Madori Ltd.
5400 Younge Street Fifth Floor
North York, ON M2N 5R5

File No. 23-050
June 25, 2025

Attention: Nick Karakis

Subject: Hydrogeological Assessment
Northwest Corner of Elm Road and Ninth Line,
Whitchurch- Stouffville, Ontario

Grounded Engineering Inc. ("Grounded") is pleased to provide you with this Hydrogeological Assessment for the site known as Northwest Corner of Elm Road and Ninth Line, in Whitchurch- Stouffville, Ontario.

1 Introduction

Madori Limited proposes to construct a new residential development consisting of three (3) buildings containing nine (9), three (3), and eight (8) townhouses, and a public laneway. Grounded has been asked to prepare an updated Hydrogeological Assessment to support the development.

The site is located north of Elm Road and west of Ninth Line in Whitchurch-Stouffville. The site is rectangular in shape, with a total area of approximately 0.36 ha. The proposed residential development will be serviced with municipal services. The site location is presented on Figure 1.

2 Previous Investigations

The following previous environmental reports were provided for review as part of this hydrogeological assessment, a summary of the previous reports is provided below:

- *Terraprobe Inc., Hydrogeologic Study Proposed Residential Subdivision (Madori Property), Stouffville, Ontario, July 8, 2004*
- *Terraprobe Inc., Hydrogeological Study Northwest Stouffville, Town of Whitchurch-Stouffville, December 18, 2015*
- *WSP Canada Inc., 5731 Bethesda Sideroad, Stouffville, Ontario Hydrogeological Investigation, March 3, 2022*
- *Grounded Engineering Inc., 5731 Bethesda Sideroad, Stouffville, Ontario Hydrogeological Assessment, March 3, 2025*

Terraprobe Inc., Hydrogeologic Study Proposed Residential Subdivision (Madori Property), Stouffville, Ontario, July 8, 2004

The investigation was carried out for an adjacent property. The hydrogeological characteristics of the adjacent property are applicable to the property at the corner of Elm Road and Ninth Line. The purpose of this investigation was to provide information regarding the hydrogeological conditions and provide considerations for the development of the property. Specifically, the following summarizes the results of the hydrogeological assessment.

- The stratigraphy consists of surficial deposits of low permeability native glacial till soils.
- Based on the information provided in the Terraprobe report, the direction of groundwater flow is to the southwest.
- The previous report by Terraprobe indicates that the hydraulic conductivity of the shallow soil at the site is very low (approximately 10^{-6} to 10^{-9} m/s). This results in a very slow groundwater flow rate with limited infiltration and recharge.
- The results of the water balance identified a deficit. However, engineered infiltration measures were not recommended due to the low permeability of the soil.
- Based on the shallow groundwater depths at the property, most shallow excavations will be below the observed shallow groundwater level. However, seepage was expected to be limited because of the low permeability glacial till. Deeper excavations in proximity of the underlying pressurized aquifer, if required, would result in significant flows and active dewatering and depressurization would be needed. A detailed assessment and a dewatering plan including a PTTW and monitoring program would be required in this situation.

Terraprobe Inc., Hydrogeological Study Northwest Stouffville, Town of Whitchurch-Stouffville, December 18, 2015

The investigation was carried out for a property to the east of Highway 48 (Markham Road), north of Main Street and to the south of Bethesda Sideroad; however, the hydrogeological characteristics of the subject property and study area are applicable to the property at the corner of Elm Road and Ninth Line. The purpose of the investigation was to provide information regarding the hydrogeological conditions. Specifically, the following summarizes the results of the Terraprobe hydrogeological study:

- The stratigraphy consists of silty clay to clayey silt till forming a till cap overlying sandy deposits typically under artesian ground conditions. Thickness of till deposits across the site vary, and sand seams were encountered within till deposits at various boreholes completed across the site.
- Shallow groundwater levels across the site were observed to be within one to two meters below ground level, with seasonal high groundwater levels at or near ground surface. Deeper groundwater levels were observed to be artesian.

- Based on the information provided in the Terraprobe report, the direction of regional groundwater flow at the site is to the south towards Lake Ontario. Local groundwater flow was noted to be expected to follow topography and be directed to a tributary to the Little Rouge Creek.
- The hydraulic conductivity of the shallow soil at the site is very low (approximately 10^{-5} to 10^{-9} m/s). This results in a very slow groundwater flow rate with limited infiltration and recharge.
- The results of the water balance identified a deficit.

WSP Canada Inc., 5731 Bethesda Sideroad, Stouffville, Ontario Hydrogeological Investigation, March 3, 2022

The investigation was carried out for a property located 500 m west of the intersection of Bethesda Sideroad and Ninth Line in Stouffville, Ontario; however, the hydrogeological characteristics of the subject property are applicable to property at the corner of Elm Road and Ninth Line. The purpose of the investigation was to provide information regarding the site-specific hydrogeological conditions. Specifically, the following summarizes the WSP hydrogeological investigation:

- The stratigraphy consists of surficial deposits of low permeability native glacial till soils. Silt and clay were found overlying the glacial till along the north side of the property. Silt and sand layers were found sparingly within the glacial till across the property.
- The hydraulic conductivity of clayey glacial till is in the order of 10^{-9} to 10^{-10} m/s.
- Shallow groundwater was measured between 0.01 mbgs (elev. 271.53 masl) and 1.67 mbgs (271.37 masl) except in the southwest corner where levels measured between 0.16 mbgs (elev. 269.35 masl) to 0.37 mbgs (elev. 269. 40 masl).
- Based on the information provided in the WSP report, the direction of shallow groundwater flow is to the southwest.
- The results of the water budget indicated 37% of the roof run off would need to be infiltrated to match the pre-development infiltration rates without mitigation measures. Engineered infiltration measures were not recommended. Passive LID measures such as increased topsoil thickness, bioretention and promotion of residential stormwater landscaping would be more appropriate. This is due to the high groundwater levels, upward gradient across the site, and low hydraulic conductivity.

Grounded Engineering Inc., 5731 Bethesda Sideroad, Stouffville, Ontario Hydrogeological Assessment, March 3, 2025

The investigation was carried out for a property located 500 m west of the intersection of Bethesda Side Road and Ninth Line in Stouffville, Ontario; however, the hydrogeological characteristics of the subject property are applicable to property at the corner of Elm Road and Ninth Line. The purpose of the investigation was to provide information regarding the hydrogeological considerations for the development of the property. Specifically, the following summarizes the Grounded Hydrogeological Assessment:

- The stratigraphy consists of surficial deposits of low permeability native glacial till soils. Silt and clay soil was found overlying the glacial till along the north side of the property. Silt and sand layers were found sparingly within the glacial till across the property. Bedrock lies approximately 100 mbgs at the Site.
- The hydraulic conductivity of the till was reported to be in the order of 10^{-7} to 10^{-10} m/s.
- Shallow groundwater was measured between 267.52 masl and 271.86 masl.
- Based on the information provided in the Grounded report, the direction of shallow groundwater flow is to the southwest.
- The results of the water budget indicate that approximately 23% of the roof runoff would need to be infiltrated in order to match the pre-development infiltration rates without mitigation measures. Engineered infiltration measures are not recommended. Passive LID measures are more appropriate for this site (such as increased topsoil thickness, bioretention, and promotion of residential stormwater landscaping). This is a result of the high groundwater levels, upward gradient across the Site, and low hydraulic conductivity. These measures were agreed to be suitable as part of the draft plan approval of the subdivision.

3 Physical Setting

3.1 Site Description and Location

The site is located north of Elm Road and west of Ninth Line in Whitchurch-Stouffville. The site is rectangular in shape, with a total area of approximately 0.36 ha. The property was vacant with some tree cover. The surrounding area consists of residential, community and commercial uses. A residential development is proposed for the site. The proposed development will be serviced with municipal services. The site location is presented on Figure 1.

3.2 Physiography

The site is located within the Markham Pickering Till Plain physiographic region as defined by Chapman and Putnam (1984). The till plain slopes southward from the edge of the Oak Ridges Moraine. The overburden in the area consists primarily of surficial deposits of glacial till. This glacial till is known as the Halton Till. The Halton Till is comprised of silt to clayey silt with occasional boulders. This soil typically has low permeability.

3.3 Site Topography and Drainage

Regionally, the surrounding area is characterized by gently rolling hills. The area is drained by several creeks which generally flow south to Lake Ontario. The Oak Ridges Moraine forms a regional topographic high to the north of the Site. The moraine is a regionally extensive deposit of sand and gravel extending from the Niagara Escarpment at Caledon to the west and Trenton to the east. In the area of Whitchurch-Stouffville and Uxbridge Townships the moraine is up to 10 km wide and forms a highland area approximately 300 m to 400 m in elevation.

The site is largely flat lying with a raised area along the east property boundary. The site is at an elevation of approximately 271 masl. Due to the low permeability till across the site, surface water will tend to flow overland to the west and be directed to ditches and catch basins along the roadway.

3.4 Site Topography and Drainage

The Following climate data were compiled from the TRCA water balance tool:

Precipitation:	869 mm/a
Evapotranspiration:	662 mm/a
Water surplus:	207 mm/a

The climate data is typical for Southern Ontario, with rainfall exceeding evapotranspiration.

3.5 Regional Geology

Based on a review of published information, the site is located within the Markham-Pickering Till Plain. The till plain slopes southward from the edge of the Oak Ridges Morain. The site is located within the Oak Ridges Moraine Planning Area. Sand and gravel, which form the southern extent of the Oak Ridges Moraine Complex, underlies the surficial till unit across the area.

The near surface overburden soil in the area consists of Halton Till, consisting of glaciolacustrine deposits of silt and clay with minor sand due to basin and quiet water deposits. Underlying the till unit are sands and gravels which have been identified at depths of 10 to 20 m below grade. The sand and gravel deposits form a confined artesian aquifer. Beneath the soil deposits on the site is bedrock of the Whitby Formation consisting of grey and black shale.

4 Results of Subsurface Investigation

4.1 Drilling

Two (2) boreholes were advanced by others on March 17, 2023. A monitoring well was installed in one of the boreholes. The boreholes were advanced to a depth of approximately 6.7 m. Borehole and monitoring well locations are shown on Figure 2.

The results of the drilling program are recorded in detail on the borehole logs in Appendix A.

4.2 Site Soil Profile

The information collected during the drilling program by others, is summarized below:

- A layer of topsoil was observed in both boreholes. The topsoil was approximately 150 mm thick.

- Underlying the topsoil layer was a layer of fill which extended to a range of approximately 0.7 to 0.8 ± mbgs (Elev. 270.1 to 270.3 ± masl).
- Fill is underlain by a clayey silt to silty sand glacial till layer, with trace to some clay, and trace gravel that extends up to a depth of 2.3 mbgs ± (Elev. 268.8 masl ±). This layer is described as brown, moist to wet and loose to compact.
- Below the clayey silt glacial till layer, is a layer of sand to silty sand which contains trace to some silt, brown, saturated and dense. The top of the underlying sand unit ranges from 268.8 masl in the east to 266.3 masl in the west. This layer extends to depths ranging from 4.6 mbgs to 6.7 mbgs ± (Elev. 264.2 to 264.4 masl ±).

5 Groundwater

5.1 Monitoring Well Installation

A monitoring well was installed in BH23-1 and screened between 4.6 and 6.1 mbgs (Elev. 266.3 to 264.8 masl). The monitoring well was installed in the underlying silty sand unit. The monitoring well was installed to permit the installation of a datalogger at the site to measure groundwater levels. The details of the monitoring well installation can be found on the borehole log in Appendix A. The location of the monitoring well is noted in Figure 2.

5.2 Summary of Groundwater Level Monitoring

The following summarizes the groundwater level monitoring at the site.

- Dataloggers were installed in BH23-1 in April of 2023 and were removed in August of 2023.
- Seasonal groundwater measurements have been obtained and plotted in a hydrograph (Figures 3) along with daily precipitation in mm.
- The data shows that the seasonally high water levels were reached in April 2023, with a groundwater depth of 1.50 mbgs (Elev. 269.3 masl).
- The data shows that the seasonally low water levels were reached in August 2023, with a groundwater depth of 2.76 mbgs (Elev. 268.4 masl), until the reading in June 2025, which recorded a groundwater depth of 2.61 mbgs (Elev. 268.3 masl).

Based on the VA3 Design Concept Site Plan (February 2025), the underside of footing elevations ranges from 269.65 masl to 270.50 masl. Based on the DS Consultants boreholes, basements will be completed within the fill and low permeability glacial till soils. The basements are all above the underlying sand unit (about 1.2 to 1.7 m separation in the east to 3.4 to 3.7 m in the west). The basements are also above the maximum groundwater level measured (about 0.7 to 1.2 m separation in the east to 0.3 to 0.6 m in the west). The Town of Whitchurch-Stouffville generally requires 0.6 m separation between the basement footings and the shallow groundwater table. This is achieved in 92% of readings obtained during 2023. The remaining 8% occurred during a very short period in late April. Also, the low permeability glacial till soils at the surface will preclude any significant groundwater seepage. Given the low permeability of the soils and that the basements are

constructed above the maximum anticipated water table level, groundwater seepage into footing drains will not occur. It is our opinion that the separation intent for Whitchurch-Stouffville has been achieved.

6 Water Balance

It is currently proposed to develop the subject Site for a residential development consisting of three (3) buildings containing nine (9), three (3), and eight (8) townhouses, and a public laneway.

The following summarizes the currently proposed land coverage areas for the development:

Area Covered by Buildings	1,274 m^2	0.13 ha
Area Covered by Hard Surface Parking	1,543 m^2	0.15 ha
Area Covered by Landscape/Greenspace	817 m^2	0.08 ha
	3,634 m^2	0.36 ha

The above-noted proposed land coverage is based upon the Site Servicing Plan by Sabourin Kimble & Associates Ltd., dated June 2025 (Figure 4).

The surface deposits of low permeability soils at the Site allow only a low volume of groundwater recharge into the shallow groundwater system. It should be noted that the site is a very small infill, and the water balance would not be considered significant within the regional context. A water balance is normally conducted during the plan of subdivision stage which would be more meaningful with respect to the water balance and would allow for various stormwater management practices and low impact development techniques (LIDs) to be implemented.

Notwithstanding the above, a water balance for the development was prepared to assess the distribution of rainfall, runoff, and infiltration for existing (pre-development) conditions. The Thornthwaite method was used to calculate the relative budget between rainfall, evaporation, and evapotranspiration in a shallow soil zone. Based on this calculation, a conceptual model of ground water flow and water balance was developed and is attached as Table 1.

In summary, the total shallow groundwater pre-development recharge component for the site is approximately 124 mm/a. The post-development water balance was calculated and is appended as Table 1.

The water balance (pre- and post-development) is summarized below:

	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	3,158	2,406	-	451	301
Post-Development	3,158	541	245	101	2,271

The percentage of roof run-off (building additions roof) required to match pre-development infiltration is 35%.

Based on the low permeability of the soil and the small size of the development, engineered infiltration measures are not recommended. LIDs can be implemented where possible and it is not anticipated that the development will have an effect on the overall regional recharge and water balance.

7 Summary and Conclusions

Based on the review of the available site information, the hydrogeologic conditions of the Property is summarized as follows:

- The overburden in the area consists primarily of surficial deposits of glacial till. This glacial till is known as the Halton Till. Based on a review of published information, the site is located within the Markham-Pickering Till Plain.
- Based on a review of available information groundwater flow is anticipated to be to the south/southwest.
- The site is largely flat lying with a raised area along the east property boundary. The site is at an elevation of approximately 271 masl.
- No hydrogeologic features were noted on site.
- Due to the low permeability till across the site, surface water will tend to flow overland to the west and be directed to ditches and catch basins along the roadway.
- Beneath the soil deposits on the site is bedrock of the Whitby Formation consisting of grey and black shale.
- Two (2) boreholes were advanced by others on March 17, 2023. A monitoring well was installed in one of the boreholes (BH23-1). The boreholes were advanced to a depth of approximately 6.7 m.
- A monitoring well was installed in BH23-1 and screened between 4.6 and 6.1 mbgs (Elev. 266.3 to 264.8 masl). The monitoring well was installed to permit the installation of a datalogger at the site to measure groundwater levels. The data shows that the seasonally high-water levels were reached in April 2023, with a groundwater depth of 1.50 mbgs (Elev. 269.3 masl). The data shows that the seasonally low water levels were reached in August 2023, with a groundwater depth of 2.76 mbgs (Elev. 268.4 masl).
- The basements will all be completed within the fill and low permeability glacial till and above the maximum anticipated groundwater level. Basements drainage into footing drains are not anticipated. It is our opinion that the separation intent of Whitchurch-Stouffville for basements has been achieved.
- Groundwater controls are likely not required during the construction of the storm and sanitary sewers. The Sabourin Kimble & Associates Ltd dated June 12, 2025 labelled “PP” showed the lowest point of the sewers to be approximately 268.8 to 267.8, extending to the top of the underlying sand (elevation ranging 268.8 - 266.3 masl). Groundwater seepage can be limited by conducting excavation in stages.
- Engineered infiltration measures are not recommended due to the small size of the development and the low permeability of the surface soil.
- In general, site design measures should incorporate the following: carrying out excavation or trench backfilling operations with materials that are like the materials that have been excavated.
- The monitoring well installed in BH23-1 needs to be maintained in accordance with the Ontario Water Resources Act, O. Reg. 903, Wells. Once the well is no longer required for monitoring or sampling

purposes it will need to be appropriately decommissioned by a licensed well contractor as required by O. Reg. 903.

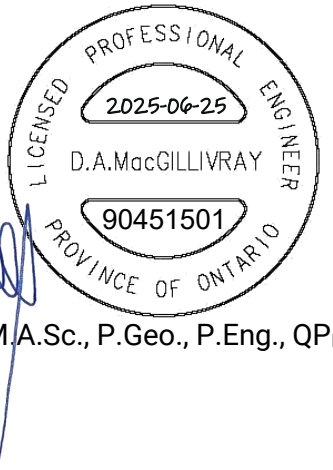
8 Closure

This report has been prepared for the use of Madori Ltd. This report is copyright of Grounded Engineering Inc.

We trust that the information contained in this letter is sufficient for your present requirements. If we can be of further assistance, please do not hesitate to contact us.

GROUNDED ENGINEERING

Kristen Shaver, M.Sc., P.Geo., QP_{ESA}
Project Geoscientist



David MacGillivray, M.A.Sc., P.Geo., P.Eng., QP_{RA-ESA}
Associate

FIGURES

GROUNDED ENGINEERING
49 MOBILE DRIVE, TORONTO, ONT., M4A 1H5
www.groundedeng.ca

LEGEND

APPROXIMATE PROPERTY BOUNDARY

Note

Reference

Google Earth, 2023

Project

ELM ROAD AND NINTH LINE, WHITCHURCH-STOUFFVILLE

Figure Title

SITE LOCATION PLAN

North

TRUE

PROJECT

Date

JUNE 2025

Scale

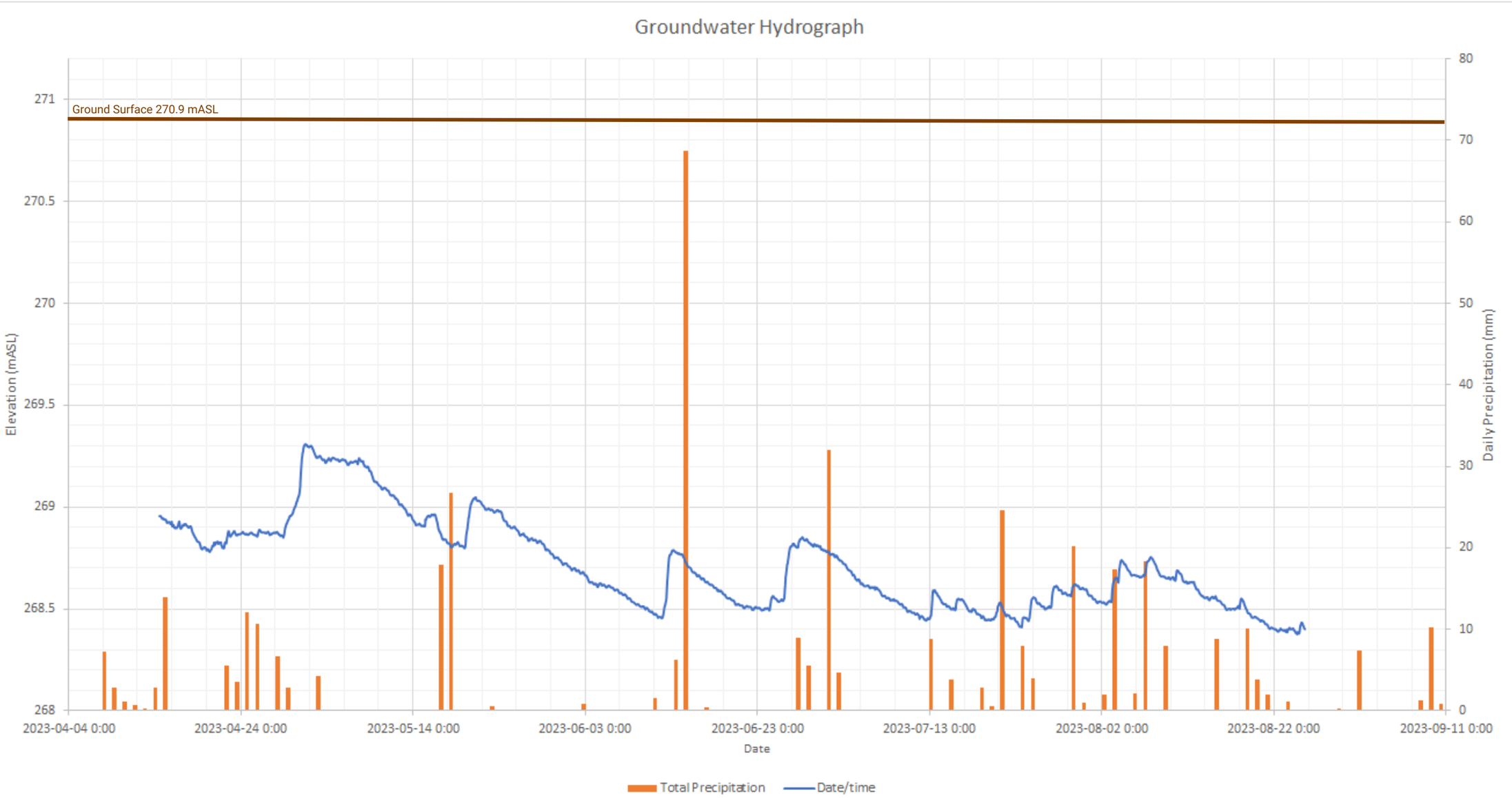
AS INDICATED

Job No

23-050

Figure No

FIGURE 1



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LEGEND

- Groundwater Level Elevations (masl)
- Precipitation (mm)

Note

Reference

Project

ELM ROAD AND NINTH LINE, WHITCHURCH-STOUFFVILLE

Figure Title

HYDROGRAPH

North

TRUE
PROJECT

Date

JUNE 2025

Scale

AS INDICATED

Job No

23-050

Figure No

FIGURE 2

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LEGEND

- PROPERTY BOUNDARY
- MONITORING WELL BY OTHERS
- BOREHOLE BY OTHERS

Note

Reference

Google Earth, 2023

Project

ELM ROAD AND NINTH LINE, WHITCHURCH-STOUFFVILLE

Figure Title

BOREHOLE LOCATION PLAN

North

TRUE
PROJECT

Date

JUNE 2025

Scale

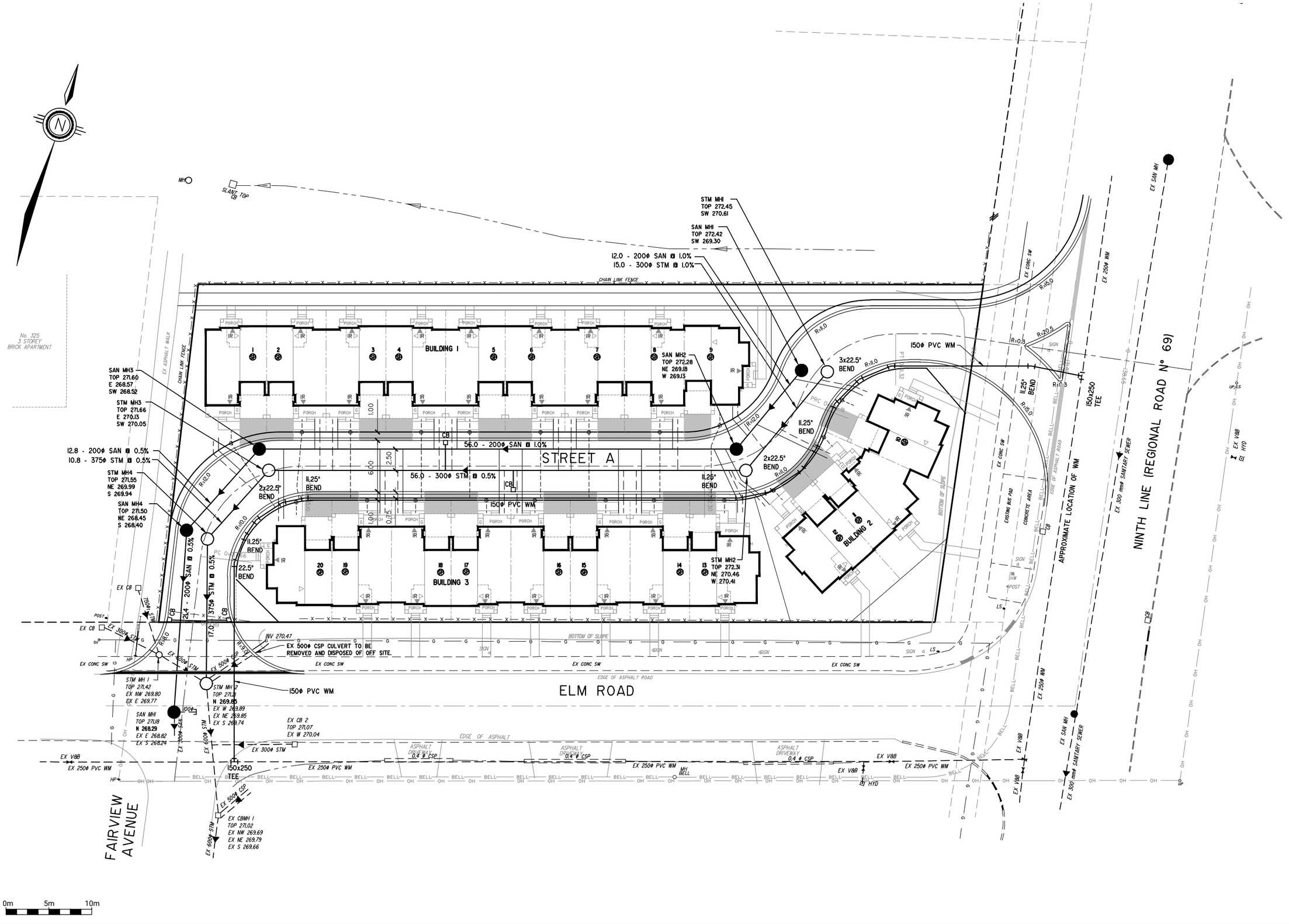
N.T.S

Job No

23-050

Figure No

FIGURE 3



GROUNDED ENGINEERING
49 MOBILE DRIVE, TORONTO, ONT., M4A 1H5
www.groundedeng.ca

LEGEND

Note

Reference

Sabourin Kimble & Associates Ltd., June 2025

Project

ELM ROAD AND NINTH LINE, WHITCHURCH-STOUFFVILLE

Figure Title

SITE SERVICING PLAN

North

TRUE

PROJECT

Date

JUNE 2025

Scale

AS INDICATED

Job No

23-050

Figure No

FIGURE 4

TABLE 1

Water Balance - Elm Road and Ninth Line

1. Climate Information

Climate data from TRCA Water Balance

Precipitation	869	mm/a	0.87	m/a *
Evapotranspiration	662	mm/a	0.66	m/a *
Water Surplus	207	mm/a	0.21	m/a

2. Infiltration Rates

Selected Approach **Table 2**

Table 2 Approach - Infiltration Factors

Topography - (Flat land, rolling land, hilly land)	0.3	*
Soil - (Tight impervious clay, etc...)	0.2	*
Cover - (Cultivated lands, woodland)	0.1	*
TOTAL:	0.6	

Infiltration (Infiltration Factor x Water Surplus)	124	mm/a	0.1242	m/a
Run-off (Water Surplus - Infiltration)	83	mm/a	0.0828	m/a

Table 3 Approach - Typical Recharge Rates

coarse sand and gravel	250+	mm/a *
fine to medium sand	200 - 250	mm/a *
silty sand to sandy silt	150 - 200	mm/a *
silt	125 - 150	mm/a *
clayey silt	100 - 125	mm/a *
clay	< 100	mm/a *

The site development area is underlain by clayey silt to silty sand.

Based on the above, the recharge rate is	150	mm/a	0.150	m/a
with runoff of	57	mm/a	0.057	m/a

3. Property Statistics - Pre-development

Area Covered by Existing Building	0	m^2	0.00	ha
Area Covered by Existing Hard Surface Paving	0	m^2	0.00	ha
Area Covered by Existing Landscaped area	3,634	m^2	0.36	ha
TOTAL	3,634	m^2	0.36	ha

4. Property Statistics - Post-development

Area Covered by Building with Additions	1,274	m^2	0.13	ha
Area Covered by Hard Surface Paving	1,543	m^2	0.15	ha
Area Covered by Landscaped Area	817	m^2	0.08	ha
TOTAL:	3,634	m^2	0.36	ha

*Based on published information

Water Balance - Elm Road and Ninth Line

5. Annual Water Balance Before Building Additions

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building (entire site)	0	0	-	-	-	0
Hard Surface Paving	0	0	-	-	-	0
Landscape Area (entire site)	3,634	3,158	2,406	-	451	301
TOTAL	**3,634**	**3,158**	**2,406**	**0**	**451**	**301**

6. Annual Water Balance After Building Additions

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building (entire site)	1,274	1,107	-	111	-	996
Hard Surface Paving	1,543	1,341	-	134	-	1,207
Landscape Area (entire site)	817	710	541	-	101	68
TOTAL	**3,634**	**3,158**	**541**	**245**	**101**	**2,271**

7. Comparison of Pre-Development (before buidling additions) and Post-Development (after building additions)

	Precipitation (m^3)	Evapotranspiration (m^3)	Evaporation (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	3,158	2,406	-	451	301
Post-Development	3,158	541	245	101	2,271

8. Infiltration of Roof Runoff

Volume of roof (building additions) run-off captured	996	m^3
Volume of post-development infiltration without roof run-off	101	m^3
Volume of roof run-off required to match pre-development infiltration rates	350	m^3
Percentage of roof run-off (building additions roof) required to match pre-development infiltration	35%	

APPENDIX A

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH23-1

PROJECT: Geotechnical Investigation
CLIENT: Fieldgate Developments
PROJECT LOCATION: Elm Road & 9th Line, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4870382.55 E 639726.12

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Mar-17-2023

REF. NO.: 23-072-100
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GR	SA	SI	CL
270.9								
270.8	**TOPSOIL:** 150mm							
0.2	**FILL:** silty sand, trace organics, trace gravel, brown, moist, loose	1	SS	5				
270.1								
269.9	**SILTY SAND:** trace clay, trace gravel, brown, very moist, compact	2	SS	17				
1.0					6	32	43	19
269.4	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, very stiff							
1.5		3	SS	18				
2	**SILTY SAND TILL:** some clay, some gravel, occasional cobble, brown, moist, compact				10	38	39	13
268.6								
2.3	**CLAYEY SILT:** trace sand, brown, moist, very stiff	4	SS	20				
3					3	78	19	
267.8								
3.1	**SANDY SILT:** some clay, trace gravel, brown, wet, dense	5	SS	42				
4					1	25	61	13
266.3								
4.6	**SAND:** trace silt, trace clay, trace gravel, brown, saturated, compact	6	SS	13				
5					1	90		(9)
6								
264.2		7	SS	12				
6.7	**END OF BOREHOLE:**							

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level(mbgl):
Mar. 22, 2023	1.95

W. L. 269.0 m
Mar 22, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT
SHEAR STRENGTH (kPa)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
$+^3$, $\times^3$: Numbers refer to Sensitivity
ε_f=3% Strain at Failure

DS SOIL LOG-2021-FINAL 23-072-100 GEO COPY.GPJ DS.GDT 23-3-29

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH23-2

PROJECT: Geotechnical Investigation
CLIENT: Fieldgate Developments
PROJECT LOCATION: Elm Road & 9th Line, Whitchurch-Stouffville, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4870382.64 E 639803.75

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: Mar-17-2023

REF. NO.: 23-072-100
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS / 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
271.1 / 0.0	**TOPSOIL:** 150mm						271					
270.9 / 0.2	**FILL:** silty sand, trace gravel, brown, moist, loose		1	SS	4							
270.3 / 0.8	**SILTY SAND TILL:** some clay, trace gravel, brown, moist to wet, loose to compact		2	SS	9		270					
1			3	SS	13							4 30 51 15
268.8 / 2.3	**SAND:** trace to some silt, brown, saturated, dense		4	SS	30		269					
3			5	SS	30		268					
4							267					
266.5 / 4.6	**SILTY SAND:** trace clay, brown, saturated, compact		6	SS	10							0 73 25 2
5							266					
6			7	SS	18		265					
264.4 / 6.7	**END OF BOREHOLE:** Notes: 1) Water observed at 2.3m during drilling.											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 23-072-100 GEO COPY.GPJ DS.GDT 23-3-29