

GEMS[®]

Hydrogeological Report

107 Ridge Road, Aurora, Ontario

Project: 25-0102

April 10, 2025

Prepared For:

2693642 Ontario Inc.
204-1206 Centre Street
Vaughan, ON, L4J 3M9

Prepared By:

Groundwater Environmental
Management Services Inc.
150 Rivermede Road, Unit 9
Concord, ON, L4K 3M8



Contents

1.0	Introduction.....	1
2.0	Site Conditions.....	1
2.1	Location and Land Usage.....	1
2.2	Proposed Development.....	1
3.0	Methodology.....	2
3.1	Drilling Program.....	2
3.2	Hydraulic Testing.....	2
3.3	Water Quality Sampling.....	2
4.0	Geology and Hydrogeological Setting.....	2
4.1	Borehole Details.....	2
4.1	Surface Cover.....	3
4.2	Fill Material.....	3
4.3	Native Soil.....	3
4.4	Groundwater Level Monitoring.....	4
5.0	Short and Long-Term Discharge Rates.....	4
5.1	Short-Term Construction Dewatering.....	4
5.2	Construction Dewatering Rates.....	4
5.3	Long-Term Seepage Rates.....	5
6.0	Potential for Adverse Effects.....	5
6.1	Regulated and Sensitive Areas.....	5
6.2	MECP Well Records and Groundwater Resources.....	5
6.3	Settlement.....	5
6.4	Recommended Additional Fieldwork and Monitoring.....	6
7.0	Water Balance Assessment.....	6
7.1	Pre-Development Conditions.....	6
7.2	Proposed Development.....	6
7.3	Water Balance Methodology.....	6
7.4	Climate, Precipitation, and Evapotranspiration.....	7
7.5	Infiltration and Runoff.....	7
7.5.1	Infiltration Factors.....	7

7.5.2	Pre-Development Infiltration and Runoff	8
7.5.3	Post-Development Infiltration and Runoff.....	8
7.5.4	Net Changes in Infiltration and Runoff.....	8
8.0	Qualified Professional (QP) Information	9
9.0	Conclusion	10
10.0	Limitations.....	11
11.0	References.....	12
12.0	Closing	13

List of Figures

Figure 1	Regional Location Plan
Figure 2	Detailed Site Plan
Figure 3	Surface Geology and MECP Wells

List of Appendices

Appendix A	Architectural Drawings
Appendix B	Borehole Logs
Appendix C	MECP Wells within 500 m Radius
Appendix D	Water Balance Calculations
Appendix E	Pre- and Post-Development Drainage Plans

1.0 Introduction

Groundwater Environmental Management Services Inc. (GEMS) has been retained by 2693642 Ontario Inc. (the client) to prepare a Hydrogeological Report for the proposed residential development located at 107 Ridge Road in Aurora, Ontario (“the Site”). The location of the Site is illustrated in **Figure 1**.

The architectural site, concept drawings, and site grading plans provided for our review, included as **Appendix A**, outline the proposed development as five detached, two storey, with basement residential buildings to the north and east sections of the Site. The Site will be upfilled to match the grade on Glensteeple Trail to the east. The excavation for the basements is conservatively assumed to extend a maximum of 3 metres below grade (mbg) to approximately 290.6 metres above sea level (masl) in the northwest and 294.1 masl in the southeast.

The water table has not been intercepted by the wells advanced as part of the investigation. This suggests that excavations for the installation of the building foundations will not require construction dewatering or long-term foundation drainage. If the design of the proposed development changes, GEMS should be engaged to reassess the findings presented in this report.

GEMS has reviewed the available relevant geological, environmental, and geotechnical information and has prepared this Hydrogeological Report in support of the proposed development.

GEMS’ scope of work included:

- Review of hydrogeological conditions and environmental information based on previous reports prepared for the Site
- Review of Borehole Logs created by GEMS (2025)
- Groundwater level monitoring
- Assessment of potential adverse environmental effects
- Assessment of MECP well records within 500 m of the Site
- Review of Pre-Development and Proposed Development drainage plans to complete the Site-Specific Water Balance

2.0 Site Conditions

2.1 Location and Land Usage

The Site is a rectangular shaped lot located on the southwest corner of Ridge Road and Glensteeple Trail in Aurora, and is approximately 300 metres (m) west of Yonge Street and 1 kilometre north of Bloomington Road [1]. The site is currently zoned as Detached Third Density Residential [2].

Lands within 500 m of the Site generally consist of Residential, Open Space, and Institutional [2].

2.2 Proposed Development

The client’s proposed development consists of the construction of five, two-storey residential buildings with one level of basement. The development will occupy an approximate total area of 2,544.32 m² as shown in the concept plan included in **Appendix A**.

3.0 Methodology

3.1 Drilling Program

On 6 February 2025, GEMS carried out a field investigation including the advancement of four boreholes denoted as MW1, MW2, BH3, and MW4 in support of the geotechnical and hydrogeological investigations. Boreholes MW1, MW2, and MW4 were equipped with schedule-40, Polyvinyl chloride (PVC) monitoring wells, with screened intervals of 3.0 m length at their base.

The monitoring wells were installed to evaluate static groundwater elevations, conduct hydraulic testing, and obtain water quality samples. As of the date of this report, all monitoring wells are dry and therefore have not been purged, sampled, or had hydraulic conductivity testing completed. If during the water level monitoring completed in the future the water table is found to have risen to the screened interval(s) of the wells, water quality sampling and hydraulic testing will be completed.

Borehole logs are provided in **Appendix B**, and a detailed Site Plan showing the borehole and monitoring well locations is presented in **Figure 2**.

3.2 Hydraulic Testing

As of the date of this report, all monitoring wells at the site are dry and therefore no hydraulic testing has been completed.

3.3 Water Quality Sampling

As of the date of this report, all monitoring wells at the site are dry and therefore no hydraulic testing has been completed.

4.0 Geology and Hydrogeological Setting

The Site is situated in the physiographic region detailed as the Oak Ridges Moraine [3]. Surficial geology at the site primarily consists of sandy silt to silt with moderate to high matrix carbonate content and clast content [4]. The surficial geology of the Site is displayed in **Figure 3**.

The bedrock underlying the Site is part of the Blue Mountain Formation composed primarily of shale and limestone [5].

The full details of the subsurface and groundwater conditions at the site are given on the Borehole Log Sheets attached in **Appendix B** of this report. The following paragraphs present a description of the site and a commentary on the engineering properties of the various soil materials contacted in the boreholes.

It should be noted that the boundaries of soil types indicated on the borehole logs are inferred from non-continuous soil sampling and observations made during drilling. These boundaries are intended to reflect transition zones for the purpose of geotechnical design, and therefore, should not be construed as exact planes of geological change.

4.1 Borehole Details

All boreholes were evaluated for this report. Boreholes MW1, MW2, BH3, and MW4 were advanced to depths between 5.0 to 11.1 mbg with elevations ranging from 291.5 to 284.9 masl.

Boreholes MW1, MW2, and MW4 were installed as monitoring wells, to depths ranging between 4.63 and 7.03 mbg with elevations ranging from 291.37 to 285.61 masl. Borehole logs of the monitoring wells are provided in **Appendix B**.

Borehole surface elevations were surveyed by a GEMS technician upon completion of the drilling program. The details of borehole advancement and the approximate well elevations are summarized below in **Table 4.1**.

Borehole ID/Well ID	Date Installed (YYYY-MM-DD)	Ground Elevation (masl)	Borehole Depth (mbg)	Borehole Depth (masl)	Well Screen Top (masl)	Well Screen Bottom (masl)
MW1	2025-02-06	294.18	7.03	287.15	290.15	287.15
MW2	2025-02-06	296.00	5	291.00	294.37	291.37
BH3	2025-02-06	295.97	11.1	284.87	-	-
MW4	2025-02-06	296.48	5	291.48	294.67	291.67

4.1 Surface Cover

The ground cover at Borehole MW 2 consists of asphaltic concrete. The thickness of the asphaltic concrete at the borehole location is 50 millimeters (mm).

4.2 Fill Material

Fill material is present below the asphaltic concrete in Borehole MW 2 and at the surface in all remaining boreholes. It consists of predominately sandy silt with some organics and traces of clay and extends to depths ranging from 0.5 to 2.4 mbg. In Borehole MW4 clayey silt, with some sand and trace gravel fill, underlain by a layer of topsoil is present below the sandy silt fill.

The fill is dark brown and black in colour and moist in appearance. The water content of the samples of fill obtained from Boreholes MW1, MW2, and BH3 range from 7 to 27 % by weight. Standard Penetrating Tests (SPT) in the fill provided N-values ranging from 3 to 24. The non-cohesive fill materials possess a loose to compact compactness condition and the cohesive fill materials possess a stiff consistency.

4.3 Native Soil

The native soil below the fill consists of silty fine sand with a trace of clay. All boreholes were terminated in the silty fine sand at a maximum depth of 11.2 mbg in Borehole BH3.

The silty fine sand is brown in colour and moist in appearance, becoming wet in borehole BH3 below a depth of 8.0 mbg. The water content of samples of silty fine sand obtained from Boreholes MW1, MW2, and BH3 range from 3% to 21% by weight.

SPTs carried out in the silty fine sand provided N-values ranging from 3 to 71, indicating a very loose to very dense compactness condition: more typically being compact to dense.

Grain size analysis was carried out on three (3) samples of silty fine sand obtained from Boreholes MW1;

Sample 4 at 2.5 m depth, BH3; Sample 2 at 0.6 m depth and BH3; Sample 7 at 4.7 m depth.

4.4 Groundwater Level Monitoring

GEMS has completed one site visit on 28 February 2025 to obtain water level measurements from the three monitoring wells (MW1, MW2, and MW4). Five additional bi-monthly site visits will be completed to provide one year of monitoring data and will be included in a future iteration of this report. The groundwater monitoring results collected are summarized below in **Table 4.4**.

Table 4.4: Monitoring Well Summary and Groundwater Elevations

Well ID	Screened Unit and Screen Depth (masl)	Ground Elevation (masl)	Static Water Levels			
			Date (YYYY-MM-DD)	Water Level (mbg)	Water Elevation (masl)	Average (masl)
MW1	SILTY, fine SAND trace clay 287.15 – 290.15 masl	294.18	2025-02-28	Dry	Dry	Dry
MW2	SILTY, fine SAND trace clay 291.37 – 294.37 masl	296.00	2025-02-28	Dry	Dry	Dry
MW4	SILTY, fine SAND trace clay 291.67 – 294.67 masl	296.48	2025-02-28	Dry	Dry	Dry

As of the date of this report, all wells have been dry during site visits to collect water level measurements. Water levels may vary due to seasonal fluctuations and precipitation.

5.0 Short and Long-Term Discharge Rates

5.1 Short-Term Construction Dewatering

A construction dewatering system design may include well points, several sump pumps, and/or a network of gravity drains. Implementing a dewatering system is the responsibility of the property owner. A qualified dewatering contractor with experience in construction dewatering should be retained to design and outline the methodology of the dewatering system.

Groundwater has not been encountered at the site to date and therefore construction dewatering is not anticipated. As no construction groundwater dewatering is anticipated, a radius of influence (ROI) was not calculated. The excavation area can be seen in **Figure 2**.

5.2 Construction Dewatering Rates

It is also necessary to account for contributions from significant precipitation events. Assuming an excavation with a total surface area of approximately 2,544.32 m². Anticipating a 25 mm daily rainfall event, the volume of rainwater contributed to this area would be 63,608 L.

The estimated dewatering rate of precipitation during construction is therefore 63,608 L/day (44.2 L/min).

A Permit to take Water or Environmental Activity and Sector Registry will not be required for water taking during construction of the proposed development, as the forecasted groundwater dewatering rate is 0

L/day.

5.3 Long-Term Seepage Rates

As the proposed structure will be constructed above the water table, long-term seepage of groundwater into the perimeter and/or subfloor drainage systems will not occur.

6.0 Potential for Adverse Effects

The following section identifies potential adverse environmental effects of the proposed construction dewatering program.

6.1 Regulated and Sensitive Areas

According to the MECP Source Protection Information Atlas the Site is located within the Lakes Simcoe and Couchiching/Black River Source Protection Area and is located within a Wellhead Protection Area, Significant Groundwater Recharge Area, Highly Vulnerable Aquifer, and within the Oak Ridges Moraine Conservation Area. However, as no groundwater dewatering is anticipated, no additional precautions need to be taken [6].

6.2 MECP Well Records and Groundwater Resources

The area within 500 m of the Site is serviced by the City of Aurora municipal water. The City of Aurora obtains its water supply from Lake Ontario and groundwater. As no groundwater will be taken to enable construction, there is no potential for groundwater interference complaints arising from construction dewatering activities.

A copy of the Ministry of Environment, Conservation and Parks (MECP) well listings within 500 metres of the Site are provided in **Appendix C**. The wells within 500 metres of the Site are displayed in **Figure 3**.

There are 99 wells identified within the 500 m area surrounding the Site:

- 5 of the wells identified are documented to be monitoring wells;
- 64 of the wells are documented to be domestic wells;
- 1 of the wells is documented to be for irrigation;
- 1 of the wells is documented to be a test hole;
- 6 wells not in use; and
- 1 well labeled as commercial.
- There is no information for the remaining 16 wells identified.

Prior to construction, any inactive monitoring wells at the Site should be properly decommissioned by a drilling contractor licensed by the MECP, following Ontario Regulation 903. Since there is no active groundwater dewatering, the wells within 500 m are not anticipated to be impacted.

6.3 Settlement

As the groundwater table will not be lowered to enable construction, there is no potential for settlement

due to dewatering.

6.4 Recommended Additional Fieldwork and Monitoring

Monitoring and additional fieldwork are recommended during temporary construction dewatering:

- Monitoring of the discharge water quantity is required to ensure compliance with the discharge agreement if rainwater collected within the excavation will be discharged to the local sewer system. GEMS recommends the following program for monitoring the discharge volumes:

<i>Location:</i>	A flow meter attached to the discharge pipe of the dewatering system.
<i>Parameter:</i>	Total volume of discharge, date, and time of measurement.
<i>Schedule:</i>	Minimum of daily recording by on-Site personnel, with values reported to the Project supervisor weekly for submission to the city and/or region.
<i>Trigger:</i>	Discharge volume exceeds the maximum rate of dewatering specified in the discharge agreement.
<i>Mitigation:</i>	Immediately reduce the pumping rate so that discharge is within the permitted limit.
<i>Reporting:</i>	Values reported to the Project supervisor weekly for submission to the city and/or region.

7.0 Water Balance Assessment

GEMS completed a Water Balance Assessment for the pre-development conditions and compared them with the proposed post-development scenario. Peak runoff rates are required to be less than or equal to the existing condition. As per drawing 202, Post-Development Drainage Plan, this will be achieved through the implementation of onsite stormwater management controls, namely five (5) infiltration trenches of 11 m by 1 m located at the rear of each of the five (5) dwellings.

The water balance calculations are included as **Appendix D**.

7.1 Pre-Development Conditions

The Site is currently developed. As per drawing 201, Pre-Development Drainage Area Plan, there is currently a total of **3,520 m²** of pervious cover and **410 m²** of impervious cover at the Site.

The Pre-Development Drainage Area Plan is included in **Appendix E**.

7.2 Proposed Development

The proposed development will consist of five (5) two-storey buildings. As per drawing 202, Post-Development Drainage Plan, the proposed development will have a total of **2,590 m²** of pervious cover and **1,340 m²** of impervious cover.

The Post-Development Drainage Plan is included in **Appendix E**.

7.3 Water Balance Methodology

The annual water budget represents the hydrologic cycle, and can be generally stated as:

Equation 1:

$$\text{Flow in} - \text{flow out} = \text{Change in groundwater storage } (\Delta S)$$

Using long-term estimates and averages for precipitation, evapotranspiration, runoff, and infiltration, there is little to no annual groundwater storage net change on the Site in steady-state conditions. It is therefore assumed that ΔS is zero. Flow in accounts for precipitation (i.e., rain, snow), and the flow out considers water runoff to lakes and streams, infiltration to the groundwater table, and evaporation from surface water or vegetation. It is assumed that groundwater flow into and out of the Site balances and is not included in the calculation. These assumptions leave the following formula:

Equation 2:

$$P = ET + R + I$$

Where:

P	=	Precipitation (mm/year)
ET	=	Evapotranspiration (mm/year)
R	=	Runoff (mm/year)
I	=	Infiltration (mm/year)

The Site-Specific Water Balance was completed for pre- and post-development conditions to determine the change in runoff and infiltration after development. The calculations are provided in **Appendix D**.

7.4 Climate, Precipitation, and Evapotranspiration

Climate data was gathered from the Government of Canada historical climate data [7]. Toronto Buttonville Airport and King City North, located approximately 14.5 km and 8.8 km from the Site, respectively, were the nearest stations with available climate data over the last 10 years. The gathered data from January 2015 to December 2024 was used for the pre- and post-development precipitation. The average annual precipitation over this period was equal to **759.1 mm/year**.

Evapotranspiration was calculated using the Thornthwaite-Mather method based on the available climate data from Toronto Buttonville Airport and King City North from 2015 to 2024 [7, 8]. The calculated evapotranspiration rate was **525.53 mm/year**. This value was used for pre- and post-development evapotranspiration rates of pervious surfaces.

Evapotranspiration on impervious surfaces was assumed to be 10% of precipitation (**75.9 mm/year**). As there is no infiltration on impervious surfaces, the surplus and runoff in these areas are both equal to **683.2 mm/year**.

As precipitation exceeds annual evapotranspiration, there is a water surplus at the Site. The Surplus is calculated as precipitation minus evapotranspiration, which is equal to **233.57 mm/year** for pervious areas. This value is applied to both pre- and post-development conditions at the Site.

7.5 Infiltration and Runoff

7.5.1 Infiltration Factors

As per the water balance equation in **Section 7.3**, the surplus water is equal to the combined values of infiltration and runoff components. The infiltration factor (IF) was calculated for pervious areas pre- and

post-development based on the topography, soil type, and land cover, as per the MECP's Stormwater Management Planning and Design Manual [9]. The calculations are presented in **Appendix A**.

The pre-development IF was calculated based on the following factors:

- Topography at the Site is flat land.
- Borehole logs for the Site show mostly silty sand soils.
- Land cover is a mix of cultivated land and woodland.

The pre-development IF is equal to 0.61. The post-development pervious surfaces will consist of a higher percentage of woodland, therefore the post-development IF is equal to 0.63.

7.5.2 Pre-Development Infiltration and Runoff

Runoff was calculated as:

Equation 3:

$$R (total) = R (pervious) + R (impervious)$$

$$R (pervious) = S * (1 - IF) * A$$

$$R (impervious) = S * A$$

Where:

R	=	Runoff (mm/year)
S	=	Surplus (mm/year)
IF	=	Infiltration Factor
A	=	Area (m ²)

Infiltration was calculated as:

Equation 4:

$$I = S * IF * A$$

Where:

I	=	Infiltration (mm/year)
S	=	Surplus (mm/year)
IF	=	Infiltration Factor
A	=	Area (m ²)

Total pre-development runoff and infiltration volumes are **600.71 m³/year** and **501.47 m³/year**, respectively.

7.5.3 Post-Development Infiltration and Runoff

Post-development runoff and infiltration were calculated using **Equation 3** and **Equation 4**. Total post-development runoff and infiltration volumes are **1,139.26 m³/year** and **381.08 m³/year**, respectively.

7.5.4 Net Changes in Infiltration and Runoff

Tables 7.5a, 7.5b, and 7.5c summarize the changes in runoff and infiltration volumes from pre- to post-development.

Table 7.5a Annual Pre-Development Water Balance

Area (m ²)	Precipitation (m ³)	Evapotranspiration (m ³)	Runoff Volume (m ³)	Infiltration Volume (m ³)
3,930	2,983.18	1,881.00	600.71	501.47

Table 7.5b Annual Post-Development Water Balance

Area (m ²)	Precipitation (m ³)	Evapotranspiration (m ³)	Runoff Volume (m ³)	Infiltration Volume (m ³)
3,930	2,983.18	1,462.85	1,139.26	381.08

Table 7.5c Comparison of Pre-Development and Post-Development Water Balance

Development Stage	Precipitation (m ³)	Evapotranspiration (m ³)	Runoff Volume (m ³)	Infiltration Volume (m ³)
Pre-Development	2,983.18	1,881.00	600.71	501.47
Post-Development	2,983.18	1,462.85	1,139.26	381.08
Change from pre- to post-development		- 418.15	+ 539.09	- 120.39
%		- 22.2%	+ 89.7%	- 24.0%

After development, it is anticipated that there will be a **22.2%** decrease in evapotranspiration (**418.15 m³/year**), an **89.7 %** increase in average annual runoff from the Site (**538.55 m³/year**), and a **24.0%** decrease in infiltration (**120.39 m³/year**) due to the increase in impervious surfaces at the Site.

8.0 Qualified Professional (QP) Information

This Water Taking and Discharge Report was prepared by Logan McNabb, who holds a Bachelor of Environmental Engineering, and reviewed and approved by Laura Maharaj, a Professional Geoscientist Licensee in Ontario. Her expertise relates to geology, hydrogeology, and dewatering.

9.0 Conclusion

Based on the above analysis, the following conclusions and recommendations are offered for the proposed development at 107 Ridge Road, Aurora, Ontario:

- The geology within the Site is characterized as Newmarket Till, which primarily consists of sandy silt to silt with moderate to high matrix carbonate content and clast content [4].
- The bedrock underlying the Site is part of the Blue Mountain Formation composed primarily of shale and limestone [5].
- The excavation invert (290.6 masl) is above the lowest screened elevation of the monitoring wells on site which are all dry, therefore no groundwater dewatering is anticipated.
- The estimated rate of dewatering from precipitation is 63,608 L/day (44.2 L/min).
- Long-term groundwater seepage is not expected as the proposed development is to be constructed above the water table.
- Well decommissioning will be required prior to construction. Any inactive wells within the Site should be decommissioned by a licensed well contractor under Ontario Regulation 903.
- After development, it is anticipated that there will be a **22.2%** decrease in evapotranspiration (**418.15 m³/year**), an **89.7 %** increase in average annual runoff from the Site (**538.55 m³/year**), and a **24.0%** decrease in infiltration (**120.39 m³/year**) due to the increase in impervious surfaces at the Site.

10.0 Limitations

Groundwater Environmental Management Services Inc. (GEMS) has prepared this report for our client and its agents exclusively. GEMS accepts no responsibility for any damages that may be suffered by third parties as a result of decisions or actions based on this report.

The findings and conclusions are site-specific and were developed in a manner consistent with that level of care and skill normally exercised by environmental professionals currently practicing under similar conditions in the area. Changing assessment techniques, regulations, and site conditions mean that environmental investigations and their conclusions can quickly become dated, so this report is current up to two years from the published date. The report should not be used after that without GEMS review/approval.

The project has been conducted according to our instructions and work program. Additional conditions, and limitations on our liability are set forth in our work program/contract. No warranty, expressed or implied, is made.

11.0 References

- [1] Google. *Google Earth*. (2024). Accessed: 20 March 2025.
- [2] Town of Aurora. "Zoning By-law 6000-17 Maps." [aurora.ca](https://www.aurora.ca/en/business-and-development/planning-and-development-zoning.aspx#Schedule-A). Accessed: 25 March 2025. [Online.] Available: <https://www.aurora.ca/en/business-and-development/planning-and-development-zoning.aspx#Schedule-A>
- [3] L. J. Chapman, D. F. Putnam, *The Physiography of Southern Ontario: Ontario Geological Survey, 3rd Edition*. Ontario Geological Survey, 2007.
- [4] P. J. Barnett, W. R. Cowan, A. P. Henry. "Quaternary Geology of Southern Ontario, southern sheet." [geologyontario.mines.gov.on.ca](https://www.geologyontario.mines.gov.on.ca). Accessed: 25 March 2025. [Online.] Available: <https://www.geologyontario.mines.gov.on.ca/publication/M2556>
- [5] Ontario Geological Survey. "Bedrock Geology of Southern Ontario, southern sheet." [geologyontario.mines.gov.on.ca](https://www.geologyontario.mines.gov.on.ca). Accessed: 25 March 2025. [Online.] Available: <https://www.geologyontario.mines.gov.on.ca/publication/M2544>
- [6] Ministry of the Environment, Conservation and Parks. "Source Protection Information Atlas." [lioapplications.lrc.gov.on.ca](https://www.lioapplications.lrc.gov.on.ca). Accessed: 25 March 2025. [Online.] Available: <https://www.lioapplications.lrc.gov.on.ca/SourceWaterProtection/index.html?viewer=SourceWaterProtection.SWPViewer&locale=en-CA>
- [7] Government of Canada. "Historical Data." [Climate.weather.gc.ca](https://climate.weather.gc.ca). Accessed: 9 April 2025. [Online.] Available: https://climate.weather.gc.ca/historical_data/search_historic_data_e.html
- [8] Thornthwaite, C.W., and Mather, J.R. 1955. The water balance. Laboratory of Climatology, Johns Hopkins University, Baltimore, MD, USA, 8:1-86.
- [9] Government of Ontario. "Stormwater Management Plan and SWMP design." [Ontario.ca](https://www.ontario.ca/document/stormwater-management-planning-and-design-manual-0/stormwater-management-plan-and-swmp). Accessed: 9 April 2025. [Online.] Available: <https://www.ontario.ca/document/stormwater-management-planning-and-design-manual-0/stormwater-management-plan-and-swmp>

12.0 Closing

We trust this information will meet your current requirements. Please do not hesitate to contact the undersigned should you have any questions or require additional information.


Yours truly,

Groundwater Environmental Management Services Inc.

Prepared By:

Reviewed By:





Logan McNabb, B.Eng., EIT

Project Manager

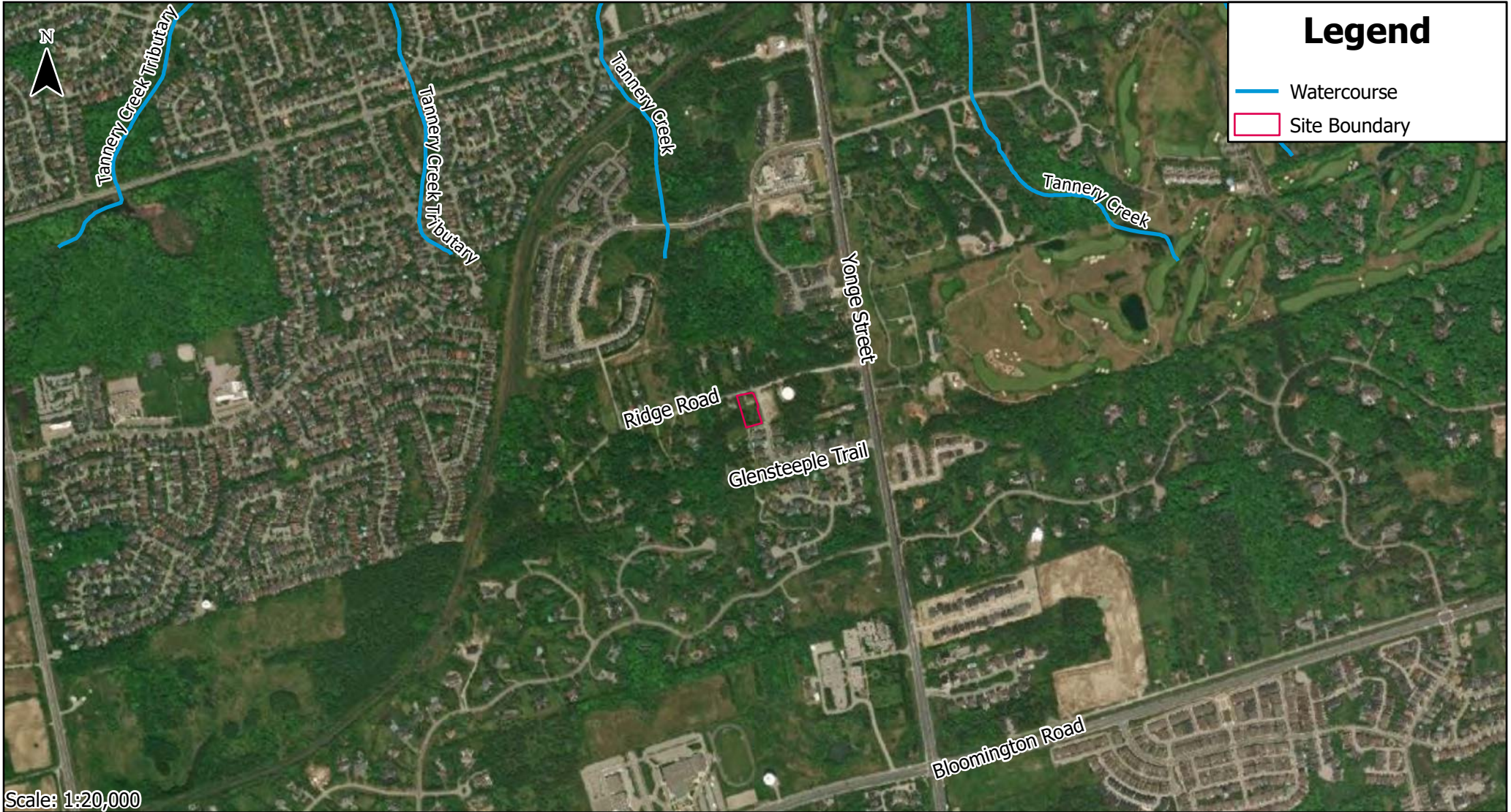


Laura Maharaj, M.Sc., P.Geo.

Director of Hydrogeology

Figure 1

Regional Location Plan



Legend

- Watercourse
- Site Boundary

Scale: 1:20,000



Scale: 1:250,000

Regional Location Plan 107 Ridge Road, Aurora, ON

Client: 2693642 Ontario Inc.

Project # 25-0102

Created by: G.Hogan

Date Saved: 2025-03-25 Figure 1 of 3

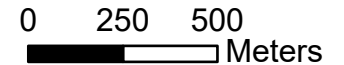


Figure 2

Detailed Site Plan



<h3>Detailed Site Plan</h3> <h4>107 Ridge Road, Aurora, ON</h4>		
Client: 2693642 Ontario Inc.	Project # 25-0102	Created by: G.Hogan
Date Saved: 2025-03-25		Figure 2 of 3

GEMS[®]

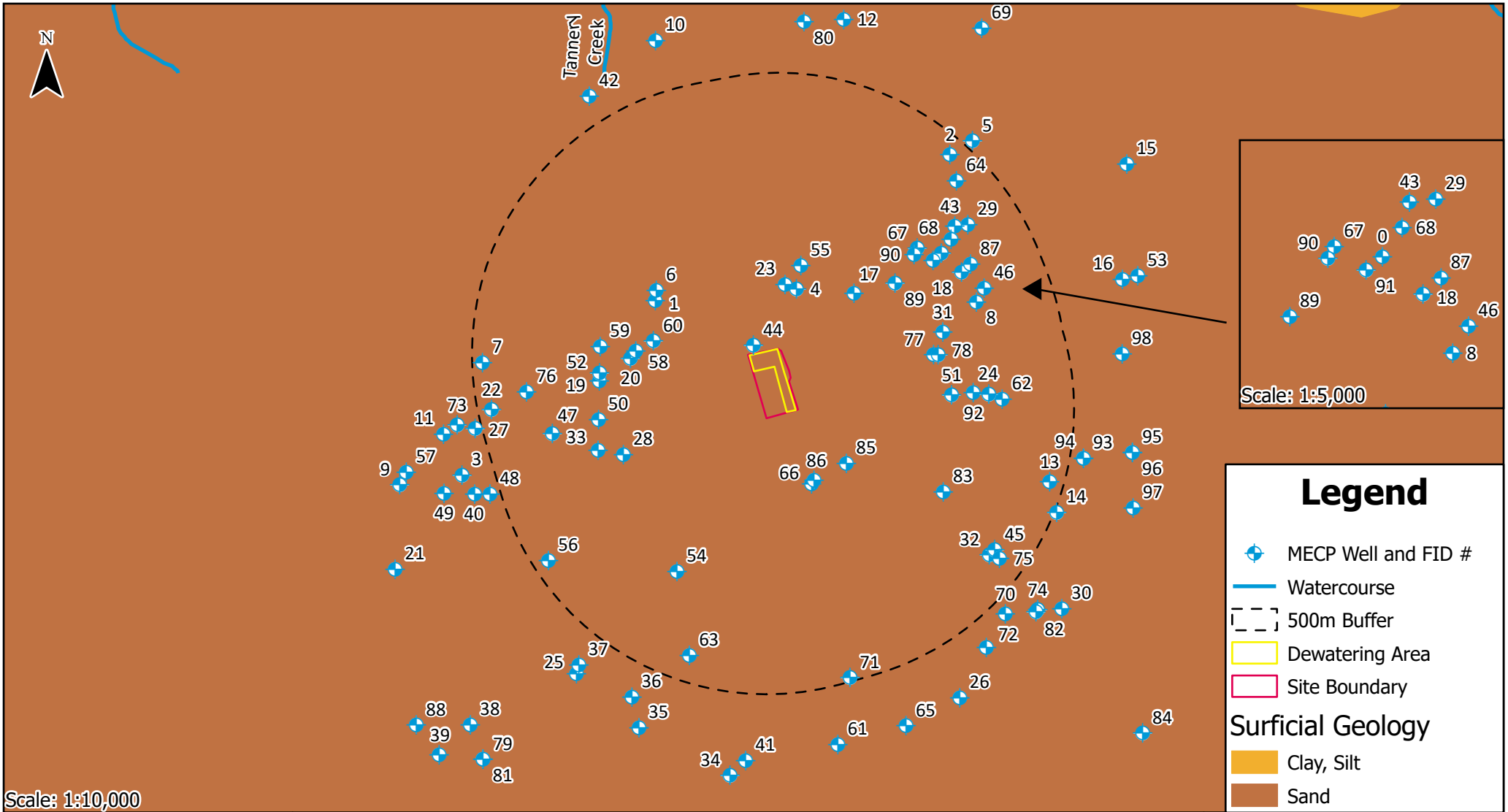
Groundwater Environmental Management Services

0 25 50

 Meters

Figure 3

Surface Geology and MECP Wells



Scale: 1:10,000

Legend

- MECP Well and FID #
- Watercourse
- 500m Buffer
- Dewatering Area
- Site Boundary

Surficial Geology

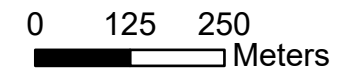
- Clay, Silt
- Sand



Scale: 1:250,000

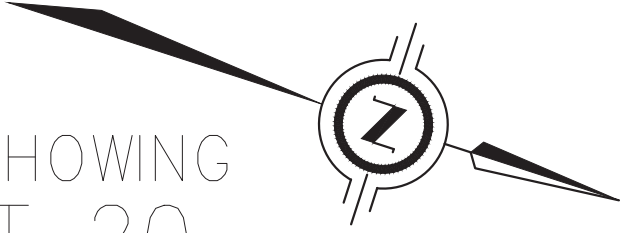
Surficial Geology and MECP Wells 107 Ridge Road, Aurora, ON

Client: 2693642 Ontario Inc.	Project # 25-0102	Created by: G.Hogan
Date Saved: 2025-03-24		Figure 3 of 3



Appendix A

Architectural Drawings



PART 1 - PLAN SHOWING
PART OF LOT 20

GEOGRAPHIC TOWNSHIP OF KING
TOWN OF AURORA

GUIDO PAPA SURVEYING
A DIVISION OF J.D. BARNES
© COPYRIGHT 2023

LOT AREA:

- LOT 1: 456.71 sq.m.
- LOT 2: 464.52 sq.m.
- LOT 3: 538.01 sq.m.
- LOT 4: 563.03sq.m.
- LOT 5: 522.05 sq.m.

FOOTPRINT

- LOT 1: 2018.33 sq.ft. 187.50 sq.m.
- LOT 2: 2018.33sq.ft. 187.50 sq.m.
- LOT 3: 2018.33 sq.ft. 187.50 sq.m.
- LOT 4: 2488.55 sq.ft. 231.19 sq.m.
- LOT 5: 2488.55 sq.ft. 231.19 sq.m.

LOT COVERAGE:

- 41.05%
- 40.36%
- 34.85%
- 41.06%
- 44.28%

GROSS FLOOR AREA:

- LOT 1: 4072.20 sq.ft. 378.32 sq.m.
- LOT 2: 4072.20sq.ft. 378.32 sq.m.
- LOT 3: 4072.20 sq.ft. 378.32 sq.m.
- LOT 4: 4399.60 sq.ft. 408.73 sq.m.
- LOT 5: 4399.60 sq.ft. 408.73 sq.m.



GLENSTEEPLE TRAIL
(BY REGISTERED PLAN 65M-4614)
PIN 03670-1101(LT)

RIDGE ROAD
(DEDICATED BY REGISTERED PLAN 132)
PIN 03670-0660(LT)

NO.	ISSUE/REVISION	DATE

The contractor shall check and verify all dimensions and report all errors and omissions to the Architect before proceeding with the work. This drawing is the property of the Architect and must be returned on completion of the work. Do not scale drawings.

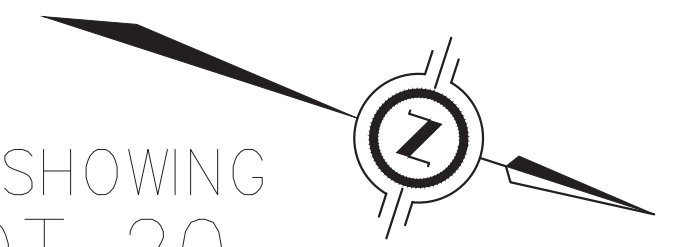
BATTAGLIA ARCHITECT INC.
Niousha Izadi
Project

PROPOSED SUBDIVISION
107 RIDGE RD.
AURORA, ON.

drawing

SITE PLAN

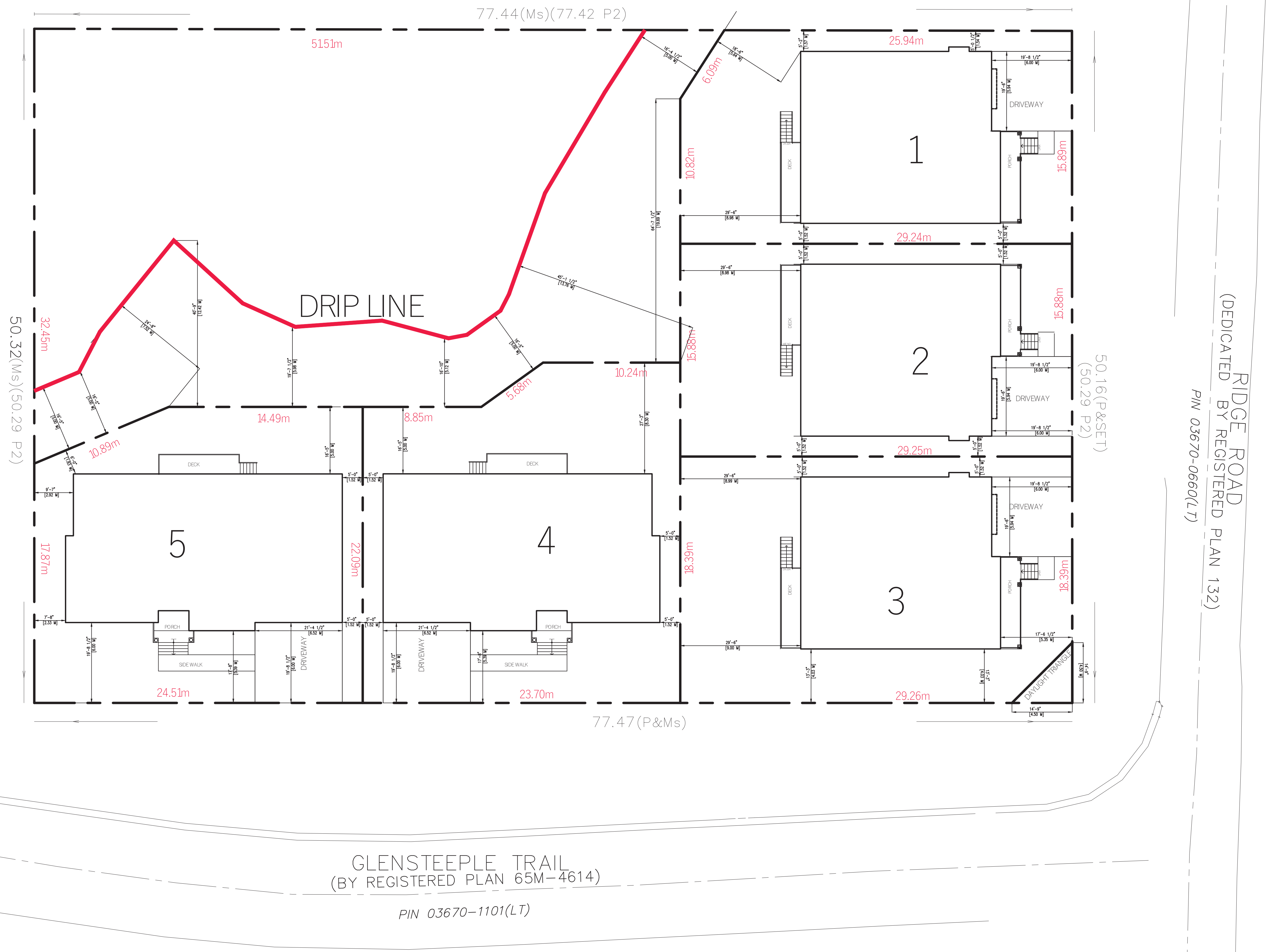
DATE	NOV / 29 / 2024
SCALE	1:150
Drawn by	NI
PROJECT NO.	24-107
Drawing no.	A1



PART 1 - PLAN SHOWING
PART OF LOT 20

GEOGRAPHIC TOWNSHIP OF KING
TOWN OF AURORA

GUIDO PAPA SURVEYING
A DIVISION OF J.D. BARNES
© COPYRIGHT 2023



LOT AREA:

- LOT 1: 456.71 sq.m.
- LOT 2: 464.52 sq.m.
- LOT 3: 538.01 sq.m.
- LOT 4: 563.03 sq.m.
- LOT 5: 522.05 sq.m.

FOOTPRINT

- LOT 1: 2018.33 sq.ft. 187.50 sq.m.
- LOT 2: 2018.33 sq.ft. 187.50 sq.m.
- LOT 3: 2018.33 sq.ft. 187.50 sq.m.
- LOT 4: 2488.55 sq.ft. 231.19 sq.m.
- LOT 5: 2488.55 sq.ft. 231.19 sq.m.

LOT COVERAGE:

- 41.05%
- 40.36%
- 34.85%
- 41.06%
- 44.28%

GROSS FLOOR AREA:

- LOT 1: 4072.20 sq.ft. 378.32 sq.m.
- LOT 2: 4072.20 sq.ft. 378.32 sq.m.
- LOT 3: 4072.20 sq.ft. 378.32 sq.m.
- LOT 4: 4399.60 sq.ft. 408.73 sq.m.
- LOT 5: 4399.60 sq.ft. 408.73 sq.m.

RIDGE ROAD
(DEDICATED BY REGISTERED PLAN 132)
PIN 03670-0660(LT)

GLENSTEEPLE TRAIL
(BY REGISTERED PLAN 65M-4614)

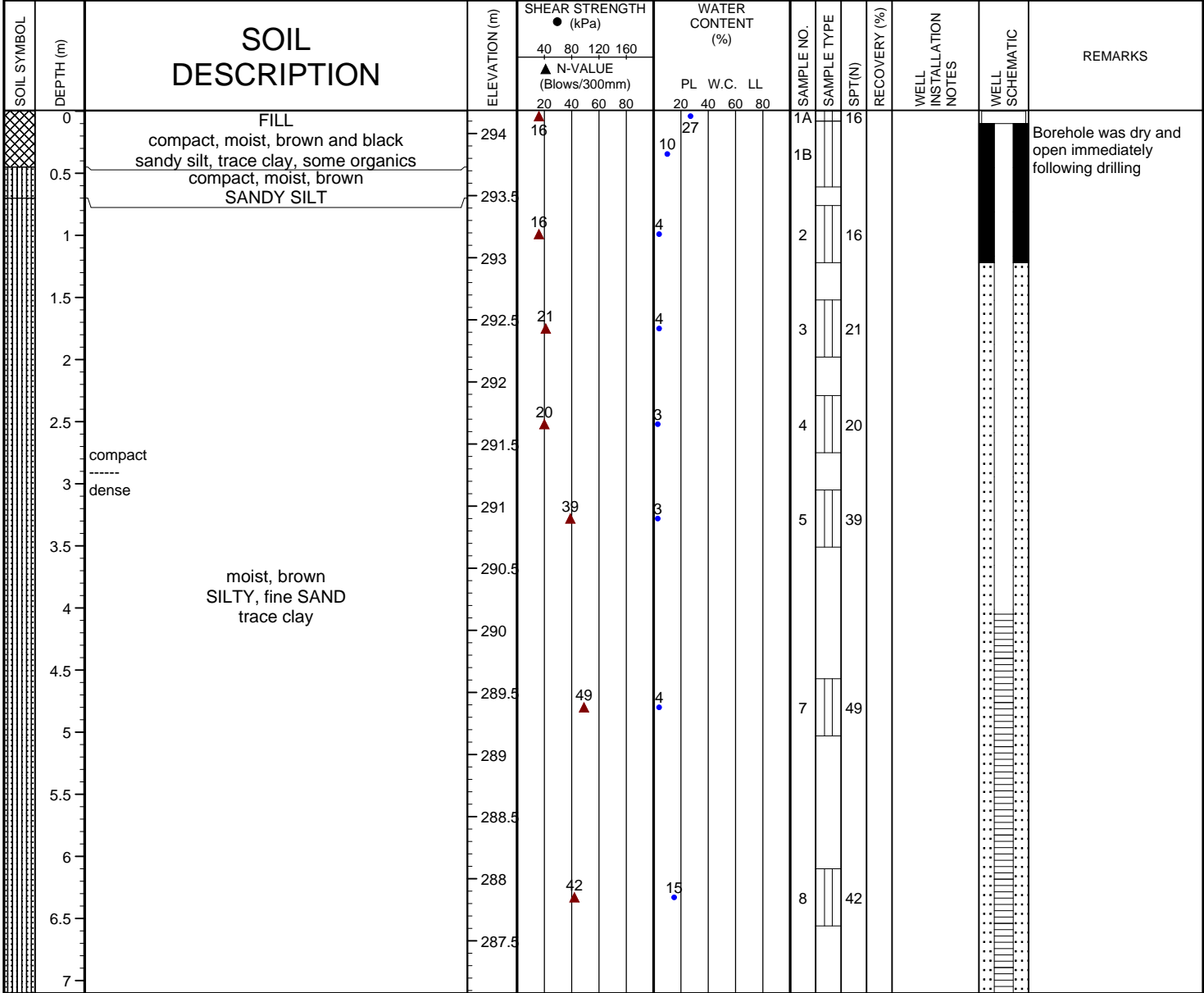
PIN 03670-1101(LT)

NO.	ISSUE/REVISION	DATE
<small>The contractor shall check and verify all dimensions and report all errors and omissions to the Architect before proceeding with the work. This drawing is the property of the Architect and must be returned on completion of the work. Do not scale drawings.</small>		
BATTAGLIA ARCHITECT INC. Niousha Izadi <small>1151 McNicoll Ave. Unit 103, Scarborough, Ontario, M1V 2L4 416-492-7172</small>		
Project PROPOSED SUBDIVISION 107 RIDGE RD. AURORA, ON.		
drawing CONCEPT PLAN		
Date NOV / 29 / 2024		Scale 1:150 Drawn by NI Project no. 24-107 Drawing no. A2

Appendix B

Borehole Logs

CLIENT: JKO Planning		PROJECT NO.: 25-0102		BOREHOLE NO. : MW1	
PROJECT: 107 Ridge Road					
LOCATION: Aurora, ON		NORTHING (m): 4869857.05	EASTING (m): 623116.18	ELEV. (m) 294.18	
DRILLING CONTRACTOR: Drill Tech Drilling		BOREHOLE DIAMETER (cm): 15.24		WELL DIAMETER (cm): 5.08	
DRILLING METHOD: Solid Stem Auger with Split Spoon Sampling				TOTAL DEPTH OF BOREHOLE (m): 6.56	



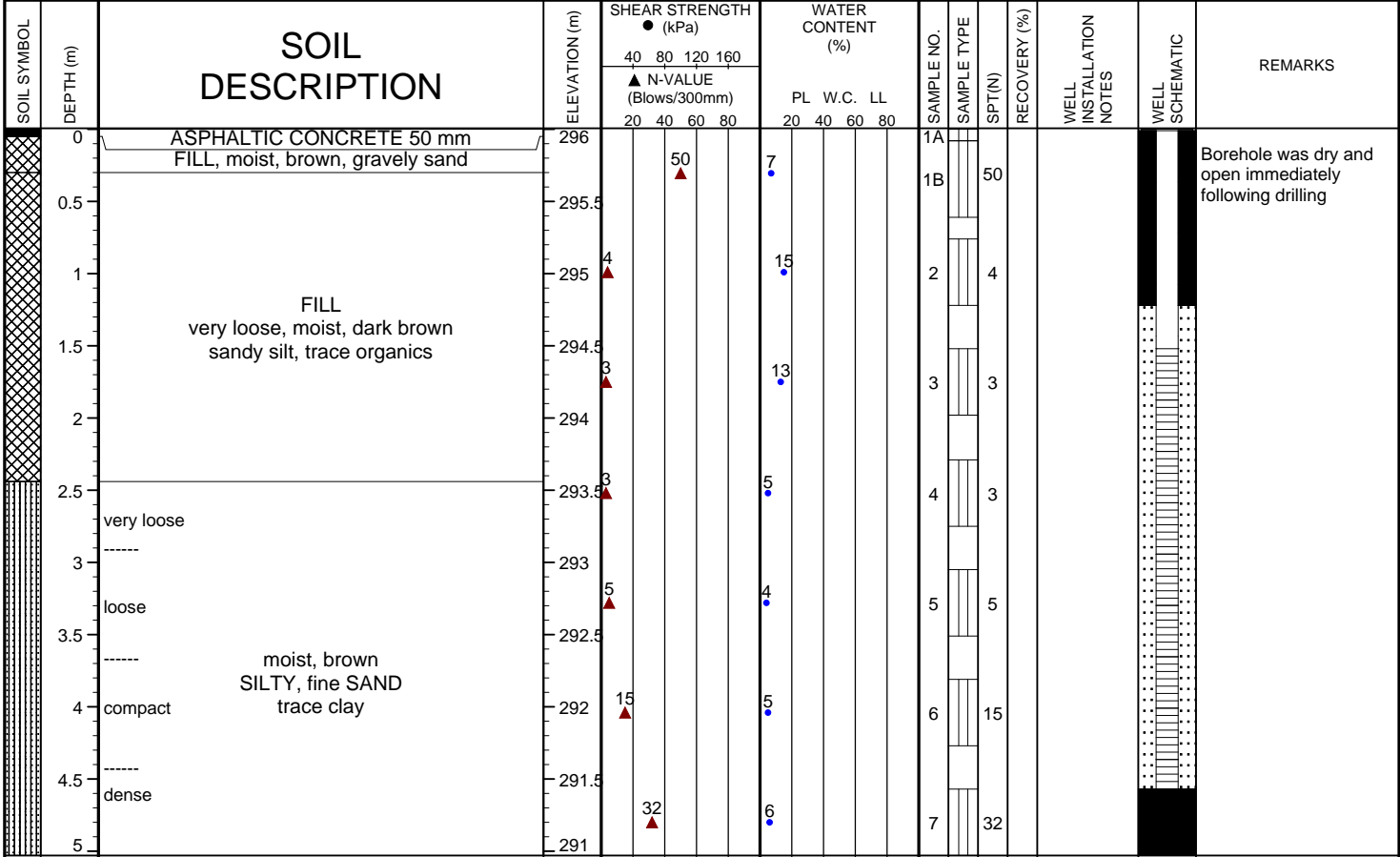
LOGGED BY: AC

DRILLING DATE: February 6, 2025

REVIEWED BY: KC

PAGE 1 OF 1

CLIENT: JKO Planning		PROJECT NO.: 25-0102		BOREHOLE NO. : MW2	
PROJECT: 107 Ridge Road					
LOCATION: Aurora, ON		NORTHING (m): 4869863.43	EASTING (m): 623128.45	ELEV. (m) 296.00	
DRILLING CONTRACTOR: Drill Tech Drilling		BOREHOLE DIAMETER (cm): 15.24		WELL DIAMETER (cm): 5.08	
DRILLING METHOD: Solid Stem Auger with Split Spoon				TOTAL DEPTH OF BOREHOLE (m): 5.03	



END OF BOREHOLE



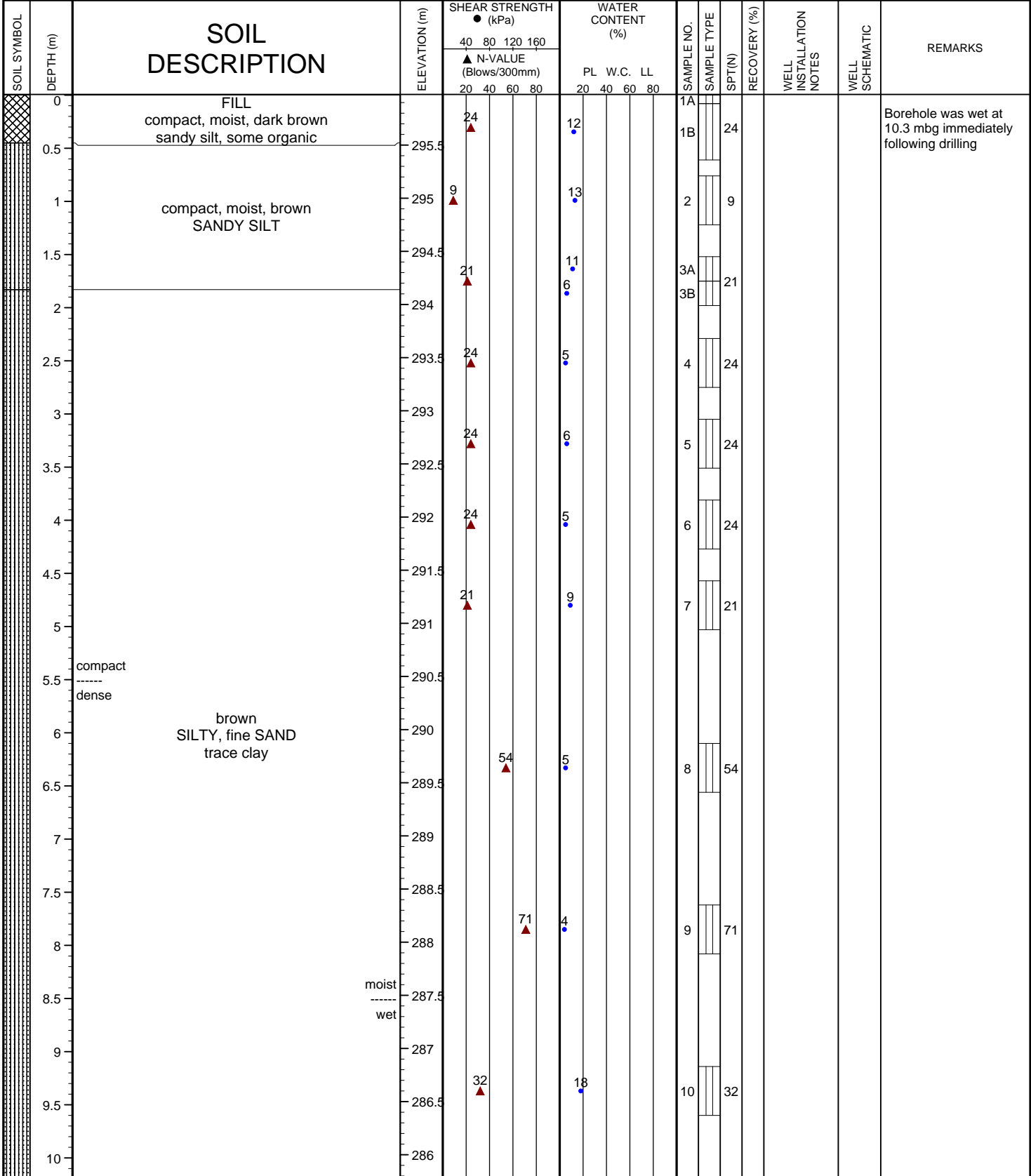
LOGGED BY: AC

DRILLING DATE: February 6, 2025

REVIEWED BY: KC

PAGE 1 OF 1

CLIENT: JKO Planning		PROJECT NO.: 25-0102		BOREHOLE NO. : BH3	
PROJECT: 107 Ridge Road					
LOCATION: Aurora, ON		NORTHING (m): 4869845.91	EASTING (m): 623149.41	ELEV. (m) 295.97	
DRILLING CONTRACTOR: Drill Tech Drilling		BOREHOLE DIAMETER (cm): 15.24		WELL DIAMETER (cm): 5.08	
DRILLING METHOD: Solid Stem Auger with Split Spoon				TOTAL DEPTH OF BOREHOLE (m): 11.13	




LOGGED BY: AC

DRILLING DATE: February 6, 2025

REVIEWED BY: KC

PAGE 1 OF 2

CLIENT: JKO Planning				PROJECT NO.: 25-0102				BOREHOLE NO. : BH3										
PROJECT: 107 Ridge Road																		
LOCATION: Aurora, ON				NORTHING (m): 4869845.91				EASTING (m): 623149.41		ELEV. (m) 295.97								
DRILLING CONTRACTOR: Drill Tech Drilling				BOREHOLE DIAMETER (cm): 15.24				WELL DIAMETER (cm): 5.08										
DRILLING METHOD: Solid Stem Auger with Split Spoon								TOTAL DEPTH OF BOREHOLE (m): 11.13										
SOIL SYMBOL	DEPTH (m)	SOIL DESCRIPTION	ELEVATION (m)	SHEAR STRENGTH (kPa)				WATER CONTENT (%)				SAMPLE NO.	SAMPLE TYPE	SPT(N)	RECOVERY (%)	WELL INSTALLATION NOTES	WELL SCHEMATIC	REMARKS
				40	80	120	160	PL	W.C.	LL	80							
	10.5	dense, wet, brown SILTY, fine SAND trace clay	285.5															
	11		285	▲ 20						● 21								
		END OF BOREHOLE																
				LOGGED BY: AC				DRILLING DATE: February 6, 2025										
				REVIEWED BY: KC				PAGE 2 OF 2										

CLIENT: JKO Planning		PROJECT NO.: 25-0102		BOREHOLE NO. : MW4	
PROJECT: 107 Ridge Road					
LOCATION: Aurora, ON		NORTHING (m): 4869820.80	EASTING (m): 623149.99	ELEV. (m) 296.48	
DRILLING CONTRACTOR: Drill Tech Drilling		BOREHOLE DIAMETER (cm): 15.24		WELL DIAMETER (cm): 5.08	
DRILLING METHOD: Solid Stem Auger with Split Spoon				TOTAL DEPTH OF BOREHOLE (m): 5.03	

SOIL SYMBOL	DEPTH (m)	SOIL DESCRIPTION	ELEVATION (m)	SHEAR STRENGTH (kPa)				WATER CONTENT (%)				SAMPLE NO.	SAMPLE TYPE	SPT(N)	RECOVERY (%)	WELL INSTALLATION NOTES	WELL SCHEMATIC	REMARKS
				40	80	120	160	PL	W.C.	LL	80							
	0	FILL, loose, moist, dark brown sandy silt, some organics	296.48	13														Borehole was dry and open immediately following drilling
	0.5	FILL stiff, moist, dark brown clayey silt, some sand, trace gravel	296.0	13														
	1.0	TOPSOIL	295.5	13														
	1.5		295.0	20														
	2.0		294.5	21														
	2.5		294.0	30														
	3.0	compact, moist, brown SILTY, fine SAND trace clay	293.5	26														
	3.5		293.0	22														
	4.0		292.5															
	4.5		292.0															
	5.0	END OF BOREHOLE	291.5															



LOGGED BY: AC

DRILLING DATE: February 6, 2025

REVIEWED BY: KC

PAGE 1 OF 1

Appendix C

MECP Wells within 500 m Radius

MECP Well Summary

Address: 107 Ridge Road, Ar

Project No. 25-0102

Well ID	Easting	Northing	FID	Well Usage
6901529	623357.6	4870007	0	Not Used
6901531	622985.6	4869939	1	Domestic
6901532	623366.6	4870136	2	Domestic
6901533	622737.6	4869707	3	Domestic
6901534	623169.6	4869957	4	Domestic
6901535	623395.6	4870154	5	Domestic
6901536	622986.6	4869952	6	Domestic
6901537	622761.6	4869854	7	Irrigation
6901539	623404.6	4869945	8	Domestic
6901540	622656.6	4869693	9	Domestic
6901542	622979.6	4870277	10	Domestic
6901543	622712.6	4869760	11	Domestic
6902679	623224.6	4870309	12	Domestic
6907413	623504.6	4869713	13	Livestock
6907415	623514.6	4869673	14	Domestic
6907416	623597.6	4870128	15	NA
6907417	623594.6	4869978	16	Livestock
6909074	623244.6	4869953	17	Domestic
6909256	623384.6	4869983	18	Domestic
6909654	622914.6	4869833	19	Domestic
6909655	622954.6	4869863	20	Domestic
6910573	622652.6	4869583	21	Domestic
6911010	622774.6	4869793	22	Domestic
6911194	623154.6	4869963	23	Domestic
6911882	623402.6	4869827	24	Livestock
6912023	622891.6	4869452	25	Domestic
6912024	623392.6	4869430	26	Commerical
6912065	622753.6	4869768	27	Domestic
6912066	622947.6	4869738	28	Domestic
6912094	623391.6	4870045	29	Domestic
6912205	623523.6	4869548	30	Livestock
6912339	623361.6	4869905	31	Livestock
6912443	623427.6	4869616	32	Domestic
6914351	622914.6	4869743	33	Domestic
6914614	623094.6	4869323	34	Domestic
6914617	622974.6	4869383	35	Domestic
6914618	622964.63	4869423	36	Domestic
6914620	622894.6	4869463	37	Domestic
6914621	622754.6	4869383	38	Domestic
6914629	622714.6	4869343	39	Domestic

MECP Well Summary

Address: 107 Ridge Road, A1

Project No. 25-0102

Well ID	Easting	Northing	FID	Well Usage
6914635	622754.6	4869683	40	Domestic
6914715	623114.6	4869343	41	Domestic
6914718	622894.6	4870203	42	Domestic
6915113	623374.6	4870043	43	Domestic
6915368	623114.6	4869883	44	Domestic
6915410	623434.6	4869623	45	Domestic
6915485	623414.6	4869963	46	Domestic
6915658	622854.6	4869763	47	Domestic
6916101	622774.6	4869683	48	Domestic
6916102	622714.6	4869683	49	Domestic
6916103	622914.6	4869783	50	Domestic
6916153	623374.6	4869823	51	Domestic
6917177	622914.6	4869843	52	Domestic
6917481	623614.6	4869983	53	Domestic
6917748	623020.6	4869587	54	Domestic
6917864	623174.6	4869988	55	Domestic
6917918	622852.6	4869598	56	Domestic
6918075	622665	4869710	57	Domestic
6919478	622961.6	4869873	58	Domestic
6919479	622915	4869878	59	Domestic
6919835	622984	4869886	60	Domestic
6920186	623234.6	4869366	61	Domestic
6920976	623440.6	4869819	62	Domestic
6921076	623038.6	4869478	63	Domestic
6921606	623375.6	4870102	64	Domestic
6922318	623323	4869392	65	Domestic
6922333	623194	4869704	66	Domestic
6923169	623326	4870013	67	Domestic
6923376	623370	4870026	68	Domestic
6927783	623405	4870301	69	Not Used
6928241	623450	4869540	70	Not Used
6928242	623249	4869453	71	Not Used
6928243	623426	4869496	72	Not Used
6931008	622730	4869772	73	Not Used
7044104	623492	4869546	74	NA
7044105	623441	4869612	75	NA
7137379	622820	4869817	76	Domestic
7174014	623350	4869875	77	NA
7174016	623356	4869875	78	NA
7183238	622772	4869338	79	Domestic

MECP Well Summary

Address: 107 Ridge Road, A1

Project No. 25-0102

Well ID	Easting	Northing	FID	Well Usage
7219159	623173	4870305	80	Test Hole
7224246	622772	4869338	81	Domestic
7227599	623490	4869543	82	Monitoring
7227600	623366	4869697	83	NA
7240722	623632	4869388	84	Domestic
7258959	623239	4869732	85	NA
7263278	623197	4869709	86	NA
7264666	623396	4869994	87	NA
7322582	622684	4869381	88	NA
7363228	623298	4869967	89	Monitoring
7363229	623322	4870005	90	Monitoring
7363230	623347	4869998	91	Monitoring
7363691	623423	4869825	92	Monitoring
7397586	623548	4869744	93	NA
7397587	623548	4869744	94	NA
7397588	623612	4869753	95	NA
7397589	623612	4869753	96	NA
7397590	623614	4869681	97	NA
7407480	623596	4869881	98	NA

Appendix D

Water Balance Calculations

P	Precipitation (mm/year)
ET	Evapotranspiration (mm/year)
R	Runoff (mm/year)
I	Infiltration (mm/year)
IF	Infiltration Factor
S	Surplus water (mm/year)

Surplus water
Infiltration
Thorntwaite and Mather, 1957

$S = P - ET$
 $I = IF \times S$
 $P = ET + R + I$

Precipitation (mm/year)	759.08	Data from Environment Canada - Toronto Buttonville A, 2015-2019 and King City North, 2019-2024.
Evapotranspiration (mm/year)	525.53	Calculated using Thornthwaite-Mather model using Toronto Buttonville A, 2015-2019, and King City North, 2019-2024 climate data.

IF is determined by summing a factor for topograph, soils, and cover (Ontario Ministry of Environment, 2003).			Pre-Development Cultivated	Pre-Development Woodland	Post-Development Cultivated	Post-Development Woodland
Topography	Flat land, average slope < 0.6 m/km	0.3				
	Rolling Land, average slope 2.8 m to 3.8 m/km	0.2	0.3	0.3	0.3	0.3
	Hilly Land, average slope 28 m to 47 m/km	0.1				
Soils	Tight impervious clay	0.1				
	Medium combinations of clay and loam	0.2	0.2	0.2	0.2	0.2
	Open sandy loam	0.4				
Cover	Cultivated Land	0.1				
	Woodland	0.2	0.1	0.2	0.1	0.2
Infiltration Factor			0.6	0.7	0.6	0.7
Percent of Area			86%	14%	0.6	0.6
Weighted Infiltration Factor			0.63		0.66	

Total Area (m ²)	3,930	3,930
Pervious Area (m ²)	3,520	2,590
Impervious Area (m ²)	410	1,340

	Parameter	Units	Pre-Development	Post-Development
	Precipitation (P)	mm/year	759.08	759.08
	Precipitation (P)	m ³ /year	2,983.18	2,983.18
Pervious Area	Evapotranspiration (ET)	mm/year	525.53	525.53
	Surplus (S)	mm/year	233.55	233.55
	Infiltration (I)	mm/year	142.46	147.13
	Runoff (R)	mm/year	91.08	86.41
Impervious Area	Evapotranspiration (ET)	mm/year	75.91	75.91
	Surplus (S)	mm/year	683.17	683.17
	Infiltration (I)	mm/year	0.00	0.00
	Runoff (R)	mm/year	683.17	683.17
Volumes	Volume of Evapotranspiration	m ³ /year	1,881.00	1,462.85
	Volume of Infiltration	m ³ /year	501.47	381.08
	Volume of Runoff	m ³ /year	600.71	1,139.26
	TOTAL VOLUME	m ³ /year	2,983.18	2,983.18

Appendix E

Pre- and Post-Development Drainage Plans



ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE TOWN OF AURORA BENCH MARK NO. DPW 246 HAVING A PUBLISHED ELEVATION OF 328.75M.

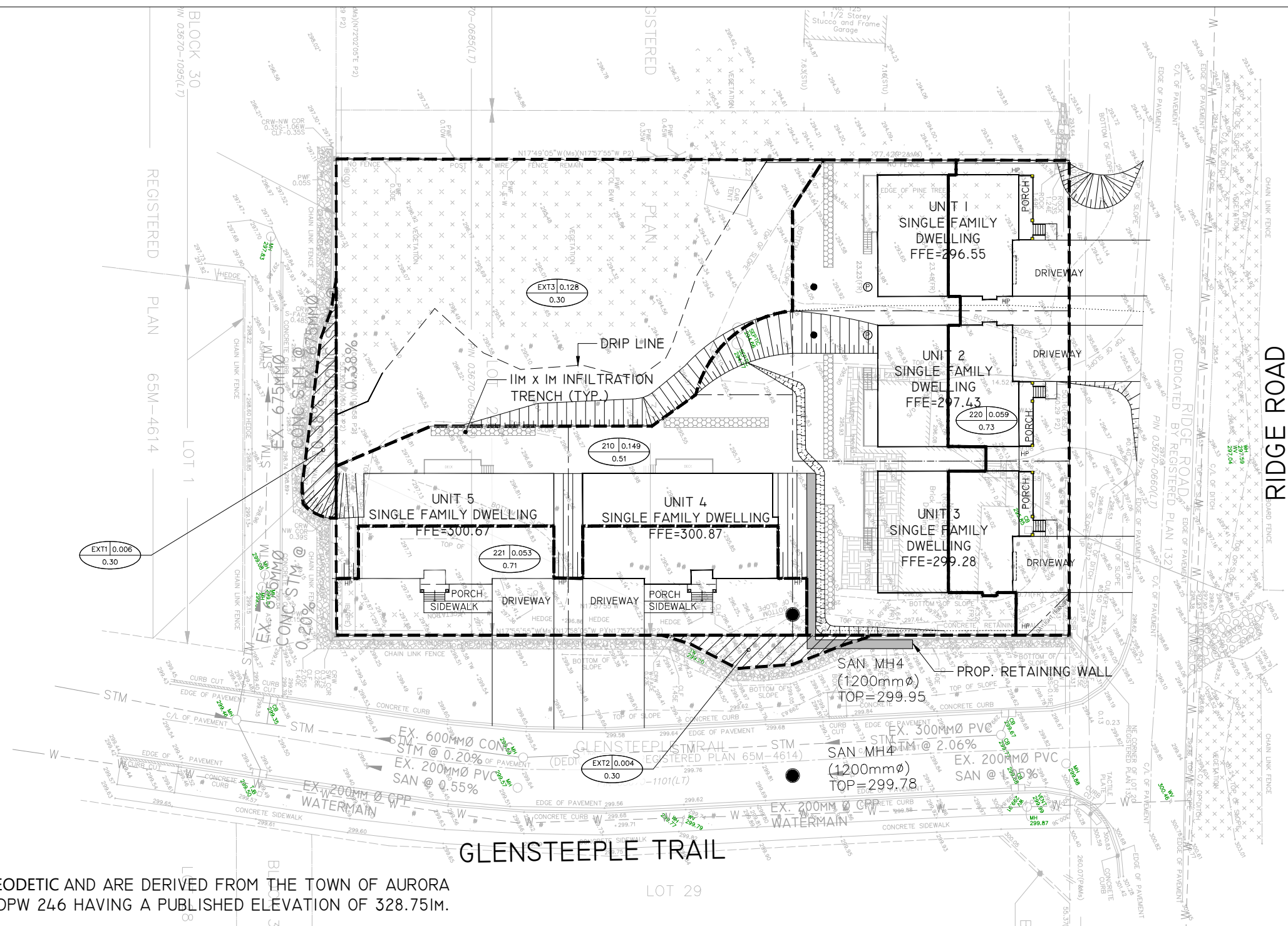
LOT 29

SITEPLANTECH INC.
50 ST. CLEMENTS AVE.
TORONTO, ON
M4R 1G9

2693642 ONTARIO INC.
107 RIDGE ROAD
AURORA, ON

PRE-DEVELOPMENT DRAINAGE PLAN

I	LOT SEVERANCE	03/06/25	DRAWN: LPM	DATE: MAR. 2025
NO.	ISSUE	DATE	SCALE: 1:500	DWG: 201



ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM THE TOWN OF AURORA BENCH MARK NO. DPW 246 HAVING A PUBLISHED ELEVATION OF 328.75M.

LOT 29

SITEPLANTECH INC.
50 ST. CLEMENTS AVE.
TORONTO, ON
M4R 1G9

2693642 ONTARIO INC.
107 RIDGE ROAD
AURORA, ON

POST-DEVELOPMENT DRAINAGE PLAN

I	LOT SEVERANCE	03/06/25	DRAWN: LPM	DATE: MAR. 2025
NO.	ISSUE	DATE	SCALE: 1:500	DWG: 202