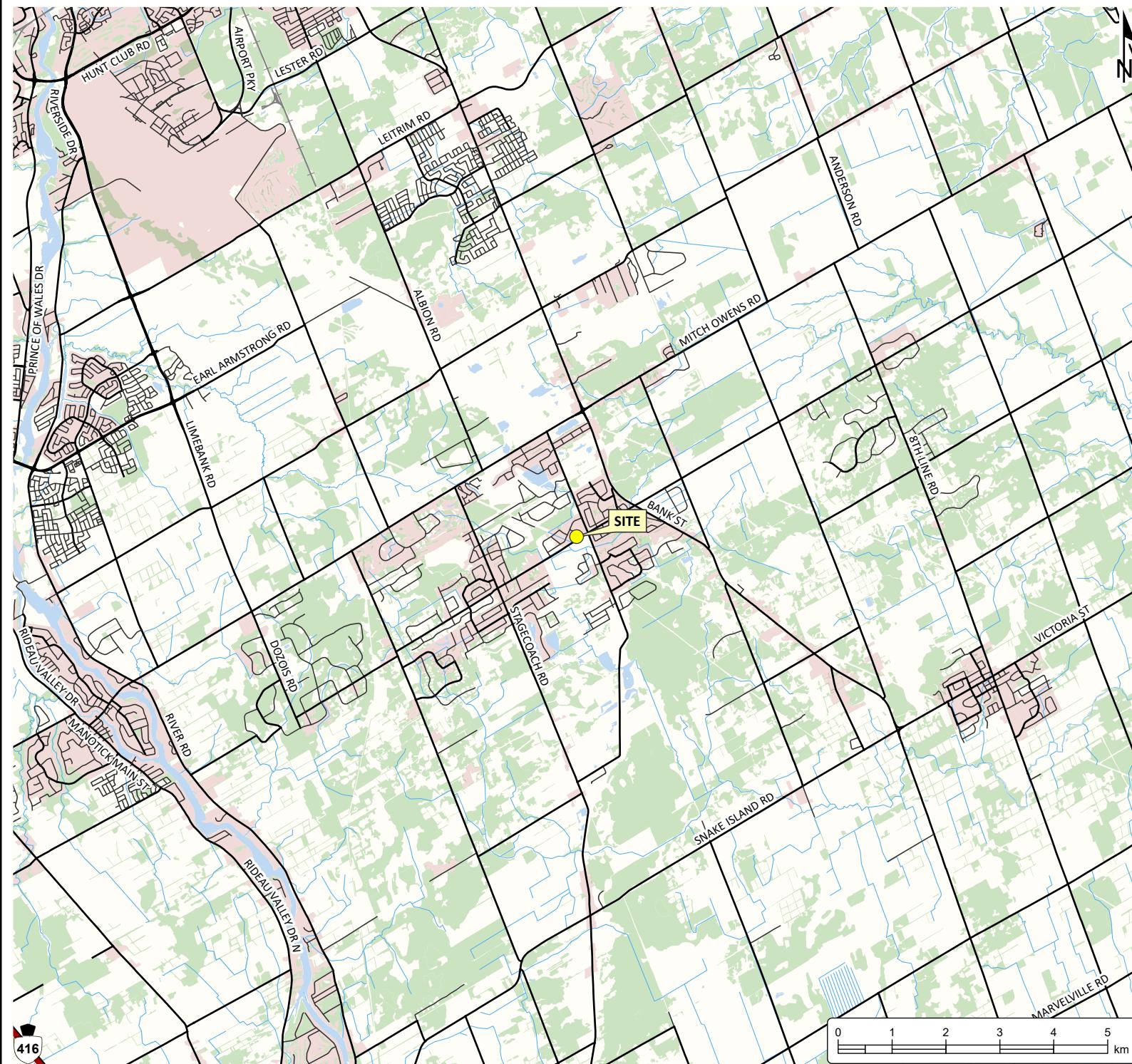
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Hydrogeological Assessment Report 1386 & 1394 Greely Lane, Ottawa, Ontario
Cassidy EW Construction Consultant Ltd.
Cambium Reference: 17281-002
July 25, 2025

Appended Figures



HYDROGEOLOGICAL ASSESSMENT REPORT
CASSIDY EW CONSTRUCTION CONSULTANT LTD.
1386 and 1387 Greely Lane
Ottawa, Ontario

LEGEND

- Highway
- Major Road
- Minor Road
- Railway
- Watercourse
- Built Up Area
- Wooded Area
- Water Area

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www.cambium-inc.com

SITE LOCATION PLAN

Project No.:	17281-002	Date:	June 2025
Rev.:		Projection:	NAD 1983 UTM Zone 18N
Scale:	1:100,000		
Created by:	NLB	Checked by:	KH
Figure:			1



HYDROGEOLOGICAL ASSESSMENT REPORT
CASSIDY EW CONSTRUCTION
CONSULTANT LTD.
1386 and 1387 Greely Lane
Ottawa, Ontario

LEGEND

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

Notes:

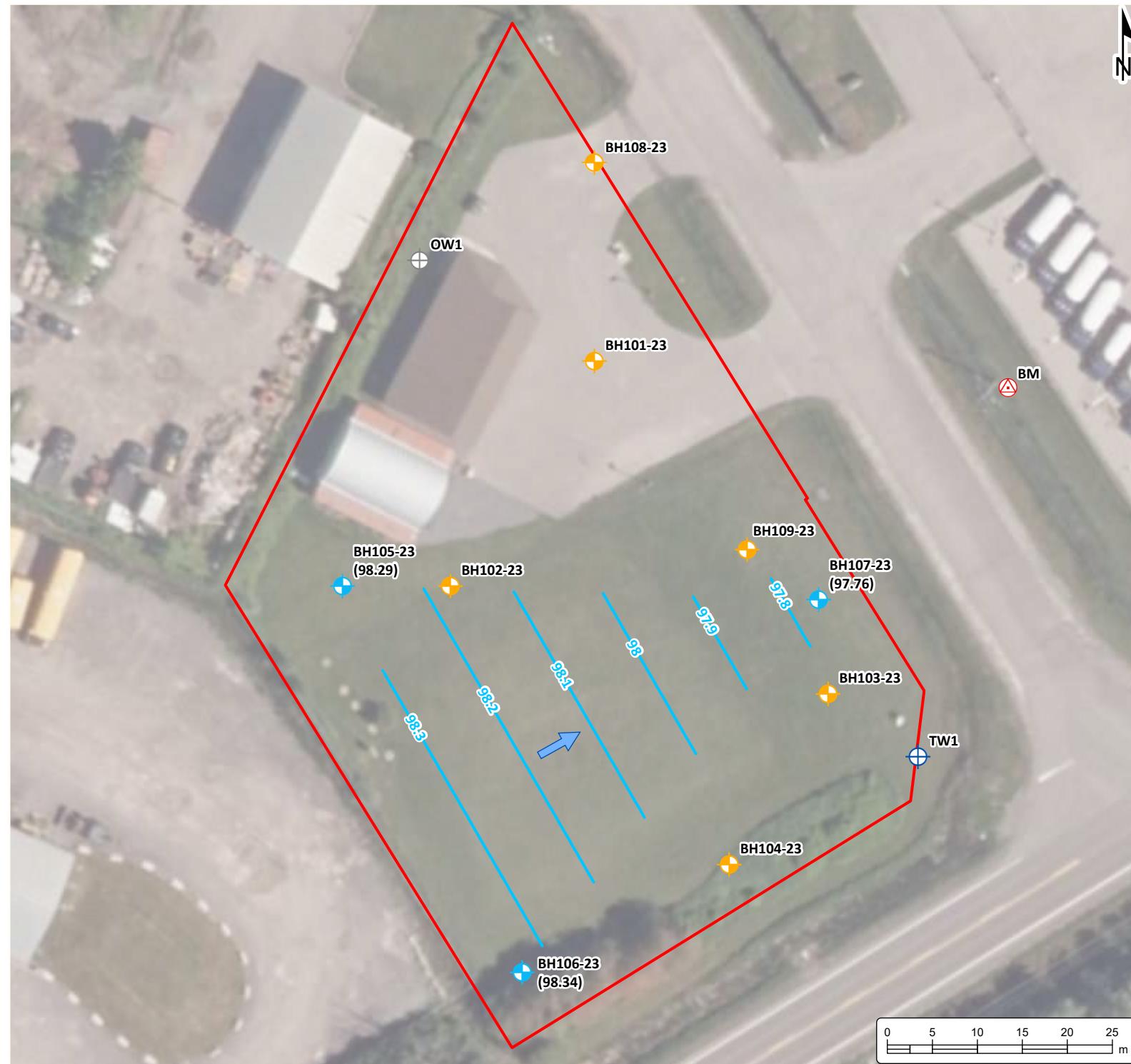
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SITE PLAN WITH BOREHOLE LOCATIONS

Project No.:	17281-002	Date:	June 2025
Rev.:		Projection:	
Scale:	1:600		NAD 1983 UTM Zone 17N
Created by:	NLB	Checked by:	KH
Figure:	2		



HYDROGEOLOGICAL ASSESSMENT REPORT
CASSIDY EW CONSTRUCTION CONSULTANT LTD.
1386 and 1387 Greely Lane
Ottawa, Ontario

LEGEND

- (98.29) Groundwater Elevations April 2024
- Benchmark
- Borehole
- Monitoring Well
- Test Well
- Observation Well
- Groundwater Contour April 2024
- Site (approximate)
- Groundwater Flow Direction April 2024

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GROUNDWATER CONFIGURATION PLAN

Project No.:	17281-002	Date:	June 2025
		Rev.:	
Scale:	1:600	Projection:	NAD 1983 UTM Zone 18N
Created by:	LD	Checked by:	KH
Figure:	3		



**HYDROGEOLOGICAL
ASSESSMENT REPORT**
CASSIDY EW CONSTRUCTION
CONSULTANT LTD.
1386 and 1387 Greely Lane
Ottawa, Ontario

LEGEND

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

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MECP WELL RECORDS WITHIN 500m

Project No.:	17281-002	Date: Rev.:	June 2025
Scale:	1:6,000	Projection: NAD 1983 UTM Zone 18N	
Created by:	Checked by:	Figure:	
NLB	KH	4	

Pre-Development	Area (m ²)
Roofed	365
Paved	811
Landscaped	3,502
Total	4,678



HYDROGEOLOGICAL ASSESSMENT REPORT
CASSIDY EW CONSTRUCTION CONSULTANT LTD.
1386 and 1387 Greely Lane
Ottawa, Ontario

LEGEND

- Roofed
- Paved
- Landscaped
- Site (approximate)

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PRE-DEVELOPMENT PLAN

Project No.:	17281-002	Date:	June 2025
Rev.:		Projection:	
Scale:	1:600		NAD 1983 UTM Zone 18N
Created by:	NLB	Checked by:	KH
Figure:	5		

Post-Development	Area (m ²)
Roofed	1,261
Paved	2,246
Landscaped	1,172
Total	4,678



HYDROGEOLOGICAL ASSESSMENT REPORT
CASSIDY EW CONSTRUCTION CONSULTANT LTD.
1386 and 1387 Greely Lane
Ottawa, Ontario

LEGEND

- Roofed
- Paved
- Landscaped
- Site (approximate)

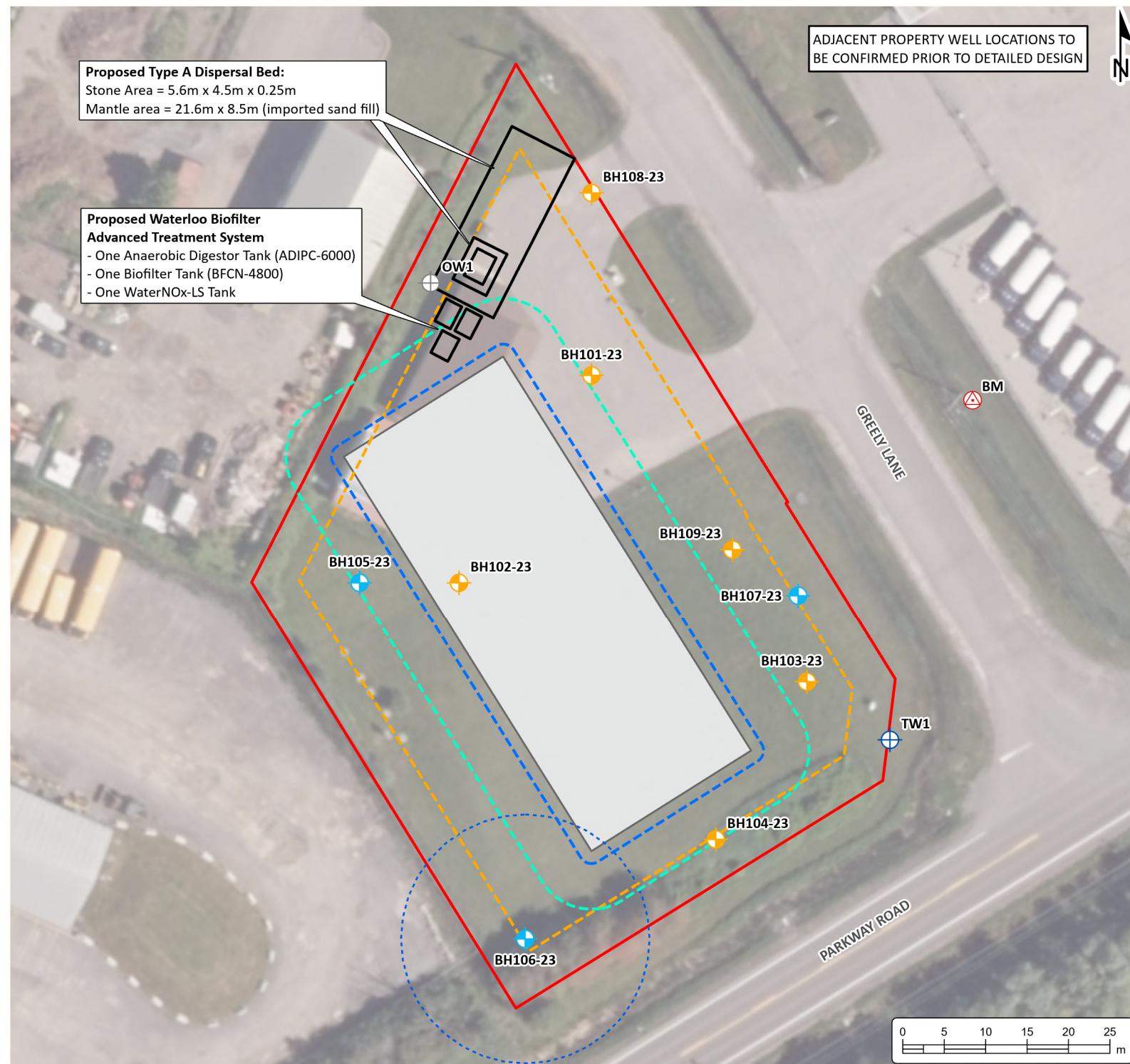
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POST-DEVELOPMENT PLAN

Project No.:	17281-002	Date:	June 2025
Rev.:		Projection:	
Scale:	1:600		NAD 1983 UTM Zone 17N
Created by:	NLB	Checked by:	KH
Figure:	6		



HYDROGEOLOGICAL ASSESSMENT REPORT
CASSIDY EW CONSTRUCTION CONSULTANT LTD.
1386 and 1387 Greely Lane Ottawa, Ontario

LEGEND

- Benchmark
- Borehole
- Monitoring Well
- Observation Well
- Test Well
- 15m Well Buffer
- 5m Property Line Setback
- 1.5m Building Setback
- 7m Building Setback
- Proposed Building
- Proposed Septic
- Site (approximate)

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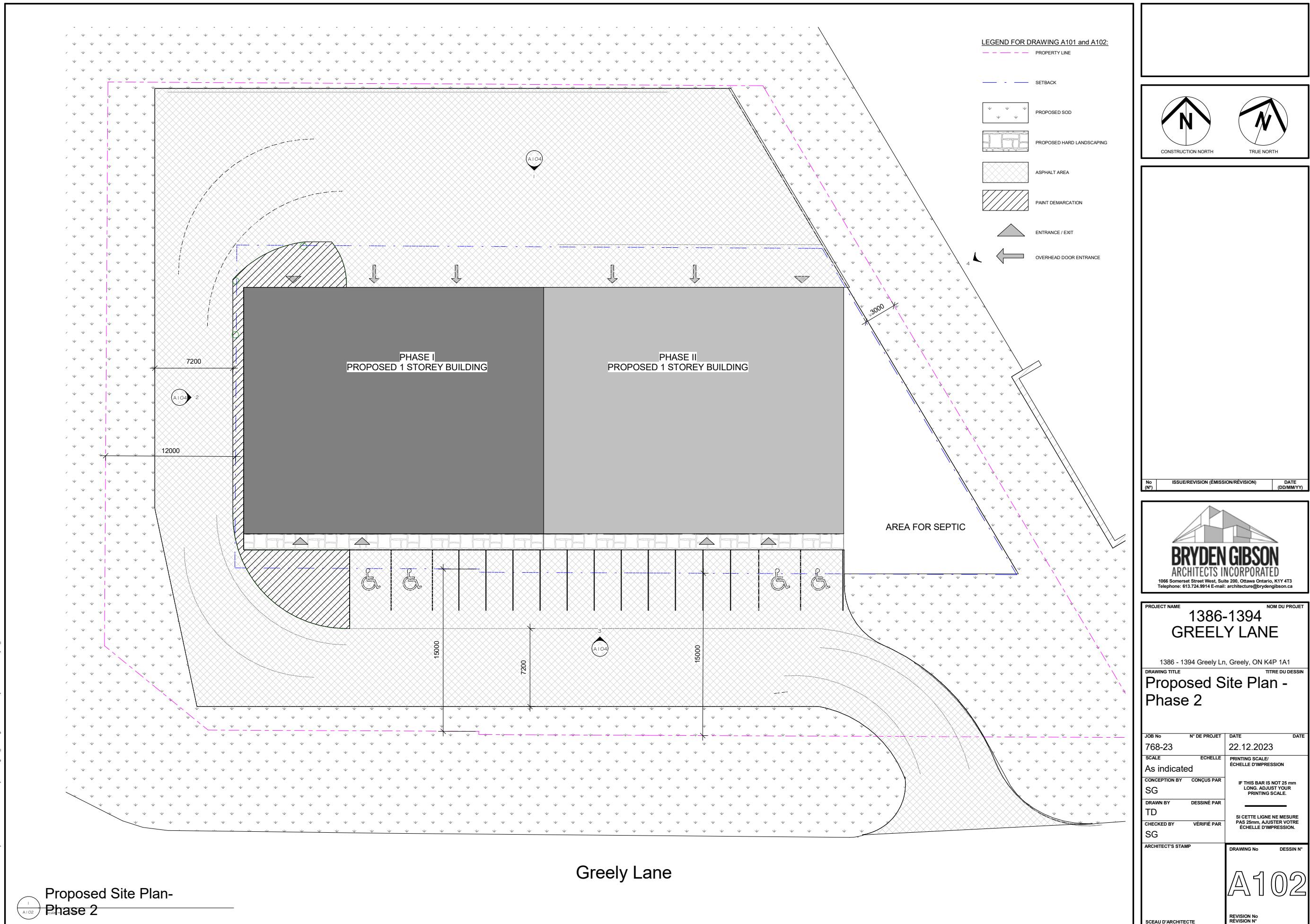
CONCEPTUAL SEWAGE SYSTEM DESIGN

Project No.:	17281-002	Date:	July 2025
		Rev.:	
Scale:	1:650	Projection:	NAD 1983 UTM Zone 18N
Created by:	NLB	Checked by:	KH



Appendix A

Property and Land Information









Source Protection Information Atlas Map

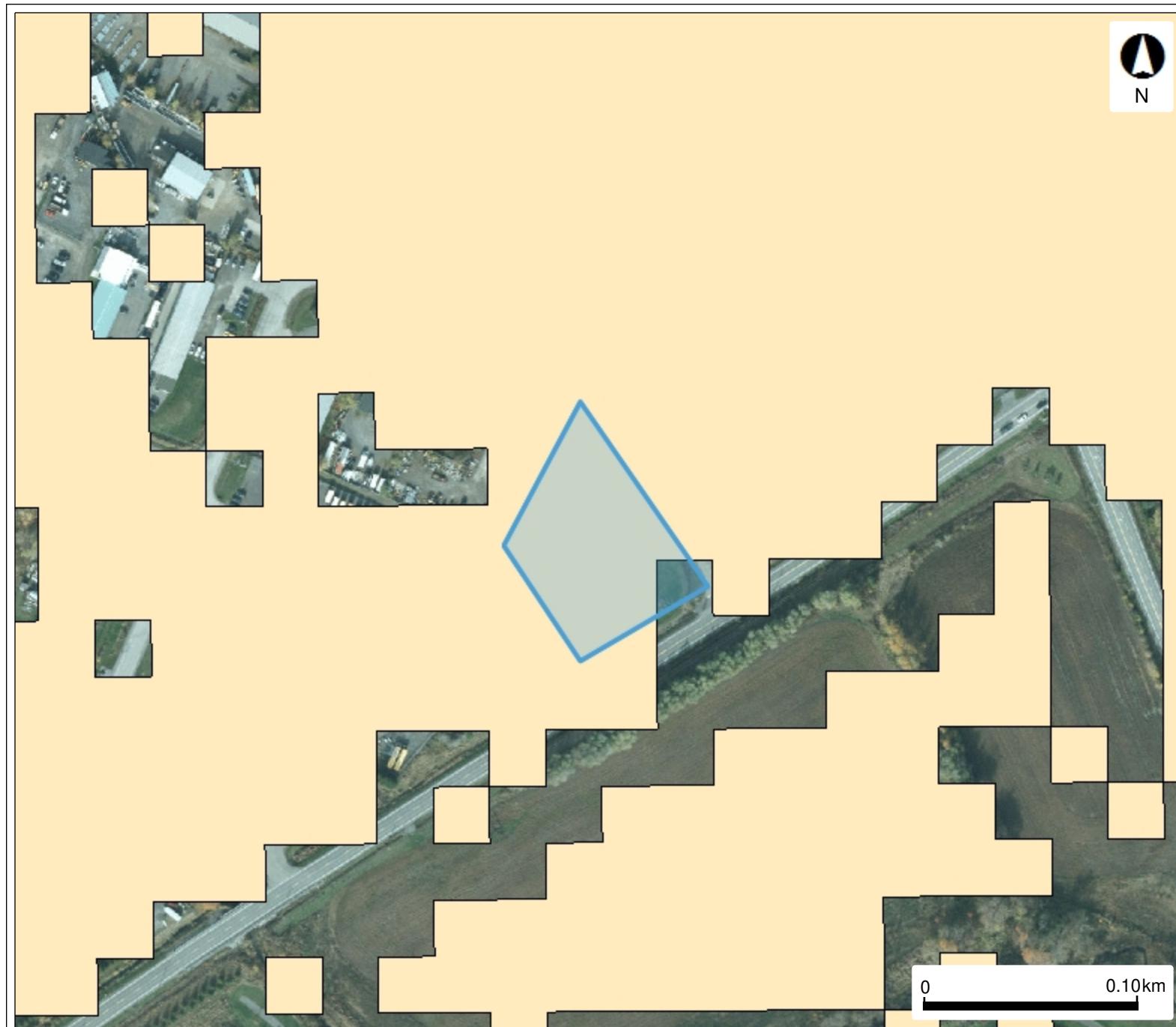


Legend

- Highly Vulnerable Aquifers (Red Hatched)
- Intake Protection Zone 3 (Blue)

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Source Protection Information Atlas - SGRA Map

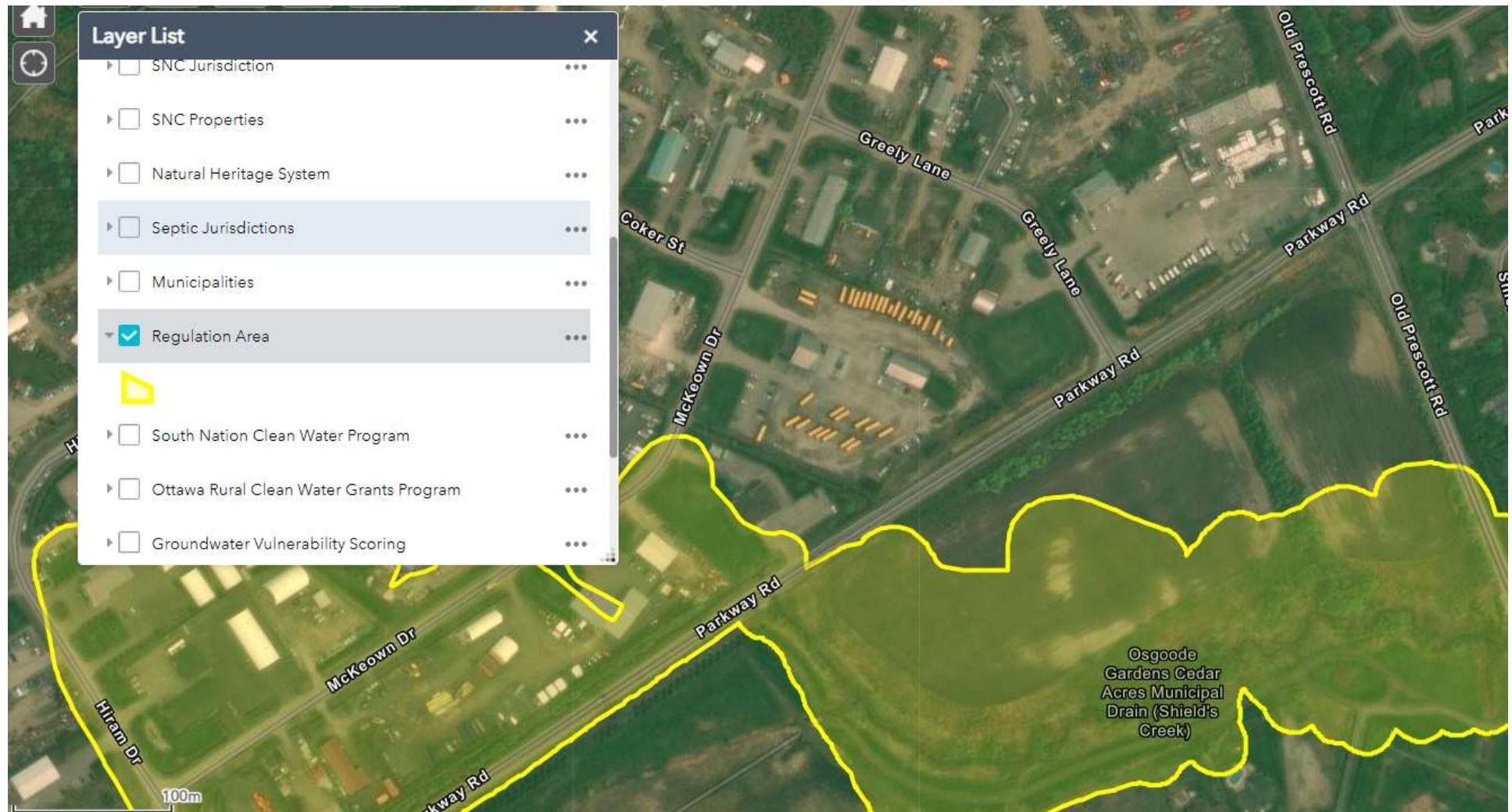


Legend

Significant Groundwater
Recharge Area

■	N/A
■	0
■	2
■	4
■	6

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Hydrogeological Assessment Report 1386 & 1394 Greely Lane, Ottawa, Ontario
Cassidy EW Construction Consultant Ltd.
Cambium Reference: 17281-002
July 25, 2025

Appendix B

Borehole Logs



Client: Cassidy EW
Contractor: Construction OGS Inc.
Project No.: 17281-001 - B
Location: Ottawa, ON

Project Name: 1386 & 1394 Greely Lane

Method: Track Mounted Hollow Stem Auger
Elevation: 99.01 mASL

Elevation: 99.01 mASL

UTM: 18 T N: 5011868 E: 455169

Log of Borehole: BH101-23

Page: 1 of 1

Date Completed: March 8, 2023



Client: Cassidy EW
Contractor: Construction OGS Inc.
Project No.: 17281-001 - B
Location: Ottawa, ON

Project Name: 1386 & 1394 Greely Lane

Method: Track Mounted Hollow Stem Auger

Elevation: 98.72 mASL

UTM: 18 T N: 5011843 E: 455153

Log of Borehole: BH102-23

Page: 1 of 1

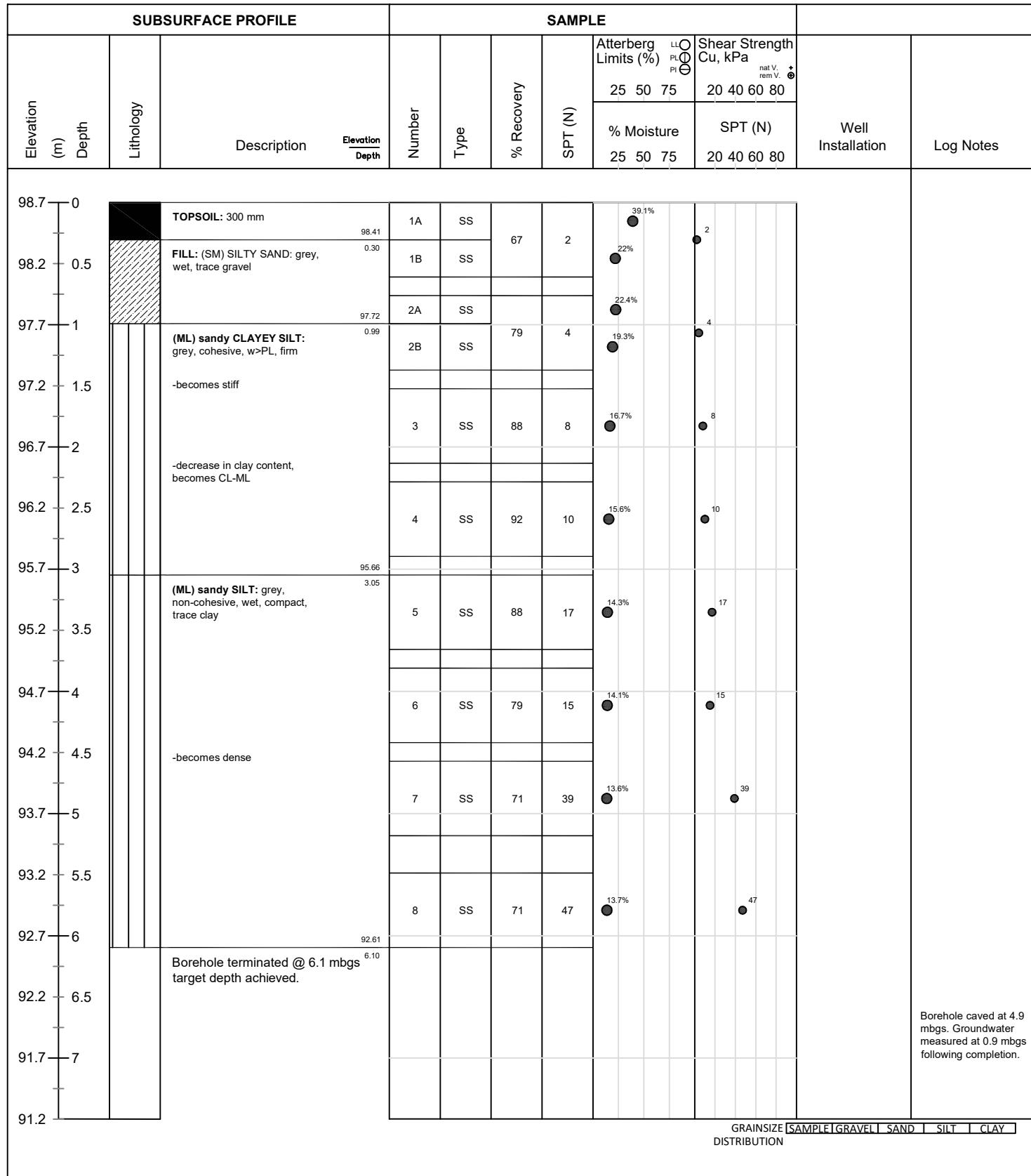
Date Completed: March 8, 2023



Cassidy EW
Client: Construction
Contractor: OGS Inc.
Project No.: 17281-001 - B
Location: Ottawa, ON

Project Name: 1386 & 1394 Greely Lane
Method: Track Mounted Hollow Stem Auger
Elevation: 98.71 mASL
UTM: 18 T **N:** 5011831 **E:** 455195

Log of Borehole: BH103-23
Page: 1 of 1
Date Completed: March 8, 2023

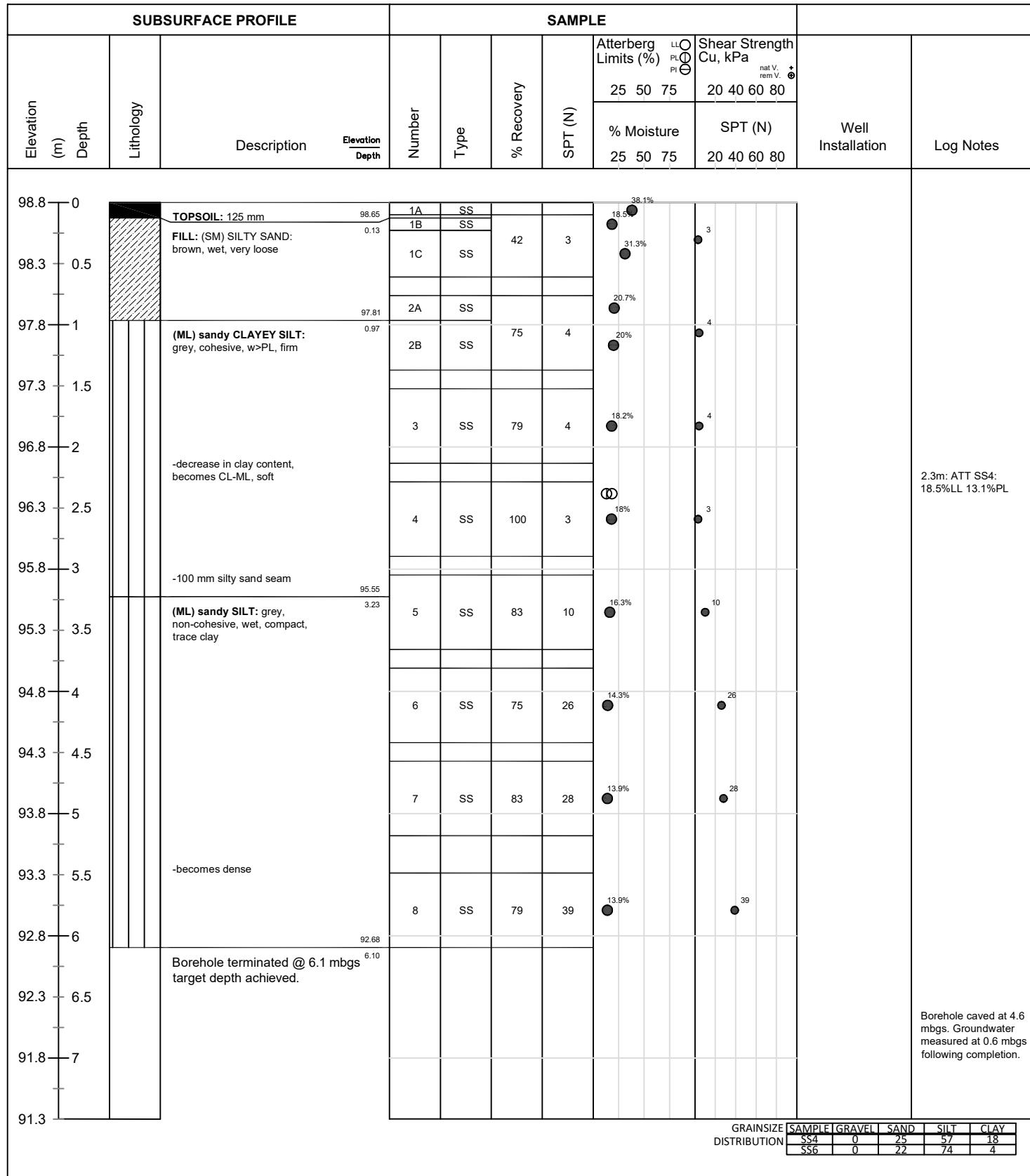




Cassidy EW
Client: Construction
Contractor: OGS Inc.
Project No.: 17281-001 - B
Location: Ottawa, ON

Project Name: 1386 & 1394 Greely Lane
Method: Track Mounted Hollow Stem Auger
Elevation: 98.78 mASL
UTM: 18 T **N:** 5011812 **E:** 455184

Log of Borehole: BH104-23
Page: 1 of 1
Date Completed: March 8, 2023

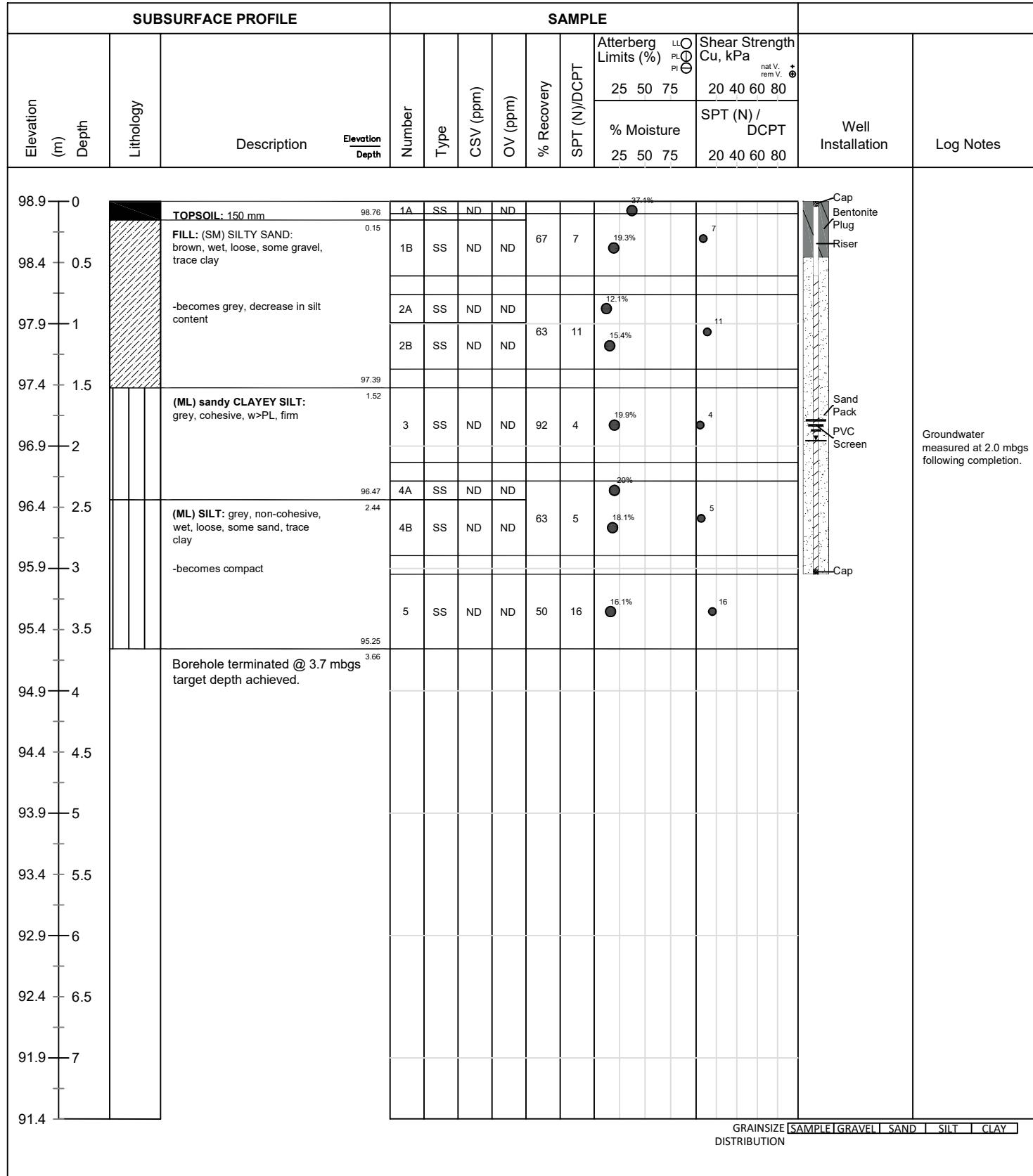




Cassidy EW
Client: Construction
Contractor: OGS Inc.
Project No.: 17281-001 - B
Location: Ottawa, ON

Project Name: 1386 & 1394 Greely Lane
Method: Track Mounted Hollow Stem Auger
Elevation: 98.91 mASL
UTM: 18 T **N:** 5011843 **E:** 455141

Log of Borehole: BH105-23
Page: 1 of 1
Date Completed: March 8, 2023





Client: Cassidy EW
Contractor: Construction
Project No.: 17281-001 - B
Location: Ottawa, ON

Project Name: 1386 & 1394 Greely Lane

Method: Track Mounted Hollow Stem Auger

Elevation: 98.64 mASL

UTM: 18 T N: 5011800 E: 455161

Log of Borehole: BH106-23

Page: 1 of 1

Date Completed: March 7, 2023

SUBSURFACE PROFILE				SAMPLE								Well Installation	Log Notes	
Elevation (m)	Depth (m)	Lithology	Description	Elevation Depth	Number	Type	CSV (ppm)	OV (ppm)	% Recovery	SPT (N)/DCPT	Atterberg Limits (%) LL PL PI			Shear Strength Cu, kPa 25 50 75 nat V. rem V.
											20 40 60 80			
98.6	0	TOPSOIL: 125 mm FILL: (SM) SILTY SAND: brown, wet, very loose, trace gravel				98.51	1A	SS	ND	ND		51.5%	20 40 60 80	
98.1	0.5					0.13	1B	SS	ND	ND		19.4%	20 40 60 80	
97.6	1	(ML) sandy CLAYEY SILT: grey, cohesive, w>PL, soft -becomes firm				97.78	1C	SS	ND	ND	54	31.1%	20 40 60 80	
97.1	1.5					0.86	2A	SS	ND	ND		22.9%	20 40 60 80	
96.6	2					0.86	2B	SS	ND	ND	75	3	19%	20 40 60 80
96.1	2.5					95.59	3	SS	ND	ND	100	5	18.3%	20 40 60 80
95.6	3					3.05	4	SS	ND	ND	92	6	19.1%	20 40 60 80
95.1	3.5	(ML) sandy SILT: grey, non-cohesive, wet, compact, trace clay				94.98	5	SS	ND	ND	75	15	15.8%	20 40 60 80
94.6	4	Borehole terminated @ 3.7 mbgs target depth achieved.				3.66								
94.1	4.5													
93.6	5													
93.1	5.5													
92.6	6													
92.1	6.5													
91.6	7													
91.1	7.5													

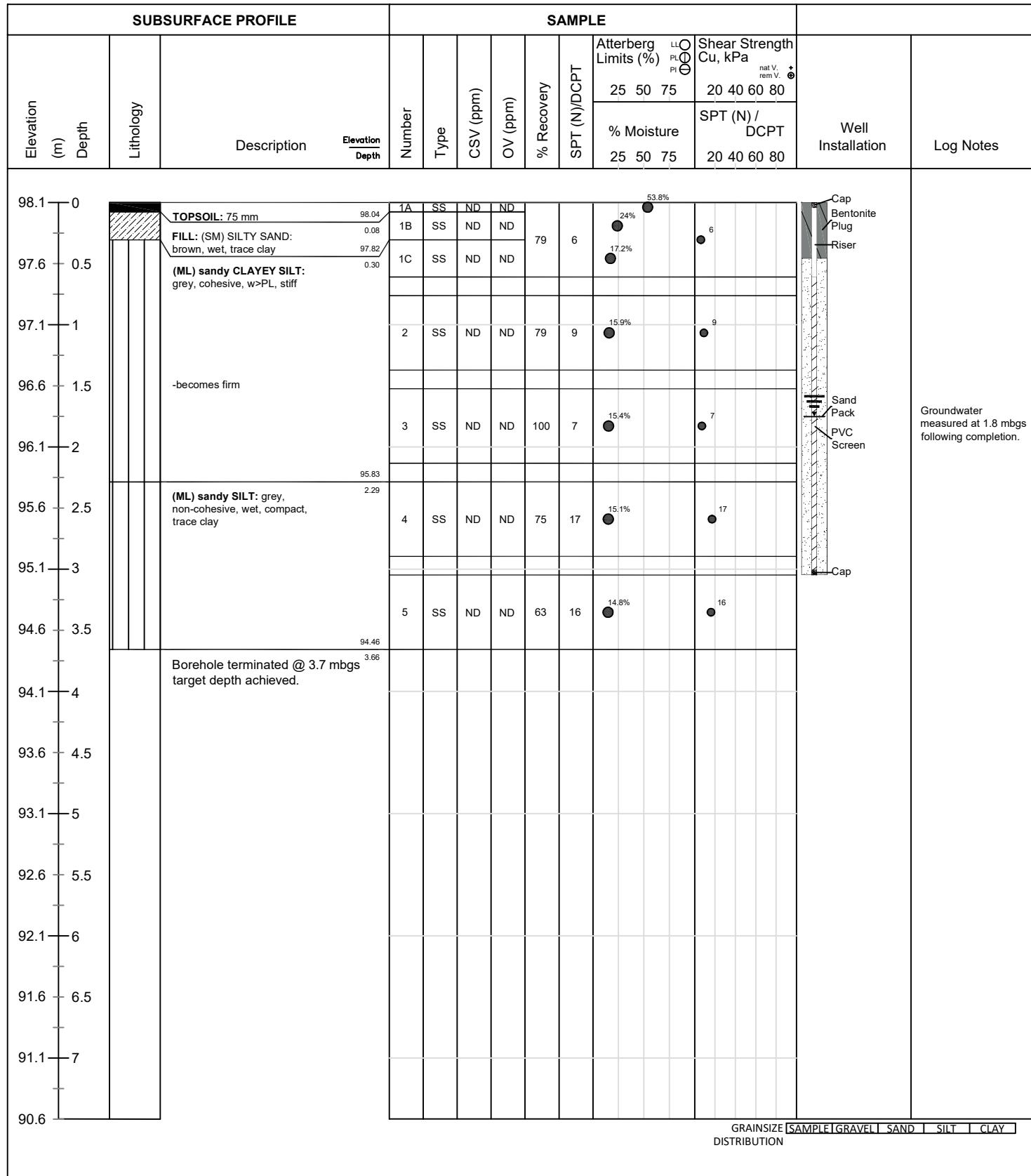
Groundwater measured at 1.5 mbgs following completion.



Cassidy EW
Client: Construction
Contractor: OGS Inc.
Project No.: 17281-001 - B
Location: Ottawa, ON

Project Name: 1386 & 1394 Greely Lane
Method: Track Mounted Hollow Stem Auger
Elevation: 98.12 mASL
UTM: 18 T **N:** 5011845 **E:** 455203

Log of Borehole: BH107-23
Page: 1 of 1
Date Completed: March 8, 2023





Cassidy EW
Client: Construction
Contractor: OGS Inc.
Project No.: 17281-001 - B
Location: Ottawa, ON

Project Name: 1386 & 1394 Greely Lane
Method: Track Mounted Hollow Stem Auger
Elevation: 99.06 mASL
UTM: 18 T **N:** 5011890 **E:** 455169

Log of Borehole: BH108-23
Page: 1 of 1
Date Completed: March 8, 2023

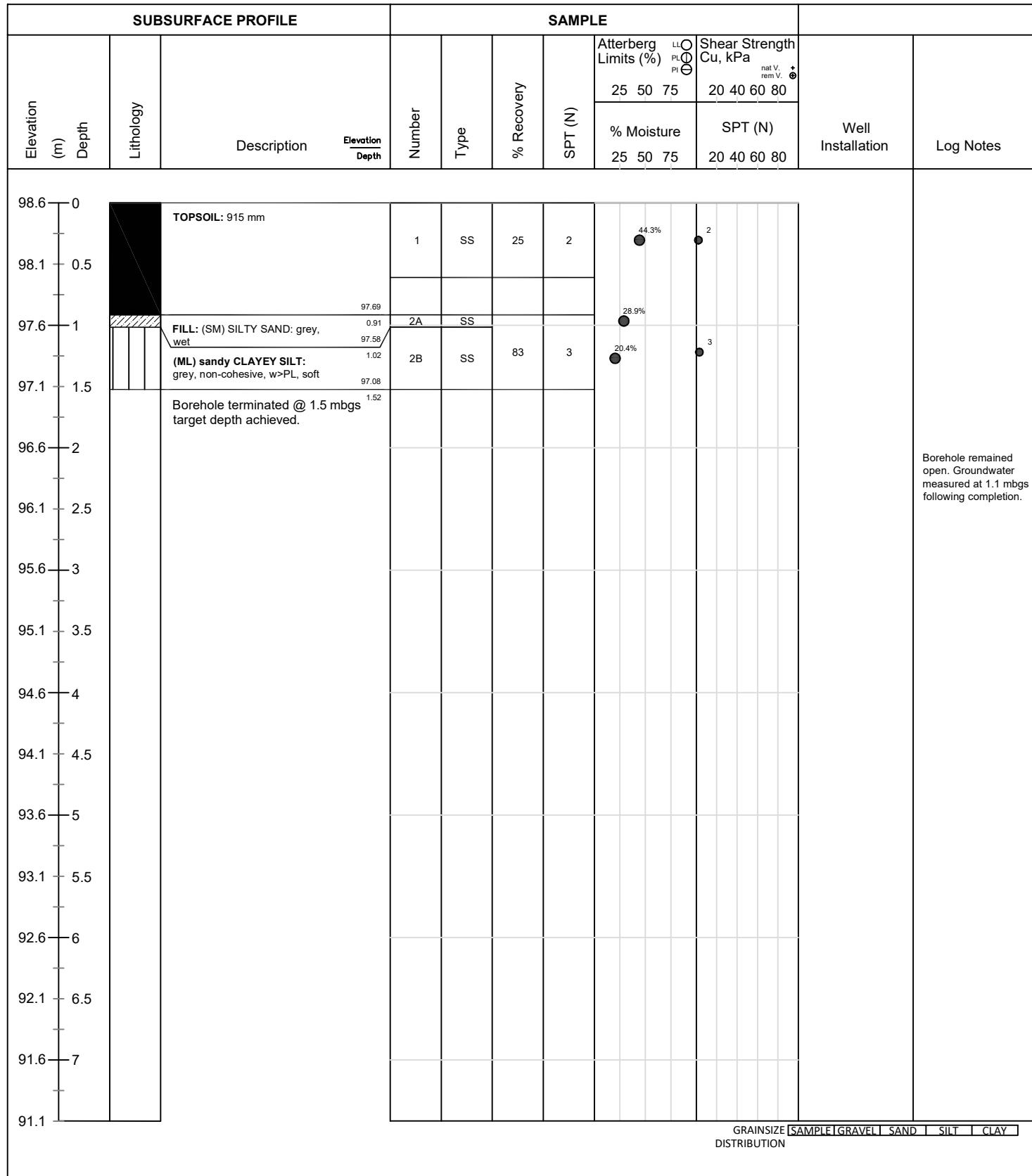
SUBSURFACE PROFILE				SAMPLE																				
Elevation (m)	Depth (m)	Lithology	Description	Elevation Depth	Number	Type	% Recovery	SPT (N)	Atterberg Limits (%) LL PL PI	Shear Strength Cu, kPa nat V. rem V.	Well Installation	Log Notes												
99.1	0		ASPHALT: 50 mm	99.01																				
98.6	0.5		FILL: (SM) GRAVELLY SAND, brown, wet, some silt [base material]	0.05	1A	SS	100	64																
98.1	1		FILL: (SM) SAND and SILT: grey, wet	0.61	1B	SS																		
97.6	1.5		(ML) sandy CLAYEY SILT: grey, non-cohesive, w>PL, firm	1.07	2A	SS																		
97.1	2			97.54	2B	SS	67	3																
96.6	2.5																							
96.1	3																							
95.6	3.5																							
95.1	4																							
94.6	4.5																							
94.1	5																							
93.6	5.5																							
93.1	6																							
92.6	6.5																							
92.1	7																							
91.6																								
Borehole terminated @ 1.5 mbgs target depth achieved.				1.52																				
<table border="1"> <tr> <td>GRAINSIZE</td> <td>SAMPLE</td> <td>GRAVEL</td> <td>SAND</td> <td>SILT</td> <td>CLAY</td> </tr> <tr> <td>DISTRIBUTION</td> <td>SS1B</td> <td>0</td> <td>63</td> <td>37</td> <td></td> </tr> </table>													GRAINSIZE	SAMPLE	GRAVEL	SAND	SILT	CLAY	DISTRIBUTION	SS1B	0	63	37	
GRAINSIZE	SAMPLE	GRAVEL	SAND	SILT	CLAY																			
DISTRIBUTION	SS1B	0	63	37																				
<p>Borehole remained open. Groundwater measured at 0.8 mbgs following completion.</p>																								



Cassidy EW
Client: Construction
Contractor: OGS Inc.
Project No.: 17281-001 - B
Location: Ottawa, ON

Project Name: 1386 & 1394 Greely Lane
Method: Track Mounted Hollow Stem Auger
Elevation: 98.60 mASL
UTM: 18 T **N:** 5011847 **E:** 455186

Log of Borehole: BH109-23
Page: 1 of 1
Date Completed: March 7, 2023





Appendix C

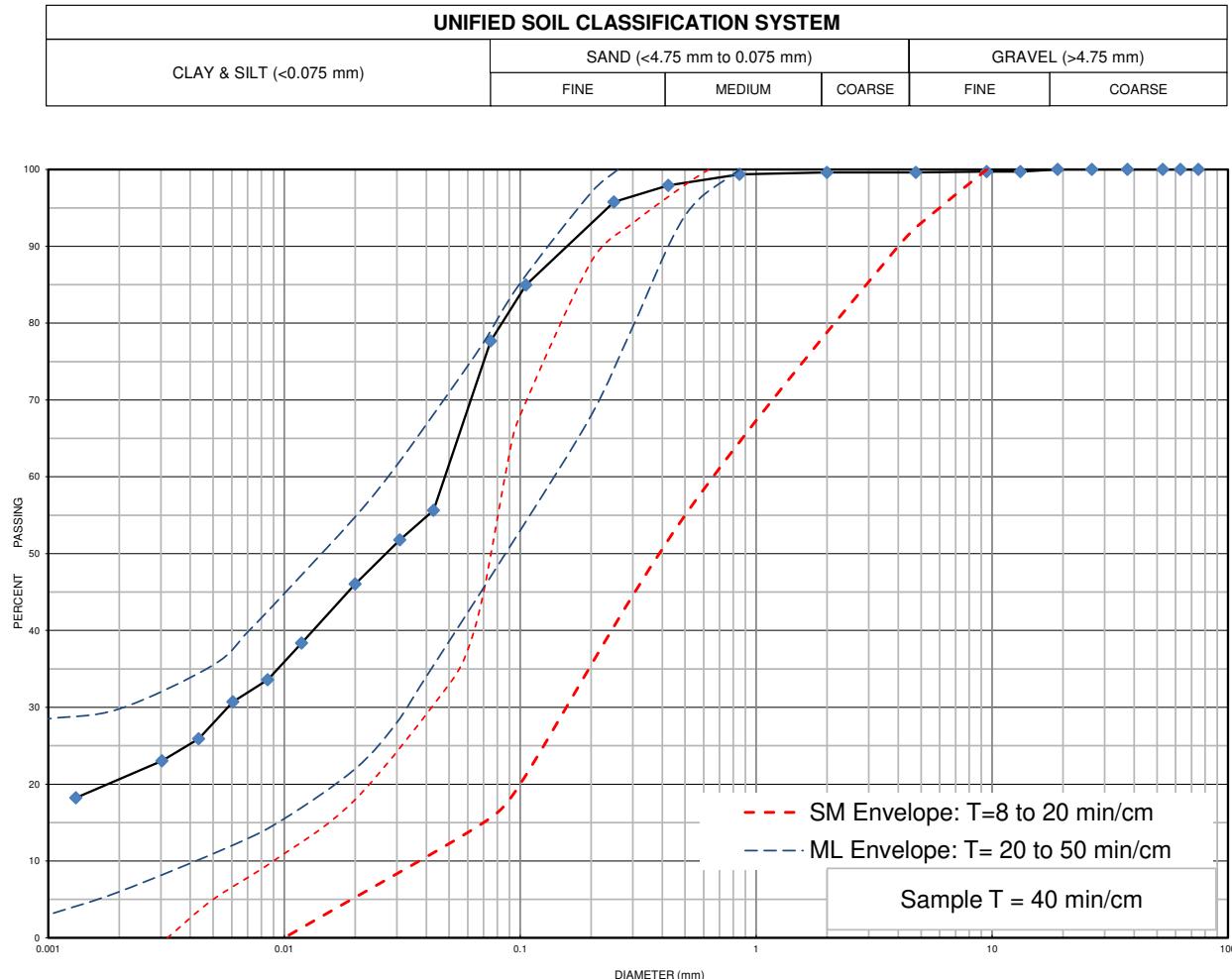
Grain Size Analysis Results



Grain Size Distribution Chart

CAMBIUM

Project Number: 17281-002 **Client:** Cassidy E.W. Construction Consultant Ltd.
Project Name: Hydrogeological Assessment - 1386 & 1394 Greely Lane, Ottawa
Sample Date: March 7-8, 2023 **Sampled By:** Farhan Imtiaz - Cambium Inc.
Location: BH 101-23 SS 3 **Depth:** 1.5 m to 2.1 m **Lab Sample No:** S-23-0475



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

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 101-23	SS 3	1.5 m to 2.1 m	0	22	57	21	18.8
Description	Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c	
Sandy Clayey Silt	ML	0.0480	0.0058	-	-	-	

Additional information available upon request

Issued By:
 (Senior Project Manager)

Date Issued: March 20, 2024

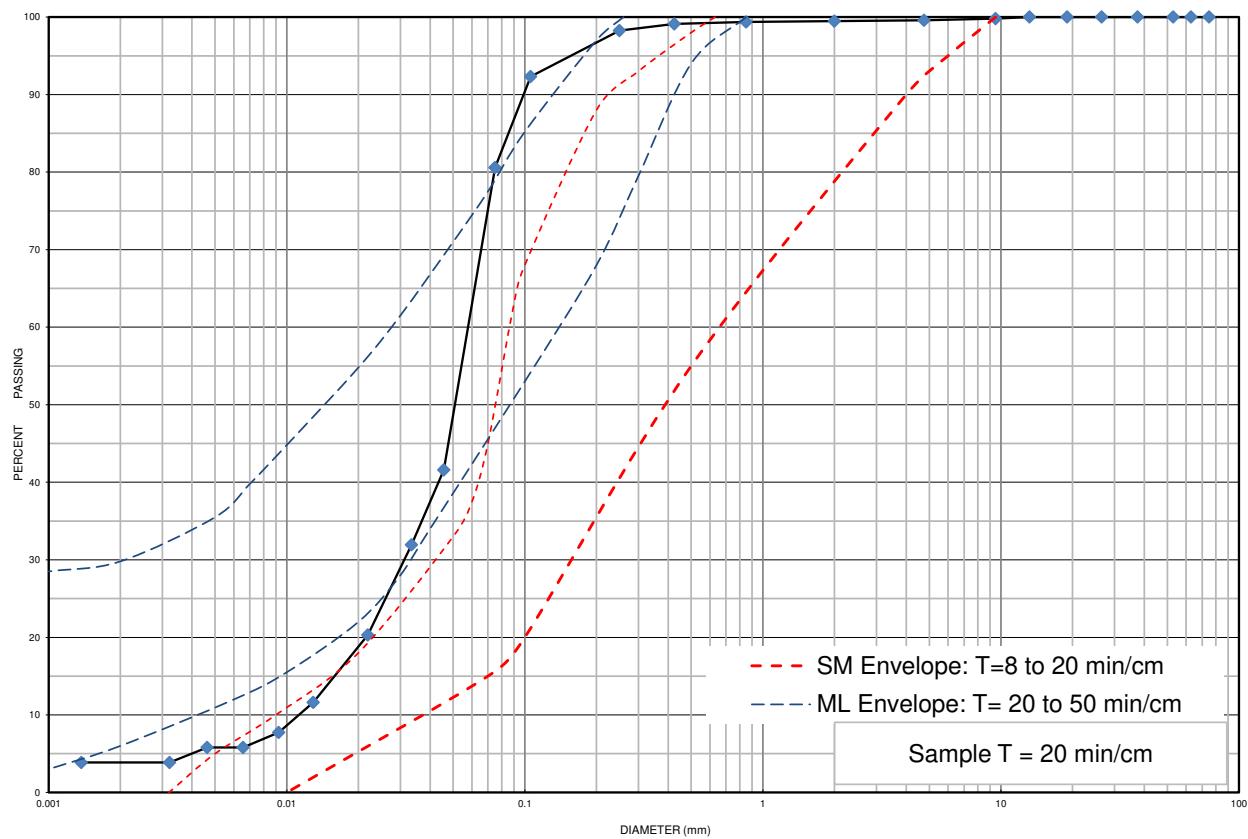


Grain Size Distribution Chart

CAMBIUM

Project Number: 17281-002 **Client:** Cassidy E.W. Construction Consultant Ltd.
Project Name: Hydrogeological Assessment - 1386 & 1394 Greely Lane, Ottawa
Sample Date: March 7-8, 2023 **Sampled By:** Farhan Imtiaz - Cambium Inc.
Location: BH 101-23 SS 6 **Depth:** 3.8 m to 4.4 m **Lab Sample No:** S-23-0476

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
		SAND	GRAVEL			BOULDERS	

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 101-23	SS 6	3.8 m to 4.4 m	0	19	77	4	13.3
Description	Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c	
Silt some Sand trace Clay	ML	0.057	0.032	0.012	4.75	1.50	

Additional information available upon request

Issued By: _____

(Senior Project Manager)

Date Issued: _____

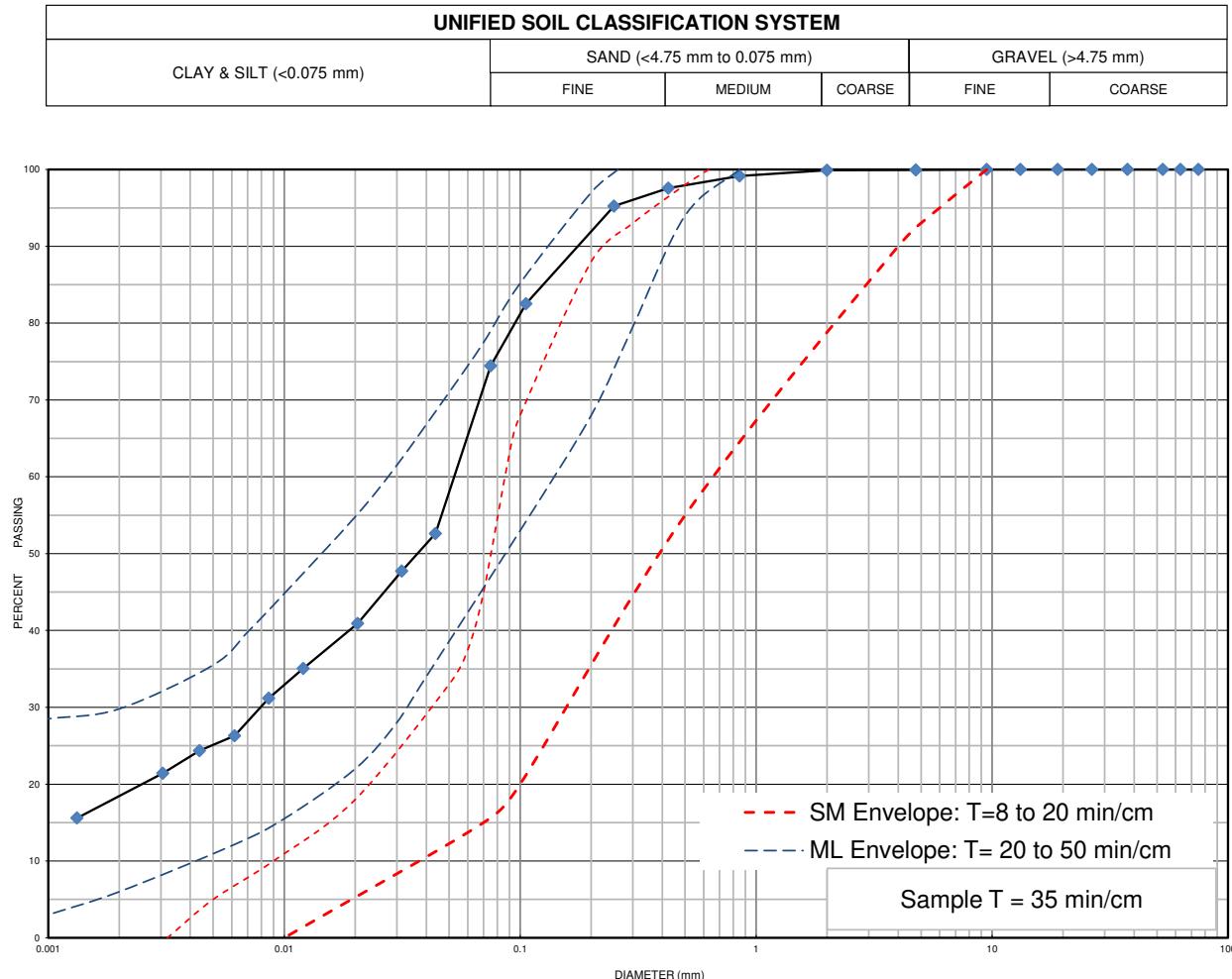
March 20, 2024



Grain Size Distribution Chart

CAMBIUM

Project Number: 17281-002 **Client:** Cassidy E.W. Construction Consultant Ltd.
Project Name: Hydrogeological Assessment - 1386 & 1394 Greely Lane, Ottawa
Sample Date: March 7-8, 2023 **Sampled By:** Farhan Imtiaz - Cambium Inc.
Location: BH 104-23 SS 4 **Depth:** 2.3 m to 2.9 m **Lab Sample No:** S-23-0477



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 104-23	SS 4	2.3 m to 2.9 m	0	25	57	18	18.0
Description	Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c	
Sandy Silt some Clay	ML	0.053	0.008	-	-	-	

Additional information available upon request

Issued By:
 (Senior Project Manager)

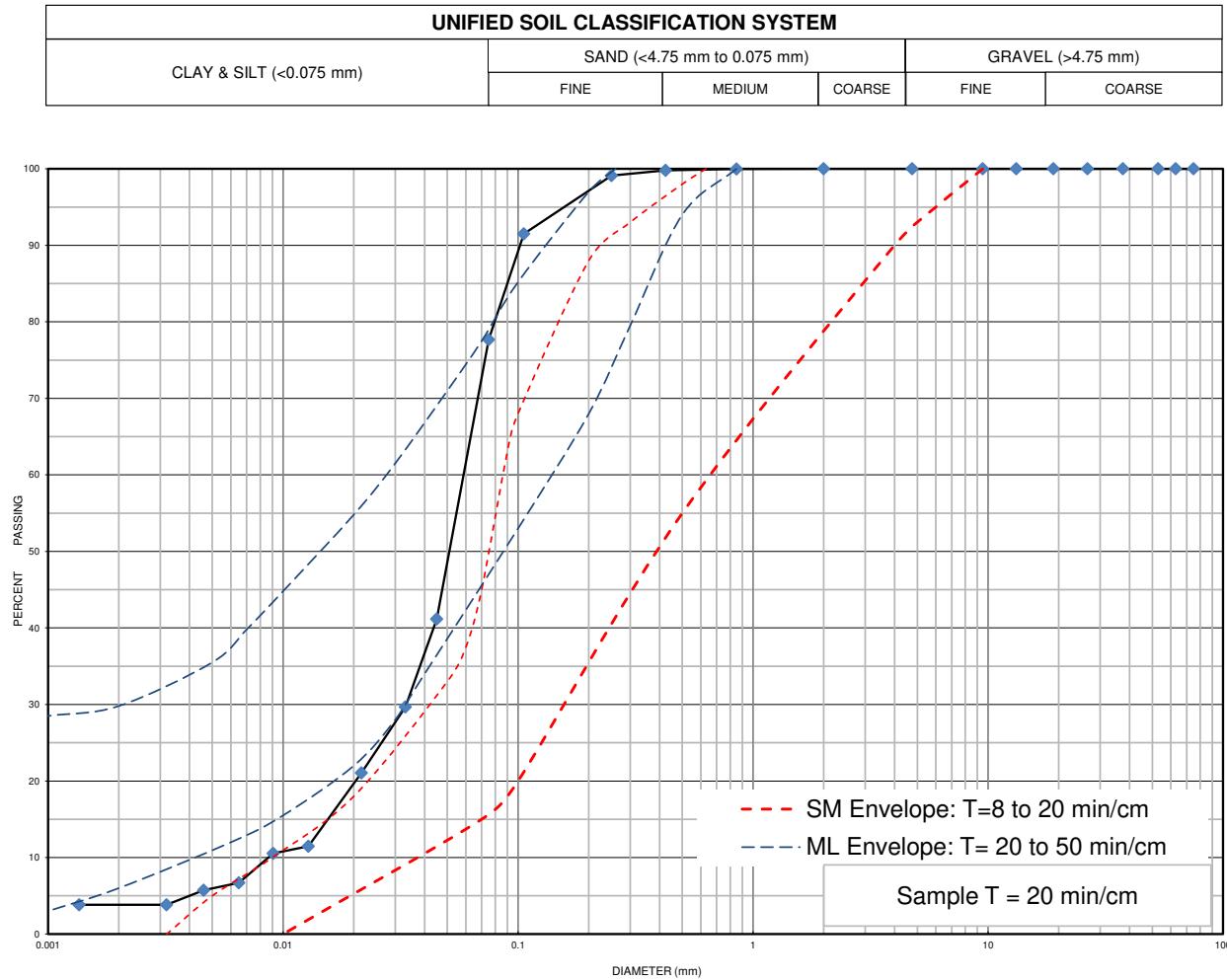
Date Issued: March 20, 2024



Grain Size Distribution Chart

CAMBIUM

Project Number: 17281-002 **Client:** Cassidy E.W. Construction Consultant Ltd.
Project Name: Hydrogeological Assessment - 1386 & 1394 Greely Lane, Ottawa
Sample Date: March 7-8, 2023 **Sampled By:** Farhan Imtiaz - Cambium Inc.
Location: BH 104-23 SS 6 **Depth:** 3.8 m to 4.4 m **Lab Sample No:** S-23-0478



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 104-23	SS 6	3.8 m to 4.4 m	0	22	74	4	14.3
Description	Classification	D ₆₀	D ₃₀	D ₁₀	C _u	C _c	
Sandy Silt trace Clay	ML	0.0590	0.0340	0.0087	6.78	2.25	

Additional information available upon request

Issued By:
 (Senior Project Manager)

Date Issued: March 20, 2024



Hydrogeological Assessment Report 1386 & 1394 Greely Lane, Ottawa, Ontario
Cassidy EW Construction Consultant Ltd.
Cambium Reference: 17281-002
July 25, 2025

Appendix D

Well Inventory Survey Results



Water Well Records Summary Report

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

All units in meters unless otherwise specified

Well ID: 1507224	Easting: 455211	UTM Zone 18		
Construction Date: 1965-09-22	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 20.7	Water Kind	FRESH	Pump Rate (LPM): 23
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 23
	Water First Found: 16.8	Primary Water Use:	Domestic	Pumping Duration (h:m): 0 : 30
	Static Level: 6			
	Layer: Driller's Description:	Top:	Bottom:	
	1 MEDIUM SAND	0	4.57	
	2 LIMESTONE	4.57	20.7	
Well ID: 1507232	Easting: 454801	UTM Zone 18		
Construction Date: 1964-07-06	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 20.4	Water Kind	FRESH	Pump Rate (LPM): 32
	Well Diameter (cm): 5.08	Final Status	Water Supply	Recommended Pump Rate: 23
	Water First Found: 20.4	Primary Water Use:	Domestic	Pumping Duration (h:m): 2 : 0
	Static Level: 2			
	Layer: Driller's Description:	Top:	Bottom:	
	1 MEDIUM SAND	0	5.49	
	2 BOULDERS	5.49	14.0	
	3 LIMESTONE	14.0	20.4	
Well ID: 1507234	Easting: 454851	UTM Zone 18		
Construction Date: 1964-07-06	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 20.7	Water Kind	FRESH	Pump Rate (LPM): 45
	Well Diameter (cm): 5.08	Final Status	Water Supply	Recommended Pump Rate: 23
	Water First Found: 20.7	Primary Water Use:	Domestic	Pumping Duration (h:m): 2 : 0
	Static Level: 1			
	Layer: Driller's Description:	Top:	Bottom:	
	1 MEDIUM SAND	0	5.49	
	2 BOULDERS	5.49	14.3	
	3 LIMESTONE	14.3	20.7	
Well ID: 1507313	Easting: 455541	UTM Zone 18		
Construction Date: 1966-12-06	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 18.3	Water Kind	FRESH	Pump Rate (LPM): 27
	Well Diameter (cm): 12.7	Final Status	Water Supply	Recommended Pump Rate: 23
	Water First Found: 15.2	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 6			
	Layer: Driller's Description:	Top:	Bottom:	
	1 GRAVEL	0	5.49	
	2 LIMESTONE	5.49	18.3	

Well ID: 1509840 **Easting:** 455391 **UTM Zone** 18
Construction Date: 1968-08-21 **Northing:** 5E+06 **Positional Accuracy:** margin of error : 100 m - 300 m

Well Depth: 12.8 **Water Kind** FRESH **Pump Rate (LPM):** 45
Well Diameter (cm): 10.2 **Final Status** Water Supply **Recommended Pump Rate:** 23
Water First Found: 12.8 **Primary Water Use:** Domestic **Pumping Duration (h:m):** 0 : 30
Static Level: 6

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.91
2	HARDPAN	0.91	3.96
3	LIMESTONE	3.96	12.8

Well ID: 1510585 **Easting:** 455331 **UTM Zone** 18
Construction Date: 1970-05-28 **Northing:** 5E+06 **Positional Accuracy:** margin of error : 100 m - 300 m

Well Depth: 32.9 **Water Kind** FRESH **Pump Rate (LPM):** 45
Well Diameter (cm): 15.2 **Final Status** Water Supply **Recommended Pump Rate:** 36
Water First Found: 32 **Primary Water Use:** Domestic **Pumping Duration (h:m):** 1 : 0
Static Level: 5

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	1.52
2	GRAVEL	1.52	5.18
3	LIMESTONE	5.18	32.9

Well ID: 1512221 **Easting:** 455604 **UTM Zone** 18
Construction Date: 1973-01-12 **Northing:** 5E+06 **Positional Accuracy:** margin of error : 300 m - 1 km

Well Depth: 14.6 **Water Kind** FRESH **Pump Rate (LPM):** 91
Well Diameter (cm): 15.2 **Final Status** Water Supply **Recommended Pump Rate:** 23
Water First Found: 14.0 **Primary Water Use:** Domestic **Pumping Duration (h:m):** 1 : 0
Static Level: 4

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	2.74
2	SAND	2.74	12.2
3	LIMESTONE	12.2	14.6

Well ID: 1513408 **Easting:** 455523 **UTM Zone** 18
Construction Date: 1973-09-10 **Northing:** 5E+06 **Positional Accuracy:** margin of error : 30 m - 100 m

Well Depth: 10.7 **Water Kind** FRESH **Pump Rate (LPM):** 36
Well Diameter (cm): 12.7 **Final Status** Water Supply **Recommended Pump Rate:** 23
Water First Found: 9.75 **Primary Water Use:** Domestic **Pumping Duration (h:m):** 1 : 57
Static Level: 6

Layer:	Driller's Description:	Top:	Bottom:
1	HARDPAN	0	7.62
2	LIMESTONE	7.62	10.7

Well ID: 1513421	Easting: 455556	UTM Zone 18		
Construction Date: 1973-09-26	Northing: 5E+06	Positional Accuracy: margin of error : 300 m - 1 km		
	Well Depth: 13.1	Water Kind	FRESH	Pump Rate (LPM): 68
	Well Diameter (cm): 12.7	Final Status	Water Supply	Recommended Pump Rate: 45
	Water First Found: 13.1	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 10
	Static Level: 5			
	Layer: Driller's Description:	Top:	Bottom:	
	1 HARDPAN	0	13.1	

Well ID: 1515384	Easting: 455451	UTM Zone 18		
Construction Date: 1976-06-19	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 38.1	Water Kind	Not stated	Pump Rate (LPM): 18
	Well Diameter (cm):	Final Status	Water Supply	Recommended Pump Rate: 18
	Water First Found: 12.8	Primary Water Use:	Domestic	Pumping Duration (h:m): 2 : 0
	Static Level: 6			
	Layer: Driller's Description:	Top:	Bottom:	
	1 SAND	0	5.79	
	1 SAND	0	5.79	
	1 SAND	0	5.79	
	1 SAND	0	5.79	
	2 LIMESTONE	5.79	38.1	
	2 LIMESTONE	5.79	38.1	
	2 LIMESTONE	5.79	38.1	
	2 LIMESTONE	5.79	38.1	

Well ID: 1515531	Easting: 455551	UTM Zone 18		
Construction Date: 1976-08-13	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 16.8	Water Kind	FRESH	Pump Rate (LPM): 91
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 68
	Water First Found: 16.1	Primary Water Use:	Municipal	Pumping Duration (h:m): 1 : 30
	Static Level: 6			
	Layer: Driller's Description:	Top:	Bottom:	
	1 GRAVEL	0	8.23	
	2 HARDPAN	8.23	15.2	
	3 SANDSTONE	15.2	15.5	
	4 UNKNOWN TYPE	15.5	16.8	

Well ID: 1517024	Easting: 455530	UTM Zone 18		
Construction Date: 1979-07-09	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 15.5	Water Kind	FRESH	Pump Rate (LPM): 91
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 55
	Water First Found: 14.6	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 30
	Static Level: 6			
	Layer: Driller's Description:	Top:	Bottom:	
	1 HARDPAN	0	4.88	
	2 SAND	4.88	13.7	
	3 GRAVEL	13.7	14.3	
	4 LIMESTONE	14.3	15.5	

Well ID: 1517148	Easting: 455430	UTM Zone 18		
Construction Date: 1979-10-05	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 16.8	Water Kind	FRESH	Pump Rate (LPM): 91
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 45
	Water First Found: 13.7	Primary Water Use:	Livestock	Pumping Duration (h:m): 1 : 30
	Static Level: 2			
	Layer: Driller's Description:	Top:	Bottom:	
	1 HARDPAN	0	11.6	
	2 SAND	11.6	13.7	
	3 LIMESTONE	13.7	16.8	

Well ID: 1517152	Easting: 455530	UTM Zone 18		
Construction Date: 1979-10-05	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 15.5	Water Kind	FRESH	Pump Rate (LPM): 114
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 68
	Water First Found: 14.9	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 30
	Static Level: 5			
	Layer: Driller's Description:	Top:	Bottom:	
	1 SAND	0	10.7	
	2 HARDPAN	10.7	12.2	
	3 LIMESTONE	12.2	15.5	

Well ID: 1517154	Easting: 455530	UTM Zone 18		
Construction Date: 1979-10-05	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 16.2	Water Kind	FRESH	Pump Rate (LPM): 82
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 45
	Water First Found: 14.9	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 30
	Static Level: 6			
	Layer: Driller's Description:	Top:	Bottom:	
	1 SAND	0	13.1	
	2 LIMESTONE	13.1	16.1	

Well ID: 1517156	Easting: 455530	UTM Zone 18		
Construction Date: 1979-10-05	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 15.2	Water Kind	FRESH	Pump Rate (LPM): 82
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 36
	Water First Found: 14.3	Primary Water Use:	Domestic	Pumping Duration (h:m): 2 : 20
	Static Level: 5			
	Layer: Driller's Description:	Top:	Bottom:	
	1 SAND	0	12.5	
	2 LIMESTONE	12.5	15.2	

Well ID: 1517638	Easting: 455630	UTM Zone 18		
Construction Date: 1981-09-08	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 12.5	Water Kind	FRESH	Pump Rate (LPM): 136
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 23
	Water First Found: 12.2	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 4			
	Layer: Driller's Description:	Top:	Bottom:	

1 CLAY 0 9.45

2 SHALE 9.45 12.5

Well ID: 1518000 **Easting:** 455630 **UTM Zone:** 18
Construction Date: 1982-11-29 **Northing:** 5E+06 **Positional Accuracy:** margin of error : 30 m - 100 m

Well Depth: 13.1 **Water Kind:** FRESH **Pump Rate (LPM):** 91
Well Diameter (cm): 15.2 **Final Status:** Water Supply **Recommended Pump Rate:** 45
Water First Found: 12.8 **Primary Water Use:** Domestic **Pumping Duration (h:m):** 1 : 0
Static Level: 5

Layer: Driller's Description: **Top:** **Bottom:**

1	TOPSOIL	0	1.83
2	QUICKSAND	1.83	12.2
3	SAND	12.2	12.5
4	LIMESTONE	12.5	13.1

Well ID: 1518291 **Easting:** 455630 **UTM Zone:** 18
Construction Date: 1983-06-20 **Northing:** 5E+06 **Positional Accuracy:** margin of error : 30 m - 100 m

Well Depth: 14.6 **Water Kind:** FRESH **Pump Rate (LPM):** 45
Well Diameter (cm): 15.2 **Final Status:** Water Supply **Recommended Pump Rate:** 23
Water First Found: 14.3 **Primary Water Use:** Public **Pumping Duration (h:m):** 1 : 0
Static Level: 4

Layer: Driller's Description: **Top:** **Bottom:**

1	SILT	0	3.66
2	TILL	3.66	11.9
3	STONES	11.9	14.6

Well ID: 1518419 **Easting:** 455430 **UTM Zone:** 18
Construction Date: 1983-08-24 **Northing:** 5E+06 **Positional Accuracy:** margin of error : 30 m - 100 m

Well Depth: 19.8 **Water Kind:** FRESH **Pump Rate (LPM):** 136
Well Diameter (cm): 15.2 **Final Status:** Water Supply **Recommended Pump Rate:** 23
Water First Found: 19.2 **Primary Water Use:** Domestic **Pumping Duration (h:m):** 1 : 0
Static Level: 2

Layer: Driller's Description: **Top:** **Bottom:**

1	SAND	0	3.35
2	SAND	3.35	9.14
3	HARDPAN	9.14	17.1
4	LIMESTONE	17.1	19.8

Well ID: 1518420 **Easting:** 455430 **UTM Zone:** 18
Construction Date: 1983-08-24 **Northing:** 5E+06 **Positional Accuracy:** margin of error : 30 m - 100 m

Well Depth: 19.8 **Water Kind:** FRESH **Pump Rate (LPM):** 68
Well Diameter (cm): 15.2 **Final Status:** Water Supply **Recommended Pump Rate:** 23
Water First Found: 19.2 **Primary Water Use:** Domestic **Pumping Duration (h:m):** 1 : 0
Static Level: 2

Layer: Driller's Description: **Top:** **Bottom:**

1	SAND	0	1.22
2	SAND	1.22	6.1
3	HARDPAN	6.1	15.2
4	SAND	15.2	16.8

Well ID: 1518698	Easting: 455530	UTM Zone 18		
Construction Date: 1983-11-24	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 22.9	Water Kind	FRESH	Pump Rate (LPM): 45
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 23
	Water First Found: 20.4	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 4			

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	2.44
2	SAND	2.44	11.6
3	SAND	11.6	14.6
4	HARDPAN	14.6	18.3
5	LIMESTONE	18.3	22.9

Well ID: 1520434	Easting: 455527	UTM Zone 18		
Construction Date: 1986-02-20	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 19.5	Water Kind	FRESH	Pump Rate (LPM): 68
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 68
	Water First Found: 15.9	Primary Water Use:	Domestic	Pumping Duration (h:m): 0 : 30
	Static Level: 5			

Layer:	Driller's Description:	Top:	Bottom:
1	GRAVEL	0	1.83
1	GRAVEL	0	1.83
2	CLAY	1.83	7.32
2	CLAY	1.83	7.32
3	CLAY	7.32	13.4
3	CLAY	7.32	13.4
4	LIMESTONE	13.4	19.5
4	LIMESTONE	13.4	19.5

Well ID: 1522346	Easting: 455172	UTM Zone 18		
Construction Date: 1988-06-21	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 38.4	Water Kind	FRESH	Pump Rate (LPM): 91
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 91
	Water First Found: 29	Primary Water Use:	Industrial	Pumping Duration (h:m): 1 : 30
	Static Level: 3			

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	2.44
2	SAND	2.44	17.1
3	LIMESTONE	17.1	38.4

Well ID: 1522347	Easting: 455239	UTM Zone 18		
Construction Date: 1988-06-21	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 18.9	Water Kind	FRESH	Pump Rate (LPM): 182
	Well Diameter (cm): 15.2	Final Status	Recharge Well	Recommended Pump Rate: 2E+
	Water First Found: 18.3	Primary Water Use:	Cooling And A	Pumping Duration (h:m): 0 : 45
	Static Level: 3			

Layer:	Driller's Description:	Top:	Bottom:

1	SAND	0	2.74
2	SAND	2.74	17.4
3	LIMESTONE	17.4	18.9

Well ID: 1522348	Easting: 455254	UTM Zone 18			
Construction Date: 1988-06-21	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m			
	Well Depth: 18.9	Water Kind	FRESH	Pump Rate (LPM):	182
	Well Diameter (cm): 15.2	Final Status	Recharge Well	Recommended Pump Rate:	2E+
	Water First Found: 18.3	Primary Water Use:	Cooling And A	Pumping Duration (h:m):	1 : 0
	Static Level: 3				
	Layer: Driller's Description:	Top:	Bottom:		
	1 SAND	0	2.74		
	2 SAND	2.74	17.4		
	3 LIMESTONE	17.4	18.9		

Well ID: 1522551	Easting: 455474	UTM Zone 18			
Construction Date: 1988-08-18	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m			
	Well Depth: 19.8	Water Kind	FRESH	Pump Rate (LPM):	91
	Well Diameter (cm): 15.2	Final Status	Recharge Well	Recommended Pump Rate:	45
	Water First Found: 15.9	Primary Water Use:	Cooling And A	Pumping Duration (h:m):	0 : 45
	Static Level: 3				
	Layer: Driller's Description:	Top:	Bottom:		
	1 SAND	0	2.74		
	1 SAND	0	2.74		
	2 TILL	2.74	10.7		
	2 TILL	2.74	10.7		
	3 GRAVEL	10.7	14.6		
	3 GRAVEL	10.7	14.6		
	4 LIMESTONE	14.6	19.8		
	4 LIMESTONE	14.6	19.8		

Well ID: 1522552	Easting: 455484	UTM Zone 18			
Construction Date: 1988-08-18	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m			
	Well Depth: 19.8	Water Kind	FRESH	Pump Rate (LPM):	91
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate:	45
	Water First Found: 17.1	Primary Water Use:	Domestic	Pumping Duration (h:m):	0 : 45
	Static Level: 2				
	Layer: Driller's Description:	Top:	Bottom:		
	1 SAND	0	2.44		
	1 SAND	0	2.44		
	2 TILL	2.44	9.75		
	2 TILL	2.44	9.75		
	3 GRAVEL	9.75	14.6		
	3 GRAVEL	9.75	14.6		
	4 LIMESTONE	14.6	19.8		
	4 LIMESTONE	14.6	19.8		

Well ID: 1529728	Easting: 455273	UTM Zone 18		
Construction Date: 1997-12-22	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 23.2	Water Kind	Not stated	Pump Rate (LPM): 227
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 23
	Water First Found: 17.1	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 2			
	Layer: Driller's Description:	Top:	Bottom:	
	1 TOPSOIL	0	1.22	
	2 CLAY	1.22	2.74	
	3 CLAY	2.74	10.4	
	4 SAND	10.4	15.5	
	5 LIMESTONE	15.5	18.9	
	6 LIMESTONE	18.9	23.2	

Well ID: 1532070	Easting: 455043	UTM Zone 18		
Construction Date: 2001-07-17	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m		
	Well Depth: 18.3	Water Kind	Not stated	Pump Rate (LPM): 45
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 45
	Water First Found: 16.8	Primary Water Use:	Commerical	Pumping Duration (h:m): 1 : 0
	Static Level: 4			
	Layer: Driller's Description:	Top:	Bottom:	
	1 SAND	0	1.52	
	1 SAND	0	1.52	
	2 CLAY	1.52	11.9	
	2 CLAY	1.52	11.9	
	3 COARSE GRAVEL	11.9	18.3	
	3 COARSE GRAVEL	11.9	18.3	

Well ID: 1533428	Easting: 455042	UTM Zone 18		
Construction Date: 2002-12-17	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 68	Water Kind	Not stated	Pump Rate (LPM): 45
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 23
	Water First Found: 65.8	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 11			
	Layer: Driller's Description:	Top:	Bottom:	
	1 TOPSOIL	0	1.22	
	1 TOPSOIL	0	1.22	
	2 SAND	1.22	3.66	
	2 SAND	1.22	3.66	
	3 CLAY	3.66	9.14	
	3 CLAY	3.66	9.14	
	4 SAND	9.14	17.7	
	4 SAND	9.14	17.7	
	5 LIMESTONE	17.7	48.8	
	5 LIMESTONE	17.7	48.8	
	6 SANDSTONE	48.8	68	

Well ID: 1533469	Easting: 455311	UTM Zone 18		
Construction Date: 2002-12-23	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 102	Water Kind	Not stated	Pump Rate (LPM): 41
	Well Diameter (cm): 20.3	Final Status	Water Supply	Recommended Pump Rate: 41
	Water First Found: 101	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 15			
	Layer: Driller's Description:	Top:	Bottom:	
	1 SAND	0	18.9	
	1 SAND	0	18.9	
	2 LIMESTONE	18.9	57.3	
	2 LIMESTONE	18.9	57.3	
	3 LIMESTONE	57.3	69.2	
	3 LIMESTONE	57.3	69.2	
	4 SANDSTONE	69.2	102	
	4 SANDSTONE	69.2	102	

Well ID: 1534585	Easting: 455214	UTM Zone 18		
Construction Date: 2004-03-31	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m		
	Well Depth: 41.8	Water Kind	Not stated	Pump Rate (LPM): 84
	Well Diameter (cm):	Final Status	Test Hole	Recommended Pump Rate: 36
	Water First Found: 41.1	Primary Water Use:	Not Used	Pumping Duration (h:m): 6 : 0
	Static Level: 3			
	Layer: Driller's Description:	Top:	Bottom:	
	1 CLAY	0	10.1	
	1 CLAY	0	10.1	
	2 SANDSTONE	10.1	15.2	
	2 SANDSTONE	10.1	15.2	
	3 LIMESTONE	15.2	41.8	
	3 LIMESTONE	15.2	41.8	

Well ID: 1536286	Easting: 454797	UTM Zone 18		
Construction Date: 2006-04-12	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m		
	Well Depth: 45.7	Water Kind		Pump Rate (LPM): 91
	Well Diameter (cm):	Final Status	Water Supply	Recommended Pump Rate: 91
	Water First Found: 43.2	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 :
	Static Level: 10			
	Layer: Driller's Description:	Top:	Bottom:	
	1 SAND	0	12.2	
	1 SAND	0	12.2	
	2 LIMESTONE	12.2	45.7	
	2 LIMESTONE	12.2	45.7	

Well ID: 1536661	Easting: 454807	UTM Zone 18	
Construction Date: 2006-09-07	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m	
	Well Depth: 25	Water Kind	Pump Rate (LPM): 91
	Well Diameter (cm):	Final Status	Recommended Pump Rate: 91
	Water First Found: 16.8	Water Supply	Pumping Duration (h:m): 1 : 0
	Static Level: 3	Primary Water Use: Domestic	
	Layer:	Driller's Description:	Top:
	1	SAND	0
	2	CLAY	5.18
	2	CLAY	5.18
	2	CLAY	5.18
	3	LIMESTONE	11

Well ID: 1536715	Easting: 454725	UTM Zone 18	
Construction Date: 2006-10-11	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m	
	Well Depth: 56.7	Water Kind	Pump Rate (LPM): 91
	Well Diameter (cm):	Final Status	Recommended Pump Rate: 91
	Water First Found: 54.3	Water Supply	Pumping Duration (h:m): 1 : 0
	Static Level: 10	Primary Water Use: Domestic	
	Layer:	Driller's Description:	Top:
	1	CLAY	0
	1	CLAY	0
	2	SAND	2.74
	2	SAND	2.74
	3	LIMESTONE	13.1
	3	LIMESTONE	13.1
	4	SANDSTONE	46.0

Well ID: 7040754	Easting: 454738	UTM Zone 18	
Construction Date: 2007-02-12	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m	
	Well Depth: 48.8	Water Kind	Pump Rate (LPM): 91
	Well Diameter (cm):	Final Status	Recommended Pump Rate: 91
	Water First Found: 19.8	Water Supply	Pumping Duration (h:m): 1 : 0
	Static Level: 10	Primary Water Use: Domestic	
	Layer:	Driller's Description:	Top:
	1	SAND	0
	1	SAND	0
	1	SAND	0

1	SAND	0	12.5
2	LIMESTONE	12.5	45.7
2	LIMESTONE	12.5	45.7
2	LIMESTONE	12.5	45.7
2	LIMESTONE	12.5	45.7
3	SANDSTONE	45.7	48.8
3	SANDSTONE	45.7	48.8
3	SANDSTONE	45.7	48.8
3	SANDSTONE	45.7	48.8

Well ID: 7048698	Easting: 454767	UTM Zone 18	
Construction Date: 2007-08-29	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m	
Well Depth: 48.8	Water Kind	Pump Rate (LPM): 91	
Well Diameter (cm):	Final Status	Recommended Pump Rate: 91	
Water First Found: 45.7	Primary Water Use: Water Supply	Pumping Duration (h:m): 1 : 0	
Static Level: 9	Domestic		
Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	12.2
1	SAND	0	12.2
1	SAND	0	12.2
1	SAND	0	12.2
2	LIMESTONE	12.2	43
2	LIMESTONE	12.2	43
2	LIMESTONE	12.2	43
2	LIMESTONE	12.2	43
3	SANDSTONE	43	48.8
3	SANDSTONE	43	48.8
3	SANDSTONE	43	48.8
3	SANDSTONE	43	48.8

Well ID: 7104239	Easting: 455341	UTM Zone 18	
Construction Date: 2008-04-28	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m	
Well Depth: 18.9	Water Kind	Pump Rate (LPM):	
Well Diameter (cm):	Final Status	Recommended Pump Rate:	
Water First Found:	Primary Water Use:	Pumping Duration (h:m):	
Static Level:	Abandoned-Ot		
Layer:	Driller's Description:	Top:	Bottom:
1		0	18.9

Well ID: 7120715	Easting: 455600	UTM Zone 18	
Construction Date: 2009-03-19	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m	
Well Depth: 50	Water Kind	Pump Rate (LPM): 82	
Well Diameter (cm):	Final Status	Recommended Pump Rate: 46	
Water First Found:	Primary Water Use:	Pumping Duration (h:m): 1 :	
Static Level: 4			
Layer:	Driller's Description:	Top:	Bottom:
1		0	50

Well ID: 7130148	Easting: 455051	UTM Zone 18	
Construction Date: 2009-09-22	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m	
	Well Depth: 4.88	Water Kind	Pump Rate (LPM):
	Well Diameter (cm): 5.2	Final Status	Recommended Pump Rate:
	Water First Found:	Primary Water Use: Monitoring an	Pumping Duration (h:m):
	Static Level:		
		Layer: Driller's Description: Top: Bottom:	
	1	GRAVEL 0 0.61	
	1	GRAVEL 0 0.61	
	1	GRAVEL 0 0.61	
	1	GRAVEL 0 0.61	
	2	SAND 0.61 1.5	
	2	SAND 0.61 1.5	
	2	SAND 0.61 1.5	
	3	CLAY 1.5 2.74	
	3	CLAY 1.5 2.74	
	3	CLAY 1.5 2.74	
	3	CLAY 1.5 2.74	
	4	SILT 2.74 4.88	
	4	SILT 2.74 4.88	
	4	SILT 2.74 4.88	
	4	SILT 2.74 4.88	

Well ID: 7156846	Easting: 454720	UTM Zone 18	
Construction Date: 2010-12-29	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m	
	Well Depth: 36.6	Water Kind	Pump Rate (LPM): 91
	Well Diameter (cm): 15.2	Final Status	Recommended Pump Rate: 91
	Water First Found: 19.8	Primary Water Use: Water Supply	Pumping Duration (h:m): 1 :
	Static Level: 1	Domestic	
		Layer: Driller's Description: Top: Bottom:	
	1	SAND 0 8.53	
	1	SAND 0 8.53	
	1	SAND 0 8.53	
	2	SAND 8.53 16.5	
	2	SAND 8.53 16.5	
	2	SAND 8.53 16.5	
	3	LIMESTONE 16.5 36.6	
	3	LIMESTONE 16.5 36.6	
	3	LIMESTONE 16.5 36.6	

Well ID: 7157870	Easting: 455093	UTM Zone 18
Construction Date: 2011-01-17	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m
	Well Depth: 54.9	Water Kind
	Well Diameter (cm): 15.2	Final Status
	Water First Found: 53.0	Primary Water Use: Untested
	Static Level: 3	Water Supply
		Pump Rate (LPM): 91
		Recommended Pump Rate: 91
		Pumping Duration (h:m): 1 : 0
	Layer: Driller's Description:	Top: Bottom:
	1 SAND	0 17.1
	2 LIMESTONE	17.1 54.9

Well ID: 7159015	Easting: 455214	UTM Zone 18
Construction Date: 2011-02-10	Northing: 5E+06	Positional Accuracy: margin of error : 10 - 30 m
	Well Depth:	Water Kind
	Well Diameter (cm):	Final Status
	Water First Found:	Abandoned-Ot
	Static Level:	Primary Water Use:
		Pump Rate (LPM):
		Recommended Pump Rate:
		Pumping Duration (h:m):
	Layer: Driller's Description:	Top: Bottom:

Well ID: 7183294	Easting: 455487	UTM Zone 18
Construction Date: 2012-06-29	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m
	Well Depth: 32	Water Kind
	Well Diameter (cm): 15.2	Final Status
	Water First Found: 30.2	Water Supply
	Static Level: 4	Primary Water Use: Untested
		Pump Rate (LPM): 91
		Recommended Pump Rate: 91
		Pumping Duration (h:m): 1 :
	Layer: Driller's Description:	Top: Bottom:
	1 CLAY	0 1.83
	2 SAND	1.83 12.8
	3 LIMESTONE	12.8 30.2
	4 LIMESTONE	30.2 32

Well ID: 7183299	Easting: 454693	UTM Zone 18
Construction Date: 2012-06-29	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m
	Well Depth: 61.3	Water Kind
	Well Diameter (cm): 15.1	Final Status
	Water First Found: 56.4	Primary Water Use: Domestic
	Static Level: 5	Pump Rate (LPM): 55
		Recommended Pump Rate: 55
		Pumping Duration (h:m): 1 :
	Layer: Driller's Description:	Top: Bottom:
	1 SAND	0 1.52
	2 CLAY	1.52 6.40
	2 CLAY	1.52 6.40
	2 CLAY	1.52 6.40
	3 SAND	6.40 18.3
	4 LIMESTONE	18.3 34.8
	5 SANDSTONE	34.8 54.6
	6 SANDSTONE	54.6 56.4
	7 SANDSTONE	56.4 61.3

Well ID: 7187406	Easting: 455459	UTM Zone 18
Construction Date: 2012-09-20	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m
	Well Depth: 29.9	Water Kind
	Well Diameter (cm): 15.9	Final Status
	Water First Found: 18.3	Primary Water Use: Domestic
	Static Level: 4	Pump Rate (LPM): 82
		Recommended Pump Rate: 46
		Pumping Duration (h:m): 1 :
	Layer: Driller's Description:	Top: Bottom:
	1 TOPSOIL	0 2.74

1	TOPSOIL	0	2.74
2	CLAY	2.74	4.87
2	CLAY	2.74	4.87
3	SAND	4.87	9.14
3	SAND	4.87	9.14
4	GRAVEL	9.14	11.3
4	GRAVEL	9.14	11.3
5	LIMESTONE	11.3	29.9
5	LIMESTONE	11.3	29.9

Well ID: 7187693	Easting: 455312	UTM Zone 18	
Construction Date: 2012-09-22	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m	
	Well Depth: 27.4	Water Kind	Pump Rate (LPM): 91
	Well Diameter (cm): 15.9	Final Status	Recommended Pump Rate: 91
	Water First Found: 24.7	Primary Water Use: Domestic	Pumping Duration (h:m): 1 :
	Static Level: 3		
	Layer: Driller's Description:	Top:	Bottom:
	1 SAND	0	11.6
	1 SAND	0	11.6
	2 LIMESTONE	11.6	24.7
	2 LIMESTONE	11.6	24.7
	3 LIMESTONE	24.7	27.4
	3 LIMESTONE	24.7	27.4

Well ID: 7194027	Easting: 455351	UTM Zone 18	
Construction Date: 2012-12-21	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m	
	Well Depth: 61	Water Kind	Pump Rate (LPM): 91
	Well Diameter (cm): 15.4	Final Status	Recommended Pump Rate: 91
	Water First Found: 33.2	Primary Water Use: Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 9		
	Layer: Driller's Description:	Top:	Bottom:
	1 SAND	0	15.2
	1 SAND	0	15.2
	1 SAND	0	15.2
	1 SAND	0	15.2
	2 LIMESTONE	15.2	33.2
	2 LIMESTONE	15.2	33.2
	2 LIMESTONE	15.2	33.2
	3 LIMESTONE	33.2	52.4
	3 LIMESTONE	33.2	52.4
	3 LIMESTONE	33.2	52.4
	4 SANDSTONE	52.4	58.5
	4 SANDSTONE	52.4	58.5

4	SANDSTONE	52.4	58.5
4	SANDSTONE	52.4	58.5
5	SANDSTONE	58.5	61
5	SANDSTONE	58.5	61
5	SANDSTONE	58.5	61
5	SANDSTONE	58.5	61

Well ID: 7197490	Easting: 454766	UTM Zone 18	
Construction Date: 2013-02-19	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m	
Well Depth: 42.7	Water Kind	Untested	Pump Rate (LPM): 91
Well Diameter (cm): 14.9	Final Status	Water Supply	Recommended Pump Rate: 91
Water First Found: 36.3	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
Static Level: 3			
Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	17.4
1	SAND	0	17.4
1	SAND	0	17.4
1	SAND	0	17.4
2	LIMESTONE	17.4	36.3
2	LIMESTONE	17.4	36.3
2	LIMESTONE	17.4	36.3
3	LIMESTONE	36.3	37.5
3	LIMESTONE	36.3	37.5
3	LIMESTONE	36.3	37.5
3	LIMESTONE	36.3	37.5
4	LIMESTONE	37.5	42.7
4	LIMESTONE	37.5	42.7
4	LIMESTONE	37.5	42.7
4	LIMESTONE	37.5	42.7

Well ID: 7200356	Easting: 454958	UTM Zone 18	
Construction Date: 2013-04-15	Northing: 5E+06	Positional Accuracy: margin of error : 100 m - 300 m	
Well Depth: 61	Water Kind	Untested	Pump Rate (LPM): 91
Well Diameter (cm): 14.9	Final Status	Water Supply	Recommended Pump Rate: 91
Water First Found: 46.9	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
Static Level: 5			
Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	13.7
1	SAND	0	13.7
1	SAND	0	13.7
1	SAND	0	13.7
2	LIMESTONE	13.7	42.1
2	LIMESTONE	13.7	42.1
2	LIMESTONE	13.7	42.1

2	LIMESTONE	13.7	42.1
3	SANDSTONE	42.1	46.9
3	SANDSTONE	42.1	46.9
3	SANDSTONE	42.1	46.9
3	SANDSTONE	42.1	46.9
4	SANDSTONE	46.9	55.5
4	SANDSTONE	46.9	55.5
4	SANDSTONE	46.9	55.5
4	SANDSTONE	46.9	55.5
5	SANDSTONE	55.5	61
5	SANDSTONE	55.5	61
5	SANDSTONE	55.5	61
5	SANDSTONE	55.5	61

Well ID: 7204662
Construction Date: 2013-07-16

Easting: 455133

UTM Zone 18

Northing: 5E+06

Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 91.4

Water Kind

Untested

Pump Rate (LPM):

55

Well Diameter (cm): 15.6

Final Status

Water Supply

Recommended Pump Rate: 55

Water First Found: 89

Primary Water Use:

Domestic

Pumping Duration (h:m): 1 : 0

Static Level: 10

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	3.35
1	SAND	0	3.35
2	SAND	3.35	10.4
2	SAND	3.35	10.4
3	SAND	10.4	18.3
3	SAND	10.4	18.3
4	LIMESTONE	18.3	38.1
4	LIMESTONE	18.3	38.1
5	SANDSTONE	38.1	41.5
5	SANDSTONE	38.1	41.5
6	LIMESTONE	41.5	49.1
6	LIMESTONE	41.5	49.1
7	SANDSTONE	49.1	89
7	SANDSTONE	49.1	89
8	SANDSTONE	89	91.4
8	SANDSTONE	89	91.4

Well ID: 7204663
Construction Date: 2013-07-16

Easting: 454826

UTM Zone 18

Northing: 5E+06

Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 61

Water Kind

Untested

Pump Rate (LPM):

55

Well Diameter (cm): 15.6

Final Status

Water Supply

Recommended Pump Rate: 55

Water First Found: 48.2

Primary Water Use:

Domestic

Pumping Duration (h:m): 1 : 0

Static Level: 10

Layer: Driller's Description: Top: Bottom:

1	SAND	0	4.27
1	SAND	0	4.27
1	SAND	0	4.27
1	SAND	0	4.27
2	SILT	4.27	11.6
2	SILT	4.27	11.6
2	SILT	4.27	11.6
2	SILT	4.27	11.6
3	SAND	11.6	14.3
3	SAND	11.6	14.3
3	SAND	11.6	14.3
3	SAND	11.6	14.3
4	LIMESTONE	14.3	40.2
4	LIMESTONE	14.3	40.2
4	LIMESTONE	14.3	40.2
4	LIMESTONE	14.3	40.2
5	LIMESTONE	40.2	48.2
5	LIMESTONE	40.2	48.2
5	LIMESTONE	40.2	48.2
5	LIMESTONE	40.2	48.2
6	LIMESTONE	48.2	57.6
6	LIMESTONE	48.2	57.6
6	LIMESTONE	48.2	57.6
6	LIMESTONE	48.2	57.6
7	LIMESTONE	57.6	61
7	LIMESTONE	57.6	61
7	LIMESTONE	57.6	61
7	LIMESTONE	57.6	61

Well ID: 7209271
Construction Date: 2013-10-10

Easting: 454896

UTM Zone 18

Northing: 5E+06

Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:

54.9

Water Kind

Untested

Pump Rate (LPM):

91

Well Diameter (cm):

15.6

Final Status

Water Supply

Recommended Pump Rate: 91

Water First Found:

21.0

Primary Water Use:

Domestic

Pumping Duration (h:m): 1 : 0

Static Level:

4

Layer: Driller's Description: **Top:** **Bottom:**

1	SAND	0	6.1
1	SAND	0	6.1
1	SAND	0	6.1
1	SAND	0	6.1
1	SAND	0	6.1
1	SAND	0	6.1
2	SAND	6.1	14.6

1	SAND	0	4.27
1	SAND	0	4.27
1	SAND	0	4.27
1	SAND	0	4.27
2	SILT	4.27	11.6
2	SILT	4.27	11.6
2	SILT	4.27	11.6
2	SILT	4.27	11.6
3	SAND	11.6	14.3
3	SAND	11.6	14.3
3	SAND	11.6	14.3
3	SAND	11.6	14.3
4	LIMESTONE	14.3	40.2
4	LIMESTONE	14.3	40.2
4	LIMESTONE	14.3	40.2
4	LIMESTONE	14.3	40.2
5	LIMESTONE	40.2	48.2
5	LIMESTONE	40.2	48.2
5	LIMESTONE	40.2	48.2
5	LIMESTONE	40.2	48.2
6	LIMESTONE	48.2	57.6
6	LIMESTONE	48.2	57.6
6	LIMESTONE	48.2	57.6
6	LIMESTONE	48.2	57.6
7	LIMESTONE	57.6	61
7	LIMESTONE	57.6	61
7	LIMESTONE	57.6	61
7	LIMESTONE	57.6	61

Well ID: 7209271
Construction Date: 2013-10-10

Easting: 454896

UTM Zone 18

Northing: 5E+06

Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:

54.9

Water Kind

Untested

Pump Rate (LPM):

91

Well Diameter (cm):

15.6

Final Status

Water Supply

Recommended Pump Rate: 91

Water First Found:

21.0

Primary Water Use:

Domestic

Pumping Duration (h:m): 1 : 0

Static Level:

4

Layer: Driller's Description:

Top:

Bottom:

1	SAND	0	6.1
1	SAND	0	6.1
1	SAND	0	6.1
1	SAND	0	6.1
1	SAND	0	6.1
1	SAND	0	6.1
2	SAND	6.1	14.6

2	SAND	6.1	14.6
2	SAND	6.1	14.6
2	SAND	6.1	14.6
2	SAND	6.1	14.6
2	SAND	6.1	14.6
3	LIMESTONE	14.6	21.0
3	LIMESTONE	14.6	21.0
3	LIMESTONE	14.6	21.0
3	LIMESTONE	14.6	21.0
3	LIMESTONE	14.6	21.0
3	LIMESTONE	14.6	21.0
4	LIMESTONE	21.0	42.4
4	LIMESTONE	21.0	42.4
4	LIMESTONE	21.0	42.4
4	LIMESTONE	21.0	42.4
4	LIMESTONE	21.0	42.4
5	SANDSTONE	42.4	44.8
5	SANDSTONE	42.4	44.8
5	SANDSTONE	42.4	44.8
5	SANDSTONE	42.4	44.8
5	SANDSTONE	42.4	44.8
6	SANDSTONE	44.8	51.8
6	SANDSTONE	44.8	51.8
6	SANDSTONE	44.8	51.8
6	SANDSTONE	44.8	51.8
6	SANDSTONE	44.8	51.8
7	SANDSTONE	51.8	54.9
7	SANDSTONE	51.8	54.9
7	SANDSTONE	51.8	54.9
7	SANDSTONE	51.8	54.9
7	SANDSTONE	51.8	54.9

Well ID: 7217217
Construction Date: 2014-03-03

Easting: 455459
Northing: 5E+06
UTM Zone 18
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:	32.3	Water Kind	Untested	Pump Rate (LPM):	91
Well Diameter (cm):	15.2	Final Status	Water Supply	Recommended Pump Rate:	91
Water First Found:	30.2	Primary Water Use:	Domestic	Pumping Duration (h:m):	1 :
Static Level:	6				

Layer: Driller's Description: Top: Bottom:

1	SAND	0	14.3
1	SAND	0	14.3
2	LIMESTONE	14.3	30.2
2	LIMESTONE	14.3	30.2
3	LIMESTONE	30.2	32.3
3	LIMESTONE	30.2	32.3

Well ID:	7228009	Easting:	455435	UTM Zone	18
Construction Date:	2014-09-22	Northing:	5E+06	Positional Accuracy:	margin of error : 30 m - 100 m
Well Depth:	61	Water Kind	Untested	Pump Rate (LPM):	91
Well Diameter (cm):	15.1	Final Status	Water Supply	Recommended Pump Rate:	91
Water First Found:	26.2	Primary Water Use:	Domestic	Pumping Duration (h:m):	1 :
Static Level:	8				
Layer:	Driller's Description:	Top:	Bottom:		
1	SAND	0	15.2		
1	SAND	0	15.2		
1	SAND	0	15.2		
1	SAND	0	15.2		
1	SAND	0	15.2		
1	SAND	0	15.2		
2	LIMESTONE	15.2	26.2		
2	LIMESTONE	15.2	26.2		
2	LIMESTONE	15.2	26.2		
2	LIMESTONE	15.2	26.2		
2	LIMESTONE	15.2	26.2		
3	LIMESTONE	26.2	40.8		
3	LIMESTONE	26.2	40.8		
3	LIMESTONE	26.2	40.8		
3	LIMESTONE	26.2	40.8		
3	LIMESTONE	26.2	40.8		
4	LIMESTONE	40.8	54.9		
4	LIMESTONE	40.8	54.9		
4	LIMESTONE	40.8	54.9		
4	LIMESTONE	40.8	54.9		
4	LIMESTONE	40.8	54.9		
5	SANDSTONE	54.9	59.1		
5	SANDSTONE	54.9	59.1		
5	SANDSTONE	54.9	59.1		
5	SANDSTONE	54.9	59.1		
5	SANDSTONE	54.9	59.1		

5	SANDSTONE	54.9	59.1
6	SANDSTONE	59.1	61
6	SANDSTONE	59.1	61
6	SANDSTONE	59.1	61
6	SANDSTONE	59.1	61
6	SANDSTONE	59.1	61

Well ID: 7230319	Easting: 455162	UTM Zone 18	
Construction Date: 2014-10-29	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m	
	Well Depth: 90.5	Water Kind	Pump Rate (LPM): 55
	Well Diameter (cm): 15.2	Final Status	Recommended Pump Rate: 55
	Water First Found: 88.7	Primary Water Use: Domestic	Pumping Duration (h:m): 1 :
	Static Level: 10		
	Layer: Driller's Description:	Top:	Bottom:
	1 SAND	0	9.14
	1 SAND	0	9.14
	2 GRAVEL	9.14	17.7
	2 GRAVEL	9.14	17.7
	3 LIMESTONE	17.7	43
	3 LIMESTONE	17.7	43
	4 LIMESTONE	43	48.2
	4 LIMESTONE	43	48.2
	5 SANDSTONE	48.2	88.7
	5 SANDSTONE	48.2	88.7
	6 SANDSTONE	88.7	90.5
	6 SANDSTONE	88.7	90.5

Well ID: 7240506	Easting: 455080	UTM Zone 18	
Construction Date: 2015-04-24	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m	
	Well Depth: 61	Water Kind	Pump Rate (LPM): 36
	Well Diameter (cm): 15.1	Final Status	Recommended Pump Rate: 36
	Water First Found: 41.8	Primary Water Use: Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 4		
	Layer: Driller's Description:	Top:	Bottom:
	1 CLAY	0	16.8
	1 CLAY	0	16.8
	1 CLAY	0	16.8
	1 CLAY	0	16.8
	2 LIMESTONE	16.8	41.8
	2 LIMESTONE	16.8	41.8
	2 LIMESTONE	16.8	41.8
	2 LIMESTONE	16.8	41.8
	3 LIMESTONE	41.8	51.8
	3 LIMESTONE	41.8	51.8

3	LIMESTONE	41.8	51.8
3	LIMESTONE	41.8	51.8
4	SANDSTONE	51.8	59.1
4	SANDSTONE	51.8	59.1
4	SANDSTONE	51.8	59.1
4	SANDSTONE	51.8	59.1
5	SANDSTONE	59.1	61
5	SANDSTONE	59.1	61
5	SANDSTONE	59.1	61
5	SANDSTONE	59.1	61

Well ID: 7243021	Easting: 455306	UTM Zone 18		
Construction Date: 2015-06-15	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 54.9	Water Kind	Untested	Pump Rate (LPM): 91
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 91
	Water First Found: 22.9	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 :
	Static Level: 2			
	Layer:	Driller's Description:	Top:	Bottom:
	1	CLAY	0	14.9
	1	CLAY	0	14.9
	1	CLAY	0	14.9
	1	CLAY	0	14.9
	2	LIMESTONE	14.9	22.9
	2	LIMESTONE	14.9	22.9
	2	LIMESTONE	14.9	22.9
	2	LIMESTONE	14.9	22.9
	3	LIMESTONE	22.9	52.4
	3	LIMESTONE	22.9	52.4
	3	LIMESTONE	22.9	52.4
	3	LIMESTONE	22.9	52.4
	4	LIMESTONE	52.4	54.9
	4	LIMESTONE	52.4	54.9
	4	LIMESTONE	52.4	54.9
	4	LIMESTONE	52.4	54.9

Well ID: 7243032	Easting: 455258	UTM Zone 18		
Construction Date: 2015-06-15	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 48.8	Water Kind	Untested	Pump Rate (LPM): 68
	Well Diameter (cm): 15.9	Final Status	Water Supply	Recommended Pump Rate: 68
	Water First Found: 46.9	Primary Water Use:	Domestic	Pumping Duration (h:m): : 10
	Static Level: 3			
	Layer:	Driller's Description:	Top:	Bottom:
	1	CLAY	0	15.9
	1	CLAY	0	15.9
	1	CLAY	0	15.9

1	CLAY	0	15.9
2	LIMESTONE	15.9	26.2
2	LIMESTONE	15.9	26.2
2	LIMESTONE	15.9	26.2
2	LIMESTONE	15.9	26.2
3	LIMESTONE	26.2	46.9
3	LIMESTONE	26.2	46.9
3	LIMESTONE	26.2	46.9
4	LIMESTONE	46.9	48.8
4	LIMESTONE	46.9	48.8
4	LIMESTONE	46.9	48.8
4	LIMESTONE	46.9	48.8

Well ID: 7243033	Easting: 455335	UTM Zone 18
Construction Date: 2015-06-15	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m
Well Depth: 65.5	Water Kind	Pump Rate (LPM): 91
Well Diameter (cm): 15.2	Final Status	Recommended Pump Rate: 91
Water First Found: 57.9	Primary Water Use: Untested	Pumping Duration (h:m): 1 :
Static Level: 9	Water Supply	Domestic

Layer:	Driller's Description:	Top:	Bottom:
1	CLAY	0	14.6
1	CLAY	0	14.6
1	CLAY	0	14.6
1	CLAY	0	14.6
2	LIMESTONE	14.6	48.8
2	LIMESTONE	14.6	48.8
2	LIMESTONE	14.6	48.8
3	LIMESTONE	48.8	57.9
3	LIMESTONE	48.8	57.9
3	LIMESTONE	48.8	57.9
3	LIMESTONE	48.8	57.9
4	LIMESTONE	57.9	63.4
4	LIMESTONE	57.9	63.4
4	LIMESTONE	57.9	63.4
5	LIMESTONE	63.4	65.5
5	LIMESTONE	63.4	65.5
5	LIMESTONE	63.4	65.5

Well ID: 7252399	Easting: 455519	UTM Zone 18		
Construction Date: 2015-11-17	Northing: 5E+06	Positional Accuracy:	margin of error : 30 m - 100 m	
	Well Depth: 25	Water Kind	Untested	Pump Rate (LPM): 91
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 91
	Water First Found: 17.7	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 3			
	Layer:	Driller's Description:	Top:	Bottom:
	1	SAND	0	9.14
	1	SAND	0	9.14
	1	SAND	0	9.14
	1	SAND	0	9.14
	2	LIMESTONE	9.14	17.7
	2	LIMESTONE	9.14	17.7
	2	LIMESTONE	9.14	17.7
	2	LIMESTONE	9.14	17.7
	3	LIMESTONE	17.7	22.9
	3	LIMESTONE	17.7	22.9
	3	LIMESTONE	17.7	22.9
	3	LIMESTONE	17.7	22.9
	4	LIMESTONE	22.9	25
	4	LIMESTONE	22.9	25
	4	LIMESTONE	22.9	25
	4	LIMESTONE	22.9	25

Well ID: 7252400	Easting: 455399	UTM Zone 18		
Construction Date: 2015-11-17	Northing: 5E+06	Positional Accuracy:	margin of error : 30 m - 100 m	
	Well Depth: 48.8	Water Kind	Untested	Pump Rate (LPM): 91
	Well Diameter (cm): 15.9	Final Status	Water Supply	Recommended Pump Rate: 91
	Water First Found: 44.2	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 :
	Static Level: 2			
	Layer:	Driller's Description:	Top:	Bottom:
	1	SAND	0	8.84
	1	SAND	0	8.84
	1	SAND	0	8.84
	1	SAND	0	8.84
	2	LIMESTONE	8.84	44.2
	2	LIMESTONE	8.84	44.2
	2	LIMESTONE	8.84	44.2
	2	LIMESTONE	8.84	44.2
	3	LIMESTONE	44.2	46.9
	3	LIMESTONE	44.2	46.9
	3	LIMESTONE	44.2	46.9
	4	LIMESTONE	46.9	48.8

4	LIMESTONE	46.9	48.8
4	LIMESTONE	46.9	48.8
4	LIMESTONE	46.9	48.8

Well ID: 7255451	Easting: 455289	UTM Zone 18		
Construction Date: 2016-01-06	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 64.0	Water Kind	Untested	Pump Rate (LPM): 91
	Well Diameter (cm): 15.6	Final Status	Water Supply	Recommended Pump Rate: 91
	Water First Found: 62.5	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 8			
	Layer:	Driller's Description:	Top:	Bottom:
	1	CLAY	0	15.9
	1	CLAY	0	15.9
	1	CLAY	0	15.9
	1	CLAY	0	15.9
	2	LIMESTONE	15.9	48.8
	2	LIMESTONE	15.9	48.8
	2	LIMESTONE	15.9	48.8
	2	LIMESTONE	15.9	48.8
	3	LIMESTONE	48.8	49.1
	3	LIMESTONE	48.8	49.1
	3	LIMESTONE	48.8	49.1
	3	LIMESTONE	48.8	49.1
	4	LIMESTONE	49.1	62.5
	4	LIMESTONE	49.1	62.5
	4	LIMESTONE	49.1	62.5
	4	LIMESTONE	49.1	62.5
	5	LIMESTONE	62.5	64.0
	5	LIMESTONE	62.5	64.0
	5	LIMESTONE	62.5	64.0
	5	LIMESTONE	62.5	64.0

Well ID: 7265398	Easting: 455315	UTM Zone 18		
Construction Date: 2016-06-21	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 73.2	Water Kind	Untested	Pump Rate (LPM): 91
	Well Diameter (cm): 15.9	Final Status	Water Supply	Recommended Pump Rate: 91
	Water First Found: 70.7	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 8			
	Layer:	Driller's Description:	Top:	Bottom:
	1	SAND	0	15.9
	1	SAND	0	15.9
	1	SAND	0	15.9
	1	SAND	0	15.9
	1	SAND	0	15.9
	1	SAND	0	15.9

2	LIMESTONE	15.9	48.8
2	LIMESTONE	15.9	48.8
2	LIMESTONE	15.9	48.8
2	LIMESTONE	15.9	48.8
2	LIMESTONE	15.9	48.8
3	SANDSTONE	48.8	55.5
3	SANDSTONE	48.8	55.5
3	SANDSTONE	48.8	55.5
3	SANDSTONE	48.8	55.5
3	SANDSTONE	48.8	55.5
4	SANDSTONE	55.5	59.1
4	SANDSTONE	55.5	59.1
4	SANDSTONE	55.5	59.1
4	SANDSTONE	55.5	59.1
4	SANDSTONE	55.5	59.1
5	SANDSTONE	59.1	70.7
5	SANDSTONE	59.1	70.7
5	SANDSTONE	59.1	70.7
5	SANDSTONE	59.1	70.7
5	SANDSTONE	59.1	70.7
6	SANDSTONE	70.7	73.2
6	SANDSTONE	70.7	73.2
6	SANDSTONE	70.7	73.2
6	SANDSTONE	70.7	73.2
6	SANDSTONE	70.7	73.2

Well ID: 7296379**Construction Date:** 2017-10-03**Easting:** 454770**UTM Zone** 18**Northing:** 5E+06**Positional Accuracy:** margin of error : 30 m - 100 m**Well Depth:** 67.1**Water Kind**

Untested

Pump Rate (LPM): 91**Well Diameter (cm):** 15.9**Final Status**

Water Supply

Recommended Pump Rate: 91**Water First Found:** 64.9**Primary Water Use:**

Domestic

Pumping Duration (h:m): 1 : 0**Static Level:** 7**Layer:** **Driller's Description:** **Top:** **Bottom:**

1	CLAY	0	3.05
1	CLAY	0	3.05
1	CLAY	0	3.05
1	CLAY	0	3.05
2	GRAVEL	3.05	17.7

2	GRAVEL	3.05	17.7
2	GRAVEL	3.05	17.7
2	GRAVEL	3.05	17.7
3	LIMESTONE	17.7	46.0
3	LIMESTONE	17.7	46.0
3	LIMESTONE	17.7	46.0
4	SANDSTONE	46.0	63.7
4	SANDSTONE	46.0	63.7
4	SANDSTONE	46.0	63.7
4	SANDSTONE	46.0	63.7
5	SANDSTONE	63.7	64.9
5	SANDSTONE	63.7	64.9
5	SANDSTONE	63.7	64.9
5	SANDSTONE	63.7	64.9
6	SANDSTONE	64.9	67.1
6	SANDSTONE	64.9	67.1
6	SANDSTONE	64.9	67.1
6	SANDSTONE	64.9	67.1

Well ID: 7301342	Easting: 455482	UTM Zone 18		
Construction Date: 2017-12-14	Northing: 5E+06	Positional Accuracy:	margin of error : 30 m - 100 m	
	Well Depth: 36.6	Water Kind	Untested	Pump Rate (LPM): 91
	Well Diameter (cm): 15.9	Final Status	Water Supply	Recommended Pump Rate: 91
	Water First Found: 35.4	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 : 0
	Static Level: 3			
	Layer: Driller's Description:	Top:	Bottom:	
	1 SAND	0	10.1	
	1 SAND	0	10.1	
	1 SAND	0	10.1	
	1 SAND	0	10.1	
	2 LIMESTONE	10.1	36.6	
	2 LIMESTONE	10.1	36.6	
	2 LIMESTONE	10.1	36.6	
	2 LIMESTONE	10.1	36.6	

Well ID: 7318099	Easting: 455258	UTM Zone 18		
Construction Date: 2018-09-10	Northing: 5E+06	Positional Accuracy:	margin of error : 30 m - 100 m	
	Well Depth: 61	Water Kind	Untested	Pump Rate (LPM): 91
	Well Diameter (cm): 15.2	Final Status	Water Supply	Recommended Pump Rate: 91
	Water First Found: 57	Primary Water Use:	Domestic	Pumping Duration (h:m): 1 :
	Static Level: 8			
	Layer: Driller's Description:	Top:	Bottom:	
	1 CLAY	0	4.27	
	1 CLAY	0	4.27	

2	SAND	4.27	15.2
2	SAND	4.27	15.2
3	LIMESTONE	15.2	41.8
3	LIMESTONE	15.2	41.8
4	SANDSTONE	41.8	45.7
4	SANDSTONE	41.8	45.7
5	SANDSTONE	45.7	57
5	SANDSTONE	45.7	57
6	SANDSTONE	57	61
6	SANDSTONE	57	61

Well ID: 7324334
Construction Date: 2018-12-11

Easting: 455498
Northing: 5E+06

UTM Zone 18

Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:	18.3	Water Kind	Untested	Pump Rate (LPM):	46
Well Diameter (cm):	15.9	Final Status	Water Supply	Recommended Pump Rate:	46
Water First Found:	15.2	Primary Water Use:	Domestic	Pumping Duration (h:m):	1 : 0
Static Level:	5				

Layer: Driller's Description: **Top:** **Bottom:**

1	SAND	0	7.31
1	SAND	0	7.31
2	SAND	7.31	11.3
2	SAND	7.31	11.3
3	LIMESTONE	11.3	15.2
3	LIMESTONE	11.3	15.2
4	LIMESTONE	15.2	18.3
4	LIMESTONE	15.2	18.3

Well ID: 7336839
Construction Date: 2019-07-10

Easting: 455307
Northing: 5E+06

UTM Zone 18

Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:	25	Water Kind	Untested	Pump Rate (LPM):	91
Well Diameter (cm):	15.9	Final Status	Water Supply	Recommended Pump Rate:	91
Water First Found:	22	Primary Water Use:	Domestic	Pumping Duration (h:m):	1 : 0
Static Level:	2				

Layer: Driller's Description: **Top:** **Bottom:**

1	SAND	0	12.5
1	SAND	0	12.5
2	LIMESTONE	12.5	22
2	LIMESTONE	12.5	22
3	LIMESTONE	22	25
3	LIMESTONE	22	25

Well ID: 7341123	Easting: 455360	UTM Zone 18		
Construction Date: 2019-09-06	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth:	Water Kind	Pump Rate (LPM):	
	Well Diameter (cm):	Final Status	Recommended Pump Rate:	
	Water First Found:	Water Supply	Pumping Duration (h:m):	
	Static Level:	Primary Water Use:		
	Layer:	Driller's Description:	Top:	Bottom:

Well ID: 7357357	Easting: 455292	UTM Zone 18		
Construction Date: 2020-04-28	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth: 24.7	Water Kind	Untested	
	Well Diameter (cm): 15.6	Final Status	Water Supply	
	Water First Found: 22.9	Primary Water Use:	Domestic	
	Static Level: 3	Pump Rate (LPM):	91	
		Recommended Pump Rate:	91	
		Pumping Duration (h:m):	1 :	
	Layer:	Driller's Description:	Top:	Bottom:
	1	CLAY	0	15.2
	1	CLAY	0	15.2
	2	LIMESTONE	15.2	24.7
	2	LIMESTONE	15.2	24.7

Well ID: 7364564	Easting: 455536	UTM Zone 18		
Construction Date: 2020-08-13	Northing: 5E+06	Positional Accuracy: margin of error : 30 m - 100 m		
	Well Depth:	Water Kind	Pump Rate (LPM):	
	Well Diameter (cm):	Final Status	Recommended Pump Rate:	
	Water First Found:	Primary Water Use:	Pumping Duration (h:m):	
	Static Level:			
	Layer:	Driller's Description:	Top:	Bottom:



Hydrogeological Assessment
Cassidy EW Construction Consultant Ltd.
Ref. No.: 17281-002
2024-04-29

Well Use Survey Summary Report



Hydrogeological Assessment
Cassidy EW Construction Consultant Ltd.
Ref. No.: 17281-002
2024-04-29

Well Use Survey Summary Report



Hydrogeological Assessment
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Ref. No.: 17281-002
2024-04-29

Well Use Survey Summary Report



Hydrogeological Assessment
Cassidy EW Construction Consultant Ltd.
Ref. No.: 17281-002
2024-04-29

Well Use Survey Summary Report

CERTIFICATE OF WELL COMPLIANCE

I, Jeremy Hanna (License T3632), **AIR ROCK DRILLING CO. LTD.**, DO HEREBY CERTIFY, that I am licensed to drill water wells in the Province of Ontario, and that I have supervised the drilling of a well on the

PROPERTY OF: DANDEX DEVELOPMENTS INC.

LOCATED AT: # 1386 GREELY LANE **Greely**

LOT # P/L 4&5 **CON #** 4 **PLAN #** 4M-351 **S/L #** Part Block 3

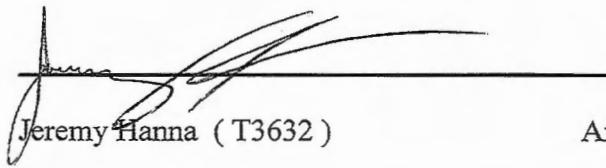
Geographical Township OSGOODE

of OTTAWA - CARLETON

I CERTIFY FURTHER that, I am aware of the well drilling requirements, the guidelines, recommendations and regulations of the Ministry of the Environment governing well installations in the Province of Ontario, and the standards specified in any subdivision agreement and hydrogeological report applicable to this site and City Standards.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased, grouted (cement or bentonite) as applicable and constructed in strict conformity with the standards required.

Signed this 21 ST day of MAY 2025,


Jeremy Hanna (T3632)

Air Rock Drilling Co. Ltd. (C-7681)

The Engineer / Hydrologist on behalf of the Landowner set out above Certifies that He/She has Inspected the well and it was constructed in accordance with the specifications In Ministry of Environment Regulation 903

Signed 11th day of June 2025,
Signed by: 

A84A949C3B4C4B4...
HYDROLOGIST / ENGINEER
(Signature / STAMP)

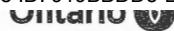
Signed by:

2025225

TAG A 379053

Cassidy EW Construction





Conservation and Parks

Tag#: A379053

Int Below)

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: Metric Imperial

Page _____ of _____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	<input type="checkbox"/> Well Constructed by Well Owner
Cassidy EW Construction			
Mailing Address (Street Number/Name)	Municipality	Province	Postal Code
1-1011 Thomas Spratt Place	Ottawa	ON	K1G 5L5

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession		
1386 Greely Lane	Osgoode	PIL 4&5	34		
County/District/Municipality	City/Town/Village	Province	Postal Code		
Ottawa Carleton	Greely	Ontario			
UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	455205	5011824	4M-351	Block 3

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) From	Depth (m) To
	Clay			0'	38'
	Boulders	at Hard Pan		38'	48'
Grey & Black	Limestone			48'	74'
Grey & Black	Limestone			74'	125'
Grey & Black	Limestone			125'	174'
Grey & Black	Limestone			174'	180'

DAN DAX DEVELOPMENTS INC.

Annular Space

Depth Set at (m) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m ³)
54'	44'	Neat cement	10.92
44'	0'	Bentonite slurry	25.20

Method of Construction

Cable Tool	Diamond	Public	Commercial	Not used
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Municipal	<input type="checkbox"/> Dewatering
<input type="checkbox"/>	<input type="checkbox"/> Jetting	<input type="checkbox"/> Livestock	<input type="checkbox"/> Test Hole	<input type="checkbox"/> Monitoring
<input type="checkbox"/> Rotary (Conventional)	<input type="checkbox"/> Driving	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling & Air Conditioning	
<input type="checkbox"/> Rotary (Reverse)	<input type="checkbox"/> Digging	<input type="checkbox"/> Industrial	<input type="checkbox"/> Other, specify	
<input type="checkbox"/> Boring				
<input checked="" type="checkbox"/> Air percussion				
<input type="checkbox"/> Other, specify				

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m) From	To	Status of Well
6 1/4"	Steel	.188	+2'	54'	<input type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify <input type="checkbox"/> Other, specify
6 1/8"	Open Hole		54'	180'	

Construction Record - Screen

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

Water Details

Water found at Depth (m) Gas	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Contested	Depth (m) From	To	Diameter (cm/in)
74 (m) Gas	<input type="checkbox"/> Other, specify			
125 (m) Gas	<input type="checkbox"/> Other, specify	0'	54'	9 1/2"
74 (m) Gas	<input type="checkbox"/> Other, specify	54'	180'	6 1/8"

Well Contractor and Well Technician Information

Business Name of Well Contractor Air Rock Drilling Co. Ltd.	Well Contractor's Licence No. C 7681	
Business address (Street Number/Name) 6009 Franktown Road	Municipality Richmond	
Province ON	Postal Code K0A 2Z0	Business E-mail Address air-rock@sympatico.ca

Bus. Telephone No. (inc. area code) Name of Well Technician (Last Name, First Name)
613-382-1700 Gauthier, Chris

Well Technician's Licence No. Signature of Technician and/or Contractor Date 2025-06-30
T5044

Results of Well Yield Testing

After test of well yield, water was:		Draw Down	Recovery
<input type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify Not tested		Time (min)	Water Level (m/ft)
Static Level		7.7	8.6
1	8.3	1	7.9
2	8.3	2	7.7
3	8.4	3	7.7
4	8.4	4	7.7
5	8.4	5	7.7
10	8.5	10	7.7
15	8.5	15	7.7
20	8.6	20	7.7
25	8.6	25	7.7
30	8.6	30	7.7
40	8.6	40	7.7
50	8.6	50	7.7
60	8.6	60	7.7

Map of Well Location

Please provide a map below following instructions on the back

Map of Well Location

#1386 GREELY LANE

70 FT

60 FT

Parkway Road

Comments: **SET AT 100 FEET (3/4 HP 15 GPM)**

Well owner's Information package delivered <input type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered 2025-05-27	Ministry Use Only
Audit No. Z427114		
Received		



Hydrogeological Assessment Report 1386 & 1394 Greely Lane, Ottawa, Ontario
Cassidy EW Construction Consultant Ltd.
Cambium Reference: 17281-002
July 25, 2025

Appendix E

Groundwater Quality Lab Results



CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G 107579

REPORT No: 24-010898 - Rev. 1

Report To:

Cambium Environmental - Kingston
625 Fortune Crescent
#1
Kingston, ON K7P 0L5

CADUCEON Environmental Laboratories
2378 Holly Lane
Ottawa, ON K1V 7P1

Attention: Kyle Horner

DATE RECEIVED: 2024-Apr-22

CUSTOMER PROJECT: 17280-002

DATE REPORTED: 2024-Jul-30

P.O. NUMBER:

SAMPLE MATRIX: Ground Water

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Anions (Liquid)	1	OTTAWA	PCURIEL	2024-Apr-24	A-IC-01	SM 4110B
BOD5 (Liquid)	1	KINGSTON	JYEARWOOD	2024-Apr-24	BOD-001	SM 5210B
Cond/pH/Alk Auto (Liquid)	1	OTTAWA	SBOUDREAU	2024-Apr-22	COND-02/PH-02/A LK-02	SM 2510B/4500H/ 2320B
Cyanide Total (Liquid)	1	KINGSTON	JMACINNES	2024-Apr-23	CN-001	SM 4500-CN-E
Formaldehyde (Subcontracted)	1	TESTMARK	SISLAM	2024-Apr-26		Subcontracted
Ion Balance (Calc.)	1	OTTAWA	ASCHNEIDER		CP-028	MECP E3196
Chromium VI (Liquid)	1	OTTAWA	STAILLON	2024-Apr-25	D-CRVI-01	MECP E3056
ICP/MS Total (Liquid)	1	OTTAWA	AOZKAYMAK	2024-Apr-24	D-ICPMS-01	EPA 6020
ICP/OES Total (Liquid)	1	OTTAWA	APRUDYVUS	2024-Apr-29	D-ICP-01	SM 3120B
ICP/OES (Liquid)	1	OTTAWA	APRUDYVUS	2024-Apr-24	D-ICP-01	SM 3120B
Mercury (Liquid)	1	OTTAWA	TBENNETT	2024-Apr-24	D-HG-02	SM 3112B
NDMA Liquid (Subcontract)	1	SGS_LAKEFIELD	SISLAM	2024-May-30		Subcontracted
Ammonia (Liquid)	1	KINGSTON	JYEARWOOD	2024-Apr-24	NH3-001	SM 4500NH3
Nonylphenols (Subcontracted)	1	SGS_LAKEFIELD	SISLAM	2024-Apr-30		Subcontracted
OC Pesticides (Liquid)	1	KINGSTON	CSUMMERHAYS	2024-Apr-23	PESTCL-001	EPA 8081
Oil & Grease (Liquid)	1	KINGSTON	MLANE	2024-Apr-25	O&G-001	SM 5520
Phenols (Liquid)	1	KINGSTON	JMACINNES	2024-Apr-25	PHEN-01	MECP E3179
Sulphide (Liquid)	1	KINGSTON	EHINCH	2024-Apr-23	H2S-001	SM 4500-S2
SVOC - Semi-Volatiles (Liquid)	1	KINGSTON	EASIEDU	2024-Apr-24	NAB-W-001	EPA 8270D
TP & TKN (Liquid)	1	KINGSTON	KDIBBITS	2024-Apr-29	TPTKN-001	MECP E3516.2
TSS (Liquid)	1	KINGSTON	MCLOSS	2024-Apr-23	TSS-001	SM 2540D
Turbidity (Liquid)	1	OTTAWA	STAILLON	2024-Apr-23	A-TURB-01	SM 2130B
VOC-Volatiles Full (Water)	1	RICHMOND_HILL	FLENA	2024-Apr-24	C-VOC-02	EPA 8260

R.L. = Reporting Limit

NC = Not Calculated

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

A handwritten signature in black ink, appearing to read "M. Dubien".

Michelle Dubien

Data Specialist

Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Alkalinity(CaCO ₃) to pH4.5	mg/L	5			283
pH @25°C	pH units	-	11.0, 9.0	SAN, STORM	7.85
Turbidity	NTU	0.1			7070
Fluoride	mg/L	0.1	10	SAN	<0.1
Sulphate	mg/L	1	1500	SAN	84
BOD ₅	mg/L	3	300, 25.0	SAN, STORM	3
Total Suspended Solids	mg/L	3	350, 15.0	SAN, STORM	9480
Phosphorus (Total)	mg/L	0.01	10, 0.4	SAN, STORM	8.72
Total Kjeldahl Nitrogen	mg/L	0.1	100	SAN	6.3
Ammonia (N)-Total (NH ₃ +NH ₄)	mg/L	0.05			0.15
Ammonia (N)-unionized	mg/L	0.01			<0.01
Sulphide	mg/L	0.01	2	SAN	0.01
Cyanide (Total)	mg/L	0.005	2, 0.02	SAN, STORM	<0.005
Phenolics	mg/L	0.001	1, 0.008	SAN, STORM	<0.001
Hardness (as CaCO ₃)	mg/L	0.02			368
Aluminum	mg/L	0.01			0.07
Barium	mg/L	0.001			0.165
Calcium	mg/L	0.02			105
Iron	mg/L	0.005			0.020
Magnesium	mg/L	0.02			25.6
Tungsten	mg/L	0.01			<0.01



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Zinc	mg/L	0.005			<0.005
Zirconium	mg/L	0.003			<0.003
Hardness (as CaCO ₃)	mg/L	-			789
Aluminum (Total)	mg/L	0.01	50	SAN	0.03
Bismuth (Total)	mg/L	0.02	5	SAN	<0.02
Boron (Total)	mg/L	0.005	25	SAN	0.028
Cadmium (Total)	mg/L	0.005	0.02, 0.008	SAN, STORM	<0.005
Calcium (Total)	mg/L	0.02			97.7
Chromium (Total)	mg/L	0.002	5, 0.08	SAN, STORM	<0.002
Cobalt (Total)	mg/L	0.005	5	SAN	<0.005
Copper (Total)	mg/L	0.002	3, 0.04	SAN, STORM	0.008
Iron (Total)	mg/L	0.005			<0.005
Lead (Total)	mg/L	0.02	5, 0.12	SAN, STORM	<0.02
Magnesium (Total)	mg/L	0.02			27.3
Manganese (Total)	mg/L	0.001	0.05, 5	STORM, SAN	0.003
Molybdenum (Total)	mg/L	0.01	5	SAN	<0.01
Nickel (Total)	mg/L	0.01	3, 0.08	SAN, STORM	<0.01
Silver (Total)	mg/L	0.005	5, 0.12	SAN, STORM	<0.005
Tin (Total)	mg/L	0.05	5	SAN	<0.05
Titanium (Total)	mg/L	0.005	5	SAN	<0.005
Tungsten (Total)	mg/L	0.01			<0.01



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Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Vanadium (Total)	mg/L	0.005	5	SAN	<0.005
Zinc (Total)	mg/L	0.005	3, 0.04	SAN, STORM	<0.005
Zirconium (Total)	mg/L	0.003			<0.003
Antimony (Total)	mg/L	0.0001	5	SAN	0.0007
Arsenic (Total)	mg/L	0.0001	0.02, 1	STORM, SAN	0.0275
Beryllium (Total)	mg/L	0.0001			0.0032
Cadmium (Total)	mg/L	0.000015	0.008	STORM	0.00112
Chromium (Total)	mg/L	0.001	0.08	STORM	0.249
Cobalt (Total)	mg/L	0.0001			0.103
Copper (Total)	mg/L	0.0001	0.04	STORM	0.301
Lead (Total)	mg/L	0.00002	0.12	STORM	0.0768
Molybdenum (Total)	mg/L	0.0001			0.0076
Nickel (Total)	mg/L	0.0002	0.08	STORM	0.189
Selenium (Total)	mg/L	0.001	0.02, 5	STORM, SAN	<0.001
Silver (Total)	mg/L	0.0001	0.12	STORM	0.0011
Thallium (Total)	mg/L	0.00005			0.00182
Uranium (Total)	mg/L	0.00005			0.0114
Vanadium (Total)	mg/L	0.0001			0.327
Chromium (VI)	mg/L	0.01			<0.01
Mercury	mg/L	0.00002	0.001, 0.0004	SAN, STORM	<0.00002
Anion Sum	meq/L	-			16.6



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Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Cation Sum	meq/L	-			15.3
% Difference	%	-			4.03
Ion Ratio	-	-			1.08
Sodium Adsorption Ratio	-	-			4.28
TDS (Ion Sum Calc)	mg/L	1			893
TDS(calc.)/EC(actual)	-	-			0.540
Conductivity Calc	µmho/cm	-			1590
Conductivity Calc / Conductivity	-	-			0.959
Langelier Index(25°C)	-	-			0.800
Saturation pH (25°C)	-	-			7.05
pH (Client Data)	pH units	-			6.97
Temperature (Client Data)	°C	-			9.9



Michelle Dubien
Data Specialist

Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Benzene	mg/L	0.0005	0.01, 0.002	SAN, STORM	<0.0005
Bromodichloromethane	mg/L	0.002	0.35	SAN	<0.002
Bromoform	mg/L	0.005	0.63	SAN	<0.005
Bromomethane	mg/L	0.0005	0.11	SAN	<0.0005
Carbon Tetrachloride	mg/L	0.0002	0.057	SAN	<0.0002
Chlorobenzene	mg/L	0.0005	0.057	SAN	<0.0005
Chloroethane	mg/L	0.003	0.27	SAN	<0.003
Chloroform	mg/L	0.001	0.08, 0.002	SAN, STORM	<0.001
Chloromethane (Methyl Chloride)	mg/L	0.002	0.19	SAN	<0.002
Dibromochloromethane	mg/L	0.002	0.057	SAN	<0.002
Ethylene Dibromide	mg/L	0.0002	0.028	SAN	<0.0002
Dichlorobenzene,1,2-	mg/L	0.0005	0.088, 0.0056	SAN, STORM	<0.0005
Dichlorobenzene,1,3-	mg/L	0.0005	0.036	SAN	<0.0005
Dichlorobenzene,1,4-	mg/L	0.0005	0.017, 0.0068	SAN, STORM	<0.0005
Dichloroethane,1,1-	mg/L	0.0005	0.2	SAN	<0.0005
Dichloroethane,1,2-	mg/L	0.0005	0.21	SAN	0.0007
Dichloroethylene,1,1-	mg/L	0.0005	0.04	SAN	<0.0005
Dichloroethylene,1,2-cis-	mg/L	0.0005	0.2, 0.0056	SAN, STORM	<0.0005
Dichloroethylene,1,2-trans-	mg/L	0.0005	0.2	SAN	<0.0005
Dichloropropane,1,2-	mg/L	0.0005	0.85	SAN	<0.0005
Dichloropropene,1,3-cis-	mg/L	0.0005	0.07	SAN	<0.0005



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Dichloropropene,1,3-trans-	mg/L	0.0005	0.07, 0.0056	SAN, STORM	<0.0005
Ethylbenzene	mg/L	0.0005	0.057, 0.002	SAN, STORM	<0.0005
Dichloromethane (Methylene Chloride)	mg/L	0.005	0.211, 0.0052	SAN, STORM	<0.005
Styrene	mg/L	0.0005	0.04	SAN	<0.0005
Tetrachloroethane,1,1,2,2-	mg/L	0.0005	0.04, 0.017	SAN, STORM	<0.0005
Tetrachloroethylene	mg/L	0.0005	0.05, 0.0044	SAN, STORM	<0.0005
Toluene	mg/L	0.0005	0.08, 0.002	SAN, STORM	<0.0005
Trichloroethane,1,1,1-	mg/L	0.0005	0.054	SAN	<0.0005
Trichloroethane,1,1,2-	mg/L	0.0005	0.8	SAN	<0.0005
Trichloroethylene	mg/L	0.0005	0.054, 0.0076	SAN, STORM	<0.0005
Trichlorofluoromethane (Freon 11)	mg/L	0.005	0.02	SAN	<0.005
Trimethylbenzene,1,3,5-	mg/L	0.0001	0.003	SAN	<0.0001
Vinyl Chloride	mg/L	0.0002	0.4	SAN	<0.0002
Xylene, m,p-	µg/L	1			<1
Xylene, m,p,o-	mg/L	0.0011	0.32, 0.0044	SAN, STORM	<0.0011
Xylene, o-	µg/L	0.5			<0.5
Oil & Grease (Total)	mg/L	1.0			1.7
Oil and Grease (Mineral)	mg/L	1.0	15	SAN	<1.0
Oil and Grease (Anim/Veg)	mg/L	1.0	150	SAN	1.4



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Acenaphthene	µg/L	0.05			<0.05
Acenaphthylene	µg/L	0.05			<0.05
Anthracene	µg/L	0.05			<0.05
Benzo[a]anthracene	µg/L	0.05			<0.05
Benzo(a)pyrene	µg/L	0.01			<0.01
Benzo(b)fluoranthene	µg/L	0.05			<0.05
Benzo(b+k)fluoranthene	µg/L	0.1			<0.1
Benzo(g,h,i)perylene	µg/L	0.05			<0.05
Benzo(k)fluoranthene	µg/L	0.05			<0.05
Butyl Benzyl Phthalate	mg/L	0.001	0.017	SAN	<0.001
Bis(2-Chloroethoxy)methane	mg/L	0.002	0.036	SAN	<0.002
Bis(2-ethylhexyl) Phthalate	mg/L	0.005	0.28	SAN	<0.005
Chrysene	µg/L	0.05			<0.05
Dibenzo(a,h)anthracene	µg/L	0.05			<0.05
Di-n-Butyl Phthalate	mg/L	0.0010	0.057	SAN	<0.0010
Dichlorophenol,2,4-	mg/L	0.0002	0.044	SAN	<0.0002
Diethyl Phthalate	mg/L	0.0010	0.2	SAN	<0.0010
Di-n-Octyl Phthalate	mg/L	0.0010	0.03	SAN	<0.0010
Fluoranthene	mg/L	0.00005	0.059	SAN	<0.00005
Fluorene	µg/L	0.05			<0.05
Indeno(1,2,3,-cd)Pyrene	µg/L	0.05			<0.05



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Indole	mg/L	0.002	0.05	SAN	<0.002
Methylnaphthalene,1-	mg/L	0.00005	0.032	SAN	<0.00005
Methylnaphthalene,2-(1-)	µg/L	1			<1
Methylnaphthalene,2-	mg/L	0.00005	0.022	SAN	<0.00005
Naphthalene	mg/L	0.00005	0.059, 0.064	SAN, STORM	<0.00005
Phenanthrene	µg/L	0.05			<0.05
Pyrene	µg/L	0.05			<0.05
Total PAH	mg/L	0.0001	0.015, 0.006	SAN, STORM	<0.0001
				Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Parameter	Units	R.L.	Limits		
Hexachlorobenzene	mg/L	0.00001	0.00004	STORM	<0.00001



Michelle Dubien
Data Specialist

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Subcontracted Analyses

Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
Parameter	Units	R.L.	Limits		-
Formaldehyde	mg/L	-	0.3	SAN	<0.008
Nitrosodimethylamine (NDMA)	mg/L	-	0.4	SAN	<0.0004
Nonylphenol Monoethoxylate	mg/L	-			<0.01
Nonylphenol Diethoxylate	mg/L	-			<0.01
Nonylphenols	mg/L	-	0.0025, 0.001	SAN, STORM	<0.001
Nonylphenol Ethoxylates	mg/L	-	0.025, 0.01	SAN, STORM	<0.01

Revised to include additional dissolved metals at clients request

: City of Ottawa

SAN: Sanitary Sewer By Law

STORM: Storm Sewer By Law

Summary of Exceedances		
Sanitary Sewer By Law		
BH106	Found Value	Limit
Total Suspended Solids	9480	350
Storm Sewer By Law		
BH106	Found Value	Limit
Total Suspended Solids	9480	15.0
Phosphorus (Total)	8.72	0.4
Arsenic (Total)	0.0275	0.02
Chromium (Total)	0.249	0.08
Copper (Total)	0.301	0.04
Nickel (Total)	0.189	0.08



Michelle Dubien
Data Specialist

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G 107579

REPORT No: 24-010898 - Rev. 2

Report To:

Cambium Environmental - Kingston
625 Fortune Crescent
#1
Kingston, ON K7P 0L5

CADUCEON Environmental Laboratories
2378 Holly Lane
Ottawa, ON K1V 7P1

Attention: Kyle Horner

DATE RECEIVED: 2024-Apr-22
DATE REPORTED: 2024-Aug-07
SAMPLE MATRIX: Ground Water

CUSTOMER PROJECT: 17280-002
P.O. NUMBER:

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Anions (Liquid)	1	OTTAWA	PCURIEL	2024-Apr-24	A-IC-01	SM 4110B
BOD5 (Liquid)	1	KINGSTON	JYEARWOOD	2024-Apr-24	BOD-001	SM 5210B
Cond/pH/Alk Auto (Liquid)	1	OTTAWA	SBOUDREAU	2024-Apr-22	COND-02/PH-02/A LK-02	SM 2510B/4500H/ 2320B
Cyanide Total (Liquid)	1	KINGSTON	JMACINNES	2024-Apr-23	CN-001	SM 4500-CN-E
Formaldehyde (Subcontracted)	1	TESTMARK	SISLAM	2024-Apr-26		Subcontracted
Ion Balance (Calc.)	1	OTTAWA	ASCHNEIDER		CP-028	MECP E3196
Chromium VI (Liquid)	1	OTTAWA	STAILLON	2024-Apr-25	D-CRVI-01	MECP E3056
ICP/MS Total (Liquid)	1	OTTAWA	AOZKAYMAK	2024-Apr-24	D-ICPMS-01	EPA 6020
ICP/OES Total (Liquid)	1	OTTAWA	APRUDYVUS	2024-Apr-29	D-ICP-01	SM 3120B
ICP/OES (Liquid)	1	OTTAWA	APRUDYVUS	2024-Apr-24	D-ICP-01	SM 3120B
Mercury (Liquid)	1	OTTAWA	TBENNETT	2024-Apr-24	D-HG-02	SM 3112B
NDMA Liquid (Subcontract)	1	SGS_LAKEFIELD	SISLAM	2024-May-30		Subcontracted
Ammonia (Liquid)	1	KINGSTON	JYEARWOOD	2024-Apr-24	NH3-001	SM 4500NH3
Nonylphenols (Subcontracted)	1	SGS_LAKEFIELD	SISLAM	2024-Apr-30		Subcontracted
OC Pesticides (Liquid)	1	KINGSTON	CSUMMERHAYS	2024-Apr-23	PESTCL-001	EPA 8081
Oil & Grease (Liquid)	1	KINGSTON	MLANE	2024-Apr-25	O&G-001	SM 5520
Phenols (Liquid)	1	KINGSTON	JMACINNES	2024-Apr-25	PHEN-01	MECP E3179
Sulphide (Liquid)	1	KINGSTON	EHINCH	2024-Apr-23	H2S-001	SM 4500-S2
SVOC - Semi-Volatiles (Liquid)	1	KINGSTON	EASIEDU	2024-Apr-24	NAB-W-001	EPA 8270D
TP & TKN (Liquid)	1	KINGSTON	KDIBBITS	2024-Apr-29	TPTKN-001	MECP E3516.2
TSS (Liquid)	1	KINGSTON	MCLOSS	2024-Apr-23	TSS-001	SM 2540D
Turbidity (Liquid)	1	OTTAWA	STAILLON	2024-Apr-23	A-TURB-01	SM 2130B
VOC-Volatiles Full (Water)	1	RICHMOND_HILL	FLENA	2024-Apr-24	C-VOC-02	EPA 8260

R.L. = Reporting Limit

NC = Not Calculated

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

A handwritten signature in black ink, appearing to read "M. Dubien".

Michelle Dubien

Data Specialist

Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Alkalinity(CaCO ₃) to pH4.5	mg/L	5			283
pH @25°C	pH units	-	8.5	PWQO	7.85
Turbidity	NTU	0.1			7070
Fluoride	mg/L	0.1			<0.1
Sulphate	mg/L	1			84
BOD ₅	mg/L	3			3
Total Suspended Solids	mg/L	3			9480
Phosphorus (Total)	µg/L	10	10	INTERIM	8720
Total Kjeldahl Nitrogen	mg/L	0.1			6.3
Ammonia (N)-Total (NH ₃ +NH ₄)	mg/L	0.05			0.15
Ammonia (N)-unionized	µg/L	10.0	20	PWQO	<10.0
Sulphide	mg/L	0.01			0.01
Cyanide (Total)	mg/L	0.005			<0.005
Phenolics	µg/L	1	1	PWQO	<1
Hardness (as CaCO ₃)	mg/L as CaCO ₃	0			368
Aluminum	µg/L	10	75	INTERIM	70
Barium	µg/L	1			165
Calcium	µg/L	20			105000
Iron	µg/L	5	300	PWQO	20
Magnesium	µg/L	20			25600
Tungsten	µg/L	10			<10



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Zinc	µg/L	5	30	PWQO	<5
Zirconium	µg/L	3			<3
Hardness (as CaCO ₃)	mg/L as CaCO ₃	-			789
Aluminum (Total)	µg/L	10			30
Bismuth (Total)	µg/L	20			<20
Boron (Total)	µg/L	5	200	INTERIM	28
Cadmium (Total)	µg/L	5	0.1, 0.2	INTERIM, PWQO	<5
Calcium (Total)	µg/L	20			97700
Chromium (Total)	µg/L	2			<2
Cobalt (Total)	µg/L	5	0.9, 0.0	INTERIM, PWQO	<5
Copper (Total)	µg/L	2	5, 0.0	INTERIM, PWQO	8
Iron (Total)	µg/L	5	300	PWQO	<5
Lead (Total)	µg/L	20	1, 0.0	INTERIM, PWQO	<20
Magnesium (Total)	µg/L	20			27300
Manganese (Total)	µg/L	1			3
Molybdenum (Total)	µg/L	10	40, 0.0	INTERIM, PWQO	<10
Nickel (Total)	µg/L	10	25	PWQO	<10
Silver (Total)	µg/L	5	0.1	PWQO	<5
Tin (Total)	µg/L	50			<50
Titanium (Total)	µg/L	5			<5
Tungsten (Total)	µg/L	10	30	INTERIM	<10



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Vanadium (Total)	µg/L	5			<5
Zinc (Total)	µg/L	5	20, 30	INTERIM, PWQO	<5
Zirconium (Total)	µg/L	3	4	INTERIM	<3
Antimony (Total)	µg/L	0.1	20	INTERIM	0.7
Arsenic (Total)	µg/L	0.1	5, 5	INTERIM, PWQO	27.5
Beryllium (Total)	µg/L	0.1	11	PWQO	3.2
Cadmium (Total)	µg/L	0.015	0.1, 0.2	INTERIM, PWQO	1.12
Chromium (Total)	µg/L	1			249
Cobalt (Total)	µg/L	0.1	0.9	INTERIM	103
Copper (Total)	µg/L	0.1	5	INTERIM	301
Lead (Total)	µg/L	0.02	1, 5	INTERIM, PWQO	76.8
Molybdenum (Total)	µg/L	0.1	40	INTERIM	7.6
Nickel (Total)	µg/L	0.2	25	PWQO	189
Selenium (Total)	µg/L	1	100	PWQO	<1
Silver (Total)	µg/L	0.1	0.1	PWQO	1.1
Thallium (Total)	µg/L	0.05	0.3, 0.3	INTERIM, PWQO	1.82
Uranium (Total)	µg/L	0.05	5	INTERIM	11.4
Vanadium (Total)	µg/L	0.1	6	INTERIM	327
Chromium (VI)	µg/L	10	1	PWQO	<10
Mercury	µg/L	0.02	0.2	PWQO	<0.02
Anion Sum	meq/L	-			16.6



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Cation Sum	meq/L	-			15.3
% Difference	%	-			4.03
Ion Ratio	-	-			1.08
Sodium Adsorption Ratio	-	-			4.28
TDS (Ion Sum Calc)	mg/L	1			893
TDS(calc.)/EC(actual)	-	-			0.540
Conductivity Calc	µmho/cm	-			1590
Conductivity Calc / Conductivity	-	-			0.959
Langelier Index(25°C)	-	-			0.800
Saturation pH (25°C)	-	-			7.05
pH (Client Data)	pH units	-			6.97
Temperature (Client Data)	°C	-			9.9



Michelle Dubien
Data Specialist

Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Benzene	µg/L	0.5	100	INTERIM	<0.5
Bromodichloromethane	µg/L	2	200	INTERIM	<2
Bromoform	µg/L	5	60	INTERIM	<5
Bromomethane	µg/L	0.5	0.9	INTERIM	<0.5
Carbon Tetrachloride	µg/L	0.2			<0.2
Chlorobenzene	µg/L	0.5	15	PWQO	<0.5
Chloroethane	µg/L	3			<3
Chloroform	µg/L	1			<1
Chloromethane (Methyl Chloride)	µg/L	2	700	INTERIM	<2
Dibromochloromethane	µg/L	2	40	INTERIM	<2
Ethylene Dibromide	µg/L	0.2	5, 5	INTERIM, PWQO	<0.2
Dichlorobenzene,1,2-	µg/L	0.5	2.5	PWQO	<0.5
Dichlorobenzene,1,3-	µg/L	0.5	2.5	PWQO	<0.5
Dichlorobenzene,1,4-	µg/L	0.5	4	PWQO	<0.5
Dichloroethane,1,1-	µg/L	0.5	200	INTERIM	<0.5
Dichloroethane,1,2-	µg/L	0.5	100	INTERIM	0.7
Dichloroethylene,1,1-	µg/L	0.5	40	INTERIM	<0.5
Dichloroethylene,1,2-cis-	µg/L	0.5	200	INTERIM	<0.5
Dichloroethylene,1,2-trans-	µg/L	0.5	200	INTERIM	<0.5
Dichloropropane,1,2-	µg/L	0.5	0.7	INTERIM	<0.5
Dichloropropene,1,3-cis-	µg/L	0.5			<0.5



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Dichloropropene,1,3-trans-	µg/L	0.5	7	INTERIM	<0.5
Ethylbenzene	µg/L	0.5	8	INTERIM	<0.5
Dichloromethane (Methylene Chloride)	µg/L	5	100	INTERIM	<5
Styrene	µg/L	0.5	4	INTERIM	<0.5
Tetrachloroethane,1,1,2,2-	µg/L	0.5	70	INTERIM	<0.5
Tetrachloroethylene	µg/L	0.5	50	INTERIM	<0.5
Toluene	µg/L	0.5	0.8, 0.8	INTERIM, PWQO	<0.5
Trichloroethane,1,1,1-	µg/L	0.5	10	INTERIM	<0.5
Trichloroethane,1,1,2-	µg/L	0.5	800	INTERIM	<0.5
Trichloroethylene	µg/L	0.5	20	INTERIM	<0.5
Trichlorofluoromethane (Freon 11)	µg/L	5			<5
Trimethylbenzene,1,3,5-	µg/L	0.1	3	INTERIM	<0.1
Vinyl Chloride	µg/L	0.2	600	INTERIM	<0.2
Xylene, m,p-	µg/L	1			<1
Xylene, m,p,o-	µg/L	1.1			<1.1
Xylene, o-	µg/L	0.5	40	INTERIM	<0.5
Oil & Grease (Total)	mg/L	1.0			1.7
Oil and Grease (Mineral)	mg/L	1.0			<1.0
Oil and Grease (Anim/Veg)	mg/L	1.0			1.4



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Acenaphthene	µg/L	0.05			<0.05
Acenaphthylene	µg/L	0.05			<0.05
Anthracene	µg/L	0.05	0.0008	PWQO	<0.05
Benzo[a]anthracene	µg/L	0.05	0.0004	INTERIM	<0.05
Benzo(a)pyrene	µg/L	0.01			<0.01
Benzo(b)fluoranthene	µg/L	0.05			<0.05
Benzo(b+k)fluoranthene	µg/L	0.1			<0.1
Benzo(g,h,i)perylene	µg/L	0.05	0.00002	INTERIM	<0.05
Benzo(k)fluoranthene	µg/L	0.05			<0.05
Butyl Benzyl Phthalate	µg/L	1	0.2	INTERIM	<1
Bis(2-Chloroethoxy)methane	µg/L	2			<2
Bis(2-ethylhexyl) Phthalate	µg/L	5			<5
Chrysene	µg/L	0.05	0.0001	INTERIM	<0.05
Dibenzo(a,h)anthracene	µg/L	0.05	0.002	INTERIM	<0.05
Di-n-Butyl Phthalate	µg/L	1	4	PWQO	<1
Dichlorophenol,2,4-	µg/L	0.2	0.2	PWQO	<0.2
Diethyl Phthalate	µg/L	1			<1
Di-n-Octyl Phthalate	µg/L	1	0.6	PWQO	<1
Fluoranthene	µg/L	0.05	0.0008	INTERIM	<0.05
Fluorene	µg/L	0.05	0.2	INTERIM	<0.05
Indeno(1,2,3,-cd)Pyrene	µg/L	0.05			<0.05



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Indole	µg/L	2			<2
Methylnaphthalene,1-	µg/L	0.05	2	INTERIM	<0.05
Methylnaphthalene,2-(1-)	µg/L	1			<1
Methylnaphthalene,2-	µg/L	0.05	2	INTERIM	<0.05
Naphthalene	µg/L	0.05	7	INTERIM	<0.05
Phenanthrene	µg/L	0.05	0.03	INTERIM	<0.05
Pyrene	µg/L	0.05			<0.05
Total PAH	µg/L	0.1			<0.1
Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
					-
Hexachlorobenzene	µg/L	0.01			<0.01



Michelle Dubien
Data Specialist

Subcontracted Analyses

Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-010898-1
				Date Collected	2024-Apr-19
Parameter	Units	R.L.	Limits		-
Formaldehyde	µg/L	-	0.8	INTERIM	<8
Nitrosodimethylamine (NDMA)	µg/L	-	15	INTERIM	<0.4
Nonylphenol Monoethoxylate	µg/L	-			<10
Nonylphenol Diethoxylate	µg/L	-			<10
Nonylphenols	µg/L	-	0.04	INTERIM	<1
Nonylphenol Ethoxylates	µg/L	-			<10

Revised to change guideline to PWQO

: PWQO Limits

INTERIM: Interim PWQO

PWQO: PWQO



Michelle Dubien
Data Specialist

Summary of Exceedances		
Interim PWQO		
BH106	Found Value	Limit
Phosphorus (Total)	8720	10
Cadmium (Total)	<5	0.1
Cobalt (Total)	<5	0.9
Copper (Total)	8	5
Lead (Total)	<20	1
Arsenic (Total)	27.5	5
Cadmium (Total)	1.12	0.1
Cobalt (Total)	103	0.9
Copper (Total)	301	5
Lead (Total)	76.8	1
Thallium (Total)	1.82	0.3
Uranium (Total)	11.4	5
Vanadium (Total)	327	6
Benzo[a]anthracene	<0.05	0.0004
Benzo(g,h,i)perylene	<0.05	0.00002
Butyl Benzyl Phthalate	<1	0.2
Chrysene	<0.05	0.0001
Dibenzo(a,h)anthracene	<0.05	0.002
Fluoranthene	<0.05	0.0008
Phenanthrene	<0.05	0.03
Formaldehyde	<8	0.8
Nonylphenols	<1	0.04
PWQO		
BH106	Found Value	Limit
Cadmium (Total)	<5	0.2
Silver (Total)	<5	0.1
Arsenic (Total)	27.5	5
Cadmium (Total)	1.12	0.2
Lead (Total)	76.8	5
Nickel (Total)	189	25
Silver (Total)	1.1	0.1
Thallium (Total)	1.82	0.3
Chromium (VI)	<10	1
Anthracene	<0.05	0.0008
Di-n-Octyl Phthalate	<1	0.6



Michelle Dubien
Data Specialist

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Michelle Dubien
Data Specialist



CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G 106721

REPORT No: 24-024417 - Rev. 0

Report To:

Cambium Environmental - Kingston
31 Hyperion Crt
Suite 102
Kingston, ON K7K 7G3

CADUCEON Environmental Laboratories
285 Dalton Ave
Kingston, ON K7K 6Z1

Attention: Natasha Augustine

DATE RECEIVED: 2024-Aug-10

CUSTOMER PROJECT: 17281-002

DATE REPORTED: 2024-Aug-16

P.O. NUMBER:

SAMPLE MATRIX: Ground Water

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
ICP/MS (Liquid)	1	OTTAWA	AOZKAYMAK	2024-Aug-13	D-ICPMS-01	EPA 200.8
ICP/OES (Liquid)	1	OTTAWA	APRUDYVUS	2024-Aug-14	D-ICP-01	SM 3120B
TSS (Liquid)	1	KINGSTON	DCASSIDY	2024-Aug-15	TSS-001	SM 2540D

R.L. = Reporting Limit

NC = Not Calculated

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

Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-024417-1
				Date Collected	2024-Aug-08
					-

Parameter	Units	R.L.	Limits		
Total Suspended Solids	mg/L	3			<3
Hardness (as CaCO ₃)	mg/L as CaCO ₃	0			380
Aluminum	µg/L	10	75	INTERIM	20
Boron	µg/L	5	200	INTERIM	62
Calcium	µg/L	20			107000
Iron	µg/L	5	300	PWQO	334
Magnesium	µg/L	20			27400
Tungsten	µg/L	10			<10
Zinc	µg/L	5	30	PWQO	<5
Zirconium	µg/L	3			<3

A handwritten signature in black ink that reads "M. Dubien".

Michelle Dubien
Data Specialist

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

Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-024417-1
				Date Collected	2024-Aug-08
					-
Antimony	µg/L	0.1	20, 5	INTERIM, PWQO	0.3
Arsenic	µg/L	0.1	5, 0.0	INTERIM, PWQO	1.0
Beryllium	µg/L	0.1	0.0, 11	INTERIM, PWQO	<0.1
Cadmium	µg/L	0.015	0.1, 0.2	INTERIM, PWQO	0.211
Chromium	µg/L	1.0			<1.0
Cobalt	µg/L	0.1			1.1
Copper	µg/L	0.1	5	INTERIM	5.4
Lead	µg/L	0.02	1, 5	INTERIM, PWQO	0.08
Molybdenum	µg/L	0.1	40	INTERIM	5.0
Nickel	µg/L	0.2	25	PWQO	3.8
Selenium	µg/L	1.00	100	PWQO	<1.00
Silver	µg/L	0.1	0.1	PWQO	<0.1
Thallium	µg/L	0.05	0.3, 0.3	INTERIM, PWQO	<0.05
Uranium	µg/L	0.05	5	INTERIM	4.68
Vanadium	µg/L	0.1	6	INTERIM	0.3

: PWQO Limits

INTERIM: Interim PWQO

PWQO: PWQO



Michelle Dubien
Data Specialist

Summary of Exceedances		
Interim PWQO		
BH106	Found Value	Limit
Cadmium	0.211	0.1
Copper	5.4	5
PWQO		
BH106	Found Value	Limit
Iron	334	300
Cadmium	0.211	0.2



Michelle Dubien
Data Specialist



CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G 106721

REPORT No: 24-024417 - Rev. 2

Report To:

Cambium Environmental - Kingston
 31 Hyperion Crt
 Suite 102
 Kingston, ON K7K 7G3

CADUCEON Environmental Laboratories
 285 Dalton Ave
 Kingston, ON K7K 6Z1

Attention: Natasha Augustine

DATE RECEIVED: 2024-Aug-10

CUSTOMER PROJECT: 17281-002

DATE REPORTED: 2024-Sep-05

P.O. NUMBER:

SAMPLE MATRIX: Ground Water

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
ICP/MS (Liquid)	1	OTTAWA	AOZKAYMAK	2024-Aug-13	D-ICPMS-01	EPA 200.8
ICP/OES (Liquid)	1	OTTAWA	APRUDYVUS	2024-Aug-14	D-ICP-01	SM 3120B
TSS (Liquid)	1	KINGSTON	DCASSIDY	2024-Aug-15	TSS-001	SM 2540D

R.L. = Reporting Limit

NC = Not Calculated

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

Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-024417-1
				Date Collected	2024-Aug-08
					-

Parameter	Units	R.L.	Limits		
Total Suspended Solids	mg/L	3	350, 15.0	SAN, STORM	<3
Hardness (as CaCO ₃)	mg/L as CaCO ₃	0.02			380
Aluminum	mg/L	0.01	50	SAN	0.02
Boron	mg/L	0.005	25	SAN	0.062
Calcium	mg/L	0.02			107
Iron	mg/L	0.005			0.334
Magnesium	mg/L	0.02			27.4
Phosphorus	mg/L	0.1			<0.1
Tungsten	mg/L	0.01			<0.01
Zinc	mg/L	0.005	3, 0.04	SAN, STORM	<0.005

A handwritten signature in black ink, appearing to read "Steve Garrett".

Steve Garrett
 Director of Laboratory Services

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Parameter	Units	R.L.	Limits	Client I.D.	BH106
				Sample I.D.	24-024417-1
				Date Collected	2024-Aug-08
					-
Zirconium	mg/L	0.003			<0.003
Antimony	mg/L	0.0001	5	SAN	0.0003
Arsenic	mg/L	0.0001	1, 0.02	SAN, STORM	0.0010
Beryllium	mg/L	0.0001			<0.0001
Cadmium	mg/L	0.000015	0.02, 0.008	SAN, STORM	0.000211
Chromium	mg/L	0.001	5, 0.08	SAN, STORM	<0.001
Cobalt	mg/L	0.0001	5	SAN	0.0011
Copper	mg/L	0.0001	3, 0.04	SAN, STORM	0.0054
Lead	mg/L	0.00002	5, 0.12	SAN, STORM	0.00008
Molybdenum	mg/L	0.0001	5	SAN	0.0050
Nickel	mg/L	0.0002	3, 0.08	SAN, STORM	0.0038
Selenium	mg/L	0.001	5, 0.02	SAN, STORM	<0.001
Silver	mg/L	0.0001	5, 0.12	SAN, STORM	<0.0001
Thallium	mg/L	0.00005			<0.00005
Uranium	mg/L	0.00005			0.00468
Vanadium	mg/L	0.0001	5	SAN	0.0003

Revised to add Phosphorous result by ICP

: City of Ottawa

SAN: Sanitary Sewer By Law

STORM: Storm Sewer By Law



Steve Garrett
Director of Laboratory Services



CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G 112298

REPORT No: 24-027621 - Rev. 0

Report To:

Cambium Environmental - Kingston
 31 Hyperion Crt
 Suite 102
 Kingston, ON K7K 7G3

CADUCEON Environmental Laboratories
 285 Dalton Ave
 Kingston, ON K7K 6Z1

Attention: Natasha Augustine

DATE RECEIVED: 2024-Sep-06

CUSTOMER PROJECT: 17281-002

DATE REPORTED: 2024-Sep-10

P.O. NUMBER:

SAMPLE MATRIX: Ground Water

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
TP & TKN (Liquid)	1	KINGSTON	YLIEN	2024-Sep-10	TPTKN-001	MECP E3516.2

R.L. = Reporting Limit

NC = Not Calculated

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

Client I.D.	Sample I.D.	Date Collected	Parameter	Phosphorus (Total)
			Units	mg/L
			R.L.	0.01
BH106	24-027621-1	2024-Sep-05		<0.01

A handwritten signature in black ink that reads "Steve Garrett".

Steve Garrett
 Director of Laboratory Services

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



CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G 132184

REPORT No: 25-015207 - Rev. 0

Report To:

Cambium Environmental - Kingston
 31 Hyperion Crt
 Suite 102
 Kingston, ON K7K 7G3

CADUCEON Environmental Laboratories
 2378 Holly Lane
 Ottawa, ON K1V 7P1

Attention: Kyle Horner

DATE RECEIVED: 2025-May-30 CUSTOMER PROJECT: 17281-001
 DATE REPORTED: 2025-Jun-06 P.O. NUMBER: 17281-001
 SAMPLE MATRIX: Ground Water

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Anions (Liquid)	2	OTTAWA	STAILLON	2025-Jun-02	A-IC-01	SM 4110B
Colour (Liquid)	2	OTTAWA	MMIRELLA	2025-Jun-04	A-COL-01	SM 2120C
Cond/pH/Alk Auto (Liquid)	2	OTTAWA	SBOUDREAU	2025-May-30	COND-02/PH-02/A LK-02	SM 2510B/4500H/ 2320B
Coliforms - DC Media (Liquid)	2	OTTAWA	AHIRSI	2025-May-30	ECTC-001	MECP E3407
DOC (Liquid)	2	OTTAWA	SLOZO	2025-Jun-02	C-OC-01	EPA 415.2
HPC Spread Plate (Liquid)	2	OTTAWA	SLOZO	2025-May-30	HPC-001	SM 9215D
Ion Balance (Calc)	2	OTTAWA	ASCHNEIDER		CP-028	MECP E3196
ICP/MS (Liquid)	2	OTTAWA	TPRICE	2025-Jun-03	D-ICPMS-01	EPA 200.8
ICP/OES (Liquid)	2	OTTAWA	GFENTON	2025-Jun-02	D-ICP-01	SM 3120B
Ammonia (Liquid)	2	KINGSTON	DCASSIDY	2025-Jun-06	NH3-001	SM 4500NH3
Phenols (Liquid)	2	KINGSTON	MCLOSS	2025-Jun-03	PHEN-01	MECP E3179
Sulphide (Liquid)	2	KINGSTON	MWILSON	2025-Jun-02	H2S-001	SM 4500-S2
Tannins (Liquid)	2	KINGSTON	MWILSON	2025-Jun-03	TAN-001	SM 5550
TP & TKN (Liquid)	2	KINGSTON	YLIEN	2025-Jun-06	TPTKN-001	MECP E3516.2
Turbidity (Liquid)	2	OTTAWA	MMIRELLA	2025-May-30	A-TURB-01	SM 2130B
VOC-Volatiles Full (Water)	2	RICHMOND_HILL	FLENA	2025-Jun-04	C-VOC-02	EPA 8260

R.L. = Reporting Limit

NC = Not Calculated

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

Michelle Dubien
 Data Specialist

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

Parameter	Units	R.L.	Limits	Client I.D. Sample I.D. Date Collected DWG	TW1-1	TW1-2
					25-015207-1	25-015207-2
					2025-May-29	2025-May-29
					-	-
Total Coliform (DC Media)	CFU/100mL	1	0	MAC	0	0
E coli (DC Media)	CFU/100mL	1	0	MAC	0	0
Background (DC Media)	CFU/100mL	1			55	37
Heterotrophic Plate Count	CFU/1mL	2			<2	<2
Alkalinity(CaCO ₃) to pH4.5	mg/L	5	500	OG	241	244
TDS (Calc. from Cond.)	mg/L	3	500	AO	495	503
Conductivity @25°C	uS/cm	1			932	946
pH @25°C	pH units	-	8.5	OG	7.98	7.95
Colour	TCU	2	5	AO	3	2
Turbidity	NTU	0.1	5	AO	8.4	3.4
Fluoride	mg/L	0.1	1.5	MAC	<0.1	<0.1
Chloride	mg/L	0.5	250	AO	125	132
Nitrate (N)	mg/L	0.05	10.0	MAC	<0.05	<0.05
Nitrite (N)	mg/L	0.05	1.0	MAC	<0.05	<0.05
Sulphate	mg/L	1	500	AO	64	65
Total Kjeldahl Nitrogen	mg/L	0.1			0.2	0.2
Ammonia (N)-Total (NH ₃ +NH ₄)	mg/L	0.05			0.08	0.08
Dissolved Organic Carbon	mg/L	0.8	5	AO	1.3	1.2
Tannin & Lignin	mg/L	0.5			<0.5	<0.5
Sulphide	mg/L	0.01	0.05	AO	<0.01	<0.01
Phenolics	mg/L	0.001			<0.001	<0.001



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Parameter	Units	R.L.	Limits	Client I.D. Sample I.D. Date Collected DWG	TW1-1	TW1-2
					25-015207-1	25-015207-2
					2025-May-29	2025-May-29
					-	-
Hardness (as CaCO ₃)	mg/L as CaCO ₃	0.02	100	OG	389	394
Aluminum	mg/L	0.01	0.1	OG	0.02	0.03
Barium	mg/L	0.001	1	MAC	0.825	0.839
Boron	mg/L	0.005	5	MAC	0.025	0.025
Calcium	mg/L	0.02			100	101
Iron	mg/L	0.005	0.3	AO	0.205	0.326
Magnesium	mg/L	0.02			33.8	34.2
Manganese	mg/L	0.001	0.05	AO	0.030	0.025
Potassium	mg/L	0.1			2.7	2.7
Sodium	mg/L	0.2	200, 20, 20	AO, WL, MAC	38.9	40.0
Strontium	mg/L	0.001			0.393	0.399
Zinc	mg/L	0.005	5	AO	<0.005	<0.005
Antimony	mg/L	0.0001	0.006	MAC	<0.0001	<0.0001
Arsenic	mg/L	0.0001	0.01	MAC	<0.0001	<0.0001
Beryllium	mg/L	0.0001			<0.0001	<0.0001
Cadmium	mg/L	0.000015	0.005	MAC	<0.000015	<0.000015
Chromium	mg/L	0.001	0.05	MAC	<0.001	<0.001
Cobalt	mg/L	0.0001			0.0001	0.0001
Copper	mg/L	0.0001	1	AO	0.0005	0.0008
Lead	mg/L	0.00002	0.010	MAC	0.00002	0.00002
Molybdenum	mg/L	0.0001			0.0008	0.0008



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Data Specialist

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Parameter	Units	R.L.	Limits	DWG	Client I.D.	TW1-1	TW1-2
					Sample I.D.	25-015207-1	25-015207-2
					Date Collected	2025-May-29	2025-May-29
					DWG	-	-
Nickel	mg/L	0.0002				0.0007	0.0007
Selenium	mg/L	0.001	0.05	MAC	<0.001	<0.001	
Silver	mg/L	0.0001			<0.0001	<0.0001	
Thallium	mg/L	0.00005			<0.00005	<0.00005	
Uranium	mg/L	0.00005	0.02	MAC	0.00035	0.00036	
Vanadium	mg/L	0.0001			<0.0001	<0.0001	
Anion Sum	meq/L	-			9.70	9.96	
Cation Sum	meq/L	-			9.56	9.71	
% Difference	%	-			0.707	1.28	
TDS (Ion Sum Calc)	mg/L	1	500	AO	510	522	
Conductivity Calc	µmho/cm	-			944	964	
pH (Client Data)	pH units	-			7.33	7.42	
Temperature (Client Data)	°C	-			11.6	11.8	



Michelle Dubien
Data Specialist

Parameter	Units	R.L.	Limits	DWG	Client I.D.	TW1-1	TW1-2
					Sample I.D.	25-015207-1	25-015207-2
					Date Collected	2025-May-29	2025-May-29
					DWG	-	-
Acetone	µg/L	30				<30	<30
Benzene	µg/L	0.5	1	MAC		<0.5	<0.5
Bromodichloromethane	µg/L	2				<2	<2
Bromoform	µg/L	5				<5	<5
Bromomethane	µg/L	0.5				<0.5	<0.5
Carbon Tetrachloride	µg/L	0.2	2	MAC		<0.2	<0.2
Chlorobenzene	µg/L	0.5	80, 30	MAC, AO		<0.5	<0.5
Chloroform	µg/L	1				<1	<1
Dibromochloromethane	µg/L	2				<2	<2
Ethylene Dibromide	µg/L	0.2				<0.2	<0.2
Dichlorobenzene,1,2-	µg/L	0.5	200, 3	MAC, AO		<0.5	<0.5
Dichlorobenzene,1,3-	µg/L	0.5				<0.5	<0.5
Dichlorobenzene,1,4-	µg/L	0.5	5, 1	MAC, AO		<0.5	<0.5
Dichlorodifluoromethane (Freon 12)	µg/L	2				<2	<2
Dichloroethane,1,1-	µg/L	0.5				<0.5	<0.5
Dichloroethane,1,2-	µg/L	0.5	5	MAC		<0.5	<0.5
Dichloroethylene,1,1-	µg/L	0.5	14	MAC		<0.5	<0.5
Dichloroethylene,1,2-cis-	µg/L	0.5				<0.5	<0.5
Dichloroethylene,1,2-cis+trans-	µg/L	0.7				<0.7	<0.7
Dichloroethylene,1,2-trans-	µg/L	0.5				<0.5	<0.5
Dichloropropane,1,2-	µg/L	0.5				<0.5	<0.5



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Parameter	Units	R.L.	Limits	Client I.D. Sample I.D. Date Collected DWG	TW1-1	TW1-2
					25-015207-1	25-015207-2
					2025-May-29	2025-May-29
					-	-
Dichloropropene,1,3-cis-	µg/L	0.5			<0.5	<0.5
Dichloropropene,1,3-cis+trans-(Calculated)	µg/L	0.5			<0.5	<0.5
Dichloropropene,1,3-trans-	µg/L	0.5			<0.5	<0.5
Ethylbenzene	µg/L	0.5	140, 1.6	MAC, AO	<0.5	<0.5
Hexane	µg/L	5			<5	<5
Dichloromethane (Methylene Chloride)	µg/L	5	50	MAC	<5	<5
Methyl Ethyl Ketone	µg/L	2			<2	<2
Methyl Isobutyl Ketone	µg/L	20			<20	<20
Methyl tert-Butyl Ether (MTBE)	µg/L	2			<2	<2
Styrene	µg/L	0.5			<0.5	<0.5
Tetrachloroethane,1,1,1,2-	µg/L	0.5			<0.5	<0.5
Tetrachloroethane,1,1,2,2-	µg/L	0.5			<0.5	<0.5
Tetrachloroethylene	µg/L	0.5	10	MAC	<0.5	<0.5
Toluene	µg/L	0.5	60	MAC	<0.5	<0.5
Trichloroethane,1,1,1-	µg/L	0.5			<0.5	<0.5
Trichloroethane,1,1,2-	µg/L	0.5			<0.5	<0.5
Trichloroethylene	µg/L	0.5	5	MAC	<0.5	<0.5
Trichlorofluoromethane (Freon 11)	µg/L	5			<5	<5
Vinyl Chloride	µg/L	0.2	1	MAC	<0.2	<0.2
Xylene, m,p-	µg/L	1			<1	<1
Xylene, m,p,o-	µg/L	1.1	90, 20	MAC, AO	<1.1	<1.1



Michelle Dubien
Data Specialist

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Parameter	Units	R.L.	Limits	Client I.D.	TW1-1	TW1-2
				Sample I.D.	25-015207-1	25-015207-2
				Date Collected	2025-May-29	2025-May-29
				DWG	-	-
Xylene, o-	µg/L	0.5			<0.5	<0.5

DWG - Drinking Water Guidelines

ODWS - Ontario Drinking Water Standards

AO - Aesthetic Objectives

IMAC - Interim Maximum Acceptable Concentration

MAC - Maximum Acceptable Concentration

ODWO - D-5-5 Objective

OG - Operational Guidelines

WL - Warning Level - Sodium Restricted Diets

Summary of Exceedances		
Aesthetic Objectives		
TW1-1	Found Value	Limit
Turbidity	8.4	5
TDS (Ion Sum Calc)	510	500
TW1-2	Found Value	Limit
TDS (Calc. from Cond.)	503	500
Iron	0.326	0.3
TDS (Ion Sum Calc)	522	500
Maximum Acceptable Concentration		
TW1-1	Found Value	Limit
Sodium	38.9	20
TW1-2	Found Value	Limit
Sodium	40.0	20
Operational Guidelines		
TW1-1	Found Value	Limit
Hardness (as CaCO ₃)	389	100
TW1-2	Found Value	Limit
Hardness (as CaCO ₃)	394	100
Warning Level - Sodium Restricted Diets		
TW1-1	Found Value	Limit
Sodium	38.9	20
TW1-2	Found Value	Limit
Sodium	40.0	20



Michelle Dubien
Data Specialist



Appendix F

Single Well Hydraulic Test Results

**Slug Test Analysis Report**

Project: Hydrogeological Assessment

Number: 17281-002

Client: Cassidy EW Construction Consultant Ltd.

Location: 1386 & 1394 Greely Lane

Slug Test: BH105 - Slug Test 1

Test Well: BH105-23

Test Conducted by: MC

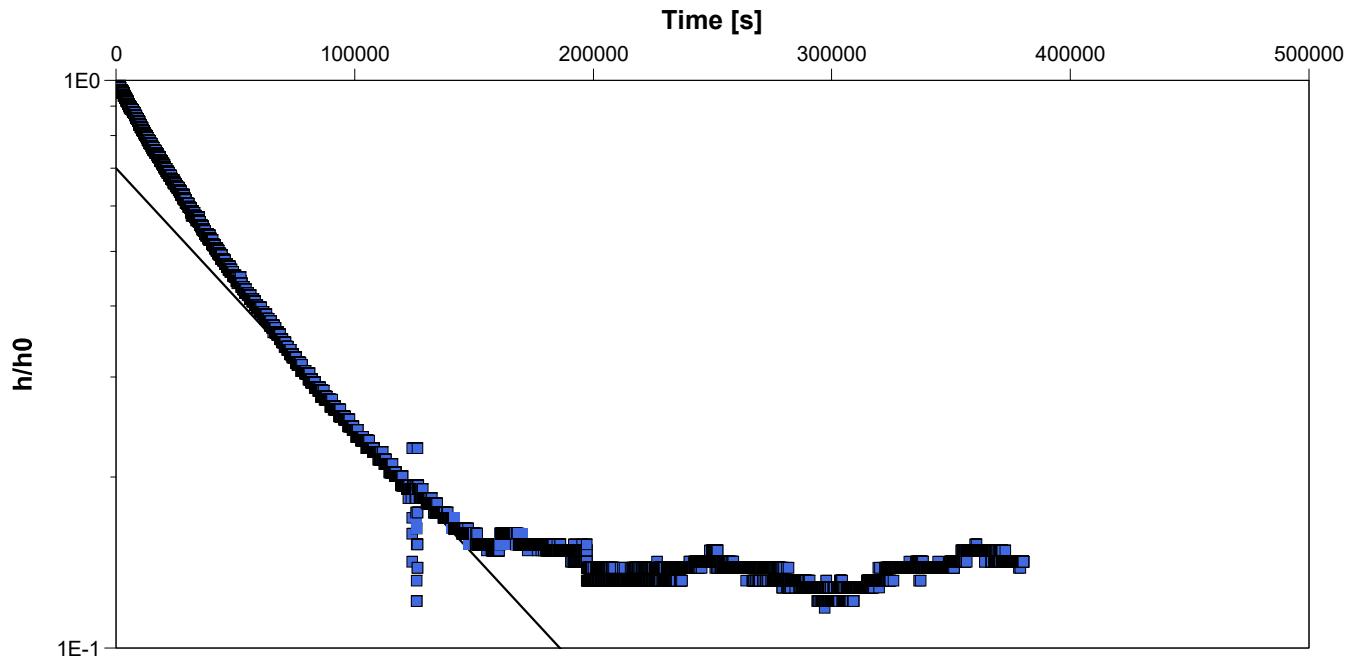
Test Date: 4/19/2024

Analysis Performed by: NA

Hvorslev

Analysis Date: 7/11/2024

Aquifer Thickness: 2.62 m



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]
BH105-23	6.35×10^{-9}



CAMBIUM

Slug Test Analysis Report

Project: Hydrogeological Assessment

Number: 17281-002

Client: Cassidy EW Construction Consultant Ltd.

Location: 1386 & 1394 Greely Lane

Slug Test: BH105 - Slug Test 2

Test Well: BH105-23

Test Conducted by: MC

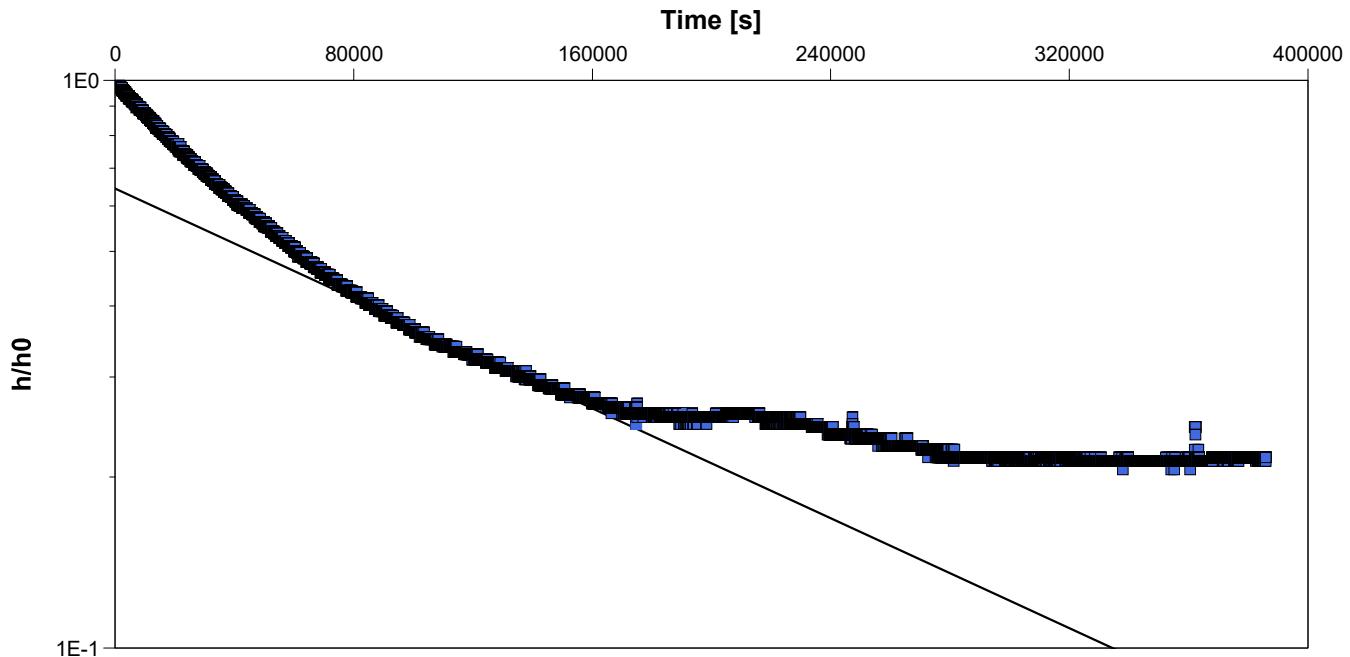
Test Date: 4/19/2024

Analysis Performed by: NA

Hvorslev

Analysis Date: 7/11/2024

Aquifer Thickness: 2.62 m



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
BH105-23	3.38×10^{-9}	

**Slug Test Analysis Report**

Project: Hydrogeological Assessment

Number: 17281-002

Client: Cassidy EW Construction Consultant Ltd.

Location: 1386 & 1394 Greely Lane

Slug Test: BH106 - Slug Test 1

Test Well: BH106-23

Test Conducted by: MC

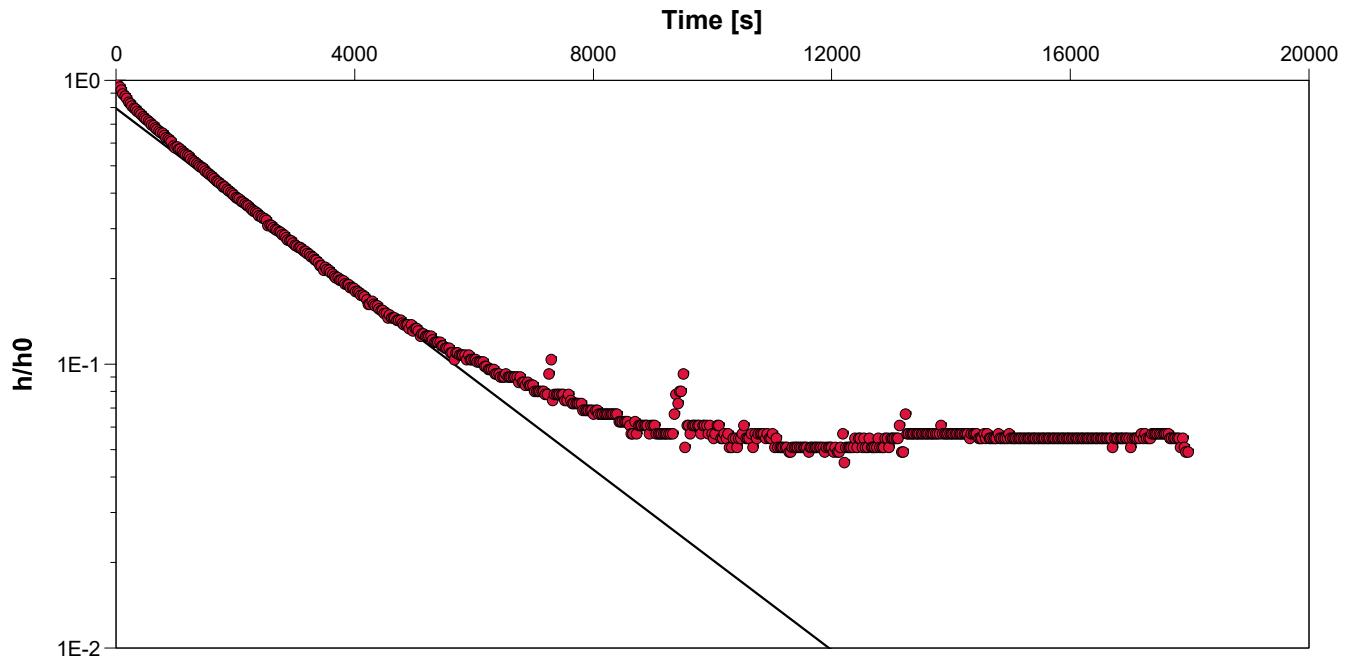
Test Date: 4/19/2024

Analysis Performed by: NA

Hvorslev

Analysis Date: 7/11/2024

Aquifer Thickness: 2.46 m



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]
BH106-23	2.22×10^{-7}



CAMBIUM

Slug Test Analysis Report

Project: Hydrogeological Assessment

Number: 17281-002

Client: Cassidy EW Construction Consultant Ltd.

Location: 1386 & 1394 Greely Lane

Slug Test: BH106 - Slug Test 2

Test Well: BH106-23

Test Conducted by: MC

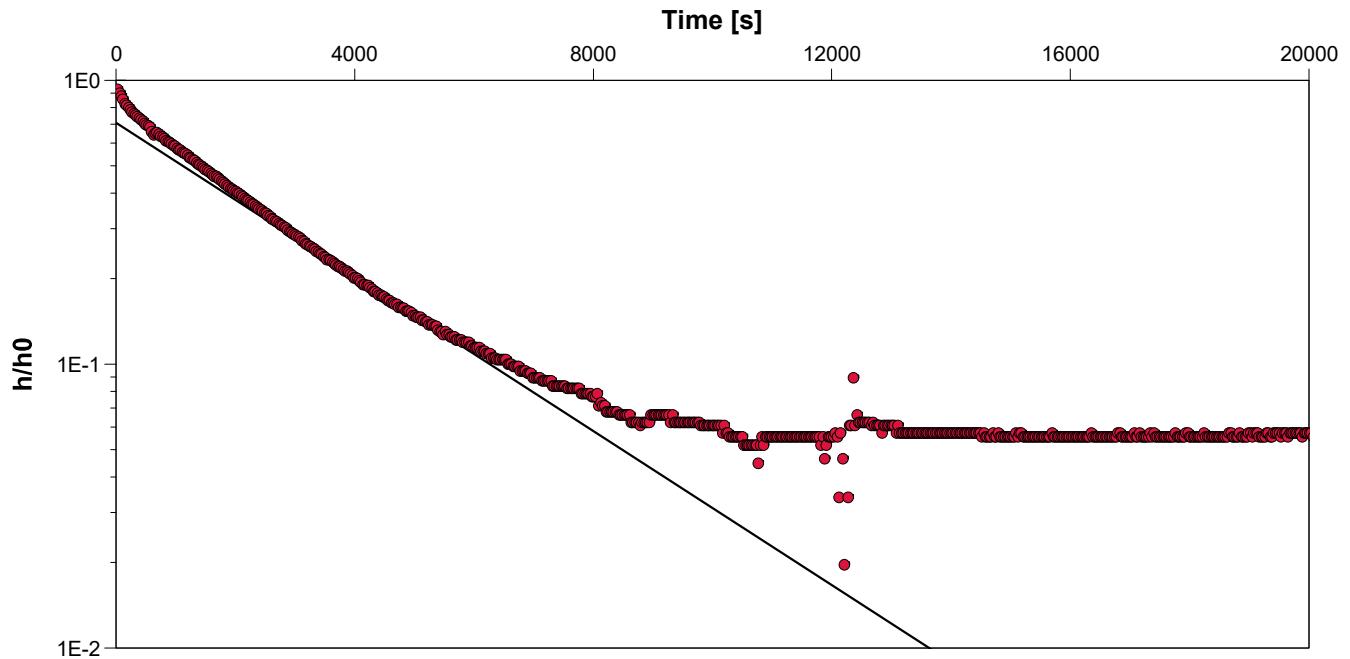
Test Date: 4/19/2024

Analysis Performed by: NA

Hvorslev

Analysis Date: 7/11/2024

Aquifer Thickness: 2.46 m



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]
BH106-23	1.90×10^{-7}



CAMBIUM

Slug Test Analysis Report

Project: Hydrogeological Assessment

Number: 17281-002

Client: Cassidy EW Construction Consultant Ltd.

Location: 1386 & 1394 Greely Lane

Slug Test: BH106 - Slug Test 3

Test Well: BH106-23

Test Conducted by: MC

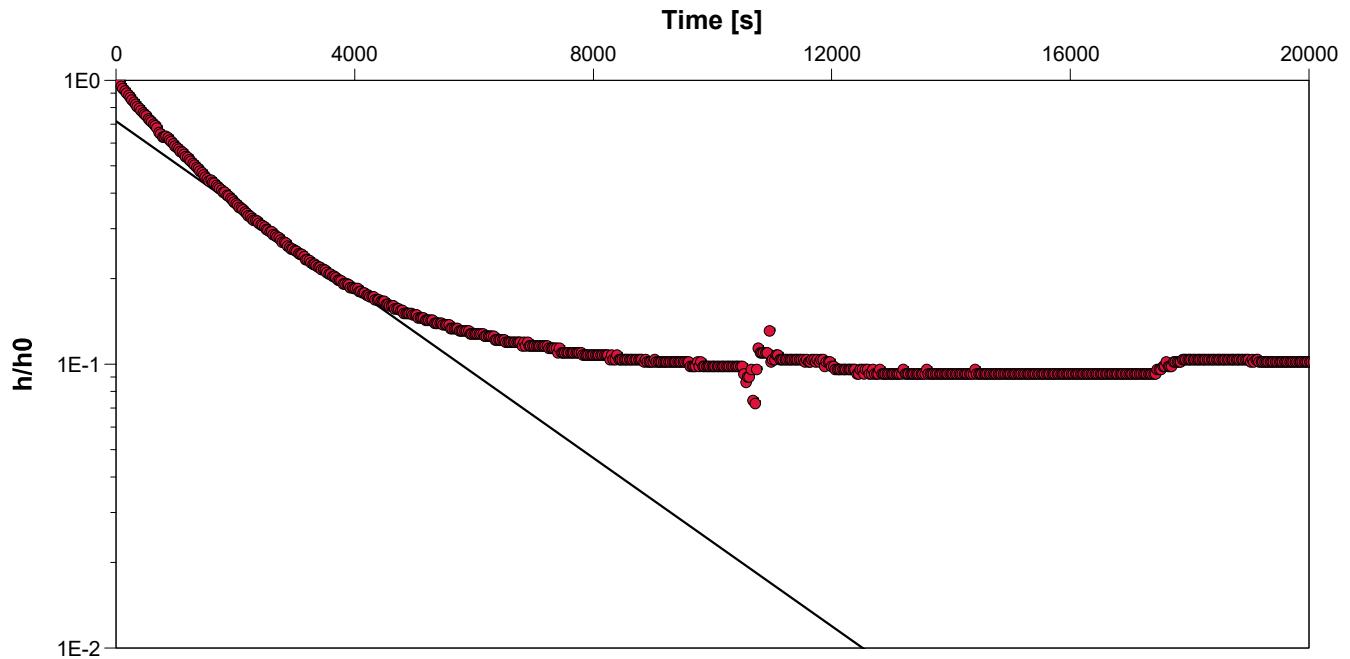
Test Date: 4/19/2024

Analysis Performed by: NA

Hvorslev

Analysis Date: 7/11/2024

Aquifer Thickness: 2.46 m



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]
BH106-23	2.07×10^{-7}

**Slug Test Analysis Report**

Project: Hydrogeological Assessment

Number: 17281-002

Client: Cassidy EW Construction Consultant Ltd.

Location: 1386 & 1394 Greely Lane

Slug Test: BH107 - Slug Test 1

Test Well: BH107-23

Test Conducted by: MC

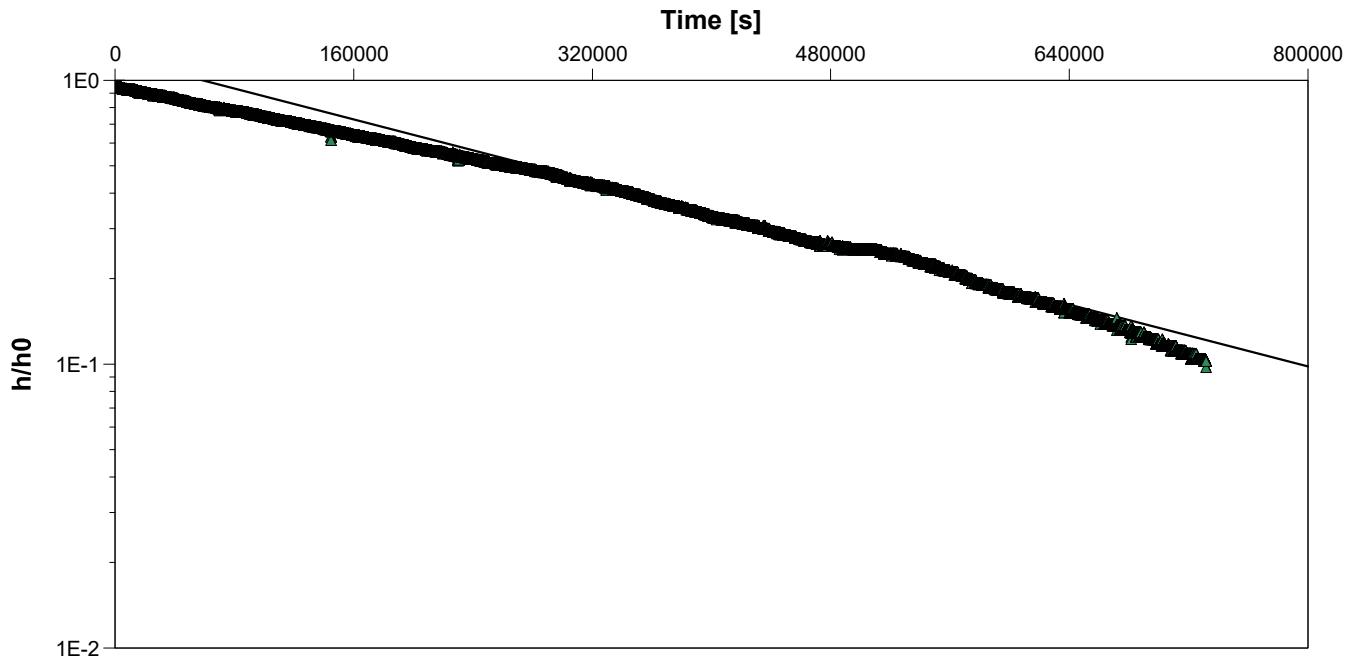
Test Date: 4/19/2024

Analysis Performed by: NA

Hvorslev

Analysis Date: 7/11/2024

Aquifer Thickness: 2.89 m



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
BH107-23	1.90×10^{-9}	



Appendix G

Dewatering Calculations



DEWATERING CALCULATIONS - CONSTRUCTION PHASE

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)	Drawdown (s)	R	$r_w = b/2$	R_o	$\ln(R_o/r_w)$	$L = R_o/2$	H	$h = H-s$	Q_{ends}	Q_{trench}	Q _{total}		
		mbgs	mbgs	mbgs	m	m	m/s	m	m	m	m	-	m	m	m	m^3/s	m^3/s	m^3/s	L/s	L/d
Elongated Trench @ 50 m Increments	Minimum K	0.30	2.50	3.60	50	2	1.90E-09	2.20	0.29	1.00	1.29	0.25	0.64	3.30	1.10	0.000000	0.000001	0.000002	0.002	143
	Maximum K	0.30	2.50	3.60	50	2	2.06E-07	2.20	2.99	1.00	3.99	1.39	2.00	3.30	1.10	0.000005	0.000050	0.000054	0.05	4,702
	Geometric mean K	0.30	2.50	3.60	50	2	1.22E-08	2.20	0.73	1.00	1.73	0.55	0.86	3.30	1.10	0.000001	0.000007	0.000008	0.01	648

s = target drawdown (initial - target depth to groundwater) (m)

R_o = radius of influence of construction dewatering/pumping, from center of excavation (m)

L = distance to line source (m)

r_s = equivalent single well radius (m)

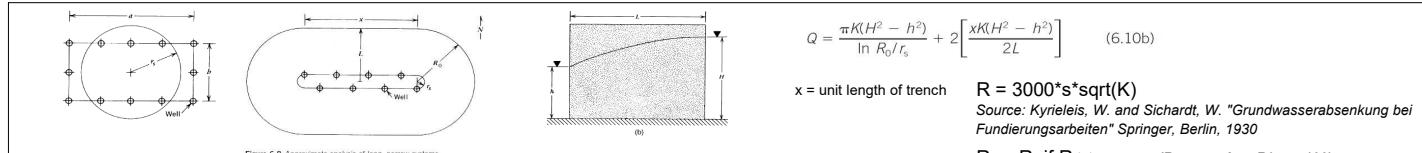
H = Initial hydraulic head in aquifer (m)

h = hydraulic head at radius of well (m)

Q = construction dewatering rate (m^3/s)

*For base of aquifer, use target depth to groundwater plus 50% of target drawdown (s), unless specific geological conditions dictate otherwise.

For practical use, R is presented as zone of influence for reporting purposes, with the distance defined from edge of excavation.



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

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

$R_o = R$, if $R >> r_s$ ($R >> rs$ when $R/r_s > 100$)
 else, $R_o = R + r_s$

Source: Cashman and Preene. "Groundwater Lowering in Construction." (2013)



DEWATERING CALCULATIONS - OPERATIONAL PHASE

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

Excavation Area		Initial Depth to Groundwater	Target Depth to Groundwater	Depth to Base of Aquifer*	Excavation Length (a)	Excavation Width (b)	Hydraulic Conductivity (K)	Drawdown (s)	R	$r_w = \sqrt{ab/\pi}$	R_o	$\ln(R_o/r_w)$	H	$h_w = H-s$	Q _{total}		
		mbgs	mbgs	mbgs	m	m	m/s	m	m	m	m	-	m	m	m^3/s	L/s	L/d
Rectangular excavation with dimensions axb	Minimum K	0.30	1.50	3.60	23	55	1.9E-09	1.20	0.16	20.07	20.22	0.01	3.30	2.10	0.000005	0.005	429
	Maximum K	0.30	1.50	3.60	23	55	2.1E-07	1.20	1.63	20.07	21.70	0.08	3.30	2.10	0.000054	0.05	4,628
	Geometric mean K	0.30	1.50	3.60	23	55	1.2E-08	1.20	0.40	20.07	20.46	0.02	3.30	2.10	0.000013	0.01	1,093

s = target drawdown (initial - target depth to groundwater) (m)

R_o = radius of influence of construction dewatering/pumping, from center of excavation (m)

r_s = equivalent single well radius (m)

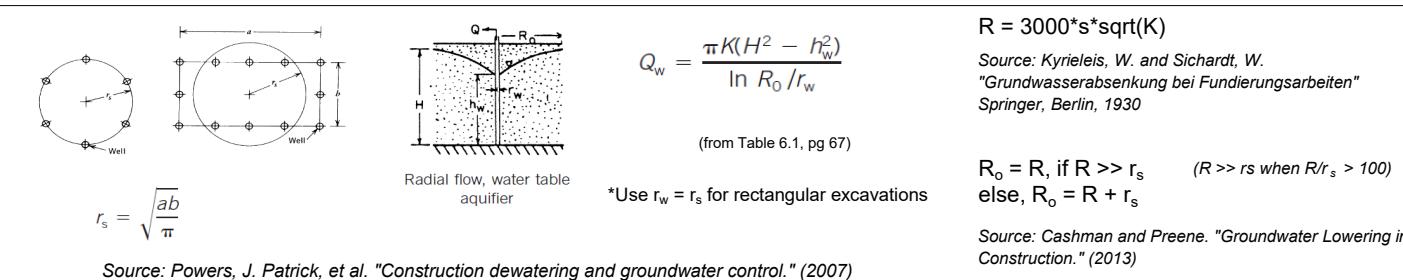
H = Initial hydraulic head in aquifer (m)

h = hydraulic head at radius of well (m)

Q = construction dewatering rate (m^3/s)

*For base of aquifer, use target depth to groundwater plus 50% of target drawdown (s), unless specific geological conditions dictate otherwise.

For practical use, R is presented as zone of influence for reporting purposes, with the distance defined from edge of excavation.





Appendix H

Hydraulic Pumping Test Results



PUMPING TEST DATA SHEET

CAMBIUM

Page 1 of 1

Project Name: Greely Lane
 Project Number: 17
 Date: May 29, 2025

Staff: Markett
 Contractor: Air Rock Drilling
 Weather: Raining, 15°C

Well Name: TW1
 Depth of Pump: -165-170ft
 Distance to Pump Well: —
 Static Level: 2.34 mbglp
 Start Time: 8:03

Diameter: 6'
 Stick up: —
 MP Elevation: —
 Geological Unit: —
 End Time: 16:03

Time	Elapsed Time	Water Level	Draw Down	Recovery	Discharge Volume	Rate Change	Comments & Observations
	0:30	2.50					
	1:00	2.48					
*	1:30	2.48					
*	3:30	2.505					* talking w/ driller
	4:00	2.50					
	4:30	2.50					
	5:00	2.50					
	6:00	2.50					
	7:00	2.50					
	8:00	2.50					
	9:00	2.50					
	10:00	2.50					
	12:00	2.50					
	14:00	2.50					
	15:00	Rate change				10 g/min	
	16:00	2.54					
	16:30	2.55					
	17:00	2.56					
	17:30	2.55					
	18:00	2.54					
	19:00	2.535					
	19:30	2.53					
	20:00	2.53					
	21:00	2.56					
	21:00	2.54					
	22:00	2.52					
	23:00	2.52					
	24:00	2.51					
	25:00	2.51					
	1:00:00	2.51					
	1:30:00	2.51					
	2:00:00	2.50					
	2:30:00	2.49					
	3:00:00	2.49					
	3:30:00	2.49					
	4:00:00	2.49					
	4:30:00	2.49					
	5:00:00	2.45					



PUMPING TEST DATA SHEET

CAMBRIUM

Page ___ of ___



CAMBIVM
Guiding Good Decisions

Project: 17281-001

Subject: Greely Lane P-Test - MW1 and gen chem

Date: May 29, 2025

Staff: M. Latt

Contact:

MW1 Wk2

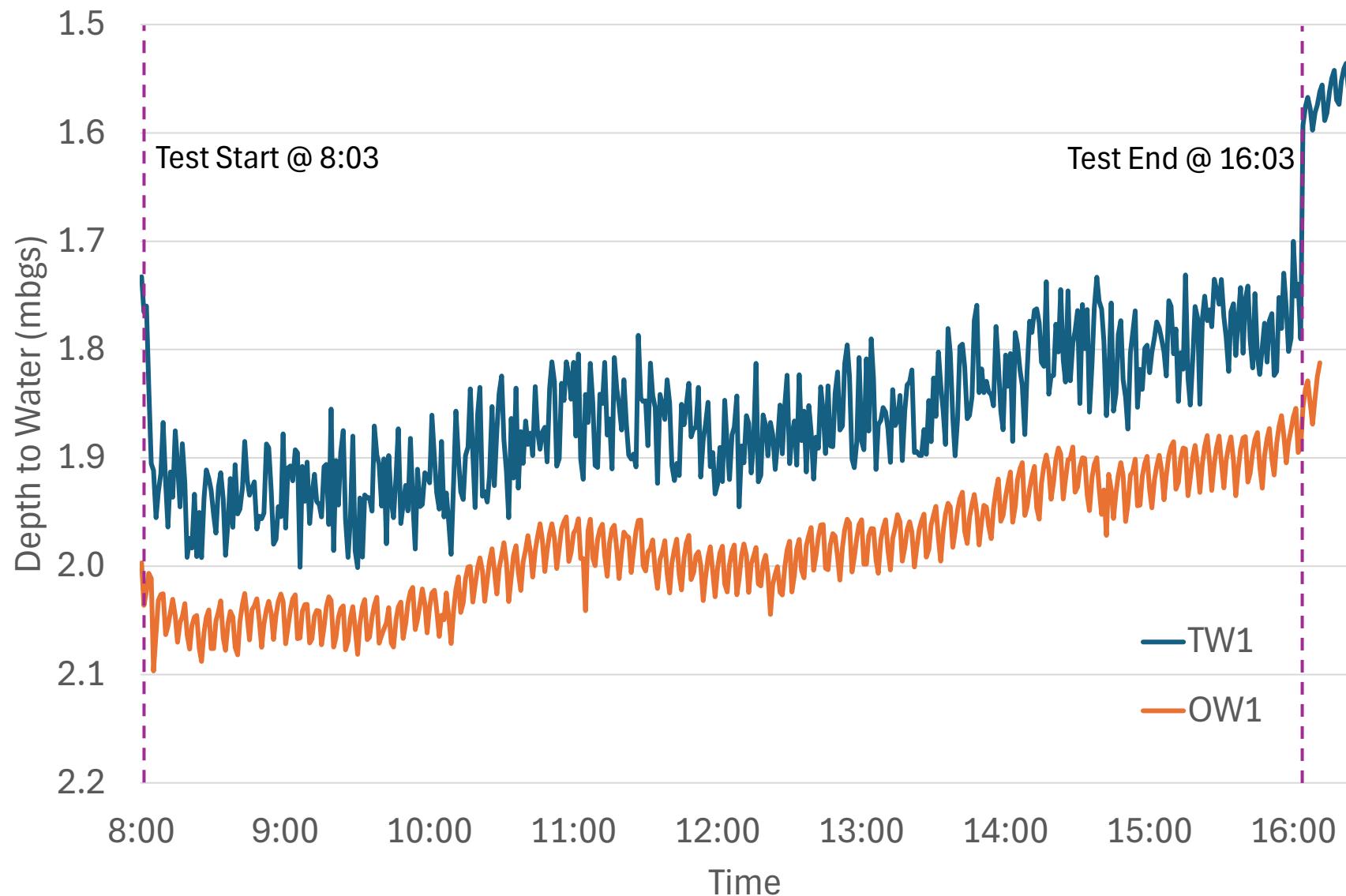
test hr	WT mbpp
Pre	2.28
1	2.28
2	2.28
3	2.28
4	2.21
5	2.19
6	2.16
7	2.12
Post	2.09

TWL gen. Chem

test hr	temp (C)	DO (mg/l)	Cond (mg/l)	pH	ORP (mV)	(FTW)	Turb.	Chlare	Comments
1	11.2	1.69	663	7.37	-9.4	4.44	0.00	0.00	
2	11.5	1.82	669	7.34	-9.4	5.89	0.00	0.00	
3	11.6	1.99	682	7.33	-9.3	7.05	0.00	0.00	Sampled TWL-1
4	11.4	1.94	684	7.31	-9.6	5.21	0.00	0.00	
5	11.3	1.92	688	7.32	-9.8	5.95	0.00	0.00	
6	11.7	1.92	690	7.36	-29.2	2.83	0.00	0.00	
7	11.8	1.91	691	7.48	-46.1	2.62	0.00	0.00	Sampled TWL-2

test hr	Colour	Odour	Clarity	Sheen
1	none	None	Clear	None
2				
3				
4				
5				
6				
7				

Measured Water Levels for TW1 Pumping Test



TW1 Pumping Test

Prepared By:

Cambium Inc

Project:

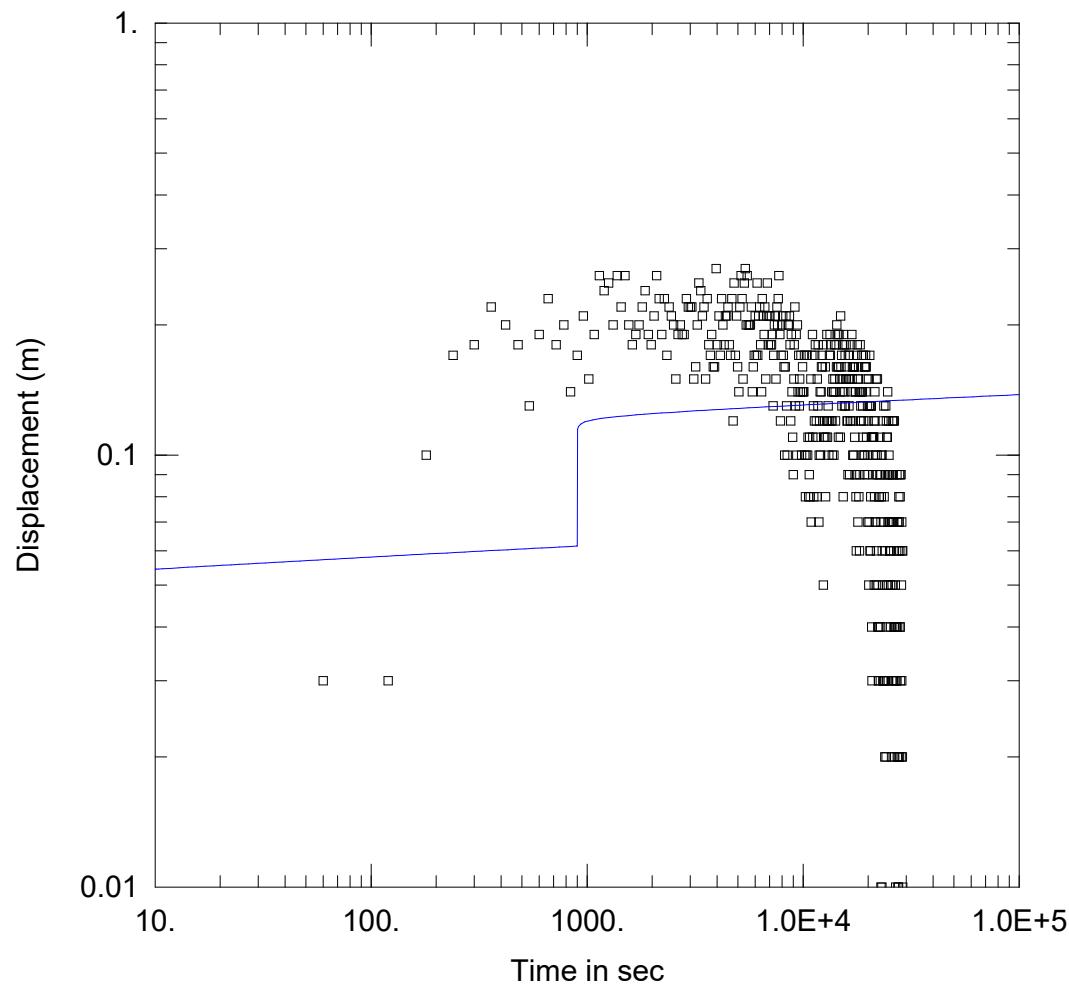
17281-002

Prepared For:

Cassidy E.W. Construction

Location:

Greely Lane, Ottawa



Data Set:

Date: 06/17/25

Time: 11:22:56

SOLUTION

Aquifer Model: Confined
 Solution Method: Theis

$T = 0.9563 \text{ m}^2/\text{sec}$
 $S = 1.0E-10$
 $Kz/Kr = 1.$
 $b = 10. \text{ m}$

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
TW1	0	0

Observation Wells

Well Name	X (m)	Y (m)
TW1	0	0



Appendix I

Water Balance Calculations and Nitrate Assessment



Water Balance Calculations



Nitrate Attenuation

Calculations for Rural Developments

Input Data		Computed Values	
<u>Areas</u>		<u>LOT #1</u>	
LOT AREA (m ²)	1171	<u>Total</u>	
<u>Surplus water</u>		<u>Infiltration Factor</u>	
0.397 m/yr		Flat	0.3
1.09E-03 m/day		Loam	0.3
1.273338 m ³ /day		Cultivated land	0.1
		Total	0.7
<u>Infiltrated water</u>		<u>Captured Runoff</u>	
0.000761 m/day		WB deficit	555 m ³ /yr 1.52054795 m ³ /day
0.891337 m ³ /day	Runoff	0.382 m ³ /day	Min infiltration 240 m ³ /yr 0.65753425 m ³ /day

PREDICTED NITRATE CONCENTRATIONS

Waterloo Biofilter
System (80.3% Nitrate
Reduction)

Q _e	1800			
C _e	7.88			
Q _i	891.34			
C _i	0.1			
Q _t	2691.34			
mg/L	5.3			



Hydrogeological Assessment Report 1386 & 1394 Greely Lane, Ottawa, Ontario
Cassidy EW Construction Consultant Ltd.
Cambium Reference: 17281-002
July 25, 2025

Appendix J

Waterloo Biofilter Supporting Documentation



WaterNOx-LS Third Party Testing Summary

In the fall of 2016, Waterloo Biofilter Systems Inc. installed their WaterNOx-LS™ denitrification unit at the Bureau de Normalisation du Quebec (BNQ) test site located in Quebec City. The system underwent BNQ 3680-600 test protocol which includes two parts - Period A and Period B. Period A is based on the methodology of NSF/ANSI Standards 40 and 245, containing the same flow patterns and stress tests. Period B provides for a further 6 months of seasonal reliability testing to ensure that the test includes cold weather results.

The WaterNOx-LS is a passive autotrophic denitrification process using sulphur-limestone minerals in a submerged, up-flow configuration. The WaterNOx-LS, which was sized for 1,600 L/day (350 gpd) followed a Waterloo Biofilter nitrifying treatment unit.

Period A Test Results

During Period A wastewater is dosed according to the hydraulic loading specified in NSF-40. Period A includes the wash-day, working-parent, power failure, and vacation period stress tests. All sample results taken during stress tests are included in the analysis. Influent wastewater temperature values ranged from 10.0 °C (50 °F) to 16.5 °C (62 °F) with an average value of 13.3 °C (56 °F). Influent pH averaged 7.9 and effluent pH averaged 7.2.

Table 1 – Period A Results for the WaterNOx-LS

Parameters	Influent	Effluent	Removal
(c)BOD ₅	260	6	97.6%
TSS	312	3	99.2%
Fecal Coliforms	2,403,000	4,900	99.8%
NO _{2,3}	0.08	0.20	
TKN	57.1	4.6	92.0%
TN	57.1	4.8	91.6%

n = 123; n = 357 for fecals

All parameters in mg/L except Fecal Coliforms in cfu/100mL

All values arithmetic averages except Fecal Coliforms in geometric average

Weekly influent total nitrogen concentrations ranged from 43.0 mg/L to 68.8 mg/L with a six-month average concentration of 57.1 mg/L.

Weekly effluent NO_{2,3} concentrations ranged from < 0.02 mg/L to 3.33 mg/L with a six-month average of 0.20 mg/L. Weekly effluent TKN concentrations ranged from 1.5 mg/L to 16.9 mg/L with a six-month average of 4.6 mg/L. Weekly effluent total nitrogen concentrations ranged from 1.7 mg/L to 17.1 mg/L with a six-month average of 4.8 mg/L. The total nitrogen reduction over the six-month period was 91.6%.



Period B Test Results

Weekday hydraulic loading is modified during Period B to a strenuous 'working parent' schedule where 40% of the flow is delivered over three hours in the morning, and 60% is delivered over three hours in the evening. All samples taken during Period B are included in the analysis. Influent wastewater temperature values ranged from 10.1 °C (50 °F) to 15.8 °C (60 °F) with an average value of 12.3 °C (54 °F). Influent pH averaged 8.0 and effluent pH averaged 7.1.

Table 2 – Period B Results for the WaterNOx-LS

Parameters	Influent	Effluent	Removal
(c)BOD ₅	248	4	98.2%
TSS	304	3	99.1%
Fecal Coliforms	2,142,000	2,800	99.9%
NO _{2,3}	0.17	3.38	
TKN	60.3	8.5	85.9%
TN	60.4	11.9	80.3%

n = 59 except Fecal Coliforms n = 118

All parameters in mg/L except Fecal Coliforms in cfu/100mL

All values arithmetic averages except Fecal Coliforms in geometric average

Weekly influent total nitrogen concentrations ranged from 21.2 mg/L to 85.6 mg/L with a six-month average concentration of 60.4 mg/L.

Weekly effluent NO_{2,3} concentrations ranged from < 0.04 mg/L to 15.2 mg/L with a six-month average of 3.38 mg/L. Weekly effluent TKN concentrations ranged from 1.2 mg/L to 21.2 mg/L with a weekly average of 8.5 mg/L. Weekly effluent total nitrogen concentrations ranged from 3.7 mg/L to 22.2 mg/L with a six-month average of 11.9 mg/L. The total nitrogen reduction over the six-month period was 80.3%.

Conclusion

In summary, the WaterNOx-LS system can successfully remove very high levels of total nitrogen passively, while buffering pH to neutral and keeping cBOD₅ and TSS levels below 10 mg/L.