Hydrogeological Assessment – 725 Lake Road, Bowmanville, Ontario

March 13, 2025

Prepared for:
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Cambium Reference: 19211-001

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Table of Contents

1.0 Introduction 1
1.1 Scope of Work 1
1.2 Site Description and Site Development 3
2.0 Environmental Features 4
3.0 Physical Setting 5
3.1 Topography and Drainage 5
3.2 Physiography 5
3.3 Overburden Geology 5
3.4 Bedrock Geology 6
4.0 MECP Well Records Assessment 7
5.0 Methodology and Results of On-site Investigations 8
5.1 Borehole Investigation 8
5.2 Physical Laboratory Testing 9
5.3 Well Construction Details 10
5.4 Groundwater Level Monitoring 10
5.5 Groundwater Flow Direction 11
5.6 In-Situ Hydraulic Conductivity Tests of Water Bearing Soils 12
5.7 In-Situ Infiltration Testing 12
5.8 Private Well Survey 13
6.0 Preliminary Construction Dewatering Estimates 14
6.1 Excavation Design Parameters 14
6.2 Estimated Construction Dewatering Rates – General Excavation 15
6.3 Assessment of Required Regulatory Permits or Registration 17
6.4 Zone of Influence 18
7.0 Water Balance Assessment 19
7.1 Water Surplus 20

7.2 Infiltration Rates 21
7.3 Pre-Development Water Balance 21
7.4 Post Development Water Balance 22
7.5 Comparison of Pre-and Post-Development 22
7.6 Discussions on LID Measures 23
7.7 Mitigation Measures 24
8.0 Source Water Protection and Risk Management 26
9.0 Conclusions and Recommendations 27
10.0 Closing 29
11.0 References 30
12.0 Standard Limitations 31

List of Tables

Table 1 MECP Water Well Information Summary 7
Table 2 Grain Size Analysis Summary 9
Table 3 Monitoring Well Construction Details 10
Table 4 Measured Groundwater Levels 10
Table 5 Results of Estimated Hydraulic Conductivity as per Slug Test 12
Table 6 Construction Dewatering Calculation Parameters 15
Table 7 Calculated Construction Dewatering Rates 16
Table 8 Pre- and Post-Development Site Statistics 20
Table 9 Determination of Infiltration Factor 21
Table 10 Pre-Development Water Balance 22
Table 11 Post-Development Water Balance 22
Table 12 Comparison of Pre- and Post -Development 22
Table 13 Requirement of Infiltration from Roof Run-off 23

List of Appended Figures

Figure 1 Site Location Plan
Figure 2 Borehole Location Plan
Figure 3 MECP Well Records Within 500 m
Figure 4 Groundwater Configuration Plan
Figure 5 Post-Development Plan

List of Appendices

Appendix A Proposed Development and Land Information
Appendix B MECP Well Records
Appendix C Borehole Logs
Appendix D Grain Size Analysis Results
Appendix E Aquifer Test Pro Results
Appendix F Well Survey Letter
Appendix G Dewatering Calculations
Appendix H Water Balance Calculations

1.0 Introduction

Cambium Inc. (Cambium) was retained by Jass Gill (Client) to complete a Hydrogeological Assessment of the property located at 725 Lake Road, Bowmanville, Municipality of Clarington, Ontario (Site).

As Cambium understands, the proposed development will involve the construction of two slab-on grade industrial buildings, with associated driveways and parking areas.

The purpose of the hydrogeological assessment was to characterize the soil and groundwater conditions across the Site, provide a water balance assessment, complete in-situ soil infiltration tests, assess any impacts on the surrounding natural environment due to the proposed development, and evaluate and provide recommendations or mitigative measures, if any.

1.1 Scope of Work

This hydrogeological assessment was carried out with the following tasks:

- **Review of Available Background Information:** a review of Ministry of Environment, Conservation and Parks (MECP) water well records, available surficial and bedrock geological mapping, physiographic mapping, and natural heritage features mapping for the Site and surrounding areas and the previous investigation reports for the Site was conducted to provide background information and to characterize the Site's soil and groundwater conditions.
- **Measurement of Groundwater Levels:** groundwater levels were measured at the existing monitoring wells to establish and/or confirm the general groundwater flow conditions and water level elevations.
- **In-Situ Hydraulic Conductivity Tests:** single well response tests (i.e. in-situ hydraulic conductivity tests) were conducted on existing monitoring wells to estimate the hydraulic conductivity of the underlying soils and/or bedrock, which are used for assessing the potential dewatering requirements.

- **In-Situ Infiltration Testing:** infiltration testing was scoped using Guelph Permeameter equipment at specific locations at the Site to characterize the infiltration rates of the shallow surficial soils (i.e., within 1.0 metre below ground surface (mbgs)). The infiltration testing will provide a general characterization of surficial infiltration rates and will help for the design and placement of Low Impact Development (LID) measures at the Site.
- **Well Survey:** a door-to-door water well survey of those properties located within 200 to 300 m of the proposed development was completed with the objective of characterizing groundwater conditions of adjacent property groundwater users.
- **Dewatering Estimates:** an assessment of short-term construction dewatering for excavation to install the exterior footings of the industrial building was completed and includes an assessment of potential impacts on the surrounding environment.
- **Water Balance (Preliminary):** a preliminary water balance study was completed for the proposed development using the Thornthwaite-Mather approach and climate data obtained from nearest Environment Canada weather station.
- **Source Water Protection:** a source water protection assessment was completed for the Site as the subject lands are situated within a Highly Vulnerable Aquifer (HVA) as per the Central Lake Ontario Conservation Authority (CLOCA) Source Protection Plan.
- **Report Preparation:** a hydrogeological report was prepared presenting the results, findings, and recommendations of this investigation.

It should be noted that a geotechnical investigation (Cambium, 2024) is being completed at the Site concurrently by Cambium and will be provided under a separate cover. There was also a previous geotechnical investigation completed at the Site in July 2022 (Cambium, 2022). The data or information obtained in the current and former investigations has been incorporated into this hydrogeological assessment report.

1.2 Site Description and Site Development

The total area of the Site is approximately 15,900 m^2 or 1.59 hectares and it is slightly rectangular in shape. The Site is zoned as “M1” industrial land under the Municipality of Clarington Zoning Bylaw 84-63 (Appendix A). This is part of Darlington Broken Front Lot 6 with an assessment roll number of 18170100100168000000.

The Site has a rolling topography with a gradual west-southwest slope towards Lake Ontario, located approximately 0.5 km south of Site. The Site is bordered to the north by Lake Road, to the south and east by open agricultural land, to the west is open land with one industrial building that is interpreted to be under development.

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

2.0 Environmental Features

To assess environmental features, databases maintained by the Ministry of Natural Resources (MNR), the MECP, and CLOCA were reviewed. Based on the data reviewed, the Site is situated within the Bennett Creek Watershed within the CLOCA Source Protection Area. The Site is not located in a CLOCA regulated area as per available mapping from the CLOCA database (Appendix A).

As per the MNR Natural Heritage System database the Site does not have any Areas of Environmental Significance or Areas of Natural and Scientific Interests (Appendix A). Additionally, there are no wetlands or woodlands mapped at the Site.

As shown on the MECP Source Water Protection Information Atlas map, the Site is partially within a Highly Vulnerable Aquifer (Appendix A) with a vulnerability score of 6.

The significance of these designations with respect to the proposed development is discussed in Section 8.0.

3.0 Physical Setting

3.1 Topography and Drainage

Based on the topographic contours on the Site plan (Drawing No. SP-1, Appendix A), the Site is generally flat with a gradual slope to the west-southwest with the topographic high elevation of 100.5 metres above sea level (masl) in the northeast border of Site and a topographic low of 94.5 masl in the southwest corner of Site.

There are no mapped waterbodies on Site. Regional surface water drainage is expected to flow overland to the west-southwest off-site. An east/west flowing stream is located about 50 m south of Site which is interpreted to capture the drainage. The unnamed watercourse ultimately flows to Lake Ontario approximately 500 m south of the Site.

3.2 Physiography

The Site is located in the physiographic region known as the Iroquois Plain. The Iroquois Plain region covers the border of Lake Ontario's shore extending from the City of Trenton in the east to the City of St. Catharines in the southwest. The Iroquois Plain refers to an area of lowlands that border the present-day Lake Ontario, which was formed within the basin of Glacial Lake Iroquois which was a larger and higher version of Lake Ontario. Lake Iroquois sediments consist both of granular soils (silt and sand) and finer-grained silt and clay soils. (Chapman & Putnam, 1984).

3.3 Overburden Geology

According to Miscellaneous Release – Data 128 from the Ontario Geological Survey (2010) there are three predominant overburden soils at the Site. A figure depicting the three overburden soil types is included in Appendix A. The west portion of Site is characterized as fine-textured glaciolacustrine deposits of silt and clay, minor sand, and gravel, described as massive to well laminated. The southeast portion of Site is stone-poor till that is characterized as, sandy silt to silty sand on Paleozoic terrain. The northeast portion of Site is characterized as coarse-textured glaciolacustrine deposits of sand, gravel, minor silt, and clay.

3.4 Bedrock Geology

According to Miscellaneous Release – Data 219 from the Ontario Geological Survey (2007), the bedrock in the area of the Site belongs to the Simcoe Group and were deposited during the Middle Ordovician to the Lindsay Formation. The Lindsay Formation is characterized by argillaceous, fine- to coarse-grained limestone with a nodular to black appearance and is highly fossiliferous.

4.0 MECP Well Records Assessment

Cambium accessed the MECP Water Well Information System to review water records within 500 m of the Site.

There were 56 wells found within approximately 500 m of the Site. Of the well records, 3 were for test holes/monitoring/observation wells, 27 were for observation wells, 14 were abandoned wells, 2 were for domestic water supply wells, and 10 had no well use information. Not all records contained information pertaining to the overburden or bedrock material, total well depth, depth to water, static water level, or recommended pumping rate. A summary of water well information, including total depth, static water level, and recommended pumping rate, is presented in Table 1.

The location of well records identified within 500 m of the Site are illustrated in Figure 3. Water well records' details are provided in Appendix B.

Table 1 MECP Water Well Information Summary

Well Count		Total Depth (mbgs)	Depth Water Encountered (mbgs)	Static Water Level (mbgs)	Recommended Pumping Rate (L/min)
Bedrock Count = 4	Minimum	41.5	30.2	6.4	5
	Maximum	271.3	39.3	9.1	27
	Geomean	76.4	34.5	7.7	11.6
Overburden Count = 52	Minimum	2.4	0.6	4.0	36
	Maximum	16.8	16.3	4.0	36
	Geomean	6.7	3.8	4.0	36

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

- Overburden was reported as clay, sand, or loam layers. Some well records also recorded isolated gravel horizons.
- Bedrock was described as grey limestone, red or black granite, or blue shale rock.

5.0 Methodology and Results of On-site Investigations

5.1 Borehole Investigation

Cambium completed a borehole investigation at the Site on June 9, 2022. A total of five boreholes, designated as BH101-22 through BH105-22, were advanced into the subsurface at predetermined locations throughout the Site. Each borehole was terminated at a depth of 5.0 mbgs.

Boreholes BH101-22, BH104-22 and BH105-22 were outfitted with monitoring wells. The monitoring wells were used for stabilized water level monitoring and to define the local groundwater regime across the Site.

A borehole location plan including location of monitoring wells is presented in Figure 2 and borehole logs with lithological details are included in Appendix C. A summary of general lithological details is resented below.

Topsoil

A layer of topsoil was encountered at each of the five boreholes advanced at the Site. The encountered topsoil layer thickness was 0.80 m at each of the boreholes.

Clay and Silt

Brown clay and silt with trace to some sand was observed in boreholes BH101-22 and BH 104-22 to depths ranging from 1.50 to 2.30 mbgs.

Silt and Sand Till

Light brown silt and sand till, with some clay and trace to some gravel was overserved in four of the five boreholes, with the exception of BH102-22. Boreholes BH101-22, BH103-22, BH104-22, and BH105-22 were terminated in this unit at 5.0 mbgs.

Sandy Silt Till

Brown sandy silt till with some clay and trace gravel was encountered in BH102-22. BH102-22 was terminated in this unit at 5.0 mbgs.

Bedrock

Bedrock was not encountered during the borehole investigation at the Site. Drilling was terminated at the depth of 5.0 mbgs.

Generally, these subsurface investigation results match the surficial mapping and at the Site and the MECP well records surrounding the Site. Layers of clay and silt as well as silty sand till was noted in surficial mapping as well as the MECP well records.

5.2 Physical Laboratory Testing

Physical laboratory testing, including grain size distribution analysis, was completed on three selected soil samples to confirm textural classification identified during field logging and to obtain moisture content estimates. Analysis results are based on the Unified Soil Classification System scale. A summary of results is provided in Table 2. Complete laboratory analysis reports are provided in Appendix D.

Based on grain size analysis data, the samples were tested between depths of 0.8 and 3.5 mbgs. Soil percolation rates ranged from 30 to >50 min/cm indicating low transmissive soils.

Table 2 Grain Size Analysis Summary

Well ID / Sample	Depth (mbgs)	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	T times (min/cm)
BH101-22 SS2	0.8 – 1.2	Clay and Silt, trace Sand	0	8	41	51	>50
BH103-22 SS5	3.0 – 3.5	Sand and Silt, some Gravel, some Clay	13	38	37	12	30
BH105-22 SS4	2.3 – 2.7	Silt and Sand, some Clay, some Gravel	10	38	40	12	30

5.3 Well Construction Details

Three boreholes (BH101-22, BH104-22, and BH105-22) were completed as monitoring wells in the overburden materials and well construction details are summarized in Table 3.

Table 3 Monitoring Well Construction Details

Well ID	Ground Surface Elevation (masl)	Well Completion Depth (mbgs)	Stick Up (mags)	Screen Interval (masl)	
				Top	Bottom
BH101-22	98.20	4.6	0.82	96.6	93.6
BH104-22	96.48	4.6	0.93	94.9	91.9
BH105-22	98.24	4.6	0.96	96.6	93.6

5.4 Groundwater Level Monitoring

Municipality of Clarington requested the Client obtain groundwater levels for a minimum of three seasons to estimate seasonally high groundwater levels and elevations for the Site. Accordingly, monitoring was completed during summer, fall and winter months.

Cambium staff measured the depths to groundwater in all monitoring wells on June 20, 2022, December 15, 2023, October 17, November 14, December 19, 2024, and January 13 and February 11, 2025. A summary of groundwater levels and elevations are presented in Table 4.

Table 4 Measured Groundwater Levels

Well ID		BH101-22	BH104-22	BH105-22
Top of Pipe Elevation (masl)		99.02	97.41	99.20
Ground Elevation (masl)		98.20	96.48	98.24
Stick-Up Height (m)		0.82	0.93	0.96
June 20, 2022	Water Level (mbgs)	1.01	1.36	1.10
	Groundwater Elev. (masl)	97.19	95.12	97.14

Well ID		BH101-22	BH104-22	BH105-22
December 15, 2023	Water Level (mbgs)	2.70	4.52	Dry
	Groundwater Elev. (masl)	95.50	91.96	-
October 17, 2024	Water Level (mbgs)	2.91	4.41	Dry
	Groundwater Elev. (masl)	95.29	92.07	-
November 14, 2024	Water Level (mbgs)	2.76	4.23	4.39
	Groundwater Elev. (masl)	95.44	92.25	93.85
December 19, 2024	Water Level (mbgs)	1.98	4.33	4.10
	Groundwater Elev. (masl)	96.23	92.16	94.15
January 13, 2025	Water Level (mbgs)	1.00	3.95	1.33
	Groundwater Elev. (masl)	97.20	92.53	96.91
February 11, 2025	Water Level (mbgs)	1.28	2.88	1.82
	Groundwater Elev. (masl)	96.92	93.60	96.42

As presented above, the measured groundwater levels in the shallow monitoring wells at the Site ranged in depth from 1.00 to 4.52 mbgs, and the groundwater elevations ranged from 91.96 to 97.20 masl over the duration of the monitoring events. Based on the available data, the groundwater elevations at the Site were generally fluctuating with the highest elevations during the early summer monitoring event (June 20, 2022) ranging between 95.12 to 97.20 masl, while they were generally the lowest in the winter monitoring event (December 15, 2024) ranging between 91.96 and 95.50 masl.

5.5 Groundwater Flow Direction

Groundwater flow direction was found to be consistent between monitoring events. Based on the groundwater elevation data obtained from the monitoring event on June 20, 2022, a site-

specific groundwater elevation contour map was prepared to present the groundwater flow direction. As shown in Figure 4, the groundwater flow direction was found to be southwest following topography.

5.6 In-Situ Hydraulic Conductivity Tests of Water Bearing Soils

The hydraulic conductivity (K-value) of the screened soils were estimated based on the single well response tests (slug tests) performed on the Site. Slug tests were conducted on monitoring well BH101-22 on December 15, 2023. Slug tests were not preformed on well BH104-22 due to insufficient volumes and not preformed on BH105-22 due to the well being dry. Rising head tests were conducted by using a bailer to remove water from the monitoring well BH101-22. Results of the hydraulic conductivity tests are presented below in Table 5 and analytical data is included in Appendix E.

Table 5 Results of Estimated Hydraulic Conductivity as per Slug Test

Well ID	Estimated Hydraulic Conductivity (m/sec)		Tested Soil Type
	Test 1	Test 2	
BH101-22	4.03×10^{-8}	3.92×10^{-8}	Clay and Silt, trace Sand

The hydraulic conductivity was estimated using AquiferTest Pro slug test software using the Hvorslev interpretation method. The estimated hydraulic conductivity is ranged from 4.03×10^{-8} to 3.92×10^{-8} m/sec with a geometric mean of 3.97×10^{-8} m/sec. This hydraulic conductivity is considered to be representative of a clay and silt soil according to published literature values.

5.7 In-Situ Infiltration Testing

Due to the non-availability of Site Servicing plan with details of LID design, in-situ soil infiltration tests using the Guelph Permeameter were not completed in fall/winter 2024. As the detailed LID design was made recently available by the stormwater management engineer for the Site (Appendix A), infiltration testing can be completed in the late spring 2025 and results will be provided in an update to the final hydrogeological assessment report.

5.8 Private Well Survey

Cambium staff visited the Site to complete a door to door well reconnaissance to inventory adjacent water well users within 500 m of the Site on November 19, 2024. Water levels and depth of any private supply wells were measured if permission was granted from the owner. If the property owner was not present, then a letter describing the work program was left at the residence. A copy of the letter has been included in Appendix F.

Cambium identified two well records in the MECP well records search (Section 4.0) that were supply wells within about 500 m of Site. The Well ID #1907102 was identified as a domestic industrial water supply well in the location of 322 Bennett Road. Cambium visited 685 Lake Road which was a business that was on municipal water. The owner indicated that there may have been historical water supply well, but it no longer exists or has been decommissioned. The business south of 322 Bennett Road, 314 Bennett Road was also interviewed and confirmed to be on Municipal water with no wells on site.

Well ID #1901076 was identified as a domestic livestock supply well and is mapped in the Port Darlington Road subdivision south of Site. Cambium looked for Well ID #1901076 in the mapped location in the subdivision and visited 16A Lookout Drive, 2B Lookout Drive, and 27B Lookout Drive. The residences visited in the subdivision confirmed that they were supplied water municipally.

The calculated zone of influence (ZOI) due to temporary construction dewatering at the Site would likely not extend off of the site. Details of estimated ZOI can be found in Section 6.0.

6.0 Preliminary Construction Dewatering Estimates

Requirements for construction dewatering generally depend on a 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 and/or basement elevation, as well as the size of proposed structure/excavation.

The proposed development will consist of two slab on grade industrial buildings. Based on the drawings provided by the client, the finished floor elevations for the Buildings A and B were set at 97.40 and 98.35 masl, respectively. However, the inverts of the proposed site services are not known at the time of preparing this report. Although the development will not have a basement, exterior footings for the proposed development will be required to extend to the maximum frost penetration depth below ground surface at the Site, according to the geotechnical investigation (Cambium, 2024). The proposed foundation depth is 1.2 mbgs according to Drawing # A301 and Drawing # A302 in Appendix A. As early summer groundwater levels measured in the monitoring wells were recorded at depths ranging from 1.01 to 1.36 mbgs and elevations from 91.96 to 97.20 masl. Therefore, excavations for exterior footings will likely extend below the water table, which will require the use of dewatering to maintain sufficiently dry conditions at the Site during construction.

6.1 Excavation Design Parameters

The foundation excavations will cut through the native soils described as clay and silt to sandy silt till. For the purposes of this preliminary dewatering assessment, it was assumed that the exterior footings for the slab on-grade buildings would be installed to 1.2 mbgs (frost penetration depth), the excavations for the footings would be 2 m wide and are assumed to be completed in 50 m segments.

Early summer groundwater levels measured in the monitoring wells were recorded at depths and ranging from 1.01 to 1.36 mbgs and as these depths are not fully representative of the peak seasonal high groundwater conditions an additional 0.5 m was added to the shallowest water level to provide a conservative dewatering estimate (i.e. 0.51 mbgs). To accommodate

safe working conditions, groundwater should be lowered to 1 m below the foundation depth of 1.2 m and therefore the base of each excavation would be 2.2 mbgs for the exterior foundation.

The bottom of the silty sand/sandy silt aquifer layer was not reached in the drilling program, however, a review of MECP well records in the vicinity of the Site indicates the presence of as clay and silt to sandy silt till layer between 0.2 and 7.3 mbgs. Therefore, aquifer thickness in the vicinity of proposed excavations was assumed to be about 7 mbgs.

Construction dewatering calculation parameters for the building footings are described below and summarized in Table 6.

Table 6 Construction Dewatering Calculation Parameters

Excavation	Length (m)	Width (m)	Groundwater Depth (mbgs)	Estimated Excavation Depth (mbgs)	Target Water Depth[1] (mbgs)	Aquifer Base Depth (mbgs)	Drawdown Depth (m)
Building Foundation Footing Trenches	50	2	0.51	1.2	2.2	7.00	1.69

(1) Includes 1 m allowance to the excavation depth for dry working conditions.

6.2 Estimated Construction Dewatering Rates – General Excavation

A modified Dupuit-Forchheimer equation was used to estimate the dewatering rate required for the proposed linear trench excavation (Powers, Corwin, Schmall, & Kaeck, 2007):

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

$Where$:

$Q = dewatering\ rate\ (m^3/s)$

$K = hydraulic\ conductivity\ (m/s)$

$H = initial\ hydraulic\ head\ in\ aquifer\ (m)$

$h = target\ hydraulic\ head\ (initial\ hydraulic\ head - target\ drawdown)\ (m)$

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

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

x = $unit\ length\ of\ trench\ (m)$

L = $distance\ to\ line\ source\ = R_0/2(m)$

The radius of influence from the excavation wall for each excavation was estimated from soil hydraulic conductivity using the method of Sichardt (1930). In conditions of low hydraulic conductivity, where R_0 is calculated to be less than r_s , the denominator of the first right hand term of the above equation is amended to be $\ln((R_0 + r_s)/r_s)$.

A summary of calculated dewatering rates, given a target groundwater depth of 2.2 mbgs with a footprint of 2 m by 50 m for the exterior footing excavations is provided in Table 7. Detailed calculations are provided in Appendix G.

Table 7 Calculated Construction Dewatering Rates

Excavation	Hydraulic Conductivity (K)		Zone of Influence (R)	Dewatering Rate (Q)		Dewatering Rate (Q) with Safety Factor of 2
	(m/s)		(m)	L/day	L/s	(L/day)
Building Foundation Footing Trenches	Minimum k	3.92 x 10^{-8}	1.0	3,500	0.04	7,000
	Maximum k	4.03 x 10^{-8}	1.0	3,600	0.04	7,200
	Geom. Mean k	3.97 x 10^{-8}	1.0	3,550	0.04	7,100

The hydraulic conductivity of the soils at the Site were consistent due to only having slug test results for one well, and therefore, the dewatering rates were consistent. Considering the maximum estimated hydraulic conductivity of 4.03 x 10^{-8} m/s as most conservative, the estimated construction dewatering rate for the footings is about 3,600 L/day or 0.04 L/s while the estimated zone of influence (R) is about 1.0 m.

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 and surrounding soils are drained.

Applying a safety factor of 2 to accommodate the uncertain factors such as aquifer thickness, the extent of horizontal excavation area, hydraulic properties of the native soils between the tested locations etc., the estimated dewatering rate for a 50 m long excavation is about 7,200 L/day or 0.08 L/s.

Considering the precipitation falling onto the excavations during the construction operations, a 20 mm daily rainfall has been considered based on the City of Toronto Wet Weather Flow Management Guidelines (2006). The total precipitation volume is given by the following formula:

Total Runoff Volume (V) per day = Excavation Area x Rainfall Intensity

Foundation Footing Trench Area = 100 m^2 x 0.02 m

= 2 m^3 (2,000 L)

Given a footprint for the estimated foundation footing trench of about 100 m^2 it is possible for an additional 2,000 L/day to accumulate within each foundation footing trench. Accordingly, the total peak short-term dewatering rate during construction was estimated at 9,200 L/day.

If the contactor encounters highly saturated granular soil layers during excavation, the contractor should be ready to pump at higher rates and be able to implement the mitigation measures.

6.3 Assessment of Required Regulatory Permits or Registration

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

Where construction dewatering in excess of 400,000 L/day is required, a Permit to Take Water (PTTW) must be obtained. For construction dewatering greater than 50,000 L/day but less

than 400,000 L/day, registration through the Environmental Activity and Sector Registry (EASR) is required.

The estimated dewatering rate for short term dewatering of an exterior footing trench at a maximum of 50 m long, was calculated at 9,200 L/day (including a safety factor of 2 and 20mm rainfall event). Since this rate is below 50,000 L/day, registration on the EASR in not expected to be required if excavations are completed sequentially.

It is imperative that daily dewatering rates be monitored (or the dewatering of stagnant water in the construction excavation estimated) to ensure that the short-term dewatering rates are less than 50,000 L/day. If the rates are greater than 50,000 L/day an EASR application should be filed, and permit acquired.

As the dewatering volumes calculated were very low, a simple sump and pump system will be sufficient to carry out the construction works at the Site.

6.4 Zone of Influence

The dewatering calculations include estimates of the horizontal distance away from the walls of each excavation where the influence of water withdrawal will be negligible (i.e., the length to zero drawdown (Kyrieleis & Sichardt, 1930)). The area included within the length of zero drawdown from the excavation is the ZOI. The maximum lengths to zero drawdown of each 50 m trench excavation (as determined from the highest hydraulic conductivity) is approximately 1 m. As this distance is minimal, the ZOI is likely to not extend off of site and therefore a ZOI figure was not prepared.

All of the properties around the ZOI are provided water from a municipal supply. There were no watercourses mapped within the ZOI. As the ZOI does not extend beyond the property boundary, no impacts were anticipated on any nearby water supply wells.

During construction dewatering activities, the areas adjacent to the construction excavations should be monitored regularly for land settlement and stability issues.

7.0 Water Balance Assessment

Following 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 ground or evapotranspiration by vegetation (ET). When long-term average values of P, R, I, and ET are used, there is minimal or no net change to groundwater storage (ΔS).

The annual water budget can be expressed as:

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

Where:

P = Precipitation (mm/yr)

R = Run-off (mm/yr)

I = Infiltration (mm/yr)

ET = Evapotranspiration (mm/yr)

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

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

The pre-development portion of the area includes is undeveloped cleared land. It is understood that the proposed development is developing the Site to two slab on grade industrial buildings, with associated infrastructure including, but not limited to, driveways, gravel walkways, and parking areas.

Based on the available design information, the development area at the Site can be generally categorized into three types as paved area, roof area, and landscape areas. The post-development plans of the proposed development are shown in Figure 5, respectively. A summary of the surface areas of the development is listed in Table 8.

Table 8 Pre- and Post-Development Site Statistics

Type of Land Coverage	Pre-Development Areas (m^2)	Post Development Areas (m^2)
Paved Area	0	4,357
Building Roof Area	0	6,387
Landscape/Vegetated Area	14,111	3,367
Total	**14,111**	**14,111**

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

7.1 Water Surplus

Water surplus is calculated by determining the difference between precipitation and evapotranspiration (changes in soil water storage was assumed to be negligible over the course of a year). The volume of water surplus is further sub-divided into portions that infiltrate the on-site soils and that are directed off-site as runoff.

The climatic data including monthly average temperature and precipitation were obtained from Environment Canada, for Bowmanville Mostert weather station (Climate Identifier: 6150830) located about 2.5 km from the Site. Data is available for a period of 30 years, from 1981 to 2010. The average annual precipitation was recorded to be 866 mm/yr and the average annual evapotranspiration was estimated to be about 539 mm/yr using the USGS Thornthwaite Monthly Water Balance methodology (Appendix G). Accordingly, the water surplus of the Site was calculated to be 351 mm/yr.

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

7.2 Infiltration Rates

The volume of surplus water that infiltrates through pervious surfaces on-site was determined by applying an infiltration factor to the surplus depth. The surplus water that does not infiltrate into pervious surfaces will leave the Site as surface water runoff. The infiltration factor varies from 0 to 1 and is estimated based on topography, soils, and vegetation cover as per the *Stormwater Management Planning and Design Manual* (Ministry of the Environment, 2003).

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

The Site exhibits rolling topography. Based on the results of the borehole investigation, the subsurface conditions at the Site consist of predominantly clay and silt or silt and sand till, and the vegetation cover was determined to be cultivated. Therefore, an infiltration factor of 0.5 was calculated for the Site using the MECP method, as outlined in Table 9.

Table 9 Determination of Infiltration Factor

Factor	Value
Topography	Rolling Land= 0.2
Soil	Clay silt to sandy silty till = 0.2
Cover	Cultivated Land = 0.1
Infiltration Factor (IF)	0.50

The calculation of infiltration and runoff in the stages of pre-development and post-development is provided in Appendix H, and are presented in the tables below.

7.3 Pre-Development Water Balance

The water balance for the existing conditions of the Site is summarized in Table 10. The pre-development infiltration and run-off rates were calculated to be 2,476 m³/yr each.

Table 10 Pre-Development Water Balance

Land Use		Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Impervious Areas	Paved Area	-	-	-	-	-
	Roof Area	-	-	-	-	-
Pervious Areas	Landscape Area	14,111	12,220	7,267	2,476	2,476
	Totals	**14,111**	**12,220**	**7,267**	**2,476**	**2,476**

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

7.4 Post Development Water Balance

The post-development water balance is summarized in Table 11. The post-development infiltration rate was calculated to be about 591 m^3/yr and the runoff rate was 8,965 m^3/yr.

Table 11 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	4,357	3,773	377	-	3,396
	Roof Area	6,387	5,531	553	-	4,978
Pervious Areas	Landscape Area	3,367	2,916	1,734	591	591
	Totals	**14,111**	**12,220**	**2,664**	**591**	**8,965**

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

7.5 Comparison of Pre-and Post-Development

The pre and post development water balances are compared in Table 12 below.

Table 12 Comparison of Pre- and Post -Development

	Precipitation (m^3)	Evapotranspiration (m3)	Infiltration (m^3)	Run-off (m^3)
Pre-Development	12,220	7,267	2,476	2,476
Post-Development	12,220	2,664	591	8,965
Change in Volume	-	-4,603	-1,886	6,488
Change in %	**-**	**-63**	**-76**	**262**

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

Based on the above, there is an estimated infiltration deficit of about 1,886 m³/yr compared to the pre-development condition. The runoff rate upon development of the Site will increase by about 6,488 m³/yr.

Table 13 Requirement of Infiltration from Roof Run-off

Volume of Pre-Development Infiltration (m^3/yr)	**2,476**
Volume of Post-Development Infiltration (m^3/yr)	**591**
Deficit from Pre to Post Development Infiltration (m^3/yr)	**1,886**
% of Roof Runoff required to match the pre-development infiltration	**38**

Based on the above calculations, a summary of the water balance is as follows:

- There is a net increase in run-off at the Site of about 6,488 m^3/yr as a result of the increase in impervious areas (such as roof and paved areas) and a decrease in pervious landscape areas.
- Post-development landscape area was decreased by about 10,744 m^2, when compared to the pre-development landscape, resulting in less infiltration across the Site.
- Without implementing any mitigation measures, there will be a net deficit of about 1,886 m^3/yr in the post-development infiltration on a yearly basis.
- Based on the estimation, with a diversion of about 38% of general roof water for infiltration, the proposed development would maintain an enhanced infiltration after the development. Therefore, Cambium would recommend the implementation of any suitable LID measures at the Site to compensate the infiltration deficit.

7.6 Discussions on LID Measures

LID practices attempt to capture the runoff and mimic the natural hydrologic cycle. In general, there are two primary categories of LIDs. The first promotes the infiltration of stormwater close to the source. These infiltration type LIDs are preferred when hydrogeological and physical conditions are optimal and allow for their emplacement. The proposed development does not include a Stormwater management pond to enhance the lost infiltration due to the Site development with paved and roof areas.

The second option captures and slowly releases the water to the groundwater system through the process of storage and filtration by infiltration LIDs.

Given the proposed Site layout, there is enough room available for the implementation of LID measures, either by means of infiltration galleries or infiltration trenches or any other suitable means. Roof downspout disconnection is a LID option available for the Site. Roof downspouts should only be disconnected where the minimum depth to the seasonally high-water table is at least 1 m below the surface. Water levels in June 2022 at the Site ranged in depth from 1.01 to 1.36 mbgs, and the elevations ranged from 97.19 to 95.12 masl. The shallow groundwater levels at Site should be considered when development of Site with any LIDs.

As there is an infiltration deficit due to the Site development, Cambium recommends implementing LID measures where 1 m vertical separation between the LID inverts and the groundwater table is possible. However, Cambium is not providing any design of LID facilities, and it would be beneficial to consult with stormwater engineers for LID design recommendations.

Peak high groundwater levels should be considered as LIDs are designed and implemented across the Site. If requested, Cambium will estimate the in-situ soil infiltration rates by completing infiltration tests using the Guelph Permeameter as a supplementary investigation, based on the detailed LID design which was recently made available by the stormwater management engineer for the Site (Appendix A).

7.7 Mitigation Measures

The Town of Clarington's requirement is to capture, retain, and infiltrate the first 27 mm of rainfall over a development. Due to shallow groundwater levels that will be variable and subject to seasonal fluctuations, two infiltration galleries (using the roof runoff only) in the southern part of the Site are being proposed by the stormwater engineers (D.G. Biddle & Associates, 2025) to mitigate the infiltration deficit and to capture the 27 mm rainfall.

Stormwater engineers propose to install one StormTech storage feature and two infiltration reservoirs are proposed under system StormTech 2 and 3, with infiltration capacities of 157.87

and 170.40 m^3 respectively. The infiltration reservoirs were designed to infiltrate 27 mm of runoff from the rooftop areas. As per the design of the proposed LIDs, the total volume that is estimated to infiltrate was 328.27 m^3 of runoff volume for the StormTech 2 and 3 LIDs. The Stormtech retention system 1 was designed with an impermeable liner to act independent of seasonal high groundwater table at the site (D.G. Biddle & Associates, 2025). The proposed features are illustrated on the servicing plan in Appendix A.

Based on the foregoing discussion Cambium understands that the first 27 mm rainfall can be captured, managed, and mitigated at the Site utilizing the proposed Stormtech infiltration features.

8.0 Source Water Protection and Risk Management

As per the MECP Source Water Protection Information Atlas the majority Site is located with a highly vulnerable aquifer with a vulnerability score of 6 (Appendix A). An HVA is defined as an aquifer that can be easily changed or affected by contamination from both human activities and natural processes as a result of (a) its intrinsic susceptibility, as a function of the thickness and permeability of overlaying layers, or (b) by preferential pathways to the aquifer.

Also, a HVA is an aquifer used as a water supply for a well where the aquifer is particularly susceptible to contamination due to the proximity of the aquifer to the surface or to the type of materials found in proximity to the aquifer.

The land use practices at the proposed development Site are not expected to cause any contamination to the water resources, as there will not be any storage of chemicals, pesticides, commercial fertilizers, fuel storage etc. Therefore, HVA is not expected to be influenced by the proposed development.

No significant wetlands or woodlands are situated on the Site (Appendix A). However, Cambium recommends following best management practices to avoid or minimize the overland flow of any contaminants from the Site to the natural environment.

9.0 Conclusions and Recommendations

Cambium was retained by Jass Gill to complete a hydrogeological assessment of the property located at 725 Lake Road, Clarington, Ontario.

The Site is situated within the Bennett Creek Watershed within the CLOCA Source Protection Area. The Site is entirely within a HVA area with a vulnerability score of 6.

A drilling investigation was conducted at the Site in June 2022, during which a total of five boreholes were completed to a depth of 5 mbgs, three of which were completed as monitoring wells to determine and confirm groundwater conditions.

Cambium staff measured the depths to groundwater in all monitoring wells on June 20, 2022, December 15, 2023, October 17, November 14, December 19, 2024, and January 13, and February 11, 2025. Water levels measured over the monitoring period ranged in depth from 1.00 to 4.52 mbgs, and the groundwater elevations ranged from 91.96 to 97.20 masl. The groundwater elevations at the Site were the highest during the early summer monitoring event (June 20, 2022) ranging between 95.12 to 97.20 masl. Groundwater flow direction was found to be to the southwest during all monitoring events, following the Site's topography.

The hydraulic conductivity of the screened soils was estimated using slug tests for BH101-22 on December 15, 2023. The estimated hydraulic conductivity ranged from 4.03×10^{-8} to 3.92×10^{-8} m/sec with a geometric mean of 3.97×10^{-8} m/sec. This hydraulic conductivity is considered to be representative of a clay and silt soil according to published literature values.

The bottom excavation for the proposed building foundations footings will extend into the water table. The estimated construction dewatering rates are projected to range up to 9,200 L/day for the exterior footing trenches (including safety factor and 20-mm rainfall contribution). Since these rates are below 50,000 L/day, registration on the EASR in not expected to be required if excavations are completed sequentially.

The conceptual water balance indicates that there will be an infiltration deficit of about 1,886 m^3/yr in the post-development infiltration upon the full development of the Site. It is expected that this infiltration deficit can be accommodated by the implementation of LID

measures, either by means of infiltration galleries, roof downspout connections, infiltration trenches or any other suitable means provided by others. However, peak high groundwater levels should be considered before LIDs are designed and implemented across the Site.

The stormwater engineers propose installing three StormTech features, with infiltration reservoir LIDs proposed under StormTech 2 and 3. The infiltration reservoirs were designed to infiltrate the first 27 mm of runoff from the rooftop areas.

The land use practices at the proposed development Site are not expected to cause any contamination to the water resources, as there will not be any storage of chemicals, pesticides, commercial fertilizers, fuel storage etc. Therefore, HVA is not expected to be influenced by the proposed development.

Cambium recommends following best management practices to avoid or minimize the risk of overland flow of any possible contaminants from the Site to the natural environment.

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.

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Junior Hydrogeologist

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HW/WY/SK/KNH

\\cambiumincstorage.file.core.windows.net\projects\19200 to 19299\19211-001 Jass Gill - GEO - 725 Lake Rd\Deliverables\REPORT - Hydro\Final\2025-03-03 RPT - HydroG - 725 Lake Road-r1.docx

11.0 References

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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.

Reliance on Materials and Information

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

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

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

Site Assessments

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

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

Reliance

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

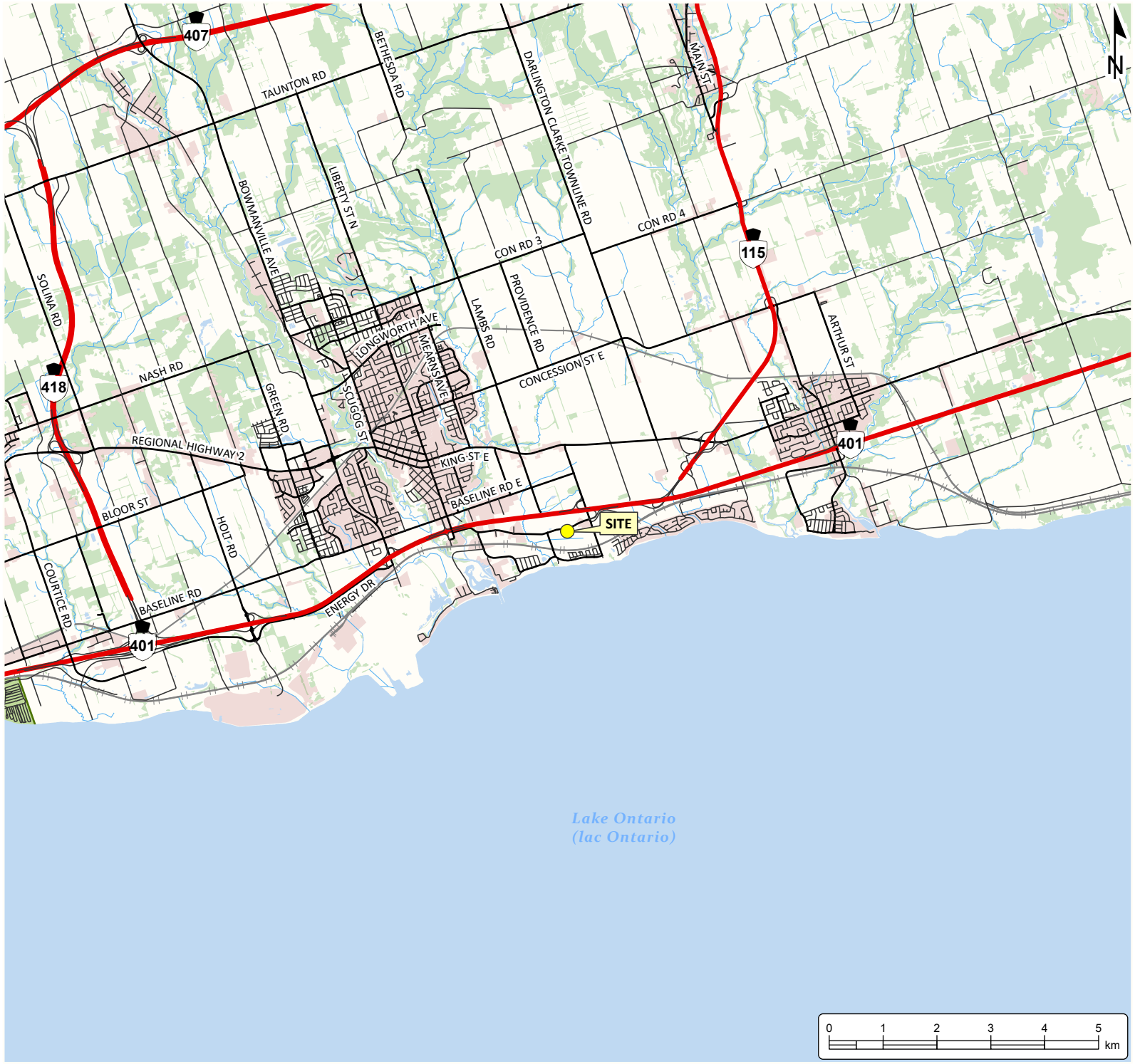
Limitation of Liability

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

Personal Liability

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

Appended Figures



HYDROGEOLOGICAL ASSESSMENT

Jass Gill
725 Lake Road
Bowmanville, Ontario

LEGEND

- Highway
- Major Road
- Minor Road
- Railway
- Watercourse
- Water Area
- First Nations Reserve
- Provincial Park
- Wooded Area
- Built Up Area

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SITE LOCATION PLAN

Project No.: 19211-001		Date: January 2024	
		Rev.:	
Scale: 1:100,000		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: SK	Figure:	1

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HYDROGEOLOGICAL ASSESSMENT

JASS GILL
725 Lake Road
Bowmanville, Ontario

LEGEND

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

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BOREHOLE LOCATION PLAN

Project No.: 19211-001		Date: February 2025 Rev.:	
Scale: 1:1,000		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: SK	Figure:	2

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HYDROGEOLOGICAL ASSESSMENT

Jass Gill
725 Lake Road
Bowmanville, Ontario

LEGEND

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

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MECP WELL RECORDS WITHIN 500m

Project No.: 19211-001		Date: January 2024 Rev.:	
Scale: 1:6,000		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: SK	Figure: 3	

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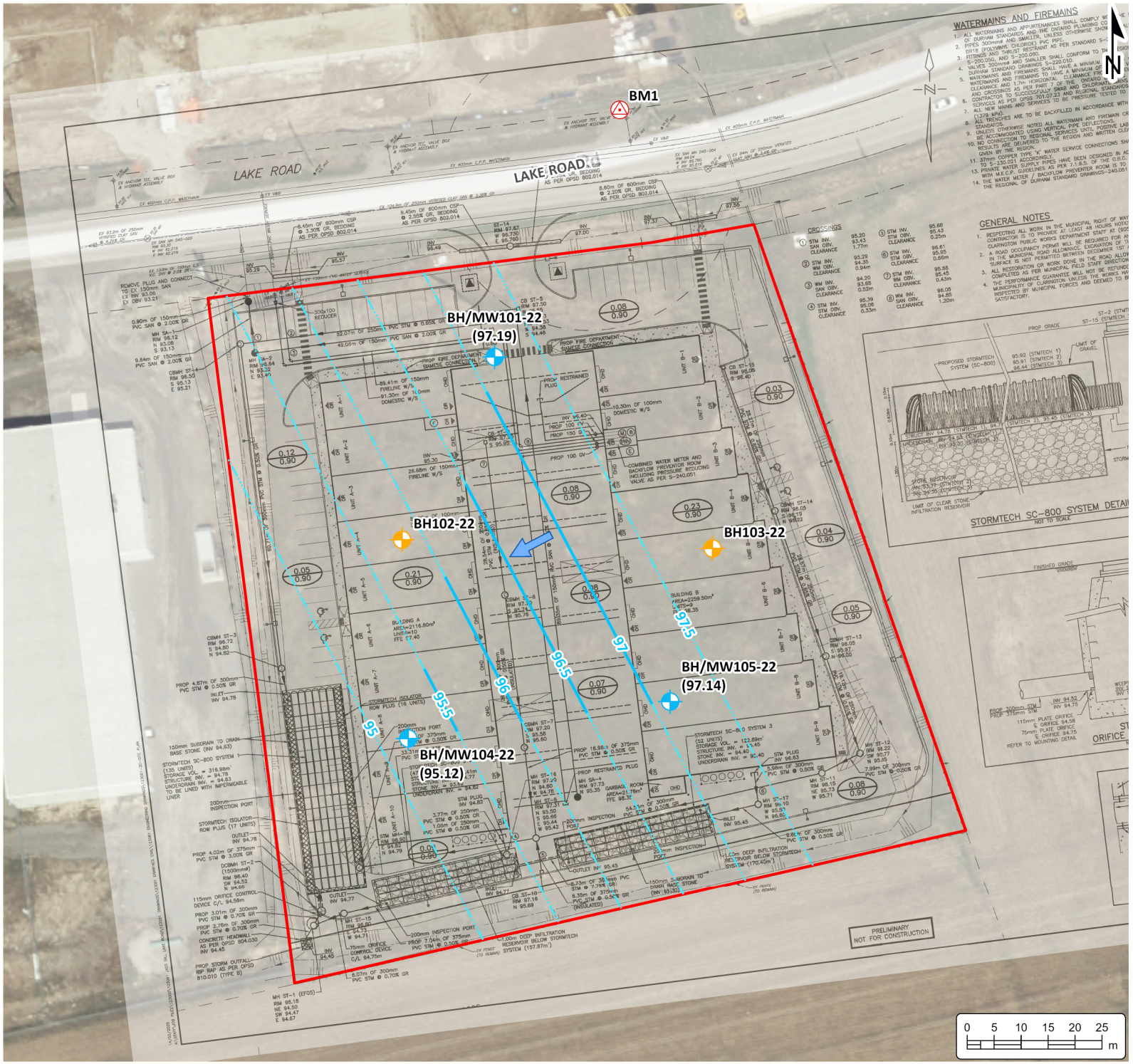

HYDROGEOLOGICAL ASSESSMENT

JASS GILL
725 Lake Road
Bowmanville, Ontario

LEGEND

- (97.19) Groundwater Elevation June 20 2022
- Benchmark
- Borehole
- Monitoring Well
- Groundwater Contour June 20 2022
- Inferred Groundwater Contour June 20 2022
- Site (approximate)
- Groundwater Flow Direction June 20 2022

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GROUNDWATER CONFIGURATION PLAN

Project No.:	19211-001	Date:	February 2025
		Rev.:	
Scale:	1:1,000	Projection:	NAD 1983 UTM Zone 17N
Created by:	DBB	Checked by:	SK
Figure:	4		

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Post-Development	Area (m2)
Roofed	4356.60
Paved	6,387.12
Landscaped	3,367.13
Total	14,110.85

HYDROGEOLOGICAL ASSESSMENT

Jass Gill
725 [illegible] Road
Bowmanville, Ontario

LEGEND

- Roofed
- Paved
- Landscaped
- Site (approximate)

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POST-DEVELOPMENT PLAN

Project No.: 19211-001		Date: April 2024	Rev.:
Scale: 1:1,000		Projection: NAD 1983 UTM Zone 17N	
Created by: DBB	Checked by: SK	Figure: 5	

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Appendix A

Proposed Development and Land Information

ITEM	ONTARIO 2024 BUILDING CODE DATA MATRIX - PART 3 or PART 9			O.B.C. REFERENCE References are Division B unless noted: [A] for Division A or [C] for Division C.	
1.	PROJECT DESCRIPTION: PROPOSED INDUSTRIAL CONDOMINIUM UNITS (BUILDING A) 725 LAKE ROAD, BOWMANVILLE, ON.	☒ NEW ☐ ADDITION ☐ CHANGE OF USE ☐ ALTERATION	☐ PART 11 11.1 to 11.4	☒ PART 3 1.1.2.[A]	☐ PART 9 1.1.2.[A] & 9.10.1.3.
2.	MAJOR OCCUPANCY (S) F-2			3.1.2.1.(1)	3.1.2.1.(1)
3.	BUILDING AREA (m^2) 3.2.2.79TING 0m^2	NEW 2116.8m^2	TOTAL 2116.8m^2	1.4.1.2. [A]	1.4.1.2. [A]
4.	GROSS AREA (m^2)	EXISTING 0m^2 NEW 2116.8m^2	TOTAL 2116.8m^2	1.4.1.2. [A]	1.4.1.2. [A]
5.	NUMBER OF STOREYS	ABOVE GRADE 1	BELOW GRADE 0	1.4.1.2. [A] & 3.2.1.1.	1.4.1.2. [A] & 9.10.4
6.	NUMBER OF STREETS / FIRE FIGHTER ACCESS 3			3.2.2.10. & 3.2.5.	9.10.20.
7.	BUILDING CLASSIFICATION 3.2.2.78			3.2.2.20. - .83.	9.10.2.
8.	SPRINKLER SYSTEM PROPOSED	☒ ENTIRE BUILDING ☐ SELECTED COMPARTMENTS ☐ SELECTED FLOOR AREAS ☐ BASEMENT ☐ IN LIEU OF RATING ☐ NOT REQUIRED		3.2.2.20. - .83.	9.10.8.2.
9.	STANDPIPE REQUIRED	☐ YES ☒ NO		3.2.9.	N/A
10.	FIRE ALARM REQUIRED	☐ YES ☒ NO		3.2.4.	9.10.18.
11.	WATER SERVICE SUPPLY IS ADEQUATE	☒ YES ☐ NO		3.2.5.7.	N/A
12.	HIGH BUILDING	☐ YES ☒ NO		3.2.6.	N/A
13.	CONSTRUCTION RESTRICTIONS	☐ COMBUSTIBLE PERMITTED ☐ NON-COMBUSTIBLE REQUIRED ☒ BOTH		3.2.2.20. - .83.	9.10.6.
	ACTUAL CONSTRUCTION	☐ COMBUSTIBLE PERMITTED ☐ NON-COMBUSTIBLE ☒ BOTH			
14.	MEZZANINE (s) AREA (m^2) 797.72			3.2.2.1.1.(3)-(8)	9.10.4.1.
15.	OCCUPANT LOAD BASED ON	☒ m^2 / PERSON ☐ DESIGN OF BUILDING		3.1.17.	9.9.1.3.
	BASEMENT:	OCCUPANCY _____	LOAD _____ PERSONS		
	1st FLOOR:	OCCUPANCY F2	LOAD 83 PERSONS		
	2nd FLOOR:	OCCUPANCY _____	LOAD _____ PERSONS		
	3rd FLOOR:	OCCUPANCY _____	LOAD _____ PERSONS		
16.	BARRIER FREE DESIGN	☒ YES ☐ NO (EXPLAIN) _____		3.8.	9.5.2.
17.	HAZARDOUS SUBSTANCES	☐ YES ☒ NO		3.3.1.2. & 3.3.1.9.	9.10.1.3.(4)
18.	REQUIRED FIRE RESISTENCE RATING (F.R.R.)	HORIZONTAL ASSEMBLIES F.R.R. (HOURS)	LISTED DESIGN No. OR DESCRIPTION (SG-2)	3.2.2.20.-.83. & 3.2.1.4.	9.10.8. 9.10.9.
		FLOORS 3/4 HOURS			
		ROOF 0 HOURS			
		MEZZANINE 3/4 HOURS			
		F.R.R. OF SUPPORTING MEMBERS		3.2.2.20.-.83. & 3.2.1.4.	9.10.8. 9.10.9.
		FLOORS 3/4 HOURS			
		ROOF 0 HOURS			
		MEZZANINE 3/4 HOURS			

19. SPATIAL SEPARATION: CONSTRUCTION OF EXTERIOR WALLS — 3.2.3. — 9.10.14.

WALL	AREA OF E.B.F. (m^2)	L.D. (m)	L/H or H/L	PERMITTED MAX % OF OPENING	PROPOSED % OF OPENING	F.R.R. (HOURS)	LISTED DESIGN OR DESCRIPTION	COMB CONST.	COMB CONSTRUCTION NON COMBUSTIBLE CLADDING	NON COMBUSTIBLE CONSTRUCTION
NORTH	171.5m^2	30.5m	3:1 to 10:1	100%	50%	0 HR				X
SOUTH	171.5m^2	19.33m	3:1 to 10:1	100%	0%	0 HR				X
EAST	604.80m^2	13.34m	3:1 to 10:1	84%	19%	1 HR				X
WEST	604.80m^2	18.60m	3:1 to 10:1	100%	21%	0 HR				X

ITEM	ONTARIO 2024 BUILDING CODE DATA MATRIX - PART 3 or PART 9			O.B.C. REFERENCE References are Division B unless noted: [A] for Division A or [C] for Division C.	
1.	PROJECT DESCRIPTION: PROPOSED INDUSTRIAL CONDOMINIUM UNITS (BUILDING B) 725 LAKE ROAD, BOWMANVILLE, ON.	☒ NEW ☐ ADDITION ☐ CHANGE OF USE ☐ ALTERATION	☐ PART 11 11.1 to 11.4	☒ PART 3 1.1.2.[A]	☐ PART 9 1.1.2.[A] & 9.10.1.3.
2.	MAJOR OCCUPANCY (S) F-2			3.1.2.1.(1)	3.1.2.1.(1)
3.	BUILDING AREA (m^2)	EXISTING 0m^2 NEW 1859.81m^2	TOTAL 1859.81m^2	1.4.1.2. [A]	1.4.1.2. [A]
4.	GROSS AREA (m^2)	EXISTING 0m^2 NEW 1859.81m^2	TOTAL 1859.81m^2	1.4.1.2. [A]	1.4.1.2. [A]
5.	NUMBER OF STOREYS	ABOVE GRADE 1	BELOW GRADE 0	1.4.1.2. [A] & 3.2.1.1.	1.4.1.2. [A] & 9.10.4
6.	NUMBER OF STREETS / FIRE FIGHTER ACCESS 3			3.2.2.10. & 3.2.5.	9.10.20.
7.	BUILDING CLASSIFICATION 3.2.2.79			3.2.2.20. - .83.	9.10.2.
8.	SPRINKLER SYSTEM PROPOSED	☒ ENTIRE BUILDING ☐ SELECTED COMPARTMENTS ☐ SELECTED FLOOR AREAS ☐ BASEMENT ☐ IN LIEU OF RATING ☐ NOT REQUIRED		3.2.2.20. - .83.	9.10.8.2.
9.	STANDPIPE REQUIRED	☐ YES ☒ NO		3.2.9.	N/A
10.	FIRE ALARM REQUIRED	☐ YES ☒ NO		3.2.4.	9.10.18.
11.	WATER SERVICE SUPPLY IS ADEQUATE	☒ YES ☐ NO		3.2.5.7.	N/A
12.	HIGH BUILDING	☐ YES ☒ NO		3.2.6.	N/A
13.	CONSTRUCTION RESTRICTIONS	☐ COMBUSTIBLE PERMITTED ☐ NON-COMBUSTIBLE REQUIRED ☒ BOTH		3.2.2.20. - .83.	9.10.6.
	ACTUAL CONSTRUCTION	☐ COMBUSTIBLE PERMITTED ☐ NON-COMBUSTIBLE ☒ BOTH			
14.	MEZZANINE (s) AREA (m^2) 743.92			3.2.2.1.1.(3)-(8)	9.10.4.1.
15.	OCCUPANT LOAD BASED ON	☒ m^2 / PERSON ☐ DESIGN OF BUILDING		3.1.17.	9.9.1.3.
	BASEMENT:	OCCUPANCY _____	LOAD _____ PERSONS		
	1st FLOOR:	OCCUPANCY F2	LOAD 70 PERSONS		
	2nd FLOOR:	OCCUPANCY _____	LOAD _____ PERSONS		
	3rd FLOOR:	OCCUPANCY _____	LOAD _____ PERSONS		
16.	BARRIER FREE DESIGN	☒ YES ☐ NO (EXPLAIN) _____		3.8.	9.5.2.
17.	HAZARDOUS SUBSTANCES	☐ YES ☒ NO		3.3.1.2. & 3.3.1.9.	9.10.1.3.(4)
18.	REQUIRED FIRE RESISTENCE RATING (F.R.R.)	HORIZONTAL ASSEMBLIES F.R.R. (HOURS)	LISTED DESIGN No. OR DESCRIPTION (SG-2)	3.2.2.20.-.83. & 3.2.1.4.	9.10.8. 9.10.9.
		FLOORS 3/4 HOURS			
		ROOF 0 HOURS			
		MEZZANINE 3/4 HOURS			
		F.R.R. OF SUPPORTING MEMBERS		3.2.2.20.-.83. & 3.2.1.4.	9.10.8. 9.10.9.
		FLOORS 3/4 HOURS			
		ROOF 0 HOURS			
		MEZZANINE 3/4 HOURS			

19. SPATIAL SEPARATION: CONSTRUCTION OF EXTERIOR WALLS — 3.2.3. — 9.10.14.

WALL	AREA OF E.B.F. (m^2)	L.D. (m)	L/H or H/L	PERMITTED MAX % OF OPENING	PROPOSED % OF OPENING	F.R.R. (HOURS)	LISTED DESIGN OR DESCRIPTION	COMB CONST.	COMB CONSTRUCTION NON COMBUSTIBLE CLADDING	NON COMBUSTIBLE CONSTRUCTION
NORTH	246.89m^2	30.5m	> 3:1	100%	21%	0 HR				X
SOUTH	246.89m^2	18.42m	3:1 to 10:1	100%	3%	0 HR				X
EAST	565.67m^2	16.37m	3:1 to 10:1	100%	21%	0 HR				X
WEST	565.67m^2	13.34m	3:1 to 10:1	84%	19%	1 HR				X

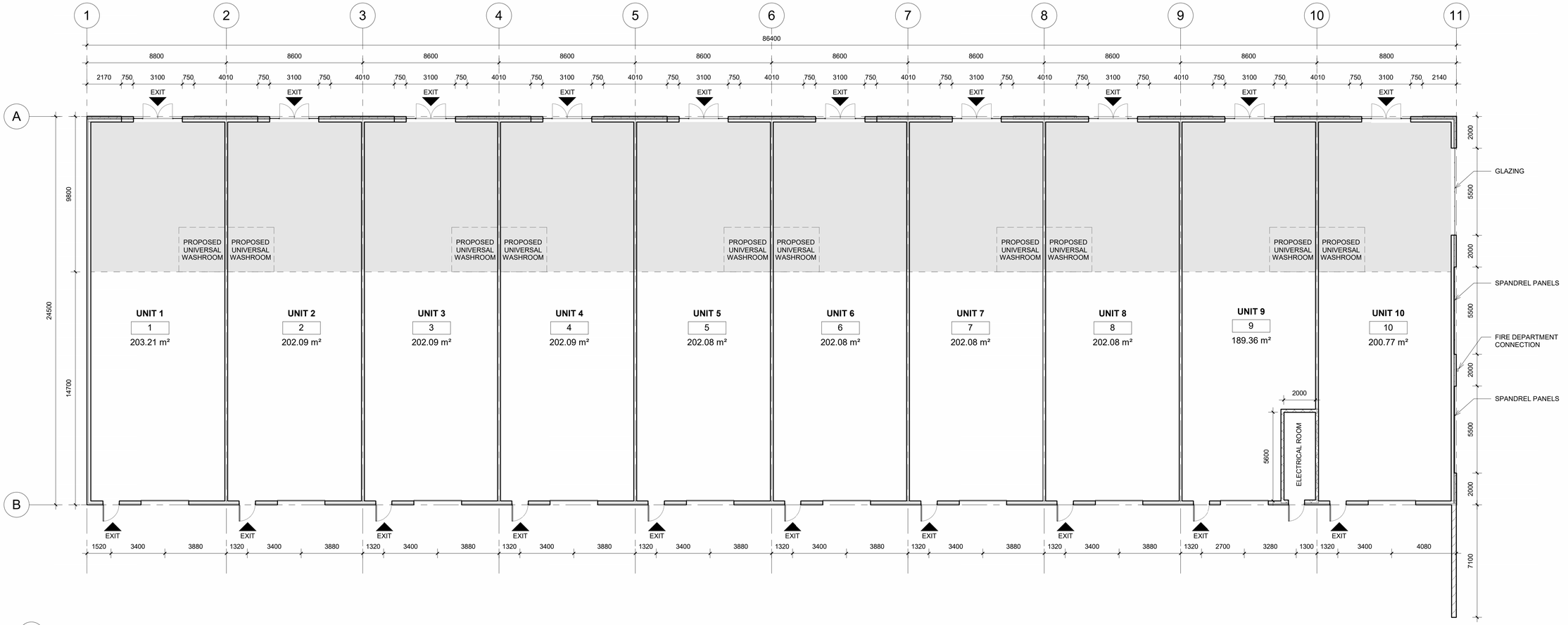
NO.	SUBMISSION	DATE
2	RE-ISSUED FOR S.P.A.	25/02/06
1	ISSUED FOR S.P.A.	24/03/22

JASS GILL
725 LAKE ROAD, CLARINGTON

BUILDING A & B OBC MATRICES

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE:
DESIGNED BY: D.D.B.
CHECKED BY: D.D.B.
PROJECT NO.: 123081
DRAWING NO.: A101



1 / A201 B1 MAIN FLOOR PLAN
1 : 125

LEGEND

- TRAVEL DISTANCE (45M MAXIMUM)
- EXIT — BUILDING EXIT
- EXTENT OF POTENTIAL OPEN MEZZANINE (40% OF FLOOR AREA)

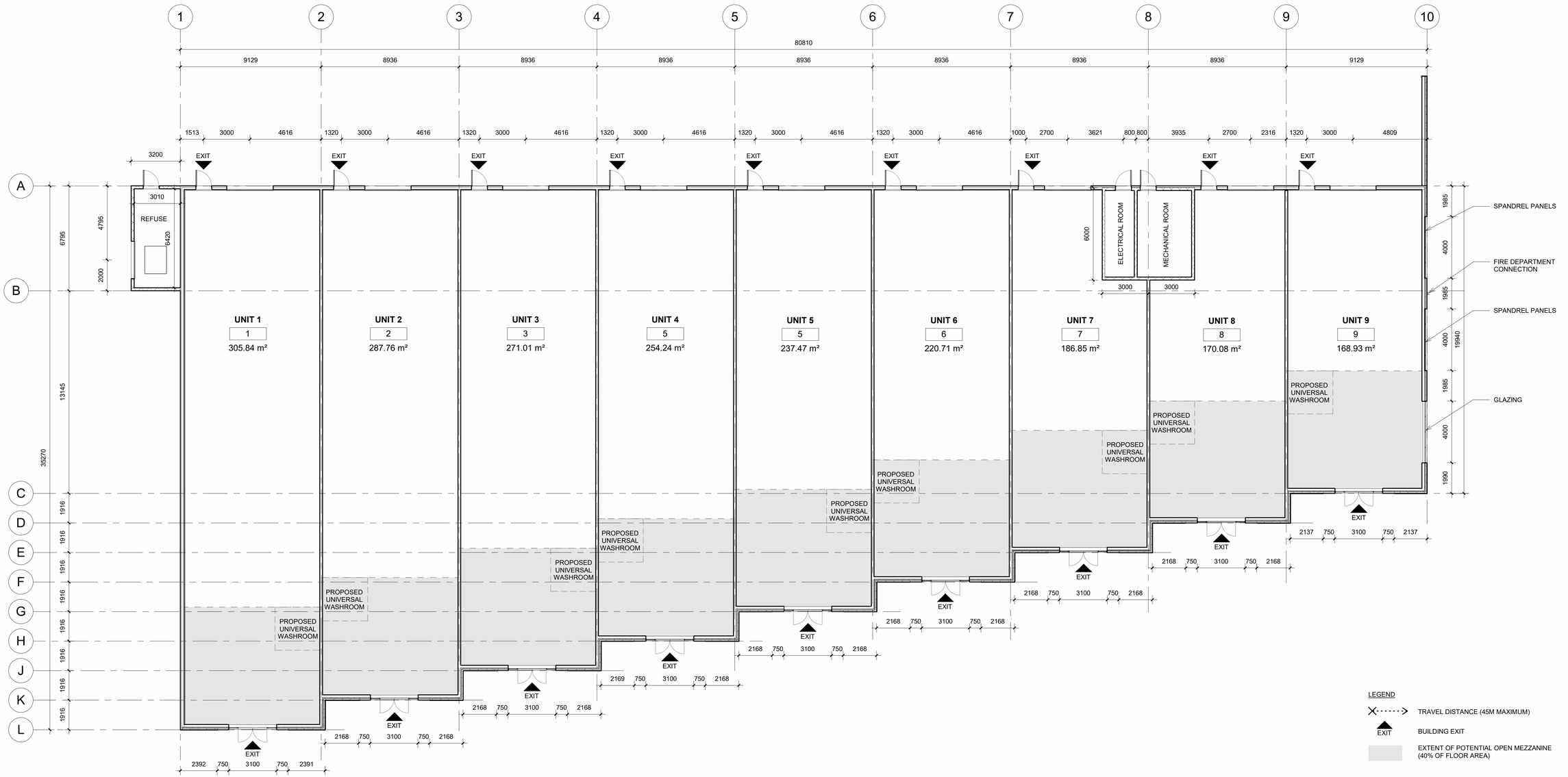
NO.	SUBMISSION	DATE
2	RE-ISSUED FOR S.P.A.	25/02/06
1	ISSUED FOR S.P.A.	24/03/22

JASS GILL
725 LAKE ROAD, CLARINGTON

BUILDING A MAIN FLOOR PLAN

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE:	As indicated
DESIGNED BY:	D.D.B.
CHECKED BY:	D.D.B.
PROJECT NO.:	123081
DRAWING NO.:	A201



1 / A202 B2 MAIN FLOOR PLAN
1 : 125

LEGEND

TRAVEL DISTANCE (45M MAXIMUM)

EXIT BUILDING EXIT

EXTENT OF POTENTIAL OPEN MEZZANINE (40% OF FLOOR AREA)

NO.	SUBMISSION	DATE
2	RE-ISSUED FOR S.P.A.	25/02/06
1	ISSUED FOR S.P.A.	24/03/22

JASS GILL
725 LAKE ROAD, CLARINGTON

BUILDING B MAIN FLOOR PLAN

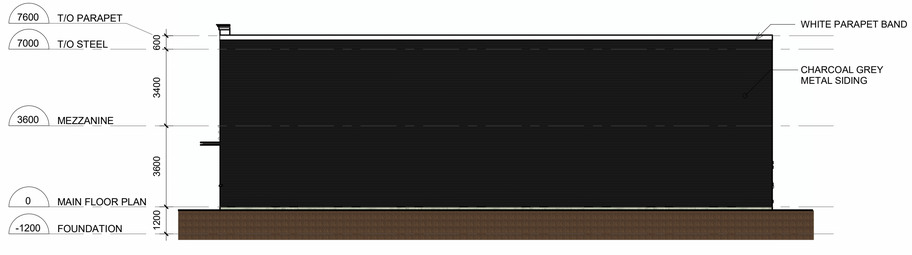
D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE:	As indicated
DESIGNED BY:	D.D.B.
CHECKED BY:	D.D.B.
PROJECT NO.:	123081
DRAWING NO.:	A202

1 A301 B1- WEST ELEVATION
1 : 125

2 A301 B1- NORTH ELEVATION
1 : 125

3 A301 B1- EAST ELEVATION
1 : 125



4 A301 B1- SOUTH ELEVATION
1 : 125

NO.	SUBMISSION	DATE
2	RE-ISSUED FOR S.P.A.	25/02/06
1	ISSUED FOR S.P.A.	24/03/22

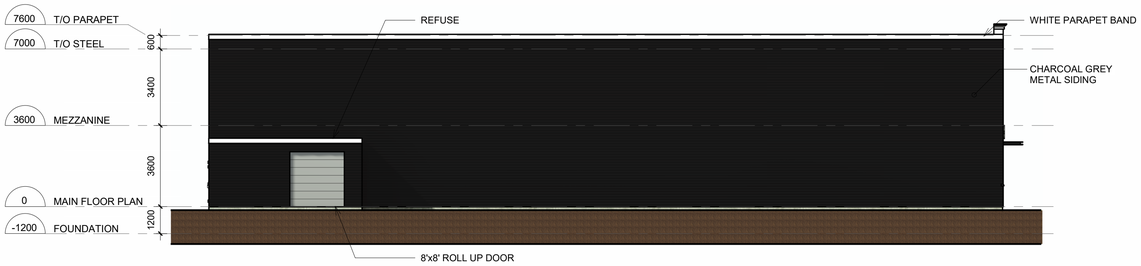
JASS GILL
725 LAKE ROAD, CLARINGTON

BUILDING A ELEVATIONS

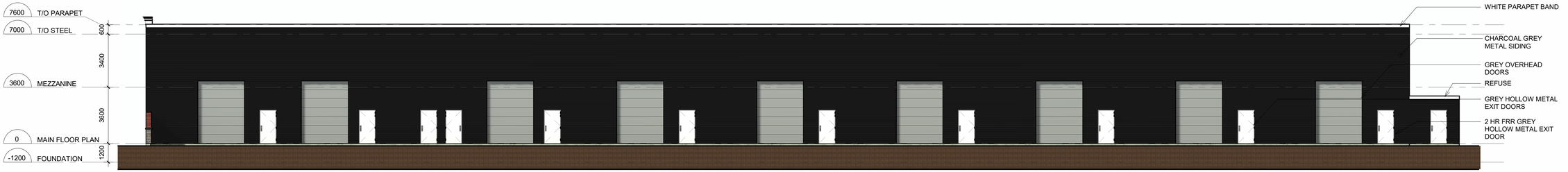
D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE:	1 : 125
DESIGNED BY:	D.D.B.
CHECKED BY:	D.D.B.
PROJECT NO.:	123081
DRAWING NO.:	A301

1 A302 B2- EAST ELEVATION
1 : 125



2 A302 B2- SOUTH ELEVATION
1 : 125



3 A302 B2- WEST ELEVATION
1 : 125

4 A302 B2- NORTH ELEVATION
1 : 125

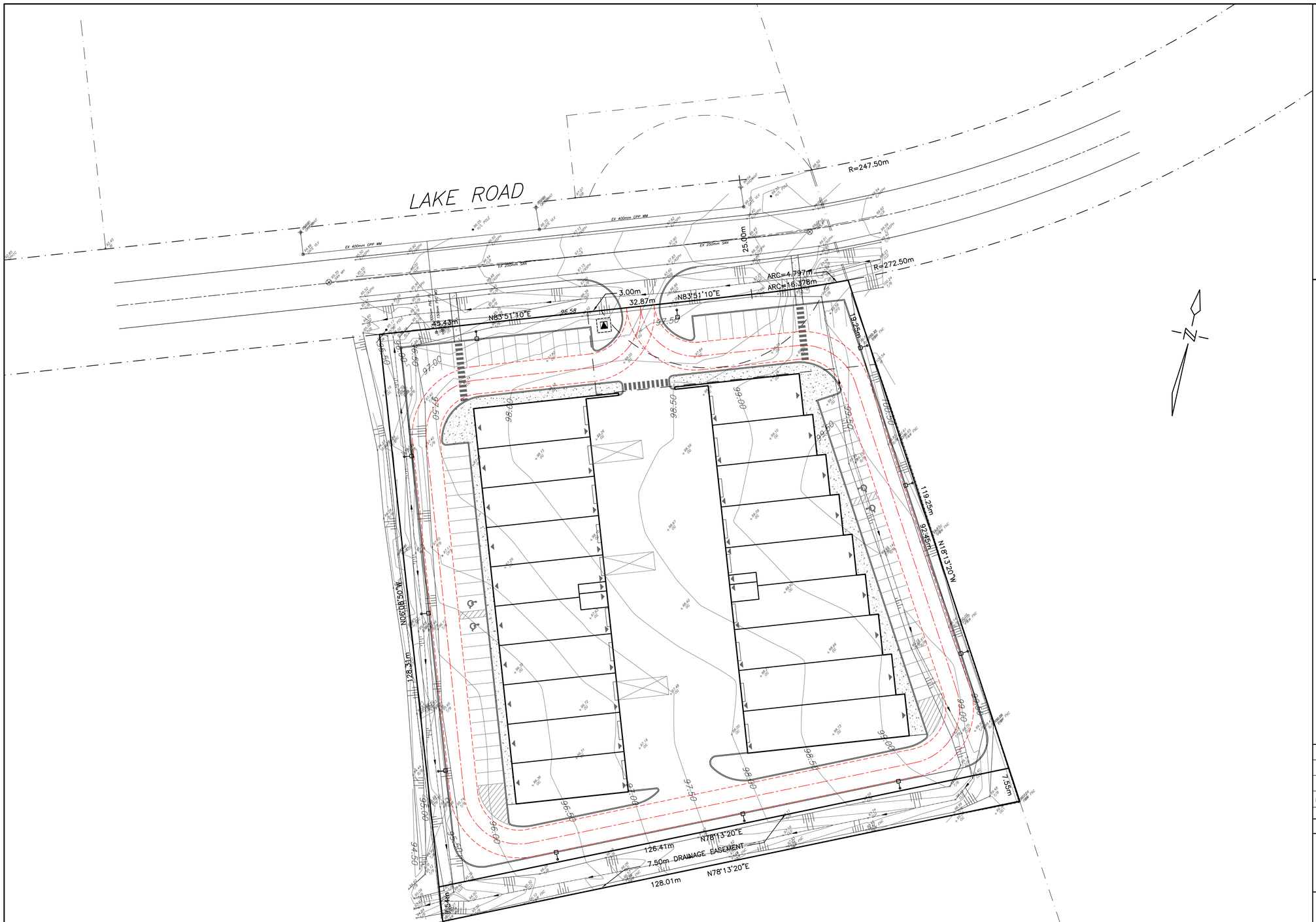
NO.	SUBMISSION	DATE
2	RE-ISSUED FOR S.P.A.	25/02/06
1	ISSUED FOR S.P.A.	24/03/22

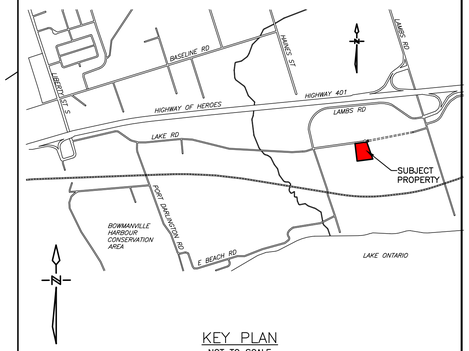
JASS GILL
725 LAKE ROAD, CLARINGTON

BUILDING B ELEVATIONS

D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

SCALE:	1 : 125
DESIGNED BY:	D.D.B.
CHECKED BY:	D.D.B.
PROJECT NO.:	123081
DRAWING NO.:	A302





KEY PLAN
NOT TO SCALE

LEGAL BOUNDARY TAKEN FROM:

REGISTERED PLAN 40M-1921

PART OF LOT 6, BROKEN FRONT CONCESSION
BLOCK 3, 9 AND 10
FORMERLY IN THE TOWNSHIP OF DARLINGTON
NOW IN THE

MUNICIPALITY OF CLARINGTON

REGIONAL MUNICIPALITY OF DURHAM

SITE STATISTICS

ZONING	(H)M1	
EXIST SITE AREA	13043.49m²	
TURNING CIRCLE AREA	1067.36m²	
TOTAL SITE AREA	14110.85m²	(100.0%)
BUILDING 1 AREA	2120.36m²	
BUILDING 2 AREA	2236.24m²	
TOTAL BUILDING AREA (NOT INCLUDING MEZZANINE)	4356.60m²	(30.9%)
BUILDING 1 GFA	2722.36m²	
BUILDING 2 GFA	2794.24m²	
TOTAL BUILDING GFA (INCLUDING MEZZANINE/METER ROOM/REFUSE)	5516.60m²	
LANDSCAPE AREA	3367.13m²	(23.9%)
ASPHALT AREA	6387.12m²	(45.2%)
PARKING REQUIRED	24	
PARKING PROVIDED	75	
LOADING REQUIRED	3	
LOADING PROVIDED	3	

PRELIMINARY
NOT FOR CONSTRUCTION

NO.	DATE	REVISION	BY

REVISIONS

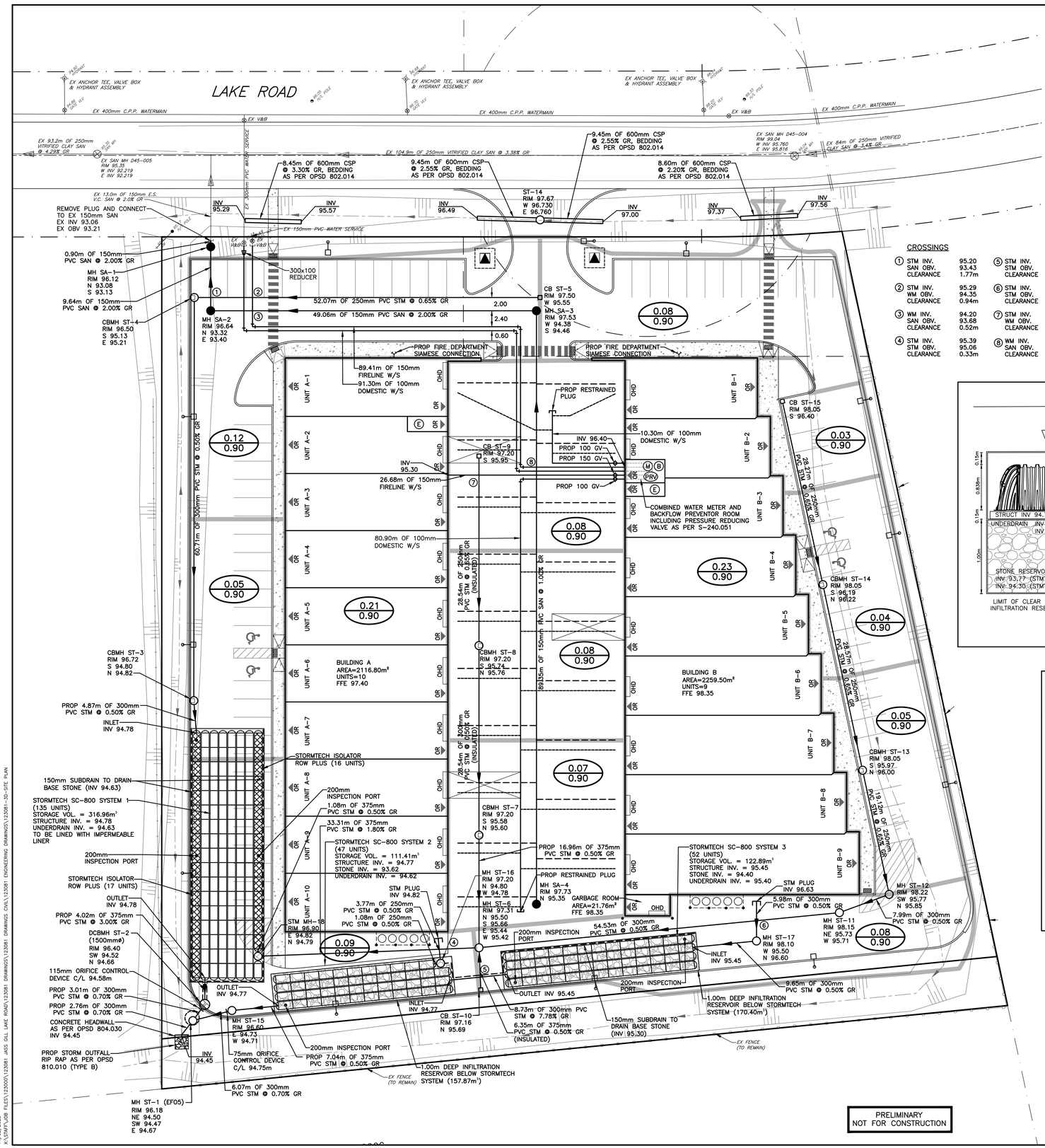
725 LAKE ROAD, CLARINGTON, ONTARIO

SITE PLAN

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

SCALE:	1:400	PROJECT NO. 123081
DRAWN BY:	B.B.	DRAWING NO. SP-1
DESIGN BY:	M.J.F.	
CHECKED BY:	M.J.F.	
DATE:	FEBRUARY 2024	

X:\STAFF\JOB FILES\123000\123081 JASS GILL LAKE ROAD\123081 DRAWINGS\123081 ENGINEERING DRAWINGS\123081-SD-SITE PLAN.DWG
19/02/2024



CROSSINGS

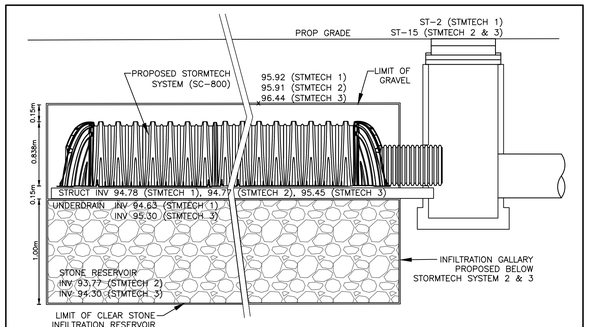
①	STM INV.	95.20	⑤	STM INV.	95.68
	SAN OBV.	93.43		STM OBV.	95.43
	CLEARANCE	1.77m		CLEARANCE	0.25m
②	STM INV.	95.29	⑥	STM INV.	96.61
	WM OBV.	94.35		STM OBV.	95.95
	CLEARANCE	0.94m		CLEARANCE	0.66m
③	WM INV.	94.20	⑦	STM INV.	95.88
	SAN OBV.	93.68		WM OBV.	95.45
	CLEARANCE	0.52m		CLEARANCE	0.43m
④	STM INV.	95.39	⑧	WM INV.	96.05
	STM OBV.	95.06		SAN OBV.	94.85
	CLEARANCE	0.33m		CLEARANCE	1.20m

WATERMAINS AND FIREMAINS

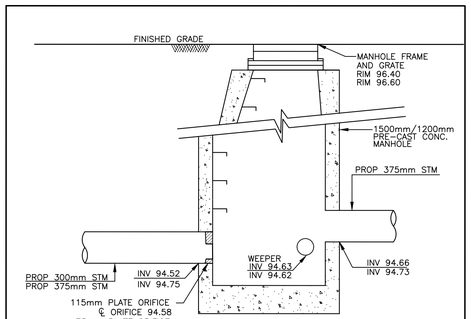
1. ALL WATERMAINS AND APPURTENANCES SHALL COMPLY WITH THE REGION OF DURHAM STANDARDS AND THE ONTARIO PLUMBING CODE.
2. PIPES 300mm# AND SMALLER, UNLESS OTHERWISE SHOWN, SHALL BE CL DR18 (POLYVINYL CHLORIDE) PVC PIPE.
3. FITTINGS AND THRUST RESTRAINT AS PER STANDARD S-210.010, S-200.050, AND S-200.060.
4. VALVES 300mm# AND SMALLER SHALL CONFORM TO THE REGION OF DURHAM STANDARD DRAWINGS S-220.010.
5. WATERMAINS AND FIREMAINS SHALL HAVE A MINIMUM OF 1.8m COVER. WATERMAINS AND FIREMAINS TO HAVE A MINIMUM OF 500mm VERTICAL CLEARANCE AND 1.7m HORIZONTAL CLEARANCE FROM ALL SEWER LINES AND CROSSINGS AS PER PART 7 OF THE ONTARIO BUILDING CODE.
6. CONTRACTOR TO SUCCESSFULLY SWAB AND CHLORINATE MAINS AND SERVICES AS PER OPSS 701.07.23 AND REGIONAL STANDARDS.
7. ALL NEW MAINS AND SERVICES TO BE PRESSURE TESTED TO 200 psi (1379 kPa).
8. ALL TRENCHES ARE TO BE BACKFILLED IN ACCORDANCE WITH REGION STANDARDS.
9. UNLESS OTHERWISE NOTED ALL WATERMAIN AND FIREMAIN CROSSINGS TO BE ACCOMMODATED USING VERTICAL PIPE DEFLECTIONS.
10. NO CONNECTION TO REGIONAL SERVICES UNTIL POSITIVE LABORATORY TEST RESULTS ARE DELIVERED TO THE REGION AND WRITTEN CLEARANCE IS GIVEN BY THE REGION.
11. 37mm COPPER TYPE 'K' WATER SERVICE CONNECTIONS SHALL CONFORM TO S-230.021 ACCORDINGLY.
13. PRIVATE WATER SUPPLY PIPES HAVE BEEN DESIGNED IN ACCORDANCE WITH M.E.C.P. GUIDELINES AS PER 7.1.6.5. OF THE O.B.C.
14. THE WATER METER / BACKFLOW PREVENTER ROOM IS TO BE DESIGN TO THE REGIONAL OF DURHAM STANDARD DRAWINGS-240.051

GENERAL NOTES

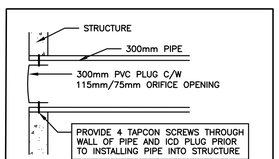
1. RESPECTING ALL WORK IN THE MUNICIPAL RIGHT OF WAY, THE CONTRACTOR IS TO PROVIDE AT LEAST 48 HOURS NOTICE TO THE CLARINGTON PUBLIC WORKS DEPARTMENT STAFF AT (905)-263-2291.
2. A ROAD OCCUPANCY PERMIT WILL BE REQUIRED FOR ANY WORK DONE IN THE MUNICIPAL ROAD ALLOWANCE. EXCAVATION OF THE ROAD SURFACE IS NOT PERMITTED BETWEEN DECEMBER 1ST AND APRIL 30TH.
3. ALL RESTORATION OR WORK DONE IN THE ROAD ALLOWANCE MUST BE COMPLETED AS PER MUNICIPAL FIELD STAFF DIRECTION.
4. THE PERFORMANCE GUARANTEE WILL NOT BE REFUNDED BY THE MUNICIPALITY OF CLARINGTON UNLESS THE WORKS HAVE BEEN INSPECTED BY MUNICIPAL FORCES AND DEEMED TO BE COMPLETED AND SATISFACTORY.



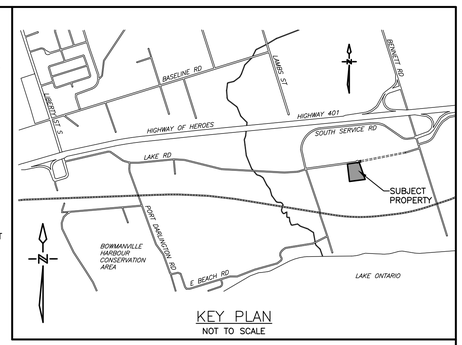
STORMTECH SC-800 SYSTEM DETAIL
NOT TO SCALE



ST-2/ST-15
ORIFICE CONTROL DETAIL
NOT TO SCALE



INLET CONTROL DEVICE
MOUNTING DETAIL
SCALE: N.T.S.



KEY PLAN
NOT TO SCALE

BENCH MARK

BENCHMARK 0011925U176A: BOWMANVILLE-- C.N.RY., STONE ARCH SUBWAY FOR SOUTH SERVICE ROAD, 1.9 KM EAST OF STATION, BOLT IN NORTHWEST FACE OF WEST WING WALL AT NORTH END OF SUBWAY, THIRD COURSE BELOW COPING.
ELEVATION: 84.479

SITE SERVICING NOTES:

1. THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES AND SERVICES TO BE VERIFIED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. CONCERNED UTILITIES TO BE GIVEN ADVANCED NOTICE FOR STAKE OUT. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE UTILITIES SHOWN ON THE DRAWINGS.
2. QUANTITIES, DIMENSIONS AND ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO ORDERING MATERIALS OR COMMENCING CONSTRUCTION.
3. ALL SANITARY SEWER AND APPURTENANCES COMPLY WITH THE REGION OF DURHAM STANDARDS. ALL PRIVATE SEWERS ARE DESIGNED IN ACCORDANCE WITH THE M.O.E. PIBS 6879, "DESIGN GUIDELINES FOR SEWAGE WORKS."
   - –SANITARY SEWER PIPES TO BE 150mm CL DR35 PVC PIPE, CL P BEDDING
   - –SANITARY SERVICE PIPES TO BE 100mm CL DR28 PVC PIPE, CL P BEDDING, AT MIN 2.0% GRADE.
   - –SANITARY MANHOLES AS PER OPSD 701.010 C/W GRATE AS PER OPSD 401.010
   - –ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH REGION OF DURHAM STANDARDS.
4. ALL WATER MAINS AND APPURTENANCES COMPLY WITH THE REGION OF DURHAM STANDARDS. ALL PRIVATE WATER SUPPLY PIPES ARE DESIGNED IN ACCORDANCE TO THE M.O.E. PIBS 6881e, "DESIGN GUIDELINES FOR DRINKING-WATER SYSTEMS."
   - –ALL WATER MAINS SHALL BE CONSTRUCTED A MINIMUM OF 1.80m BELOW FINISHED GRADE
   - –ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH REGION OF DURHAM STANDARDS
   - –100mm DOMESTIC WATERLINE TO BE CL DR18 PVC, CL P BEDDING
   - –150mm FIRELINE TO BE DR 18 PVC, CL P BEDDING
   - –37mm COPPER TYPE 'K' WATER SERVICE PIPES, CL P BEDDING PER S-230.021.
5. ALL STORM SEWERS AND APPURTENANCES SHALL COMPLY WITH THE MUNICIPALITY OF CLARINGTON STANDARDS AND THE ONTARIO PLUMBING CODE.
   - –STORM SEWER PIPE LARGER THAN 450mm SHALL BE CL 65D CONC PIPE, CL B BEDDING
   - –STORM SEWER PIPE 450mm AND SMALLER SHALL BE DR35 PVC PIPE, CL P BEDDING
   - –STORM SEWER MANHOLES AND CATCH BASIN MANHOLES SHALL BE AS PER OPSD 701.010
   - –CATCH BASINS SHALL BE AS PER OPSD 705.010.
   - –MANHOLE GRATES SHALL BE AS PER OPSD 401.010
   - –CATCH BASIN GRATES SHALL BE AS PER OPSD 400.020
   - –ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH OPSD STANDARDS
6. GENERALLY, A MINIMUM OF 0.25m SHALL BE PROVIDED BETWEEN THE OUTSIDE OF PIPE BARRELS AT THE POINT OF CROSSING FOR STORM AND SANITARY SEWERS. A MINIMUM OF 0.50m SHALL BE PROVIDED BETWEEN THE OUTSIDE OF PIPE BARRELS AT THE POINT OF CROSSING FOR ALL SEWERS CROSSING WATER MAINS.
7. MH ST-1 SHALL BE AN OIL/GRIT SEPARATOR, STORMCEPTOR MODEL EF05.
8. CONCRETE HEADWALL AS PER OPSD 804.030.
9. RIP-RAP OUTLET TO DITCHING AS PER OPSD 810.010

LEGEND

- DRAINAGE BOUNDARY
- 0.25 / 0.90 — DRAINAGE AREA (ha) / RUN-OFF COEFFICIENT
- (M) WATER METER LOCATION
- (B) BACKFLOW PREVENTOR LOCATION
- (E) ELECTRICAL ROOM
- (PRV) PRESSURE REDUCING VALVE LOCATION

NO.	SUBMISSION	DATE
1.	REVISED AS PER 1ST SUBMISSION COMMENT	2025/02/13

725 LAKE ROAD, BOWMANVILLE
MUNICIPALITY OF CLARINGTON

SITE SERVICING AND STORM DRAINAGE PLAN

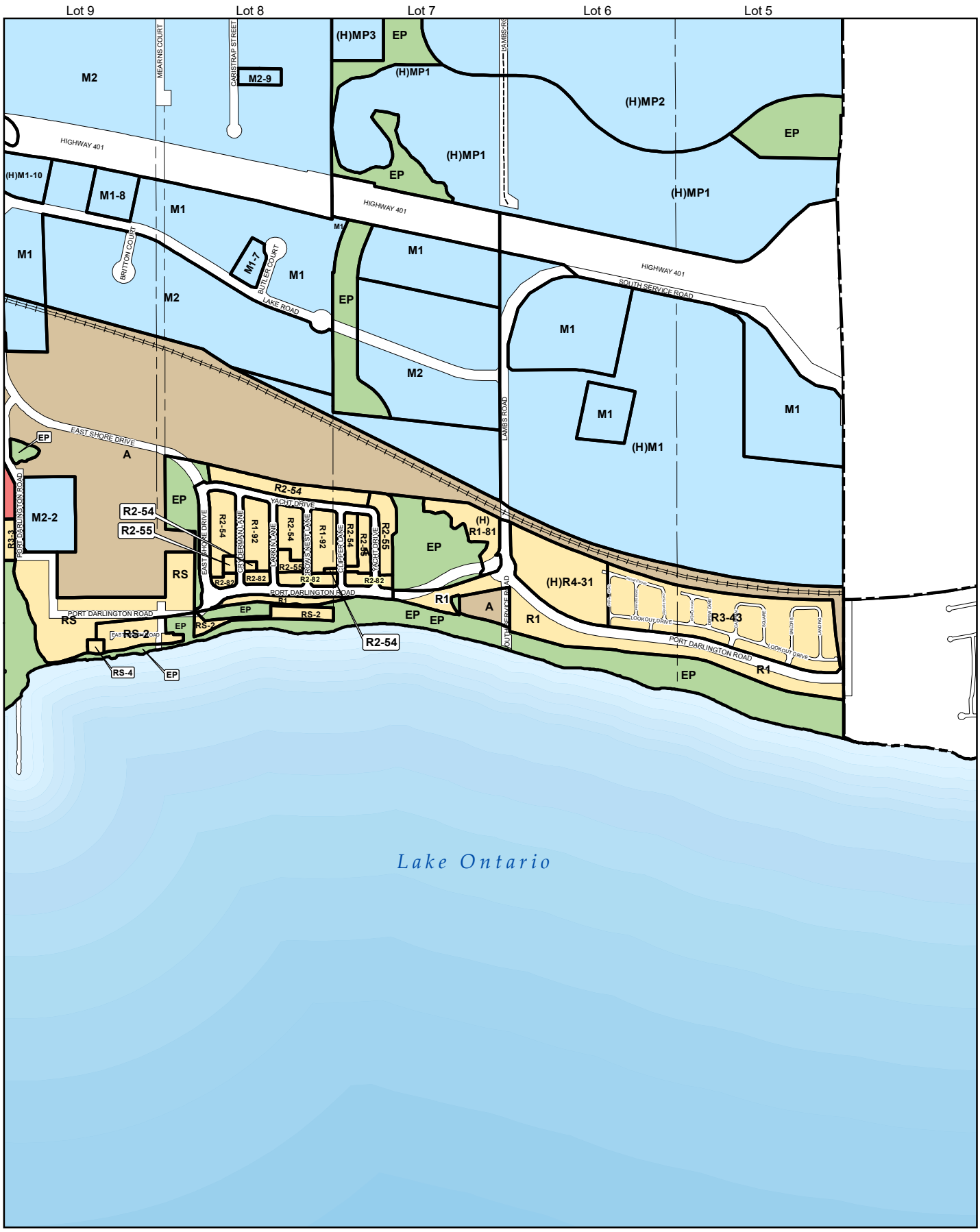
D.G. BIDDLE & ASSOCIATES
CONSULTING ENGINEERS & PLANNERS
96 King Street East
Oshawa, Ontario, L1H 1B6
Phone: 905-576-8500
info@dgbiddle.com
dgbiddle.com

LICENSED PROFESSIONAL ENGINEER
C. J. FLAMMINIO
100544401
FEB. 13/2025
PROVINCE OF ONTARIO

SCALE:	1:300
DESIGNED BY:	M.R.W.
CHECKED BY:	K.G.K.
PROJECT NO.:	123081
DRAWING NO.:	SS-1

PRELIMINARY
NOT FOR CONSTRUCTION

14/02/2025
X:\STAFF\JOB FILES\123000\123081 JASS GILL LAKE ROAD\123081 DRAWINGS\123081 ENGINEERING DRAWINGS\123081-3D-SITE PLAN



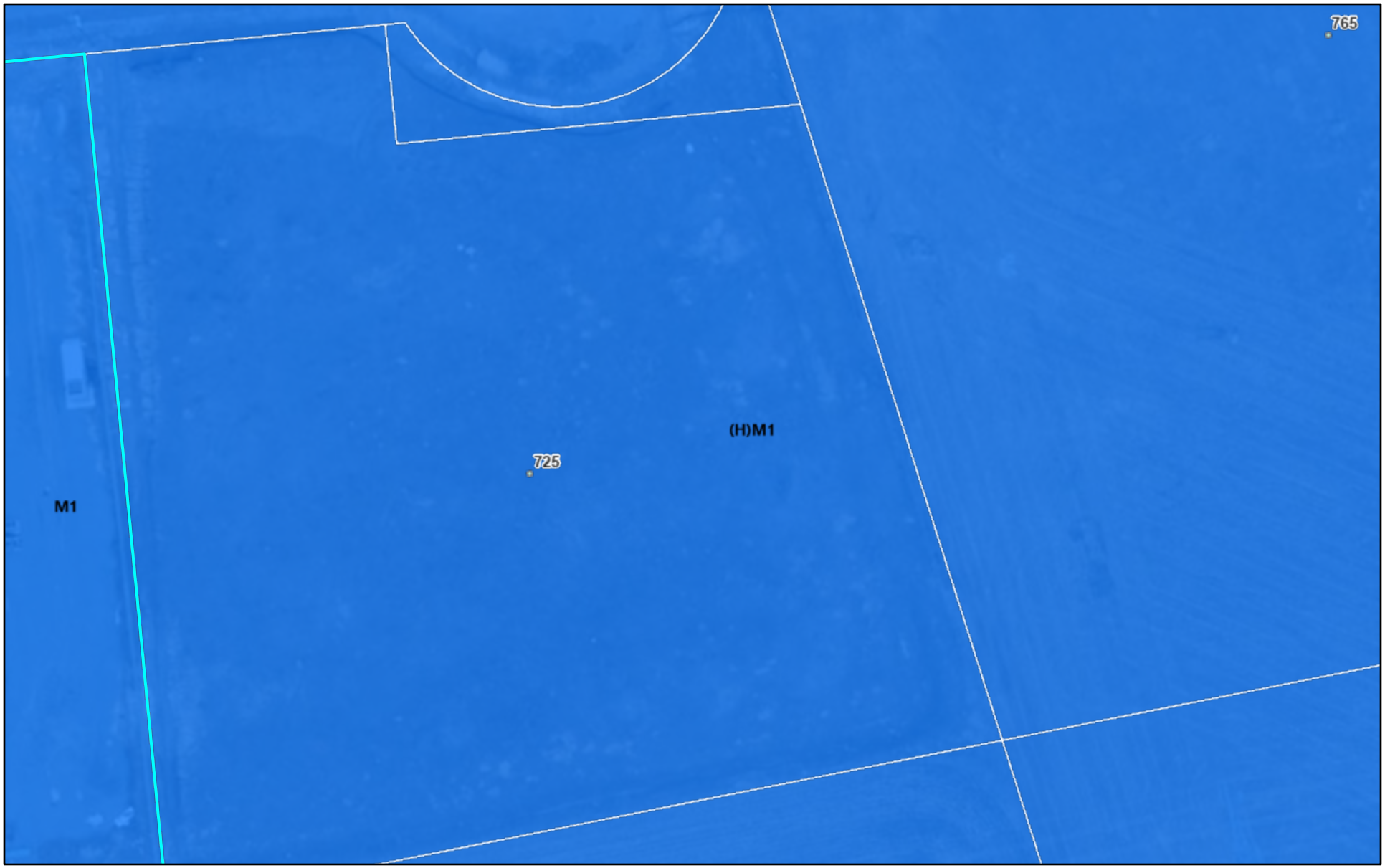
Residential
Commercial
Institutional
Industrial
EP
Agricultural
Neighbourhood Character Overlay
ARTERIAL ROAD TYPE 'A'
ARTERIAL ROAD TYPE 'B'

August 2020

Municipality of Clarington Zoning By-Law 84-63 Schedule 3 (Bowmanville)

3F
3B **3C** 1B

Zoning By-Law Map



3/22/2024, 11:45:22 AM

1:1,128

0 0.01 0.01 0.02 mi

0 0.01 0.02 0.04 km

Assessment Parcels

Address Points

Urban Areas And Hamlets

Municipal Boundary

Zoning By-Law 84-63 (South of ORM)

Industrial Zone (M)

Urban Areas and Hamlets

Central Lake Ontario Conservation Authority

CLOCA Regulated Areas Map

Legend

CLOCA Regulated Area

Central Lake Ontario Conservation

1:6,159

N

Map Compiled by the Central Lake Ontario Conservation Authority, 100 Whiting Avenue, Oshawa, Ontario, L1H 3T3

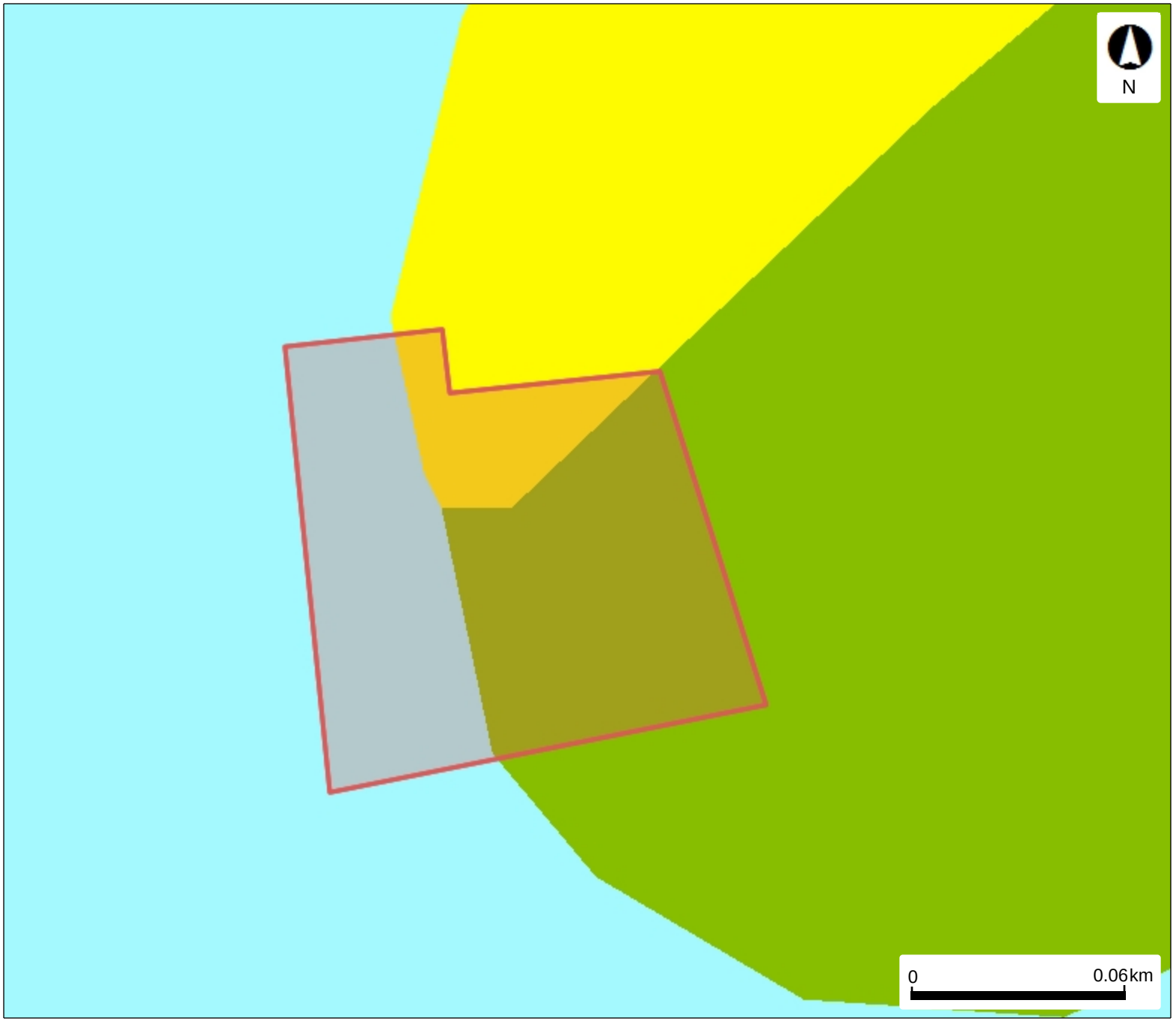
This map is for information purposes only and the Central Lake Ontario Conservation Authority takes no responsibility for, nor guarantees, the accuracy of all the information contained within the map.

Source: CLOCA, 2024; Regional Municipality of Durham, 2024; Orthophoto: First Base Solutions, April 2019.

Projection: NORTH AMERICAN DATUM 1983 UNIVERSAL TRASVERSE MERCATOR (6 DEGREES) PROJECTION, ZONE 17, CENTRAL MERIDIAN (81 DEGREES WEST)

Date Printed: April 18, 2024

Surficial Map



Legend

Surficial

- 1: Precambrian bedrock
- 2: Precambrian bedrock-drift compl
- 2a: Mainly till veneer
- 2b: Mainly stratified veneer
- 3: Paleozoic bedrock
- 4: Paleozoic bedrock-drift complex
- 4a: Mainly till veneer
- 4b: Mainly stratified veneer
- 5a: Shield-derived silty to sandy till
- 5b: Stone-poor, carbonate-derived to sandy till
- 5c: Stony, carbonate-derived silty t sandy till
- 5d: Glaciolacustrine-derived silty to clayey till
- 5e: Undifferentiated older till and stratified sediment
- 6: Ice-contact stratified deposits
- 6a: In moraines, kames, eskers and crevasse fills
- 6b: In subaquatic fans
- 7: Glaciofluvial deposits
- 7a: Sandy deposits
- 7b: Gravelly deposits
- 8: Fine-textured glaciolacustrine deposits
- 8a: Massive-well laminated
- 8b: Interbedded flow till, rainout dep and silt and clay
- 9: Coarse-textured glaciolacustrine deposits
- 9a: Deltaic deposits

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

Ontario

Map Created: 2/15/2024

Map Center: 43.89795 N, -78.64805 W

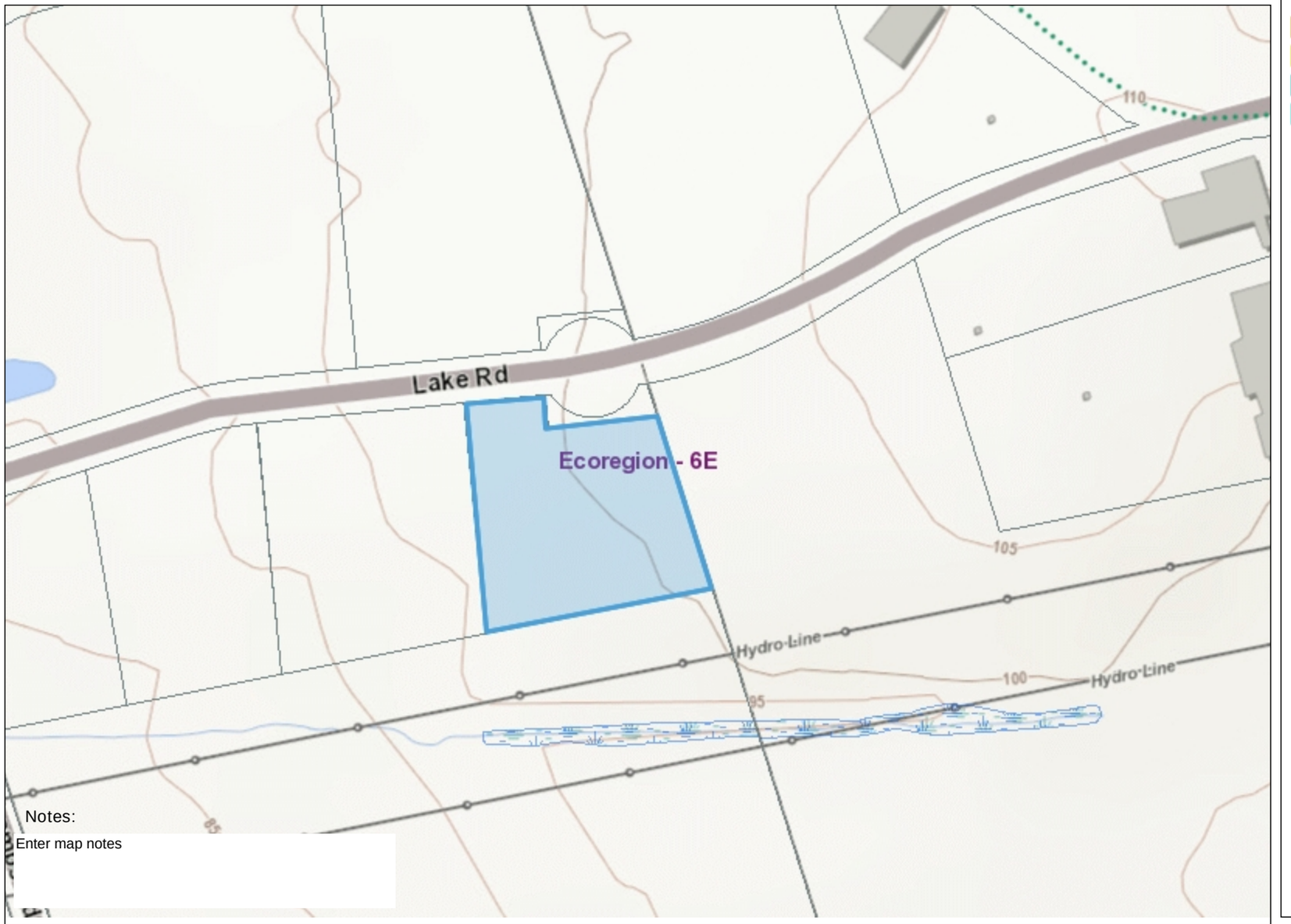
Ontario

Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

Natural Heritage Areas Map

Map created:2/15/2024



Notes:

Enter map notes

Legend

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

0.2 0 0.08 0.2 Kilometres

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

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

SPIA -HVA

Legend

- Highly Vulnerable Aquifers
- Watercourse Direction
- Assessment Parcel

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

Ontario

Map Created: 2/15/2024
Map Center: 43.89795 N, -78.64805 W

Appendix B
MECP Well Records

Water Well Records Summary Report

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

All units in meters unless otherwise specified

Well ID: 1901076 **Easting:** 688967 **UTM Zone** 17
Construction Date: 1966-10-21 **Northing:** 4862802 **Positional Accuracy:** margin of error : 100 m - 300 m

Well Depth:	10.4	**Water Kind**	FRESH	**Pump Rate (LPM):**	36
Well Diameter (cm):	15.2	**Final Status**	Water Supply	**Recommended Pump Rate:**	36
Water First Found:	9.14	**Primary Water Use:**	Livestock	**Pumping Duration (h:m):**	2 : 30
Static Level:	4				

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	CLAY	0.30	4.27
3	CLAY	4.27	8.53
4	GRAVEL	8.53	10.4

Well ID: 1907102 **Easting:** 689295 **UTM Zone** 17
Construction Date: 1984-11-19 **Northing:** 4863343 **Positional Accuracy:** margin of error : 30 m - 100 m

Well Depth:	41.5	**Water Kind**	FRESH	**Pump Rate (LPM):**	45
Well Diameter (cm):	15.2	**Final Status**	Water Supply	**Recommended Pump Rate:**	27
Water First Found:	39.3	**Primary Water Use:**	Industrial	**Pumping Duration (h:m):**	1 : 0
Static Level:	9				

Layer:	Driller's Description:	Top:	Bottom:
1	HARDPAN	0	22.9
2	FINE SAND	22.9	34.4
3	SHALE	34.4	41.5

Well ID: 1907243 **Easting:** 689255 **UTM Zone** 17
Construction Date: 1985-04-11 **Northing:** 4863263 **Positional Accuracy:** margin of error : 30 m - 100 m

Well Depth:	61	**Water Kind**	FRESH	**Pump Rate (LPM):**	
Well Diameter (cm):	15.2	**Final Status**	Abandoned-Su	**Recommended Pump Rate:**	5
Water First Found:	30.2	**Primary Water Use:**	Commerical	**Pumping Duration (h:m):**	1 : 0
Static Level:	6				

Layer:	Driller's Description:	Top:	Bottom:
1	COARSE SAND	0	9.14
1	COARSE SAND	0	9.14
2	CLAY	9.14	29
2	CLAY	9.14	29
3	STONES	29	61
3	STONES	29	61

Well ID: 1907244
Construction Date: 1985-04-11

Easting: 689315
Northing: 4863283

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

Well Depth: 271
Well Diameter (cm): 15.2
Water First Found:
Static Level:

Water Kind
Final Status Abandoned-Su
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	10.7
1	SAND	0	10.7
2	CLAY	10.7	32.9
2	CLAY	10.7	32.9
3	STONES	32.9	222
3	STONES	32.9	222
4	SHALE	222	226
4	SHALE	222	226
5	STONES	226	227
5	STONES	226	227
6	STONES	227	230
6	STONES	227	230
7	GRANITE	230	233
7	GRANITE	230	233
8	STONES	233	239
8	STONES	233	239
9	STONES	239	248
9	STONES	239	248
10	STONES	248	271
10	STONES	248	271

Well ID: 1907245
Construction Date: 1985-04-11

Easting: 689275
Northing: 4863223

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

Well Depth: 49.7
Well Diameter (cm): 15.2
Water First Found:
Static Level:

Water Kind
Final Status Abandoned-Su
Primary Water Use: Commerical

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

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	10.7
2	CLAY	10.7	31.1
3	STONES	31.1	49.7

Well ID: 1912012
Construction Date: 1994-08-08

Easting: 689076
Northing: 4863474

UTM Zone 17
Positional Accuracy: unknown UTM

Well Depth: 3.05
Well Diameter (cm): 91.4
Water First Found:
Static Level:

Water Kind
Final Status Abandoned-Su
Primary Water Use: Not Used

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

Layer:	Driller's Description:	Top:	Bottom:

1	UNKNOWN TYPE	0	3.05

Well ID: 1912013
Construction Date: 1994-08-08
Easting: 688664
Northing: 4863388
UTM Zone 17
Positional Accuracy: unknown UTM

Well Depth: 2.44
Well Diameter (cm): 91.4
Water First Found:
Static Level:
Water Kind
Final Status Abandoned-Su
Primary Water Use: Not Used
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:
1	UNKNOWN TYPE	0	2.44

Well ID: 1914172
Construction Date: 1999-08-03
Easting: 689076
Northing: 4863474
UTM Zone 17
Positional Accuracy: unknown UTM

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

Layer:	Driller's Description:	Top:	Bottom:

Well ID: 1917146
Construction Date: 2004-07-09
Easting: 689268
Northing: 4863385
UTM Zone 17
Positional Accuracy: margin of error : 10 - 30 m

Well Depth: 9.14
Well Diameter (cm): 3.20
Water First Found: 4.41
Static Level:
Water Kind FRESH
Final Status Observation W
Primary Water Use:
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.15
2	TILL	0.15	0.77
3	TILL	0.77	4.41
4	TILL	4.41	9.14
5	SAND	9.14	

Well ID: 1917147
Construction Date: 2004-07-09
Easting: 689231
Northing: 4863431
UTM Zone 17
Positional Accuracy: margin of error : 10 - 30 m

Well Depth: 9.3
Well Diameter (cm): 32
Water First Found: 7
Static Level:
Water Kind FRESH
Final Status Observation W
Primary Water Use:
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	TILL	0.30	2.25
3	TILL	2.25	6.2
4	TILL	6.2	9.30

Well ID: 1917148
Construction Date: 2004-07-09

Easting: 689117
Northing: 4863386

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

Well Depth: 6.2
Well Diameter (cm): 3.20
Water First Found:
Static Level:

Water Kind
Final Status Observation W
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:
1		0	0.06
2	GRAVEL	0.06	0.25
3	TOPSOIL	0.25	1.35
4	TILL	1.35	4.67
5	TILL	4.67	6.2

Well ID: 1917149
Construction Date: 2004-07-09

Easting: 689231
Northing: 4863431

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

Well Depth: 6.2
Well Diameter (cm): 3.20
Water First Found: 2.13
Static Level:

Water Kind FRESH
Final Status Observation W
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	TILL	0.30	2.25
3	TILL	2.25	6.2

Well ID: 1917150
Construction Date: 2004-07-09

Easting: 689208
Northing: 4863348

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

Well Depth: 9.14
Well Diameter (cm): 3.20
Water First Found: 4
Static Level:

Water Kind FRESH
Final Status Observation W
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:
1	GRAVEL	0	0.15
2	TOPSOIL	0.15	0.35
3	SAND	0.35	1.70
4	SAND	1.70	9.14

Well ID: 1917151
Construction Date: 2004-07-09

Easting: 689241
Northing: 4863356

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

Well Depth: 9.14
Well Diameter (cm): 3.20
Water First Found: 1.8
Static Level:

Water Kind FRESH
Final Status Observation W
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:
1	GRAVEL	0	0.7
2	TILL	0.7	1.8
3	TILL	1.8	9.14

Well ID: 1917152
Construction Date: 2004-07-09

Easting: 689154
Northing: 4863408

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

Well Depth: 7.62
Well Diameter (cm): 3.20
Water First Found: 7.31
Static Level:

Water Kind FRESH
Final Status Observation W
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:
1		0	0
2	GRAVEL	0	0.55
3	SAND	0.55	2
4	TILL	2	3.05
5	TILL	3.05	7.31
6	TILL	7.31	7.62

Well ID: 1917153
Construction Date: 2004-07-09

Easting: 689144
Northing: 4863333

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

Well Depth: 4.68
Well Diameter (cm): 3.20
Water First Found: 2
Static Level:

Water Kind FRESH
Final Status Observation W
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.75
2	TILL	0.75	4.68

Well ID: 7166598
Construction Date: 2011-08-05

Easting: 689227
Northing: 4863419

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

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

Water Kind
Final Status
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:

Well ID: 7166717
Construction Date: 2011-08-05

Easting: 689231
Northing: 4863422

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

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

Water Kind
Final Status Abandoned-Su
Primary Water Use: Monitoring an

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

Layer:	Driller's Description:	Top:	Bottom:

Well ID: 7166718
Construction Date: 2011-08-05

Easting: 689229
Northing: 4863421

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

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

Water Kind
Final Status Abandoned-Su
Primary Water Use: Monitoring an

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

Layer:	Driller's Description:	Top:	Bottom:

Well ID: 7166719
Construction Date: 2011-08-05
Easting: 689146
Northing: 4863337
UTM Zone 17
Positional Accuracy: margin of error : 10 - 30 m

Well Depth:
Well Diameter (cm):
Water First Found:
Static Level:
Water Kind
Final Status Abandoned-Su
Primary Water Use: Monitoring an
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

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

Well ID: 7166720
Construction Date: 2011-08-05
Easting: 689267
Northing: 4863384
UTM Zone 17
Positional Accuracy: margin of error : 10 - 30 m

Well Depth:
Well Diameter (cm):
Water First Found:
Static Level:
Water Kind
Final Status Abandoned-Su
Primary Water Use: Monitoring an
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

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

Well ID: 7166721
Construction Date: 2011-08-05
Easting: 689235
Northing: 4863368
UTM Zone 17
Positional Accuracy: margin of error : 10 - 30 m

Well Depth:
Well Diameter (cm):
Water First Found:
Static Level:
Water Kind
Final Status Abandoned-Su
Primary Water Use: Monitoring an
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

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

Well ID: 7166722
Construction Date: 2011-08-05
Easting: 689205
Northing: 4863358
UTM Zone 17
Positional Accuracy: margin of error : 10 - 30 m

Well Depth:
Well Diameter (cm):
Water First Found:
Static Level:
Water Kind
Final Status Abandoned-Su
Primary Water Use: Monitoring an
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

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

Well ID: 7166723
Construction Date: 2011-08-05
Easting: 689120
Northing: 4863391
UTM Zone 17
Positional Accuracy: margin of error : 10 - 30 m

Well Depth:
Well Diameter (cm):
Water First Found:
Static Level:
Water Kind
Final Status Abandoned-Su
Primary Water Use: Monitoring an
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

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

Well ID: 7204024
Construction Date: 2013-06-28

Easting: 689231
Northing: 4863223

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

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

Water Kind
Final Status
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:

Well ID: 7245850
Construction Date: 2015-08-05

Easting: 689341
Northing: 4863336

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

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

Water Kind
Final Status
Primary Water Use:

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

Layer:	Driller's Description:	Top:	Bottom:

Well ID: 7275201
Construction Date: 2016-11-22

Easting: 689193
Northing: 4863399

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

Well Depth: 10.1
Well Diameter (cm): 5.08
Water First Found:
Static Level:

Water Kind
Final Status Monitoring an
Primary Water Use: Monitoring an

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

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	7.01
2	SAND	7.01	10.1

Well ID: 7275202
Construction Date: 2016-11-22

Easting: 689166
Northing: 4863388

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

Well Depth: 11.3
Well Diameter (cm): 5.08
Water First Found:
Static Level:

Water Kind
Final Status Monitoring an
Primary Water Use: Monitoring an

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

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	6.1
2	SAND	6.1	11.3

Well ID: 7275203
Construction Date: 2016-11-22

Easting: 689150
Northing: 4863360

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

Well Depth: 11.6
Well Diameter (cm): 5.08
Water First Found:
Static Level:

Water Kind
Final Status Monitoring an
Primary Water Use: Monitoring an

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

Layer:	Driller's Description:	Top:	Bottom:
1	SAND	0	6.1
2	SAND	6.1	11.6

Well ID: 7310751
Construction Date: 2018-05-08

Easting: 689233
Northing: 4863596

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

Well Depth: 16.8
Well Diameter (cm): 5.08
Water First Found: 16.3
Static Level:

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

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

Layer:	Driller's Description:	Top:	Bottom:
1	SILT	0	16.8

Well ID: 7310752
Construction Date: 2018-05-08

Easting: 689206
Northing: 4863679

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

Well Depth: 15.2
Well Diameter (cm): 5.08
Water First Found:
Static Level:

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

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

Layer:	Driller's Description:	Top:	Bottom:
1	SILT	0	15.2

Well ID: 7320591
Construction Date: 2018-09-20

Easting: 688725
Northing: 4863136

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

Well Depth: 7.62
Well Diameter (cm): 5.08
Water First Found: 6.40
Static Level:

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

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

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	SAND	0.30	7.62
3		7.62	

Well ID: 7320592
Construction Date: 2018-09-20

Easting: 688793
Northing: 4863266

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

Well Depth: 7.62
Well Diameter (cm): 5.08
Water First Found: 6.40
Static Level:

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

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

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	SAND	0.30	6.1
3	SAND	6.1	7.62

Well ID: 7320593
Construction Date: 2018-09-20

Easting: 688812
Northing: 4863157

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

Well Depth: 9.14
Well Diameter (cm): 5.08
Water First Found: 6.40
Static Level:

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

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

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	SAND	0.30	6.1

3	SAND	6.1	9.14

Well ID: 7320594
Construction Date: 2018-09-20
Easting: 688704
Northing: 4863242
UTM Zone 17
Positional Accuracy: margin of error : 300 m - 1 km

Well Depth: 10.7
Well Diameter (cm): 5.08
Water First Found: 6.40
Static Level:
Water Kind Untested
Final Status Observation W
Primary Water Use: Monitoring
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m):

Layer:	Driller's Description:	Top:	Bottom:
1	TOPSOIL	0	0.30
2	SAND	0.30	10.7

Well ID: 7327075
Construction Date: 2019-01-29
Easting: 688382
Northing: 4863370
UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 6.1
Well Diameter (cm): 5.08
Water First Found: 0.61
Static Level:
Water Kind Untested
Final Status Observation W
Primary Water Use: Monitoring
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m): :

Layer:	Driller's Description:	Top:	Bottom:
1	SILT	0	1.52
2	CLAY	1.52	3.05
3	CLAY	3.05	4.57
4	TILL	4.57	6.1

Well ID: 7327076
Construction Date: 2019-01-29
Easting: 688332
Northing: 4863283
UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 6.1
Well Diameter (cm): 5.08
Water First Found: 0.61
Static Level:
Water Kind Untested
Final Status Observation W
Primary Water Use: Monitoring
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m): :

Layer:	Driller's Description:	Top:	Bottom:
1	SILT	0	1.52
2	CLAY	1.52	3.05
3	CLAY	3.05	4.57
4	TILL	4.57	6.1

Well ID: 7327077
Construction Date: 2019-01-29
Easting: 688427
Northing: 4863255
UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth: 6.1
Well Diameter (cm): 5.08
Water First Found:
Static Level:
Water Kind
Final Status Observation W
Primary Water Use: Monitoring
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m): :

Layer:	Driller's Description:	Top:	Bottom:
1	SILT	0	1.52
1	SILT	0	1.52
1	SILT	0	1.52
1	SILT	0	1.52
2	CLAY	1.52	3.05
2	CLAY	1.52	3.05

2	CLAY	1.52	3.05
2	CLAY	1.52	3.05
3	CLAY	3.05	4.57
3	CLAY	3.05	4.57
3	CLAY	3.05	4.57
3	CLAY	3.05	4.57
4	TILL	4.57	6.1
4	TILL	4.57	6.1
4	TILL	4.57	6.1
4	TILL	4.57	6.1

Well ID: 7343399
Construction Date: 2019-09-06
Easting: 689222
Northing: 4863390
UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

Well Depth:
Well Diameter (cm):
Water First Found:
Static Level:
Water Kind
Final Status Abandoned-Ot
Primary Water Use: Monitoring
Pump Rate (LPM):
Recommended Pump Rate:
Pumping Duration (h:m): :

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

Well ID: 7343400
Construction Date: 2019-09-06
Easting: 689237
Northing: 4863423
UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

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

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

Well ID: 7343401
Construction Date: 2019-09-06
Easting: 689260
Northing: 4863400
UTM Zone 17
Positional Accuracy: margin of error : 30 m - 100 m

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

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

Appendix C
Borehole Logs

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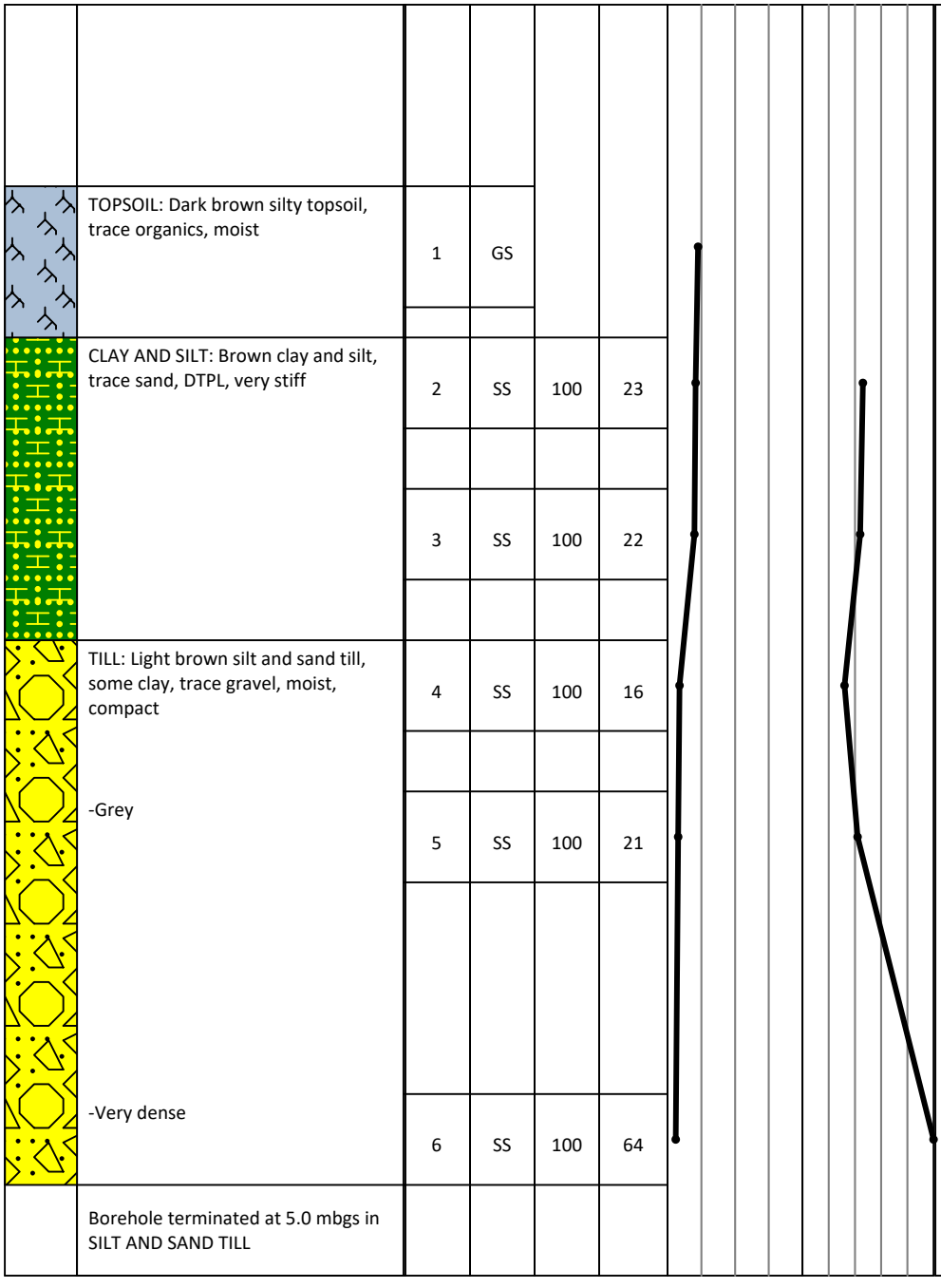
Oshawa
Kingston
T: 866-217-7900
www.cambium-inc.com

Log of Borehole: BH/MW101-22

Client:	MTC	**Project Name:**	Geotechnical Investigation	**Project No.:**	19211-001
Contractor:	DrillTech Drilling Ltd	**Method:**	Solid Stem Auger	**Date Completed:**	June 9, 2022
Location:	725 Lake Road, Bowmanville	**UTM:**	17T 4863261 m N, 688856 m E	**Elevation:**	98.20 masl

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
99 / 0										
98		TOPSOIL: Dark brown silty topsoil, trace organics, moist	1	GS						
98 / 1		CLAY AND SILT: Brown clay and silt, trace sand, DTPL, very stiff	2	SS	100	23				
97			3	SS	100	22				
97 / 2										
96		TILL: Light brown silt and sand till, some clay, trace gravel, moist, compact	4	SS	100	16				
96 / 3										
95		-Grey	5	SS	100	21				
95 / 4										
94		-Very dense	6	SS	100	64				
94 / 5										
93		Borehole terminated at 5.0 mbgs in SILT AND SAND TILL								



GSA SS2:
0% Gravel
8% Sand
41% Silt
51% Clay

Water level measured at 1.01 mbgs on June 20, 2022

Borehole open and dry upon completion

Logged By: TA **Input By:** KL

Peterborough
Barrie
Oshawa
Kingston
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Log of Borehole: BH102-22

Client:	MTC	**Project Name:**	Geotechnical Investigation	**Project No.:**	19211-001
Contractor:	DrillTech Drilling Ltd	**Method:**	Solid Stem Auger	**Date Completed:**	June 9, 2022
Location:	725 Lake Road, Bowmanville	**UTM:**	17T 4863227 m N, 688839 m E	**Elevation:**	97.62 masl

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
0 / 97		TOPSOIL: Dark brown silty topsoil, trace organics, moist	1	SS	100	2				
1 / 96		TILL: Brown sandy silt till, some clay, trace gravel, moist, loose	2	SS	100	9				
2 / 95		-Compact	3	SS	100	19				
3 / 94		-Dense to very dense	4	SS	100	61				
4 / 93		-Grey	5	SS	100	42				
5		-Dry	6	SS	100	59				Borehole open and dry upon completion
		Borehole terminated at 5.0 mbgs in SANDY SILT TILL								

Logged By: TA **Input By:** KL

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Oshawa
Kingston
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Log of Borehole: BH103-22

Client:	MTC	**Project Name:**	Geotechnical Investigation	**Project No.:**	19211-001
Contractor:	DrillTech Drilling Ltd	**Method:**	Solid Stem Auger	**Date Completed:**	June 9, 2022
Location:	725 Lake Road, Bowmanville	**UTM:**	17T 4863225 m N, 688897 m E	**Elevation:**	99.15 masl

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
99 / 0		TOPSOIL: Dark brown silty sand topsoil, trace organics, moist	1	GS						
98 / 1		TILL: Brown sand and silt till, some gravel, some clay, moist, dense to very dense	2	SS	100	34				
			3	SS	100	44				
97 / 2			4	SS	66	50/ 125 mm				
96 / 3		-Grey	5	SS	66	42				GSA SS5: 13% Gravel 38% Sand 37% Silt 12% Clay
95 / 4			6	SS	33	50/ 150 mm				Borehole open and dry upon completion
94 / 5		Borehole terminated at 5.0 mbgs in SAND AND SILT TILL								

Logged By: TA **Input By:** KL

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Oshawa
Kingston
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Log of Borehole: BH/MW104-22

Client: MTC
Project Name: Geotechnical Investigation
Project No.: 19211-001
Contractor: DrillTech Drilling Ltd
Method: Solid Stem Auger
Date Completed: June 9, 2022
Location: 725 Lake Road, Bowmanville
UTM: 17T 4863190m N, 688840 m E
Elevation: 96.48 masl

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
97 / 0									Cap	
									Monument	
96 / 0		TOPSOIL: Dark brown silty topsoil, trace organics, moist, loose	1	SS	80	7				
									Bentonite Plug	
96 / 1		CLAY AND SILT: Brown clay and silt, some sand, DTPL, stiff	2	SS	100	12			PVC Standpipe	
95 / 1										Water level measured at 1.36 mbgs on June 20, 2022
95 / 2		TILL: Light brown sand and silt till, some clay, trace gravel, moist, compact	3	SS	100	26				
94 / 2		-Dry, very dense	4	SS	45	50/ 100 mm				
									Sand Pack	
94 / 3									PVC Screen	
93 / 3			5	SS	100	50/ 75mm				
93 / 4										
92 / 4			6	SS	0				Cap	Borehole open and dry upon completion
92 / 5		Borehole terminated at 5.0 mbgs in SAND AND SILT TILL								
91										

Logged By: TA
Input By: KL

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Log of Borehole: BH/MW105-22

Client:	MTC	**Project Name:**	Geotechnical Investigation	**Project No.:**	19211-001
Contractor:	DrillTech Drilling Ltd	**Method:**	Solid Stem Auger	**Date Completed:**	June 9, 2022
Location:	725 Lake Road, Bowmanville	**UTM:**	17T 4863197 m N, 688889 m E	**Elevation:**	98.24 masl

Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
99 / 0									Cap	
									Monument	
98		TOPSOIL: Dark brown silty topsoil, trace organics, moist	1	GS						
									Bentonite Plug	
									PVC Standpipe	
97 / 1		TILL: Brown silt and sand till, some clay, some gravel, moist, compact	2	SS	100	12				Water level measured at 1.10 mbgs on June 20, 2022
		-Compact	3	SS	100	26				
96 / 2		-Dense to very dense	4	SS	100	30				GSA SS4: 10% Gravel 38% Sand 40% Silt 12% Clay
95 / 3			5	SS	80	50/ 100 mm			Sand Pack PVC Screen	
94 / 4		-Grey	6	SS	100	67			Cap	Borehole open and dry upon completion
93 / 5		Borehole terminated at 5.0 mbgs in SILT AND SAND TILL								

Logged By: TA **Input By:** KL

Appendix D
Grain Size Analysis Results

Grain Size Distribution Chart

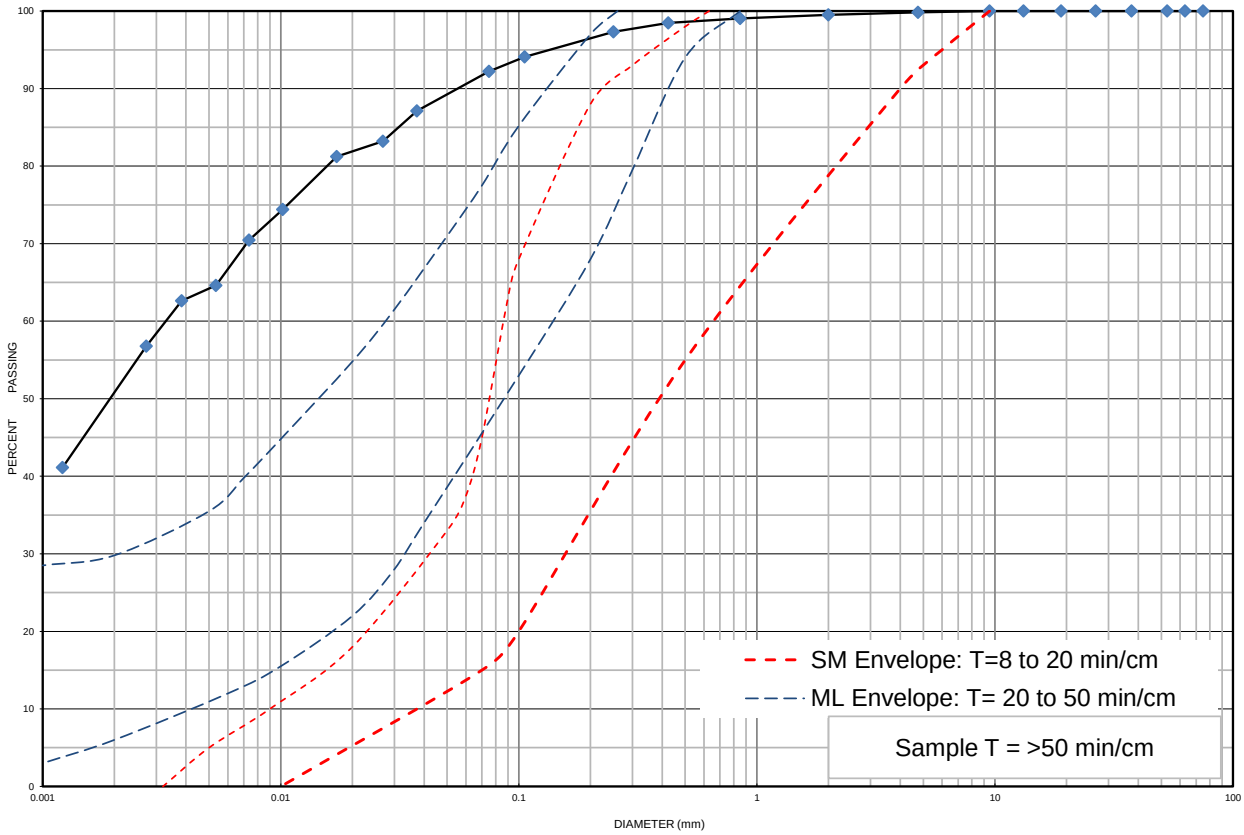
Project Number: *19211-001* **Client:** *Jass Gill*

Project Name: *#123081 - 725 Lake Road Industrial Building Clarington*

Sample Date: *June 10, 2022* **Sampled By:** *Tessa Arsenault - Cambium Inc.*

Location: *BH 101-22 SS 2* **Depth:** *0.8 m to 1.2 m* **Lab Sample No:** *S-22-0948*

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



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

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 101-22	SS 2	0.8 m to 1.2 m	0	8	41	51	20.8

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Clay and Silt trace Sand	CL	0.0033	-	-	-	-

Additional information availabe upon request

Issued By: _____ *Date Issued:* *January 9, 2024*

(Senior Project Manager)

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Grain Size Distribution Chart

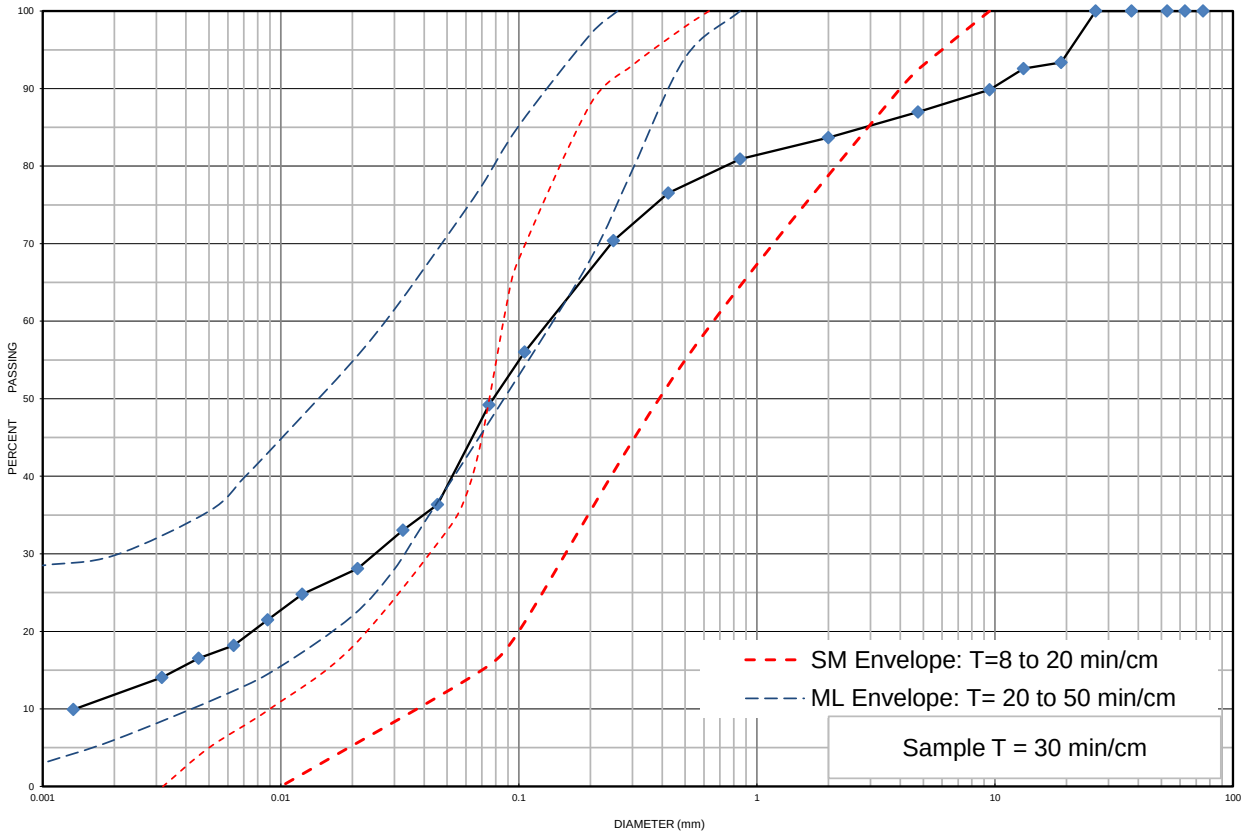
Project Number: *19211-001* **Client:** *Jass Gill*

Project Name: *#123081 - 725 Lake Road Industrial Building Clarington*

Sample Date: *June 10, 2022* **Sampled By:** *Tessa Arsenault - Cambium Inc.*

Location: *BH 103-22 SS 5* **Depth:** *3 m to 3.5 m* **Lab Sample No:** *S-22-0949*

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



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

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 103-22	SS 5	3 m to 3.5 m	13	38	37	12	6.7

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sand and Silt some Gravel some Clay	SM	0.1450	0.0260	0.0014	103.57	3.33

Additional information availabe upon request

Issued By: _____ *Date Issued:* *January 9, 2024*

(Senior Project Manager)

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Grain Size Distribution Chart

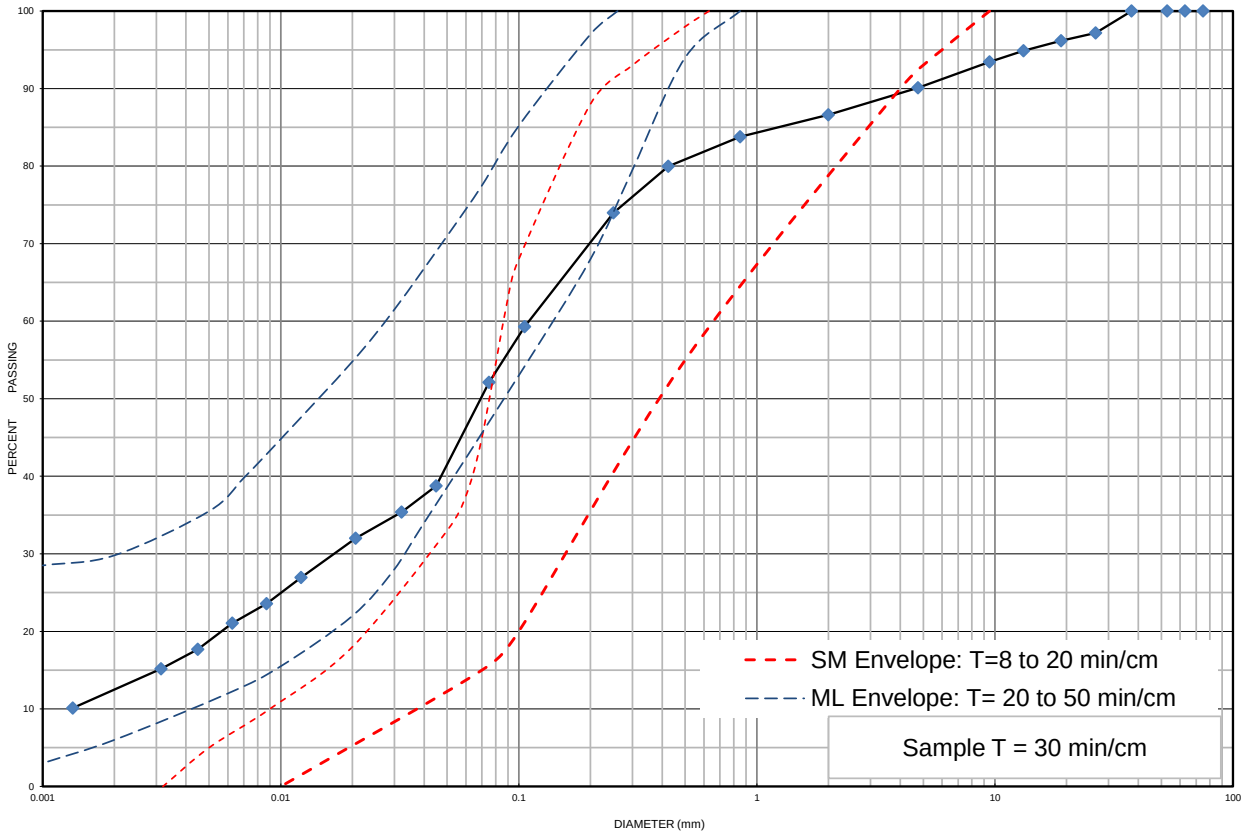
Project Number: *19211-001* **Client:** *Jass Gill*

Project Name: *#123081 - 725 Lake Road Industrial Building Clarington*

Sample Date: *June 10, 2022* **Sampled By:** *Tessa Arsenault - Cambium Inc.*

Location: *BH 105-22 SS 4* **Depth:** *2.3 m to 2.7 m* **Lab Sample No:** *S-22-0950*

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



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

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 105-22	SS 4	2.3 m to 2.7 m	10	38	40	12	7.6

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silt and Sand some Clay some Gravel	ML	0.1200	0.0170	0.0014	85.71	1.72

Additional information availabe upon request

Issued By: _____ *Date Issued:* *January 9, 2024*

(Senior Project Manager)

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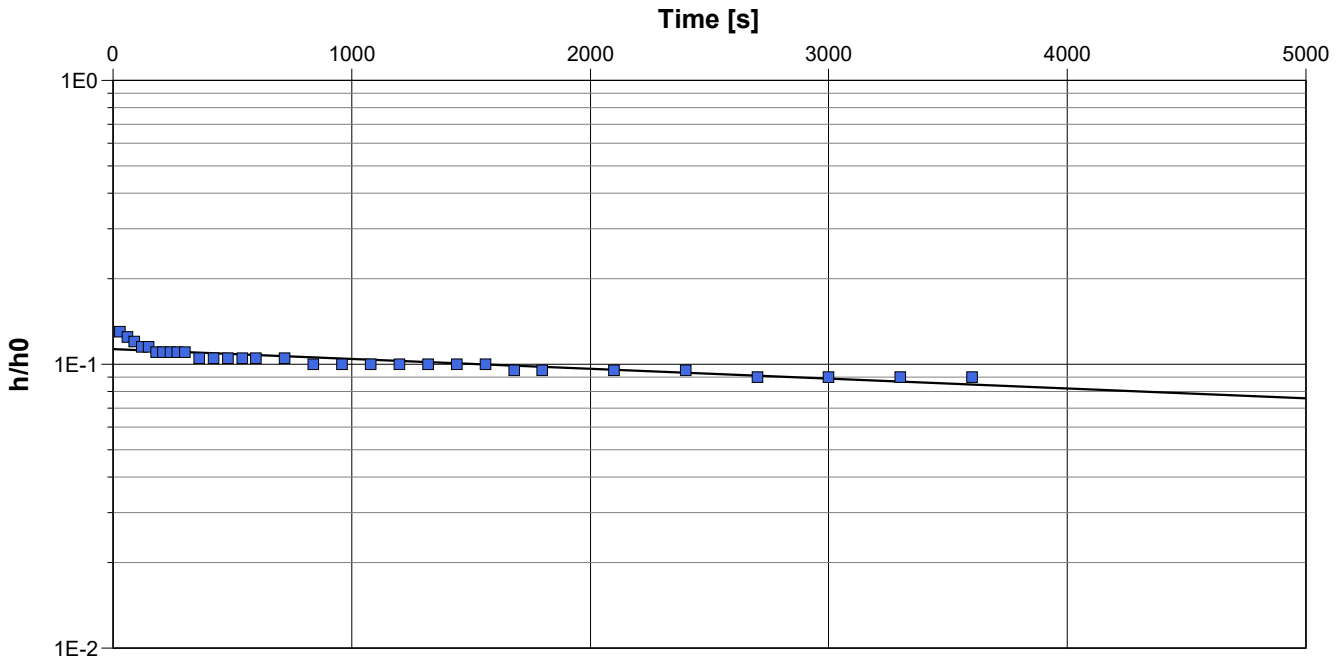
Appendix E
Aquifer Test Pro Results

	Slug Test Analysis Report
	Project: Hydrogeologic. Investigation
	Number: 19211-001
	Client: Jass Gill

Location: 725 Lake Rd., Clarington	Slug Test: MW101 - Test One	Test Well: MW101
Test Conducted by:		Test Date: 12/15/2023
Analysis Performed by: H. Warren	Test One	Analysis Date: 1/9/2024
Aquifer Thickness: 1.40 m		

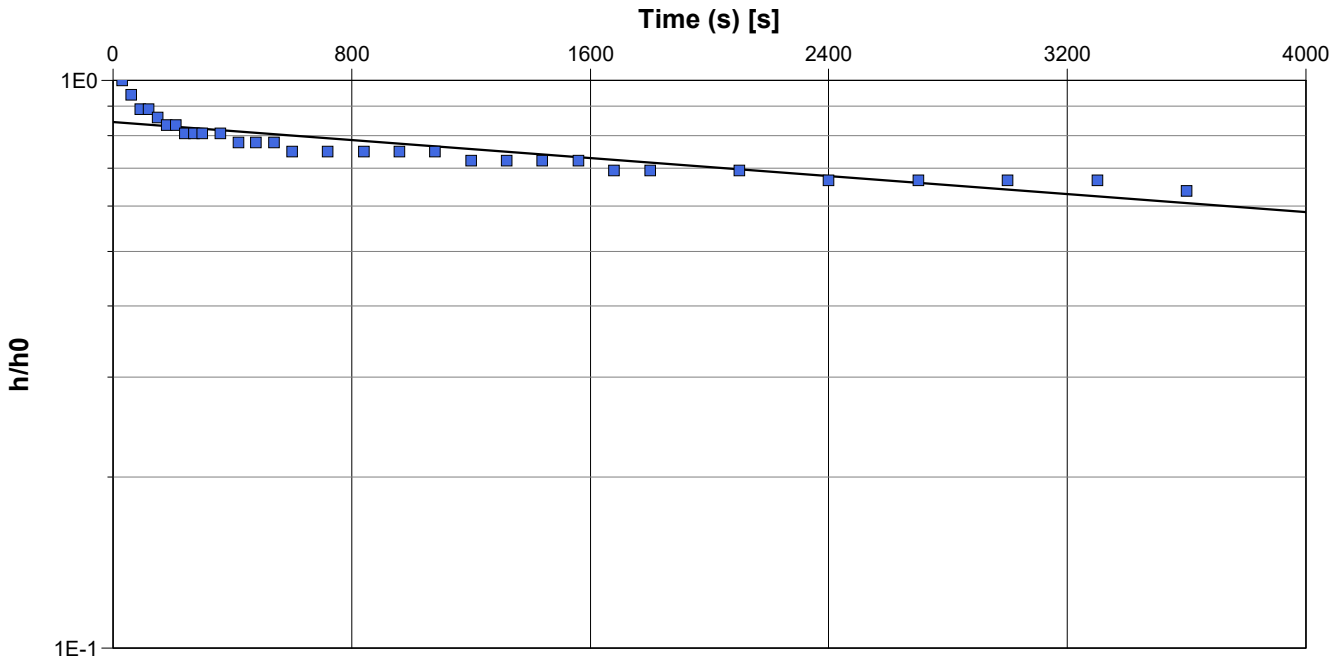


Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
MW101	4.03×10^{-8}	

	Slug Test Analysis Report
	Project: Hydrogeological Assessment
	Number: 19211-001
	Client: Jass Gill

Location: 725 Lake Road, Bowmanville, ON	Slug Test: BH101-22-Test 2	Test Well: BH101-22
Test Conducted by: H. Warren		Test Date: 12/15/2023
Analysis Performed by: H. Warren	Hvorslev	Analysis Date: 1/9/2024
Aquifer Thickness: 1.89 m		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
BH101-22	3.92×10^{-8}	

Appendix F
Well Survey Letter

CAMBIUM

Environmental

Geotechnical

Building Sciences

Construction Testing & Inspection

Telephone
(866) 217.7900
(705) 742.7900

Website
cambium-inc.com

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

Locations
Peterborough
Kingston
Barrie
Whitby
Ottawa

Laboratory
Peterborough

November 18, 2024 (Cambium Project Number 19211-001)

Dear property owner,

Cambium Inc. is completing a water well survey of some properties adjacent to a proposed industrial development at 725 Lake Road, Bowmanville, Ontario.

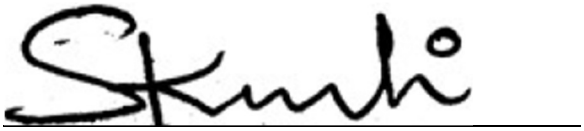
As part of the survey, we are taking inventory of existing private groundwater users in the area of the proposed development. The purpose of the survey is to characterize existing groundwater users in the area. Cambium may request permission to investigate your well at a later date (should your well be safe and accessible to inspect). The well investigation will include an onsite interview (or phone call) with you and a water level/depth measurement of your well.

If a private supply well is located on your property, and you would like to participate in the survey, please contact Warren Young by email at warren.young@cambium-inc.com, or by telephone at 1-705-742-7900. Data collected from your well will be provided to you. Also, please see the attached water well questionnaire and complete as much information as possible. All of the information requested in the questionnaire is not necessarily required. Once complete please scan the document (or take a photograph) and email to the above referenced address, or mail back to us using the pre-paid postage envelope. Please respond by November 30th, 2024.

Please note: You are not obligated to respond to this letter and participation on your part is voluntary. However, participation is encouraged. If you have any questions regarding this letter, please contact Warren Young or Sudhakar Kurli at 1-705-742-7900.

Best regards,

Cambium Inc.



Sudhakar Kurli, M.Sc., P.Geo.
Project Manager

Attached: Water Well Survey Questionnaire

Appendix G
Dewatering Calculations

DEWATERING CALCULATIONS

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

Excavation Area		Initial Depth to Groundwater	Target Depth to Groundwater	Depth to Base of Aquifer*	Unit Length of Trench (a)	Width of Trench (b)	Hydraulic Conductivity (K)	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	0.51	2.20	7.00	50	2	3.92E-08	1.69	1.00	1.00	2.00	0.70	1.00	6.49	4.80	0.000003	0.000037	**0.000041**	**0.04**	**3,517**
	Maximum K	0.51	2.20	7.00	50	2	4.03E-08	1.69	1.02	1.00	2.02	0.70	1.01	6.49	4.80	0.000003	0.000038	**0.000042**	**0.04**	**3,590**
	Geometric mean K	0.51	2.20	7.00	50	2	3.97E-08	1.69	1.01	1.00	2.01	0.70	1.01	6.49	4.80	0.000003	0.000038	**0.000041**	**0.04**	**3,550**

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.

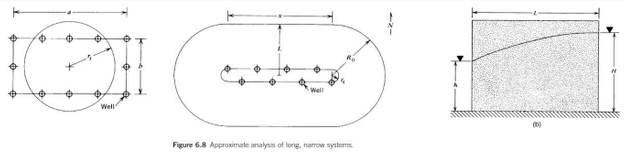


Figure 6.8 Approximate analysis of long, narrow systems.

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

$$Q = \frac{\pi K(H^2 - h^2)}{\ln R_0/r_s} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right] \qquad (6.10b)$$

x = unit length of trench

R = 3000*s*sqrt(K)
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)

Appendix H
Water Balance Calculations

Water Balance Calculations

725 Lake Road Industrial Building, Clarington, ON

THORNTHWAITE-TYPE MONTHLY WATER-BALANCE MODEL

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

		Input Data				Computed Values							
											Surplus	351	mm/yr
Weather Station Location:	**Bowmanville Mostert**					**Latitude:**	**43.9**	**degree**					
Solar Declination (degree)	-20.6	-12.6	-1.5	10.0	19.0	23.1	21.0	13.4	2.6	-9.0	-18.5	-23.0	
DayLength (hr)*	9.2	10.3	11.8	13.3	14.6	15.2	14.9	13.8	12.3	10.8	9.5	8.8	
Available Water Storage Capacity		0.20	m/m		**Root Depth**	460	mm			**SOILmax**	92.0	mm	

MONTHLY WATER BALANCE DATA

Temperatures in C, water-balance terms in mm.

Month:	J	F	M	A	M	J	J	A	S	O	N	D	Year
TEMPERATURE (T)	-5.6	-4.4	-0.2	6.4	12.4	17.5	20.0	19.2	15.0	8.7	3.4	-2.2	
PRECIPITATION (P)	63.1	50.5	55.0	70.6	75.9	83.8	63.2	78.1	98.7	70.8	88.6	68.1	866
RAIN	32.2	32.8	41.0	68.0	75.9	83.8	63.2	78.1	98.7	70.6	83.1	46.1	774
SNOW	31	18	14	3	0	0	0	0	0	0	6	22	93
MELT FACTOR (F)	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.57	0.00	
PACK	55	73	87	0	0	0	0	0	0	0	2	24	
MELT	0	0	0	90	0	0	0	0	0	0	3	0	93
INPUT (W)	32	33	41	158	76	84	63	78	99	71	86	46	866
POTENTIAL ET (PET)	0	0	0	41	68	94	110	97	65	40	24	0	539
NET INPUT (ΔW)	32	33	41	117	8	-10	-47	-19	33	31	62	46	
SOIL MOISTURE (SOIL)	92	92	92	92	92	82	50	40	74	92	92	92	
ΔSOIL	0	0	0	0	0	-10	-33	-9	33	18	0	0	0
ET	0	0	0	41	68	93	96	87	65	40	24	0	515
SURPLUS=W-ET-DSOIL	32	33	41	117	8	0	0	0	0	12	62	46	351

Notes:

Precipitation, Rain, Temperature, and Latitude are inputted parameters

SOILmax = available water storage capacity * root depth

m = month

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

$SNOW_m = P_m - RAIN_m$

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

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

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

$W_m = RAIN_m+MELT_m$.

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

$\Delta W_m = W_m - PET_m$

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

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

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

Pre- and Post-Development Water Balance Calculations

725 Lake Road Industrial Building, Clarington, ON

1 Climate Information

Precipitation	866	mm/yr
Actual Evapotranspiration	515	mm/yr
Water Surplus	351	mm/yr

2 Infiltration Rates

Table 2 Approach - Infiltration factors		
Topography: Rolling land	0.2	
Soil Type:medium combinations of clay and loam	0.2	
Cover: Cultivated land	0.1	
Total Infiltration Factor	**0.5**	
Infiltration (Water Surplus * Infiltration Factor)	**176**	mm/yr
Run-off (Water Surplus - Infiltration)	**176**	mm/yr

Table 3 Approach - Typical Recharge Rates		
Coarse Sand and Gravel	>250	mm/yr
Fine to medium sand	200-250	mm/yr
Silty sand to sandy silt	150-200	mm/yr
Silt	125-150	mm/yr
Clayey Silt	100- 125	mm/yr
Clay	<100	mm/yr

Site development area is underlain predominantly by clay and silt/silt and sand till

Based on the above, the recharge rate is typically	125-150	mm/yr

3 Pre-Development Property Statistics	**ha**	**m^2**
Total Paved Area	0.00	0
Total Roof Area	0.00	0
Total Landscape Area	1.41	14,111
Total	**1.41**	**14,111**

4 Post-Development Property Statistics	**ha**	**m^2**
Total Paved Area	0.44	4,357
Total Roof Area	0.64	6,387
Total Landscape Area	0.34	3,367
Total	**1.41**	**14,111**

Pre- and Post-Development Water Balance Calculations

725 Lake Road Industrial Building, Clarington, ON

5 Pre-Development Water Balance

Land Use		Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Impervious Areas	Paved Area	-	-	-	-	-
	Roof Area	-	-	-	-	-
Pervious Areas	Landscape Area	14,111	12,220	7,267	2,476	2,476
	Totals	14,111	12,220	7,267	2,476	2,476

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

6 Post-Development Water Balance

Land Use		Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Impervious Areas	Paved Area	4,357	3,773	377	-	3,396
	Roof Area	6,387	5,531	553	-	4,978
Pervious Areas	Landscape Area	3,367	2,916	1,734	591	591
	Totals	14,111	12,220	2,664	591	8,965

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

7 Comparision of Pre- and Post -Development

	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-off (m^3)
Pre-Development	12,220	7,267	2,476	2,476
Post-Development	12,220	2,664	591	8,965
Change in Volume	- 0	- 4,603	- 1,886	6,488
Change in %	- 0	- 63	- 76	262

8 Requirement for Infiltration of Roof Run-off

Volume of Pre-Development Infiltration (m^3/yr)	2,476
Volume of Post-Development Infiltration (m^3/yr)	591
Deficit from Pre to Post Development Infiltration (m^3/yr)	1,886
Percentage of Roof Runoff required to match the pre-development infiltration (%)	38