June 29, 2026 **Report Number: 260052-H1**

Angil Development Group Inc.
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Attention: **Mr. Yuanda Li**

HYDROGEOLOGICAL INVESTIGATION REPORT FOR THE PROPOSED FOUR-STOREY SLAB-ON-GRADE RESIDENTIAL DEVELOPMENT AT 12717 NINTH LINE WHITCHURCH-STOUFFVILLE ONTARIO L4A 7X3

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1.0 INTRODUCTION

Canada Engineering Services Inc. (CESI), was authorized by Mr. Yuanda Li, of Angil Development Group Inc., to conduct a Hydrogeological Assessment for the proposed four-storey residential slab-on-grade building development located at 12717 Ninth Line, Whitchurch-Stouffville, Ontario. The information presented in this report, along with our desktop study, literature research, data from government entities' online database, Ontario Geological Survey database, and field work completed for this project, served as the primary resources utilized for conducting the assessment.

1.1 Scope of Work

1. Determine the geological history of the site, the hydrogeological setting of the site and surroundings, and the watershed of the site.

2. Investigate the soils profile, bedrock below the site, water table levels and flow characteristics, including water flow directions and hydraulic gradients at the site.

3. Research of water well records, of wells actively in use and that could be affected by de-watering at the site.

4. Site topography and surficial drainage.

5. Establish the nearest surface water bodies, such as rivers, creeks, or lakes present around the subject site and their approximate distance from the site.

6. The use of installed wells to conduct in-situ conductivity tests.

7. Water quality testing versus the Regional Municipality of York Bylaws & how to handle exceedances.

8. Estimation of temporary and permanent de-watering volumes and impact on surrounding properties and buildings.

9. Assess whether the volume of water to be extracted and discharged meets or exceeds the permitted volume by the Ministry of Environment, Conservation and Parks (MECP) and the Regional Municipality of York Sewer Use Bylaws, respectively.

10. Carry out and prepare the hydrogeology review in accordance with the following regulations:

1 The Ontario Water Resources Act;
2 Ontario Regulation 387/04;
3 Regional Municipality of York Sewer Use Bylaws.

11. Present the findings in the hydrogeological report.

1.2 Project Data

The proposed development consists of a four-storey slab-on-grade residential building at 12717 Ninth Line, Whitchurch-Stouffville, Ontario. Architectural drawings prepared by Z Square Consulting Inc., dated June 5, 2026, were used as reference documents for this assessment and are attached in Appendix A.

According to Architectural Drawings A1.1, A3.1, and A3.2, included in Appendix A, the proposed building footprint is 1,519.2 m², and the proposed ground floor Finished Floor Elevation (FFE) is 278.79 masl (meters above mean sea level).

It was assumed that the proposed footings will be placed at 1.5 m depth below the FFE of the proposed ground floor, corresponding to a underside of footing elevation of 277.29 masl (278.79 masl - 1.50 m). This elevation is also considered to represent the bottom of excavation.

To account for a potential allowance of 0.30 m for base heave, if encountered during excavation, the target temporary de-watering elevation was calculated to be 276.99 masl (277.29 masl - 0.30 m). For the permanent dewatering assessment, the groundwater control level has been assumed to be maintained at 0.30 m below the finished basement floor elevation. Based on the proposed ground floor FFE of 278.79 masl, the corresponding permanent groundwater control elevation is therefore calculated to be 278.49 masl (278.79 masl – 0.30 m).

Based on the available groundwater monitoring data, the highest recorded spring groundwater level was observed in monitoring wells BH1/MW1 and BH3/MW3 at an elevation of 276.65 masl on June 2, 2026.

As discussed above, the assumed temporary and permanent de-watering target elevations are 0.34 m (276.99 masl - 276.65 masl) and 1.84 m (278.49 - 276.65 masl) above the highest recorded groundwater level, respectively. Accordingly, both temporary and permanent de-watering are not anticipated to be required for the proposed development at the subject site.

1.3 Site Description

The site is located along Ninth Line, north of the roundabout at Bayberry Street and Baker Hill Boulevard. The property is bounded by Ninth Line to the west, while residential developments are present to the south, beyond which Bayberry Street is located. The east and north boundaries of the site adjoin vacant lands, which appear to have been previously or currently used for agricultural purposes. The surrounding area is generally characterized by an established residential community.

At the time of the site investigation, an existing residential structure was observed within the property. Aside from the building footprint, the majority of the site consisted of grassed or open green space. The site is generally flat, with a very gentle slope toward the west.

The proposed development consists of a four-storey slab-on-grade residential building. The existing structure on the site is to be demolished to facilitate the proposed works. It is understood that the proposed building footprint will occupy a significant portion of the overall property area.

1.4 Property Ownership

CESI, was authorized by Mr. Yuanda Li, of Angil Development Group Inc., to conduct a Hydrogeological Assessment.

The contact information of Mr. Yuanda Li is as follows:

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1.5 List of Reports Reviewed

1. A geotechnical report from CESI dated June 24, 2026; “Geotechnical investigation update for proposed four-storey slab-on-grade residential development at 12717 Ninth Line, Stouffville, Ontario, Report Number: 260052-G1”.

2.0 HYDROGEOLOGICAL DATA

2.1 Physical Setting

According to the Ontario Geological Survey, the site area lies in the South Slope physiographic region (Chapman, L.J. and Putnam, D.F., 2007. Physiography of Southern Ontario; Ontario Geological Survey). The physiographic landforms of the site area consist of Drumlinized Till Plains. The physiographic region and landforms of the site are shown in Drawing Numbers 3 and 4 in Appendix B.

2.2 Water Bodies, Aquifers, Aquitards and Areas of Natural Significance

The major surface water features in the vicinity of the project site include several local and regional water bodies such as ponds, reservoirs and wetlands. Local streams are present within approximately 0.5 km of the site, primarily to the north and east. The Stouffville Reservoir is located approximately 0.55 km southeast of the site, while Madori Park Pond is situated approximately 1.2 km southwest of the site. Musselman's Lake lies approximately 5.5 km north of the site. On a broader regional scale, Lake Ontario is located more than 25 km to the south. Based on the regional topography and hydrogeological setting, the general groundwater flow direction is interpreted to be southward, toward Lake Ontario.The Surface Drainage Pattern of the Site and Surrounding is shown in Drawing 5 in Appendix B.

According to maps published by the Ontario Ministry of the Environment, Conservation and Parks (MECP), the site is located within the jurisdiction of the Toronto and Region Conservation Authority (TRCA) and also falls inside the Toronto Source Protection Area (TSPA). The site is not located within any regulated areas under the TRCA. It is also not located within an Intake Protection Zone (IPZ) and a Highly Vulnerable Aquifer (HVA) area. However, the site is situated within a Significant Groundwater Recharge Area (SGRA) and a Wellhead Protection Area (WHPA) Moderate Sensitivity Zone. See Drawing Numbers 6, 7, and 8 in Appendix B for further details.

A shallow aquifer was encountered during drilling at the site within a depth range of approximately 4.5 m to 6.5 m below existing ground surface. The aquifer was observed within a silt and fine sand layer underlying the till layer encountered in all five boreholes.

2.3 Geology of Site and Surrounding

According to the Ontario Geological Survey (OGS Earth), the bedrock at the site consists of the Georgian Bay, Blue Mountain and Billings Formation. The lithology of this unit includes limestone, shale, dolostone, and siltstone (Bedrock Geology of Ontario, OGS Earth). Refer to Drawing Number 9 in Appendix B.

The Quaternary geology of the site, as published by OGS Earth, consists of Halton Till. Refer to Drawing Number 10 in Appendix B. (Quaternary Geology of Ontario; OGS Earth).

The surficial geology of the site, as obtained from OGS Earth, is classified as till, consisting of clay to silt textured till derived from glaciolacustrine deposits or shale. Refer to Drawing Number 11 in Appendix B (Surficial Geology of Southern Ontario; OGS Earth).

2.4 Topography and Groundwater Flow Direction

The site's topography is generally flat, with a gentle slope toward the west. The groundwater flow direction, as obtained from MECP well records and the Oak Ridges Moraine Groundwater Program's Groundwater Contour, indicates that the general groundwater flow at the site and surrounding areas is toward the south and southwest; refer to Drawing Number 12 in Appendix B.

An analysis of groundwater flow directions, based on stabilized groundwater level readings recorded from the on-site monitoring wells, suggests that the general groundwater flow is toward the south. The hydraulic gradient was calculated to be 1.55 %. Refer to Drawing Number 13 in Appendix B.

2.5 Site Specific Geology

Detailed soil descriptions from CESI field investigations are presented in Borehole Log Numbers 1–5, along with a Grain Size Graph (Figure 1) in Appendix B. The locations the boreholes and monitoring wells are shown in Drawing Number 2 in Appendix B. The terms and symbols used in the borehole descriptions are also shown in Appendix B.

A brief description of the soil profiles encountered during the field borehole investigation is as follows:

Topsoil

A layer of grey to brown silty sand, with some organics was found at the surfaces of all the boreholes. This layer was moist, in a compact state and was generally 300 mm thick.

Silty Sand Fill

A layer of silty sand fill was found below the topsoil layer in all the boreholes. This layer was grey to brown, was moist and in a compact state down to depths of 1.1 m, 0.6 m, 0.8 m, 0.6 m and 0.6 m in Borehole Numbers 1, 2, 3, 4 and 5 respectively.

Fine Sand

A layer of grey fine sand with trace silt was found immediately below the fill layer in Borehole Numbers 2, 3, 4 and 5. This layer was grey in colour, was moist and in a compact state down to depths between 0.9 m to 1.1 m.

Silt and Sand Till

A layer of compact to dense silt and sand till was found immediately below the fine sand in Borehole Numbers 2, 3, 4 and 5 and below the fill layer in Borehole Number 1. It was moist and mottled grey-brown in colour and contained a trace of clay and gravel down to a depth of 4.6 m, 4.6 m, 4.7 m, 4.6 m, and 4.9 m in Borehole Numbers 1, 2, 3, 4 and 5 respectively. Pocket penetrometer readings taken within this layer were approximately 150 kPa to 450 kPa.

Silt and Fine Sand

A layer of silt and fine sand, trace sand was found immediately below the silt and sand till layer in all the boreholes. It was moist to wet, grey in colour and in a compact to dense state. This layer extended down to the bottoms of all the boreholes at a depth of 6.5 m.

3.0 HYDROGEOLOGICAL SITE INVESTIGATION

3.1 Monitoring Well Installation

Monitoring wells were installed at the bottom of Borehole Numbers 1, 3 and 5, each consisting of a 3.1-meter screen at the bottom of the well with a 50-mm internal diameter. The screens were connected to PVC pipes, also with an internal diameter of 50 mm. The wells were backfilled with sand up to a depth of 3.6 meters above the base of the screens, after which they were filled with bentonite pellets. All three monitoring wells were installed as monument-type protective casings for future groundwater level monitoring.

The locations of the wells are shown on Drawing Number 2 in Appendix B, and their surface elevations are provided in Table Number 1. All borehole surface elevations were determined based on a site survey conducted by CESI staff during the drilling program.

The well identities, installation dates, surface elevations, depths, base elevations, screen lengths, and the lengths of sand backfill (from the bases of the screens to just above the tops of the screens) are summarized in Table Number 1 below:

Table Number 1

Monitoring Well ID	Date of Installation	Surface Elevation (masl)	Depth of Borehole (m)	Elevation of Base of Well (masl)	Length of Well Screen (m)	Length of Sand Backfill (m)
BH1/MW1	June 4, 2020	278.65	6.00	272.65	3.1	3.6
BH3/MW3	June 5, 2020	279.35	6.00	273.35	3.1	3.6
BH5/MW5	June 4, 2020	279.82	6.00	273.82	3.1	3.6

3.2 Dates of Water Level Readings, Depths and Elevations

Water level readings were recorded on the dates listed below, and the corresponding depths and elevations are presented in Table 2. A total of nine sets of groundwater level readings were collected from the installed monitoring wells, including six sets collected between July and September 2020 and three additional sets collected during the spring of 2026.

Table Number 2

Borehole/ Well No.	Borehole Surface Elev. (masl)	Date of Reading	Depth of Groundwater Level (m)	Groundwater Elevation (masl)	Remarks
BH1/MW1	278.65	Jul 7, 2020	2.80	275.85	Slug Test Performed on July 20, 2020 Highest Groundwater Readings Elevation is 276.65 masl
		Jul 20, 2020	3.48	275.17	
		Aug 4, 2020	2.61	276.04	
		Aug 18, 2020	2.65	276.00	
		Aug 31, 2020	3.52	275.13	
		Sep 15, 2020	3.41	275.24	
		Jun 2, 2026	**2.00**	**276.65**	
		Jun 17, 2026	2.26	276.39	
		Jun 30, 2026	2.26	276.39	
BH3/MW3	279.35	Jul 7, 2020	3.76	275.59	Slug Test Performed on July 20, 2020 Highest Groundwater Readings Elevation is 276.35 masl
		Jul 20, 2020	4.36	274.99	
		Aug 4, 2020	3.86	275.49	
		Aug 18, 2020	3.81	275.54	
		Aug 31, 2020	4.50	274.85	
		Sep 15, 2020	4.45	274.90	
		Jun 2, 2026	**3.00**	**276.35**	
		Jun 17, 2026	3.14	276.21	
		Jun 30, 2026	3.43	275.92	
BH5/MW5	279.82	Jul 7, 2020	4.00	275.82	Slug Test Performed on July 20, 2020 Highest Groundwater Readings Elevation is 276.65 masl
		Jul 20, 2020	4.70	275.12	
		Aug 4, 2020	4.14	275.68	
		Aug 18, 2020	4.17	275.65	
		Aug 31, 2020	4.87	274.95	
		Sep 15, 2020	4.82	275.00	
		Jun 2, 2026	**3.17**	**276.65**	
		Jun 17, 2026	3.40	276.42	
		Jun 30, 2026	3.53	276.29	

3.3 Groundwater Sampling

One groundwater sample was collected on July 7, 2020, using a new dedicated low density polyethylene bailer and a new pair of nitrile powder-free gloves was worn during the sampling operations. The sample was placed in labeled coloured jars and vials of various sizes that were supplied by the laboratory and stored within individual bubble wrap bags in a cooler filled with ice packs to maintain a temperature of approximately 4ºC. The sample was transported and temporarily stored in our laboratory and then submitted to Eurofin Laboratories in Ottawa, Ontario, within 7 days of collection.

They were kept in a cooler or refrigerator, prior to shipment to the laboratory. Due diligence was exercised in observing all technical procedures in putting down monitoring wells and sealing them in order to minimize any potential cross-contamination or surface contamination, while following the Ontario Water Resources Act. When taking water from the ground or discharging water to sewers, Ontario Regulation 387/04 was followed.

3.4 Groundwater Testing

The water sample was tested at Eurofins Laboratories against the Regional Municipality of York, Sanitary Sewers Use Bylaw criteria. Eurofins Laboratories is a Canadian Association for Laboratory Accreditation (CALA) Accredited Laboratory in accordance with ISO/IEC 17025:2020 - "General Requirements for the Competence of Testing and Calibration Laboratories" for analysis of all parameters for the Regional Municipality of York Sewer Use Bylaw testing of water.

The test results indicated one exceedance of the Sanitary Sewer Bylaw limits in the water sample. Laboratory results from Eurofins are included in Appendix D. A summary of the exceedance is provided in the table below.

Table Number 3

Analyte	Unit	Guideline	Test Result
Total Suspended Solids (TSS)	mg/L	MAC 350 (Sanitary Sewer)	1390
Note: MAC - Maximum Acceptable Concentration.			

Exceedance of Total Suspended Solids (TSS) can be effectively managed and reduced to within acceptable limits through the use of settling basins, filtration systems, flocculation, and geotextile de-watering bags.

3.5 Surrounding Well Records

A total of 52 well records were identified within a 500-meter radius of the site, based on the well database from the Oak Ridges Moraine Groundwater Program (ORMGP). Detailed information, including well IDs, UTM coordinates, completion dates, status, purpose, depths, and ground elevations, is provided in Table 5 below.

Of the identified wells, two were primarily used for engineering purposes, including monitoring and observation. 5 wells served industrial purposes, 18 wells were used for domestic water supply, one well was used for municipal exploration, and the status of the remaining 26 wells is unknown.

Since no de-watering is required as discussed in section 1.2 of this report, no negative impacts on any surrounding wells are anticipated at the subject property.

Table Number 5

Well ID	UTM X	UTM Y	Drill Date	Status	Purpose		BH Depth (m)	Ground Elevation (masl)
7266052	640060	4871681	3/3/16	Monitoring	Engineering	Monitoring Well	9.14	279.78
7372720	639629	4871517	10/22/20	Unknown	Engineering	Monitoring Well	7.62	276.30
7143710	639863	4870938	4/6/10	Abandoned	Industrial	Other - Industrial	26.52	275.15
7262606	640318	4870844	7/24/13	Unknown	Industrial	Other - Industrial	n/a	275.38
7251979	640338	4870861	10/27/15	Unknown	Industrial	Other - Industrial	n/a	272.54
7222216	639231	4870802	6/6/14	Unknown	Industrial	Other - Industrial	n/a	269.30
7279205	638666	4871179	11/18/16	Unknown	Industrial	Other - Industrial	n/a	270.13
7104492	640323	4871828	1/14/08	Active	Unknown	Unknown	4.57	282.12
7123843	640304	4871842	5/20/09	Active	Unknown	Unknown	4.36	281.98
1916441	640000	4871180	5/1/03	Abandoned	Unknown	Unknown	n/a	280.07
7394556	639845	4871430	6/29/21	Decommissioned	Unknown	Unknown	9.10	278.63
7394584	639946	4871440	6/29/21	Decommissioned	Unknown	Unknown	8.20	280.00
7394580	639976	4871428	6/28/21	Decommissioned	Unknown	Unknown	8.20	280.00
7394577	639687	4871387	7/6/21	Decommissioned	Unknown	Unknown	4.60	276.46
7394583	639892	4871440	6/29/21	Decommissioned	Unknown	Unknown	7.60	278.63
7394582	639836	4871377	6/29/21	Decommissioned	Unknown	Unknown	7.60	278.75

Well ID	UTM X	UTM Y	Drill Date	Status	Purpose		BH Depth (m)	Ground Elevation (masl)
7394585	639728	4871374	7/6/21	Decommissioned	Unknown	Unknown	4.60	276.98
7394581	639752	4871275	7/6/21	Decommissioned	Unknown	Unknown	4.30	277.60
7394578	639814	4871324	7/6/21	Decommissioned	Unknown	Unknown	4.20	278.75
7394555	639867	4871317	6/29/21	Decommissioned	Unknown	Unknown	4.30	278.75
7394579	639959	4871489	7/6/21	Decommissioned	Unknown	Unknown	7.30	280.00
7400373	639634	4871171	6/16/21	Unknown	Unknown	Unknown	n/a	275.52
7376558	639942	4871625	5/25/20	Unknown	Unknown	Unknown	n/a	280.20
7439527	639635	4871518	8/20/22	Unknown	Unknown	Unknown	n/a	275.77
7446794	639203	4871191	2/21/23	Unknown	Unknown	Unknown	n/a	271.32
7411892	640119	4870684	10/19/21	Unknown	Unknown	Unknown	4.60	276.00
7446793	639231	4871163	2/22/23	Unknown	Unknown	Unknown	n/a	270.51
7370386	639703	4871213	6/4/20	Unknown	Unknown	Unknown	n/a	277.60
7472967	639231	4871163	2/9/24	Unknown	Unknown	Unknown	n/a	270.51
7446791	639230	4871165	2/22/23	Unknown	Unknown	Unknown	n/a	270.51
7475768	638751	4870837	3/19/24	Unknown	Unknown	Unknown	n/a	270.00
7453932	638751	4870837	1/25/23	Unknown	Unknown	Unknown	n/a	270.00
7451411	639233	4871160	3/17/23	Unknown	Unknown	Unknown	n/a	270.45
6909703	639455	4871513	6/14/69	Active	Water Supply	Domestic	10.06	275.67
6908379	639965	4871082	11/23/62	Active	Water Supply	Domestic	7.32	279.41
6909088	639605	4871453	1/27/69	Active	Water Supply	Domestic	24.38	276.93
6920304	639005	4871505	3/22/89	Active	Water Supply	Domestic	18.29	276.07
6919227	639744	4870952	8/10/87	Active	Water Supply	Domestic	21.64	274.74
6908195	638951	4871446	4/22/61	Active	Water Supply	Domestic	16.46	275.26
6914727	639195	4871403	10/23/78	Active	Water Supply	Domestic	17.07	274.34
6909683	639455	4871513	11/11/69	Active	Water Supply	Domestic	12.19	275.67
7208232	639012	4871483	8/15/13	Active	Water Supply	Domestic	18.29	275.80
6926750	638668	4871065	12/3/02	Active	Water Supply	Domestic	14.63	270.18
6915714	639855	4871023	7/11/80	Active	Water Supply	Domestic	32.00	277.10
6914075	639215	4871183	6/15/77	Active	Water Supply	Domestic	22.86	271.06
6908188	639554	4871587	2/3/54	Active	Water Supply	Domestic	14.94	276.51
6926748	638668	4871065	11/26/02	Active	Water Supply	Domestic	12.50	270.18
6920303	639005	4871502	3/23/89	Active	Water Supply	Domestic	18.29	276.07
6908191	638778	4871433	4/20/55	Active	Water Supply	Domestic	18.29	273.82
6908185	639468	4870569	9/22/61	Active	Water Supply	Domestic	15.24	270.90
6908378	640043	4871161	3/13/61	Active	Water Supply	Domestic	6.71	279.57
6920071	639950	4871828	9/10/87	Abandoned	Water Supply	Municipal Exploration	139.60	282.32

4.0 DE-WATERING ANALYSIS

As discussed in section 1.2 of this report, the assumed temporary and permanent de-watering target elevations are 0.34 m (276.99 masl - 276.65 masl) and 1.84 m (278.49 - 276.65 masl) above the highest recorded groundwater level, respectively. Therefore, both temporary and permanent de-watering are not anticipated to be required for the proposed development at the subject site.

4.1 Determination of Hydraulic Conductivity

As part of the Hydrogeological Investigation, three slug tests were conducted to determine the hydraulic conductivity of groundwater. A summary of the slug test calculations and their graphical representation are illustrated in Appendix C.

Rising head Slug Tests were carried out for all the slug tests conducted on-site. A known volume of water was bailed out of each well and the rate of rise in water level was recorded.

The collected data were analyzed using the Hvorslev method to calculate hydraulic conductivity. The resulting hydraulic conductivities for the monitoring wells were as follows:

Borehole / Monitoring BH1/MW1:	2.4×10^{-7} m/s
Borehole / Monitoring BH3/MW3:	9.8×10^{-7} m/s
Borehole / Monitoring BH5/MW5:	5.2×10^{-7} m/s

The maximum hydraulic conductivity measured on-site, from field slug tests conducted in all monitoring wells was 9.8×10^{-7} m/s, indicating a very low soil permeability. See all slug test calculations in Appendix C.

4.2 Permit to Take Water

A Permit to Take Water (PTTW) from the Ministry of the Environment, Conservation and Parks (MECP) is required if the water extraction rate ranges between 50 m^3/day and 400 m^3/day. Since no de-watering is required at the subject site, a PTTW will not be required.

5.0 CONCLUSIONS AND RECOMMENDATIONS

According to the desktop study, the site is located within the jurisdiction of the Toronto and Region Conservation Authority and also falls inside the Toronto Source Protection Area. The site is not located within any regulated areas under the TRCA. It is also not located within an Intake Protection Zone (IPZ) and a Highly Vulnerable Aquifer (HVA) area. However, the site is situated within a Significant Groundwater Recharge Area (SGRA) and a Wellhead Protection Area (WHPA) Moderate Sensitivity Zone.

As the highest recorded spring groundwater elevation is lower than the target temporary and permanent de-watering elevation, both temporary and permanent de-watering are not required at the subject site. Since no de-watering is anticipated at the subject site, no negative impacts on any surrounding wells and properties are anticipated.

The groundwater sample collected for testing indicated one exceedance of the Sanitary Sewer Bylaw limits, specifically for Total Suspended Solids (TSS). Exceedance of TSS can be effectively managed and reduced to within acceptable limits through the use of settling basins, filtration systems, flocculation, and geotextile de-watering bags before discharging.

As no de-watering is required at the subjects site, a Permit to Take Water (PTTW) will not be required.

6.0 REFERENCES

Ontario Ministry of Northern Development and Mines, Mines and Minerals Division, Ontario Geology Survey, Bedrock Geology of Southern Ontario via OGSEarth, August 2012.

Ontario Ministry of Northern Development and Mines, Mines and Minerals Division, Ontario Geology Survey, Physiography of Southern Ontario via OGSEarth, August 2012.

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Ministry of Environment Records available through Freedom of Information.

Google Earth Maps (2024)

7.0 GENERAL COMMENTS

It is possible that the soil and water conditions between boreholes are quite different from those found at the borehole locations. Any interpretation of data for areas between boreholes should be viewed with this in mind. The accuracy of our report is limited to the findings at specific borehole locations.

The inspections and reviews of data described above were carried out based on the terms of reference as outlined earlier in this report. It was prepared specifically for the use of the owner of the proposed Four-Storey Slab-on-Grade residential development for the site located at 12717 Ninth Line, Whitchurch-Stouffville, Ontario

In the course of carrying out this Hydrogeological Assessment, the possibility of obtaining imprecise, partial or incorrect data cannot be totally eliminated but only reduced to an acceptable level. This report was prepared with due care and diligence, and is based on information gathered and professional judgement of the best information available at the time of the investigation.

The Consultant makes no warranty, either expressed or implied, as to the Consultant's findings, recommendations, plans, specifications, or professional advice. The Consultant has endeavored to perform its services in accordance with generally accepted standards of practice in effect at the time of performance.

The Client recognizes that neither the Consultant nor any of the Consultant's sub-consultants or subcontractors owes any fiduciary responsibility to the Client.

This report may not be used by any third party, other than the client to whom it is addressed, Angil Development Group Inc., without written consent. Canada Engineering Services Incorporated is not responsible for any damages or losses incurred by any other third party arising from the use of this report or for any decisions or actions by any other third party based on this report.

This report was prepared from limited data. Should there be any design or construction changes that would require a review of the hydrogeological analyses or any questions regarding the hydrogeological aspects of any codes, standards or regulations, then this office should be consulted. This may necessitate a supplementary investigation and report for our recommendations to be reliable.

We trust that this report meets your requirements. Please call the undersigned at 647 829 6151 if you have any questions.

Sincerely,
CANADA ENGINEERING SERVICES INC.

Jay Lad, M. Sc., P.Eng.
Project Engineer



Ram Jagdat. P. Eng., QP.
Consulting Engineer.
Principal

email: ram@cesi.ca
cell: 647 829 6151

APPENDIX A





12727 NINTH LINE DEVELOPMENT

ARCHITECTURAL DRAWINGS	
SHEET NO.	SHEET NAME
A0.1	COVER PAGE
A1.1	SITE PLAN
A1.2	EXISITING & DEMOLITION PLAN
A2.1	SECOND FLOOR PLAN
A2.2	THIRD FLOOR PLAN
A2.3	FOURTH FLOOR PLAN
A2.4	MECH. PENTHOUSE LEVEL PLAN
A2.5	ROOF PLAN
A3.1	WEST AND EAST ELEVATIONS
A3.2	NORTH AND SOUTH ELEVATION
A4.1	AXO (SOUTH/WEST)
A4.2	AXO (NORTH/WEST)

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7. DO NOT SCALE DRAWINGS.

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12727 NINTH LINE,
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ON L4A 2Z7

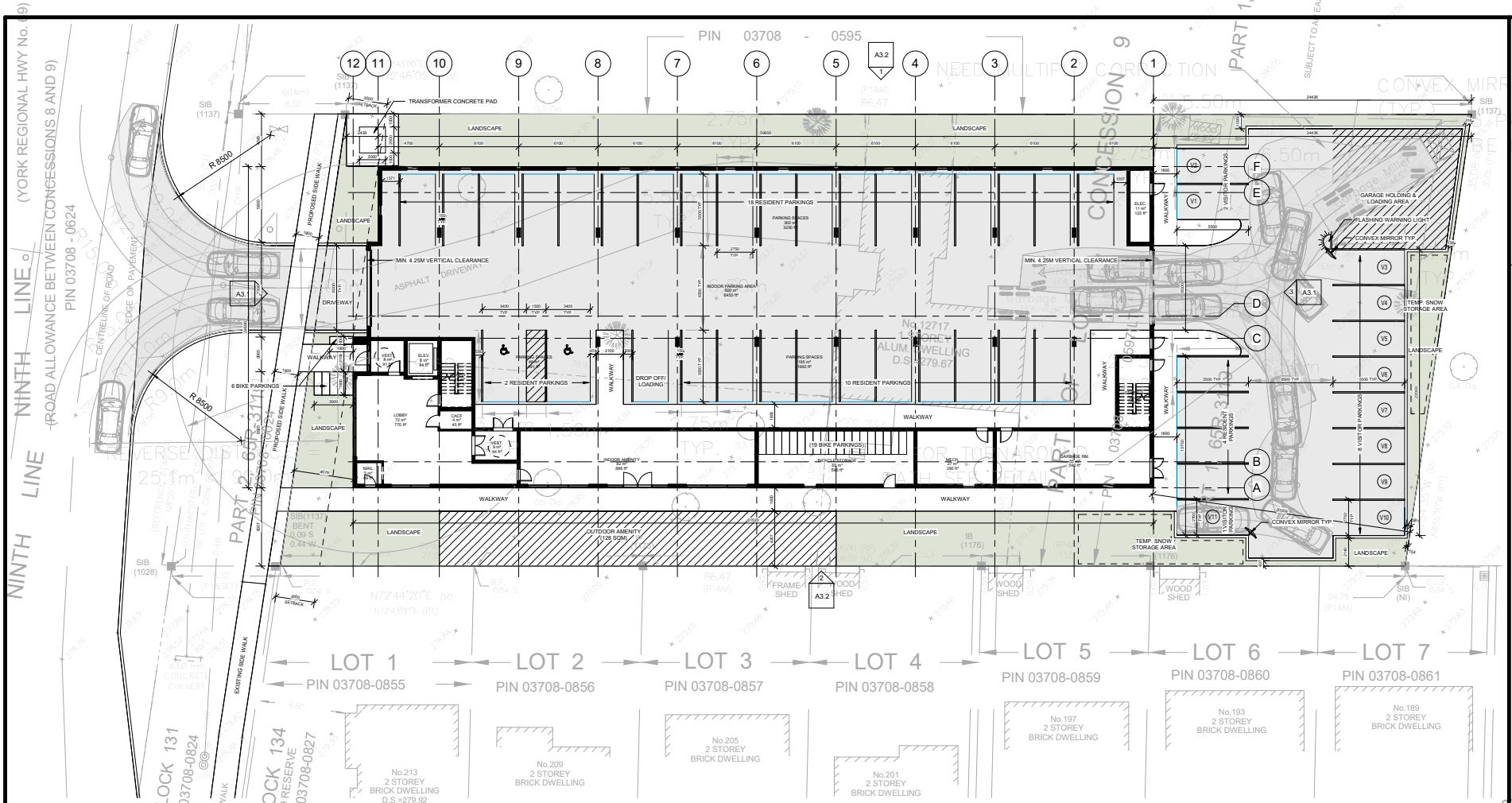
26019 PROJECT SCALE
MDZ DRAWN REVIEWED

COVER PAGE

A0.1

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1 SITE PLAN
1 : 150

SITE STATISTICS		
SITE AREA	3,002.9 SQM	
BUILDING AREA	1,519.2 SQM	
BUILDING COVERAGE	50.6%	
GROSS FLOOR AREA	4,991.59 SQM	
FLOOR AREA INDEX (DENSITY)	1.66 (4,991.59 SQM OUT OF 3,002.9 SQM)	
TOTAL LEASABLE AREA	3,950.81 SQM	
INDOOR AMENITY AREA	82 SQM	
OUTDOOR AMENITY AREA	128 SQM	
BUILDING HEIGHT	14.13M (NOT INCLUDE MPH)	
NUMBER OF STOREY	4	
NUMBER OF DWELLING UNIT	40	
	NUMBER OF UNIT	AVERAGE UNIT AREA
1 BEDROOM UNIT 2 BEDROOM UNIT 3 BEDROOM UNIT	4 (10%) 16 (40%) 20 (50%)	58.8 SQM 76.14 SQM 129.67 SQM
NUMBER OF BARRIER-FREE UNIT	REQUIRED UNIT #	PROPOSED UNIT #
1 BEDROOM UNIT 2 BEDROOM UNIT 3 BEDROOM UNIT	1 (15% MIN.) 3 (15% MIN.) 3 (15% MIN.)	1 (25%) 3 (18.75%) 3 (15%)
NUMBER OF LOADING SPACE	1	
TOTAL PARKING SPACE	47	
TOTAL BICYCLE PARKING SPACE	25	
OUTDOOR PARKINGS AND DRIVEWAY AREA	603.08 SQM (20.08% OF LOT AREA)	
HARD LANDSCAPE AREA	222.5 SQM (7.41% OF LOT AREA)	
SOFT LANDSCAPE AREA	548.64 SQM (18.27% OF LOT AREA)	
ROOFTOP AREA COVERED BY MECH. PENTHOUSE	16.01% (201.37 SQM OUT OF 1258.12 SQM)	

PARKING		
UNDERGROUND PAKING		0
GROUND/SURFACE		46
	REQUIRED	PROPOSED
RESIDENT	50 (1.25 PER UNIT)	35
VISITOR	11 (0.25 PER UNIT)	11
BARRIER FREE	3 (4% OF TOTAL REQ. PARKING)	2
TOTAL		46
RATIO	1.5 PER UNIT	1.15 PER UNIT

GROSS FLOOR AREA		
Level	Area	Area (sf)
GROUND FLOOR	834.27 m²	8979.98 ft²
SECOND FLOOR	1460.66 m²	15722.43 ft²
THIRD FLOOR	1460.66 m²	15722.43 ft²
FOURTH FLOOR	1236.00 m²	13304.23 ft²
Total Area	4991.59 m²	53729.07 ft²

LEASEABLE AREA		
Level	Area	Area (sf)
SECOND FLOOR	1357.40 m²	14610.95 ft²
THIRD FLOOR	1357.40 m²	14610.95 ft²
FOURTH FLOOR	1236.00 m²	13304.23 ft²
Total Area	3950.81 m²	42526.13 ft²

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7. DO NOT SCALE DRAWINGS.

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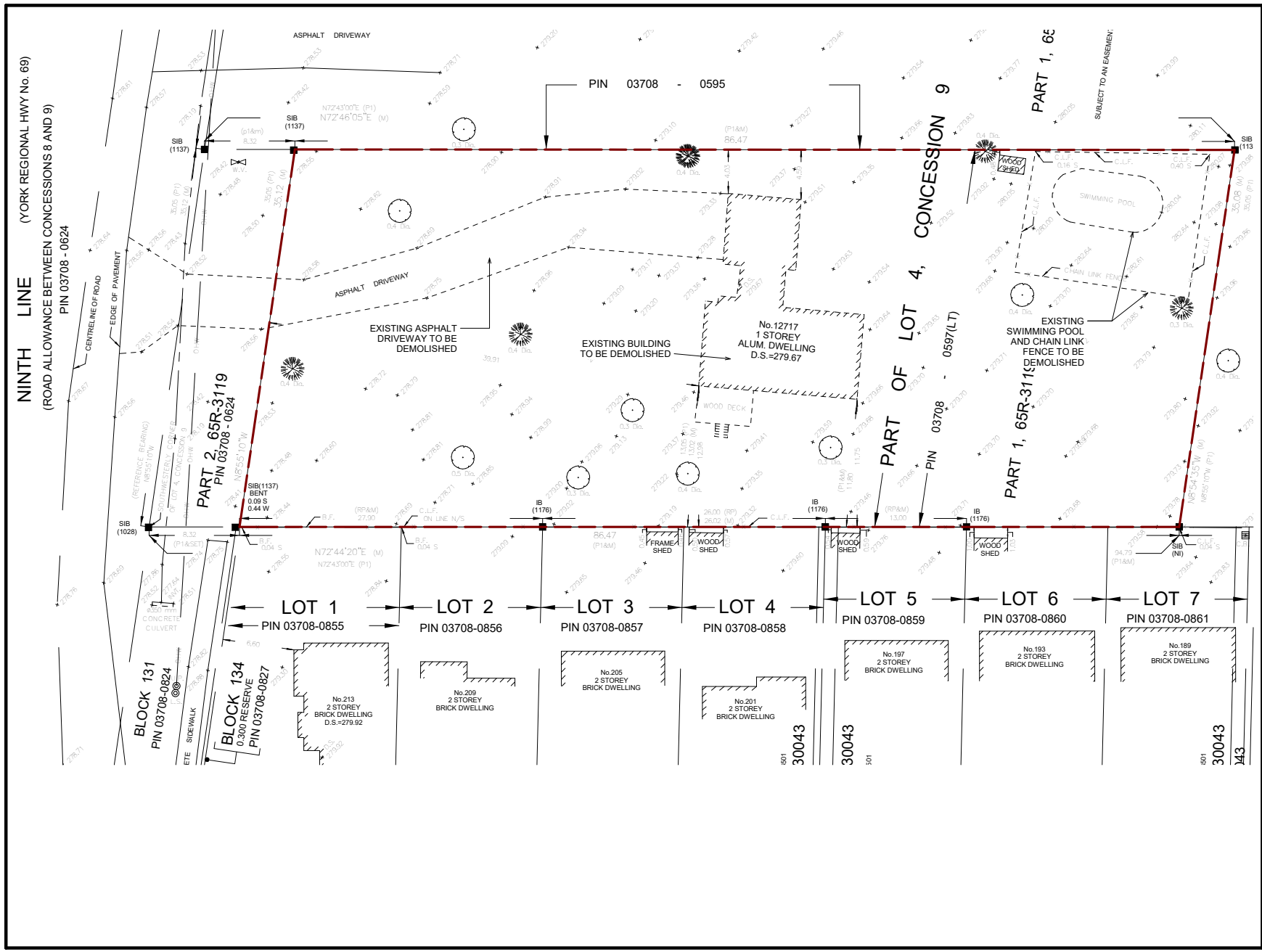
12717 NINTH LINE DEVELOPMENT
12717 NINTH LINE, WHITCHURCH-STOUFFVILLE, ON L4A 2Z7

26019	MDZ	
PROJECT SCALE	DRAWN	REVIEWED

SITE PLAN
A1.1

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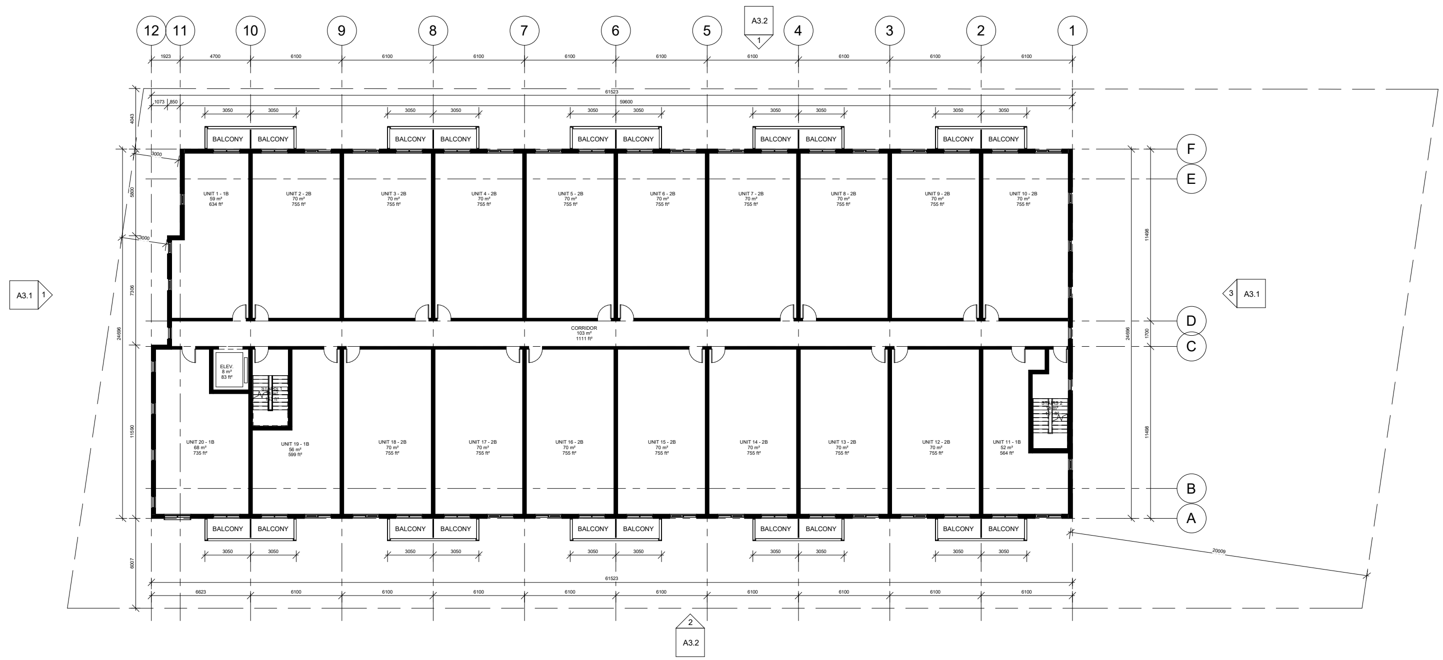
26019 — PROJECT SCALE
MDZ — DRAWN / REVIEWED

EXISITING & DEMOLITION PLAN

A1.2

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1 SECOND FLOOR PLAN
1 : 150

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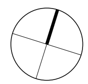
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26019 PROJECT | SCALE | DRAWN | MDZ REVIEWED

SECOND FLOOR PLAN

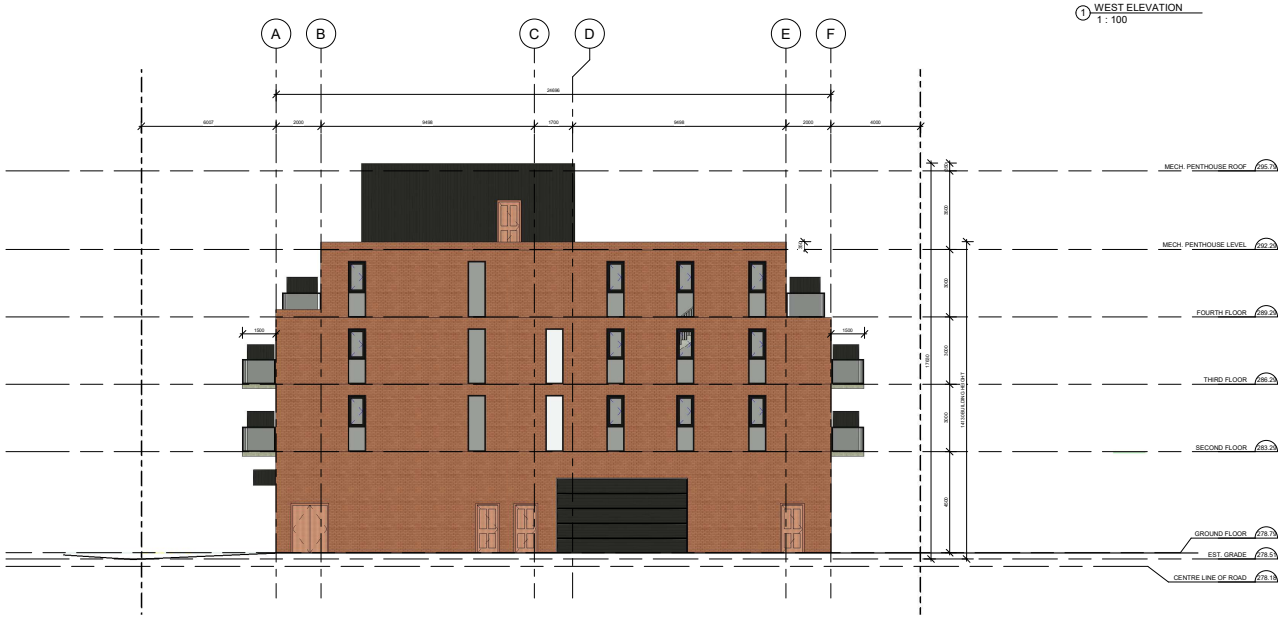
A2.1

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1 WEST ELEVATION
1 : 100



3 EAST ELEVATION
1 : 100

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26019 1 : 100 MDZ
PROJECT SCALE DRAWN REVIEWED

WEST AND EAST ELEVATIONS

A3.1

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1 NORTH ELEVATION
1 : 100



2 SOUTH ELEVATION
1 : 100

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26019	1 : 100	MDZ
PROJECT	SCALE	DRAWN REVIEWED

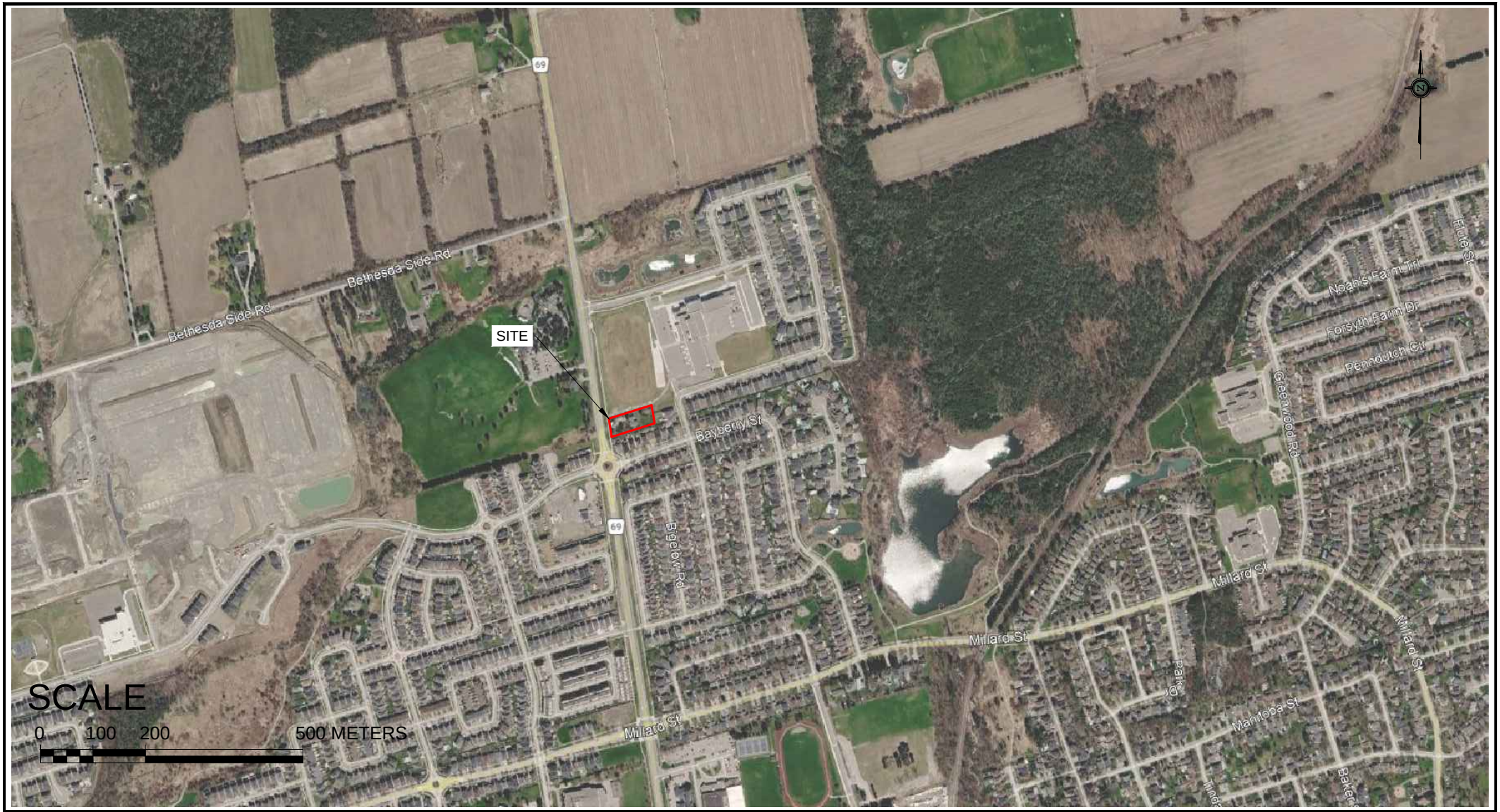
NORTH AND SOUTH ELEVATION

A3.2

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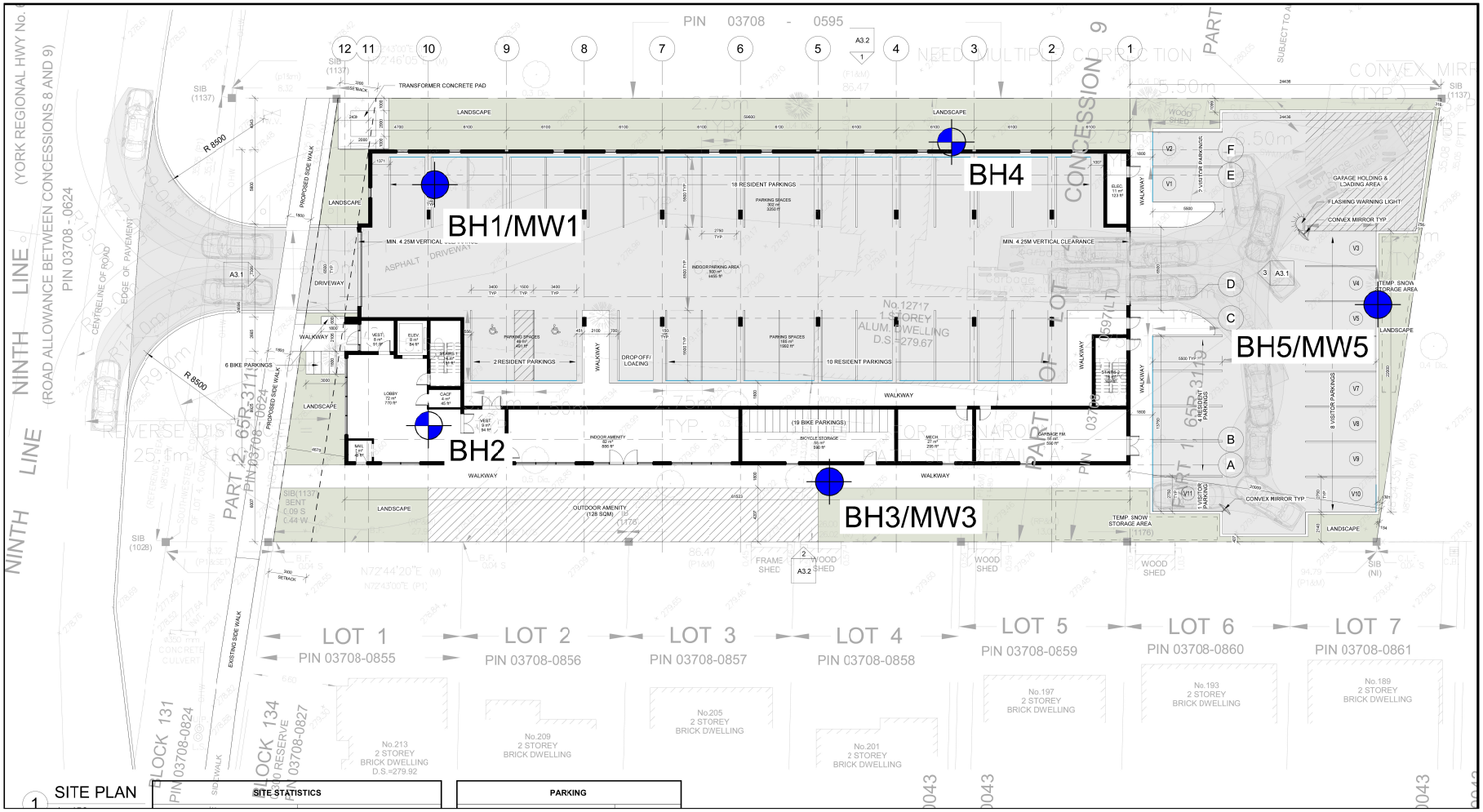
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APPENDIX B



CLIENT: ANGIL DEVELOPMENT GROUP INC. 2710 14TH AVENUE MARKHAM, ONTARIO L3R 0J1	PROJECT: HYDROGEOLOGICAL INVESTIGATION 12717 NINTH LINE WHITCHURCH-STOUFFVILLE, ONTARIO L4A 7X3	TITLE: KEYPLAN SHOWING SITE AND SURROUNDING	SCALE: AS SHOWN DRAWING NO: 1	DATE: JUNE / 2026 PROJECT No: 260052

CANADA ENGINEERING SERVICES INC.
39 DAVISBROOK BOULEVARD
SCARBOROUGH, ONTARIO M1T 2H6
Ph: 416 492 4000 Fax: 416 492 4001
E-mail address: cesi@cesi.ca



1 SITE PLAN

SITE STATISTICS	PARKING

NOTE:
THIS IS DRAWING PREPARED BY REFERENCING THE SITE PLAN BY Z SQUARE CONSULTING INC., DATED JUNE 5 2026.

LEGEND:

- BOREHOLE
- BOREHOLE WITH MONITORING WELL

CLIENT:
ANGIL DEVELOPMENT GROUP INC.

2710 14TH AVENUE
MARKHAM, ONTARIO
L3R 0J1

PROJECT:
HYDROGEOLOGICAL INVESTIGATION

12717 NINTH LINE
WHITCHURCH-STOUFFVILLE, ONTARIO
L4A 7X3

TITLE:
SITE SURVEY DRAWING SHOWING BOREHOLE, MONITORING WELL & PERCOLATION TEST LOCATIONS

SCALE:	DATE:
AS SHOWN	JUNE / 2026
DRAWING NO:	PROJECT No:
2	260052

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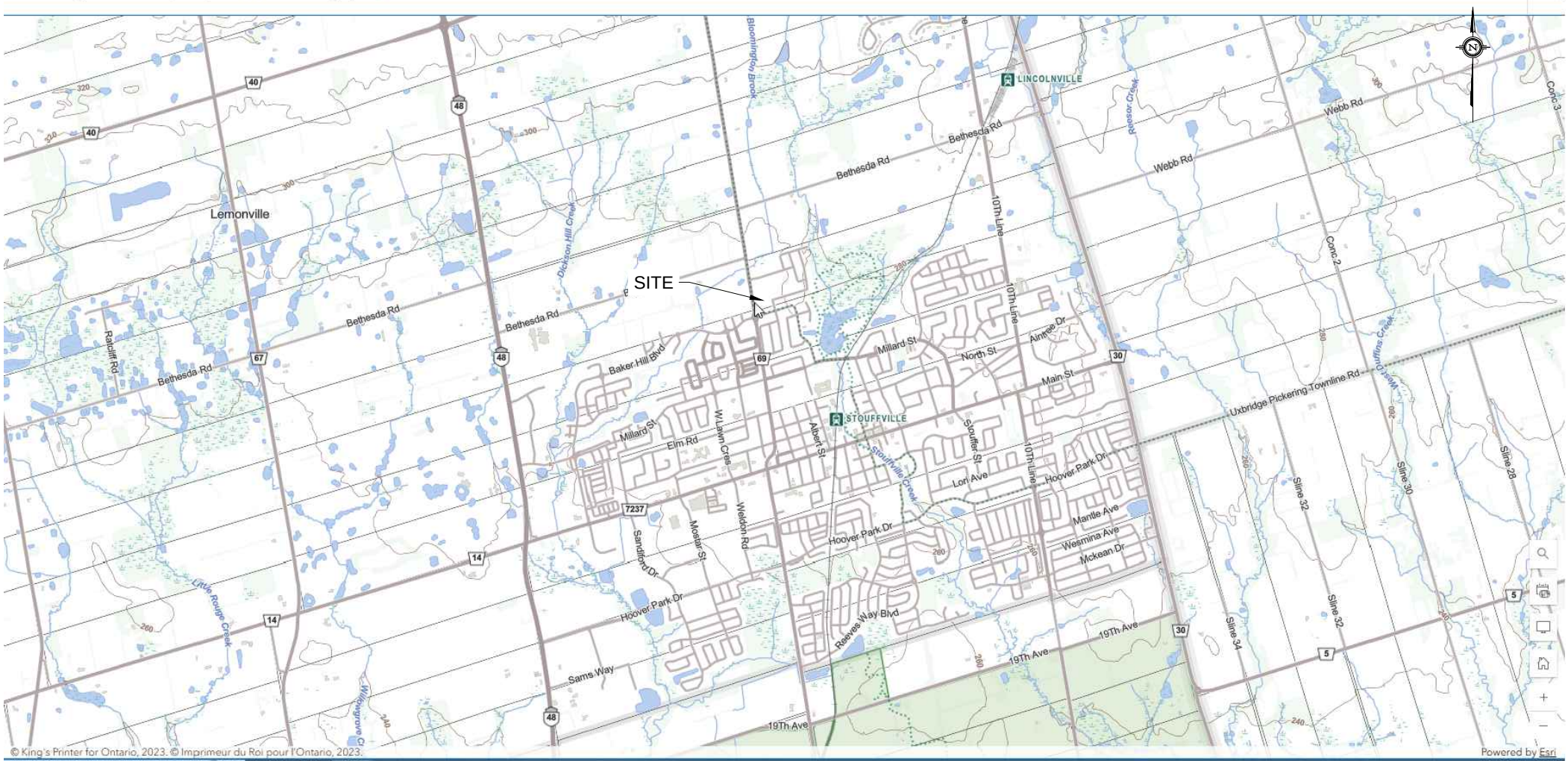
CLIENT: ANGIL DEVELOPMENT GROUP INC. 2710 14TH AVENUE MARKHAM, ONTARIO L3R 0J1	PROJECT: HYDROGEOLOGICAL INVESTIGATION 12717 NINTH LINE WHITCHURCH-STOUFFVILLE, ONTARIO L4A 7X3	TITLE: PHYSIOGRAPHIC REGION OF SITE AND SURROUNDING	SCALE: AS SHOWN DRAWING NO: 3	DATE: JUNE / 2026 PROJECT No: 260052

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SCARBOROUGH, ONTARIO M1T 2H6
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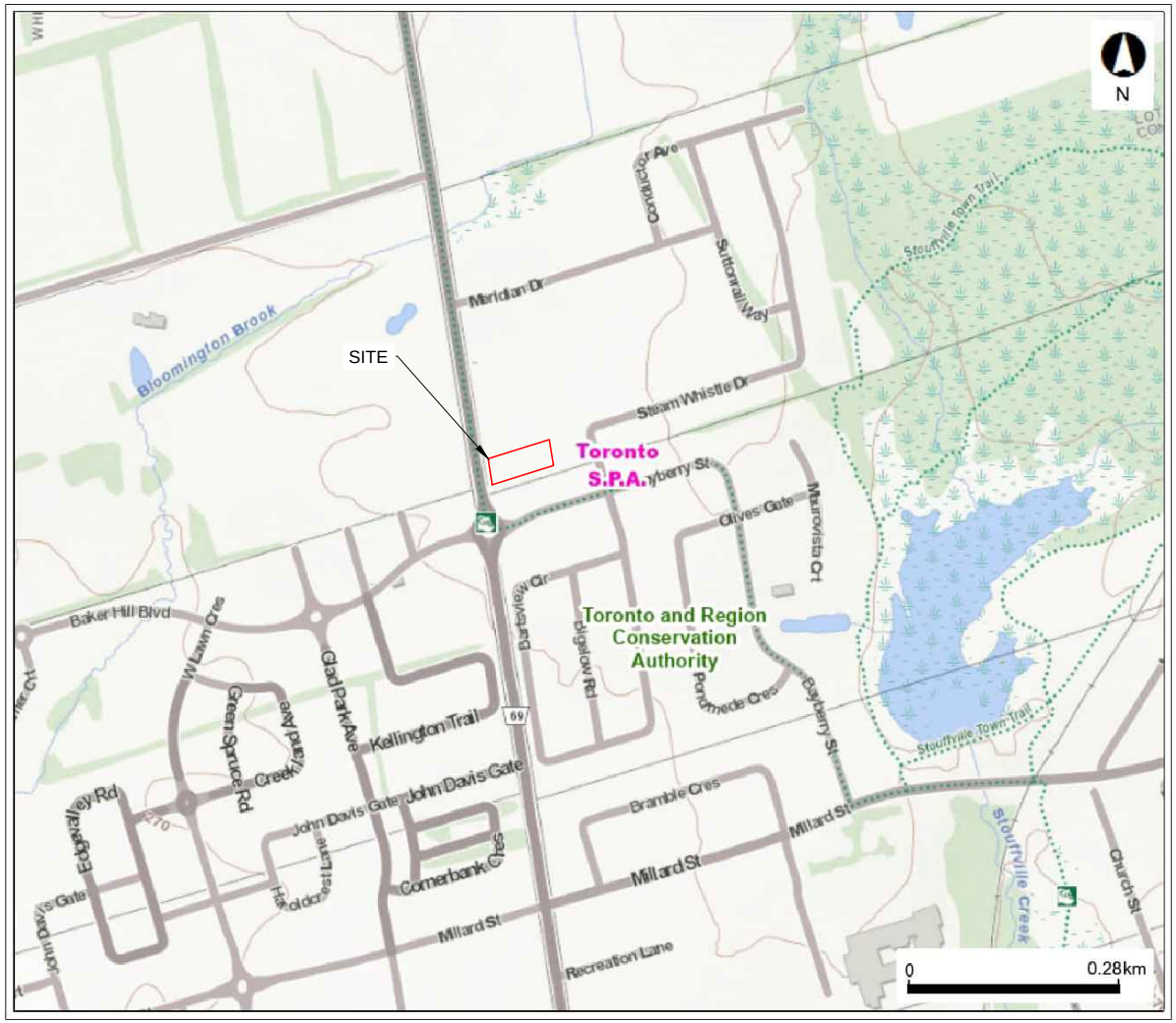
CLIENT: ANGIL DEVELOPMENT GROUP INC. 2710 14TH AVENUE MARKHAM, ONTARIO L3R 0J1	PROJECT: HYDROGEOLOGICAL INVESTIGATION 12717 NINTH LINE WHITCHURCH-STOUFFVILLE, ONTARIO L4A 7X3	TITLE: PHYSIOGRAPHIC LANDFORM OF SITE AND SURROUNDING	SCALE: AS SHOWN DRAWING NO: 4	DATE: JUNE / 2026 PROJECT No: 260052

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CLIENT: ANGIL DEVELOPMENT GROUP INC. 2710 14TH AVENUE MARKHAM, ONTARIO L3R 0J1	PROJECT: HYDROGEOLOGICAL INVESTIGATION 12717 NINTH LINE WHITCHURCH-STOUFFVILLE, ONTARIO L4A 7X3	TITLE: SURFACE DRAINAGE PATTERN OF SITE AND SURROUNDING (ONTARIO HYDRO NETWORK)	SCALE: AS SHOWN DRAWING NO: 5	DATE: JUNE / 2026 PROJECT No: 260052

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Legend

- Source Protection Areas
- Conservation Authority

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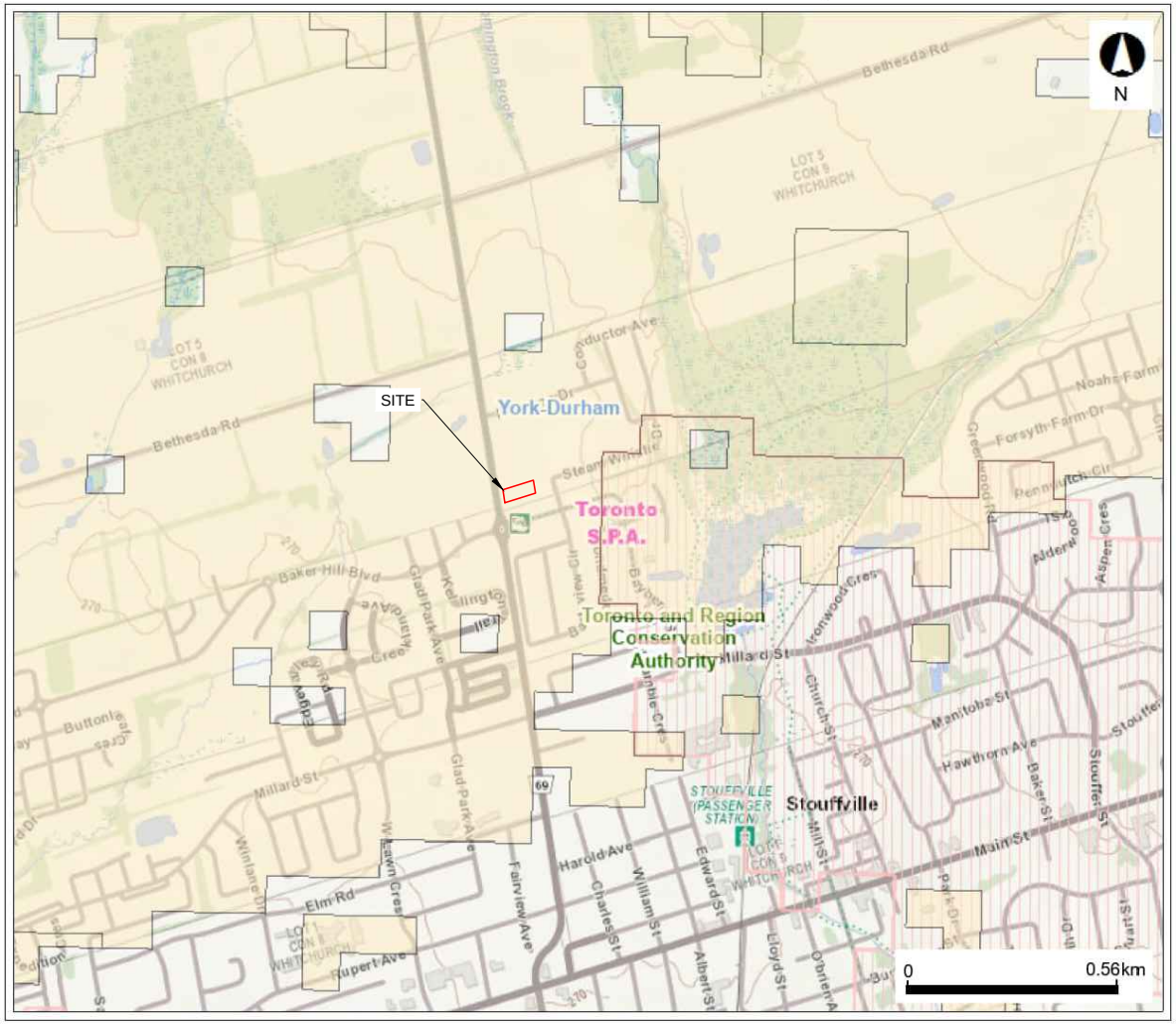
PROJECT:
HYDROGEOLOGICAL INVESTIGATION

12717 NINTH LINE
WHITCHURCH-STOUFFVILLE, ONTARIO
L4A 7X3

TITLE:
CONSERVATION AUTHORITY AND SOURCE PROTECTION AREA OF SITE AND SURROUNDING

SCALE:	DATE:
AS SHOWN	JUNE / 2026
DRAWING NO:	PROJECT No:
6	260052

CANADA ENGINEERING SERVICES INC.
39 DAVISBROOK BOULEVARD
SCARBOROUGH, ONTARIO M1T 2H6
Ph: 416 492 4000 Fax: 416 492 4001
E-mail address: cesi@cesi.ca



Legend

- Intake Protection Zone Q
- Wellhead Protection Area Q1
- Wellhead Protection Area Q2
- Significant Groundwater Recharge Area
  - N/A
  - 0
  - 2
  - 4
  - 6
- Highly Vulnerable Aquifers
- WHPA-E
- Intake Protection Zone 1
- Intake Protection Zone 2
- Intake Protection Zone 3
- Vulnerable Scoring Area - (WHPA-E)
  - 4.1 - 7.9
  - 8 - 8.9
  - 9 - 10
- Vulnerable Scoring Area - Surface Water
  - 0 - 3.9
  - 4 - 7.9
  - 8 - 8.9
  - 9 - 10
- MECP Districts
- Source Protection Areas
- Conservation Authority

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.

Searched By:
Address
Value:
12717 Ninth Line, STOUFFVILLE, ONTARIO

Toggle highlighted geometry on map

Water Quality | Policy Search by SPA | PTTW

Location Information

Zoom in to confirm your location and results

Latitude: **43.98073** Longitude: **-79.25751**
UTM Zone: **17**
Easting: **639748.74** Northing: **4871208.97**
Upper Tier Municipality: **REGIONAL MUNICIPALITY OF YORK**
Lower Tier Municipality: **TOWN OF WHITCHURCH-STOUFFVILLE**
Township Concession and Lot: **WHITCHURCH LOT 4 CON 9**
Assessment Parcel Address: **12717 Ninth Line**
Assessment Roll #: **19440000613000000000**
MECP District: **York-Durham**
MECP Region: **Central Region**

Source Protection Details for Location

Source Protection Area: **Toronto**
View Source Protection Plan
Wellhead Protection Area: **No**
Wellhead Protection Area (WHPA-E): **No**
Issue Contributing Area: **No**
Significant Groundwater Recharge Area: **Yes** ; score is **N/A**
Highly Vulnerable Aquifer: **No**
Event Based Area: **No**
Wellhead Protection Area Q1: **Yes** Stress: **Moderate**
Wellhead Protection Area Q2: **Yes** Stress: **Moderate**
Intake Protection Zone Q: **No**
Information is current as of: **January 30, 2026**

Ontario

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THIS IS NOT A PLAN OF SURVEY.

Map Created: 6/24/2026
Map Center: 43.98042 N, -79.25523 W

CLIENT: ANGIL DEVELOPMENT GROUP INC. 2710 14TH AVENUE MARKHAM, ONTARIO L3R 0J1	PROJECT: HYDROGEOLOGICAL INVESTIGATION 12717 NINTH LINE WHITCHURCH-STOUFFVILLE, ONTARIO L4A 7X3	TITLE: WATER QUALITY AND QUANTITY LAYERS INFORMATION OF SITE AND SURROUNDING	SCALE: AS SHOWN DRAWING NO: 7 DATE: JUNE / 2026 PROJECT No: 260052

CANADA ENGINEERING SERVICES INC.
39 DAVISBROOK BOULEVARD
SCARBOROUGH, ONTARIO M1T 2H6
Ph: 416 492 4000 Fax: 416 492 4001
E-mail address: cesi@cesi.ca

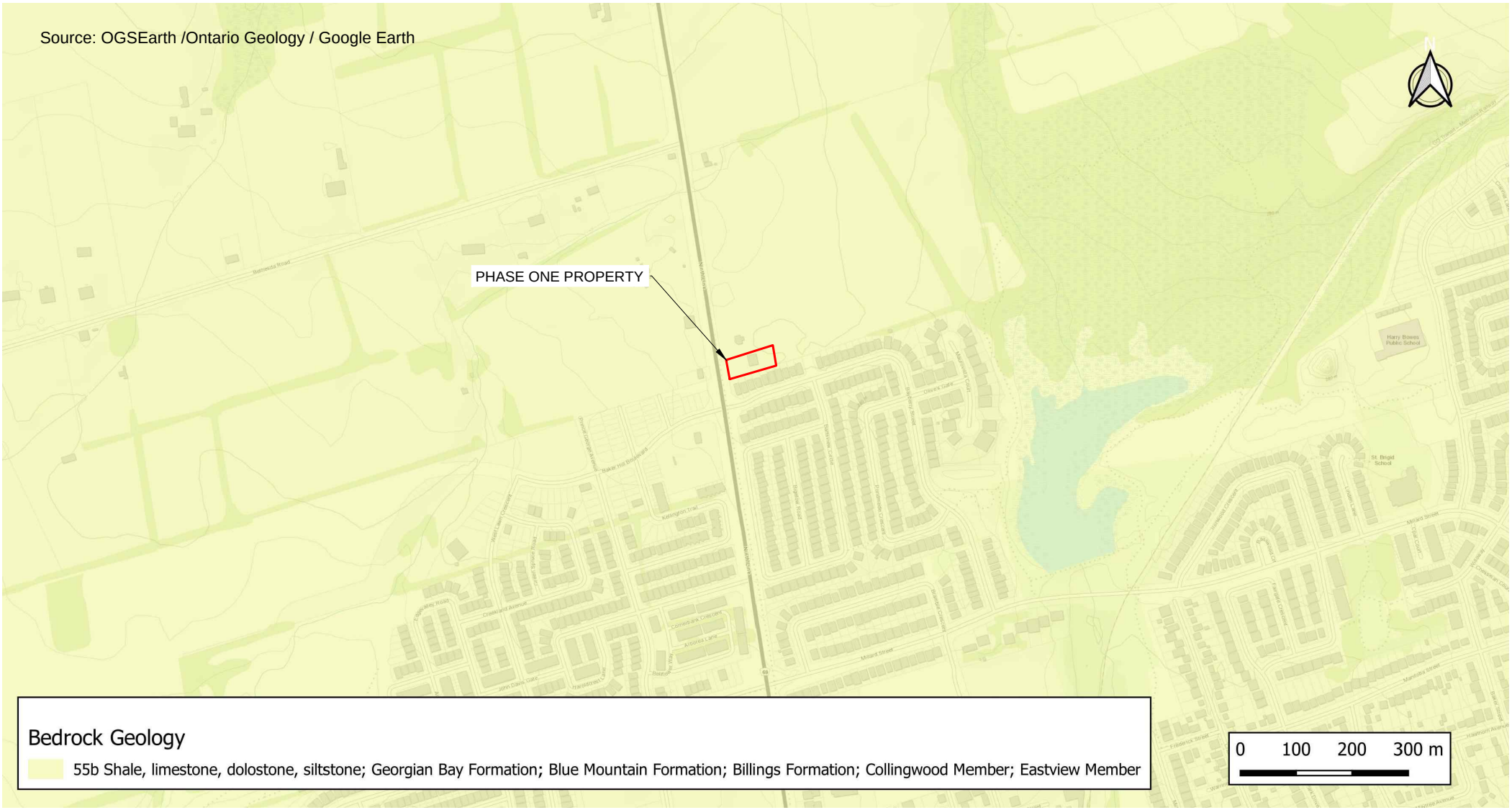
Toronto and Region Conservation Authority

TRCA Regulation Mapping



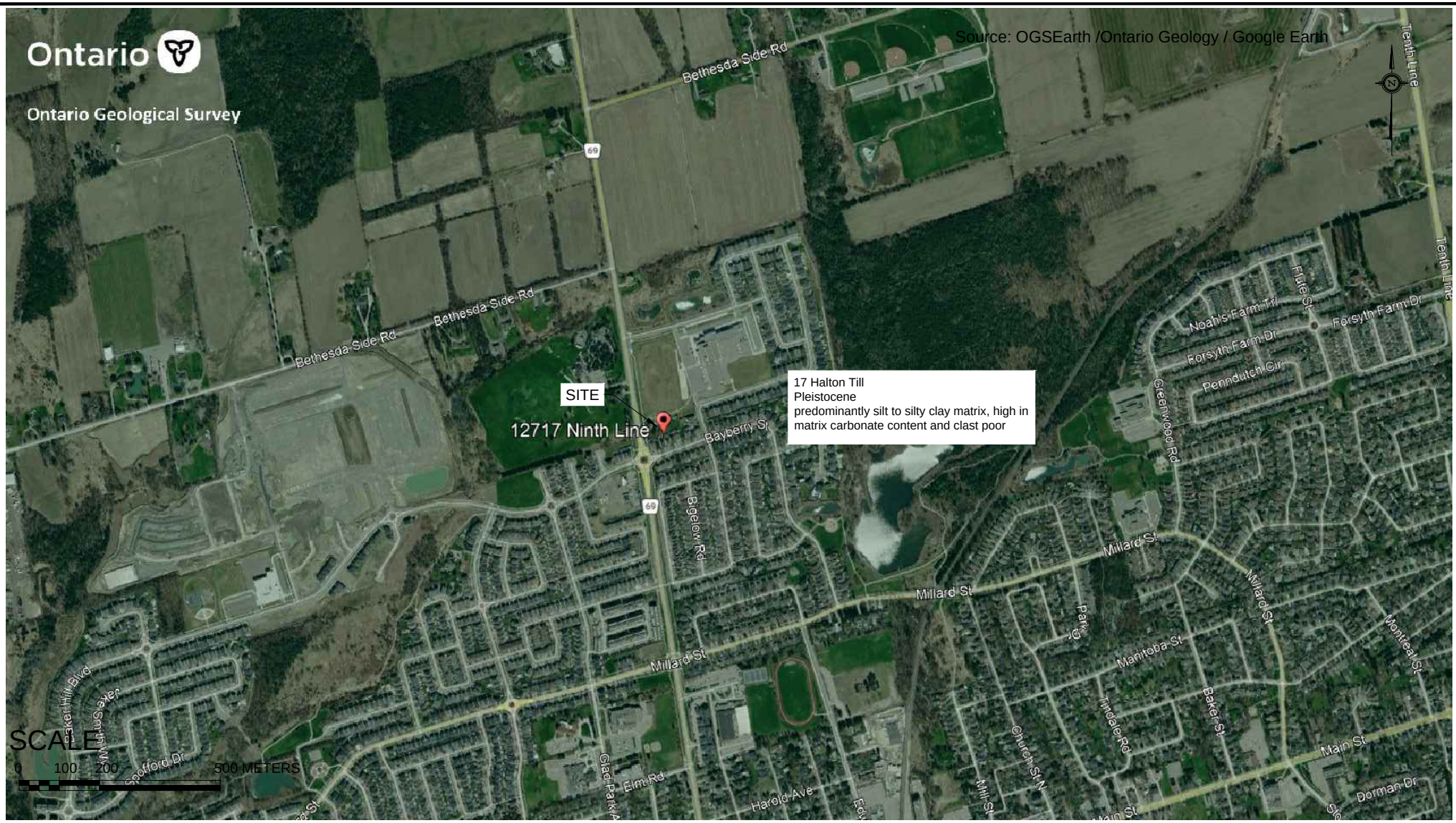
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CANADA ENGINEERING SERVICES INC.
39 DAVISBROOK BOULEVARD
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E-mail address: cesi@cesi.ca



CLIENT: ANGIL DEVELOPMENT GROUP INC. 2710 14TH AVENUE MARKHAM, ONTARIO L3R 0J1	PROJECT: HYDROGEOLOGICAL INVESTIGATION 12717 NINTH LINE WHITCHURCH-STOUFFVILLE, ONTARIO L4A 7X3	TITLE: BEDROCK GEOLOGY OF SITE AND SURROUNDING	SCALE: AS SHOWN DRAWING NO: 9	DATE: JUNE / 2026 PROJECT No: 260052

CANADA ENGINEERING SERVICES INC.
39 DAVISBROOK BOULEVARD
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Ph: 416 492 4000 Fax: 416 492 4001
E-mail address: cesi@cesi.ca



CLIENT: ANGIL DEVELOPMENT GROUP INC. 2710 14TH AVENUE MARKHAM, ONTARIO L3R 0J1	PROJECT: HYDROGEOLOGICAL INVESTIGATION 12717 NINTH LINE WHITCHURCH-STOUFFVILLE, ONTARIO L4A 7X3	TITLE: QUATERNARY BEDROCK GEOLOGY OF SITE AND SURROUNDING	SCALE: AS SHOWN DRAWING NO: 10	DATE: JUNE / 2026 PROJECT No: 260052

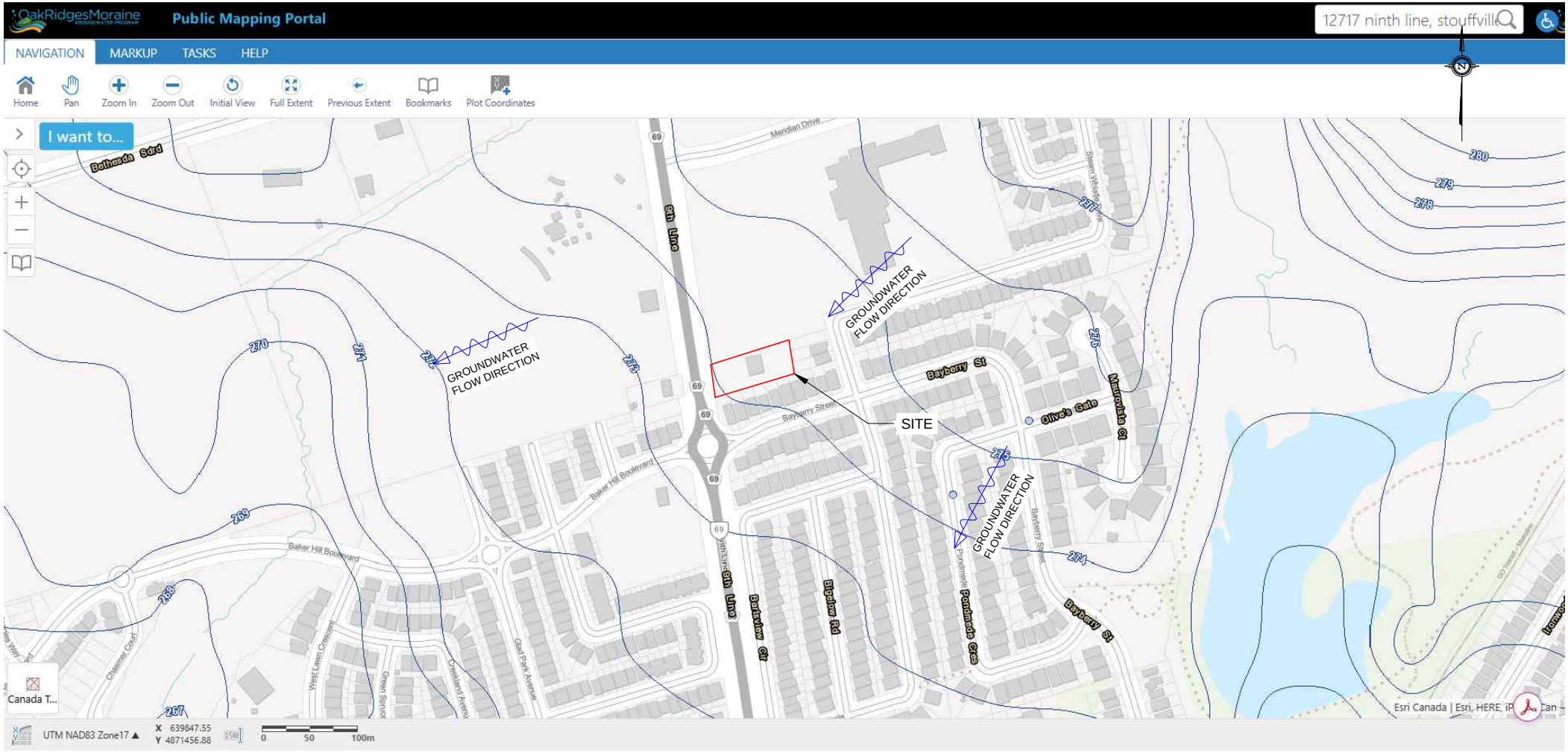
CANADA ENGINEERING SERVICES INC.
39 DAVISBROOK BOULEVARD
SCARBOROUGH, ONTARIO M1T 2H6
Ph: 416 492 4000 Fax: 416 492 4001
E-mail address: cesi@cesi.ca



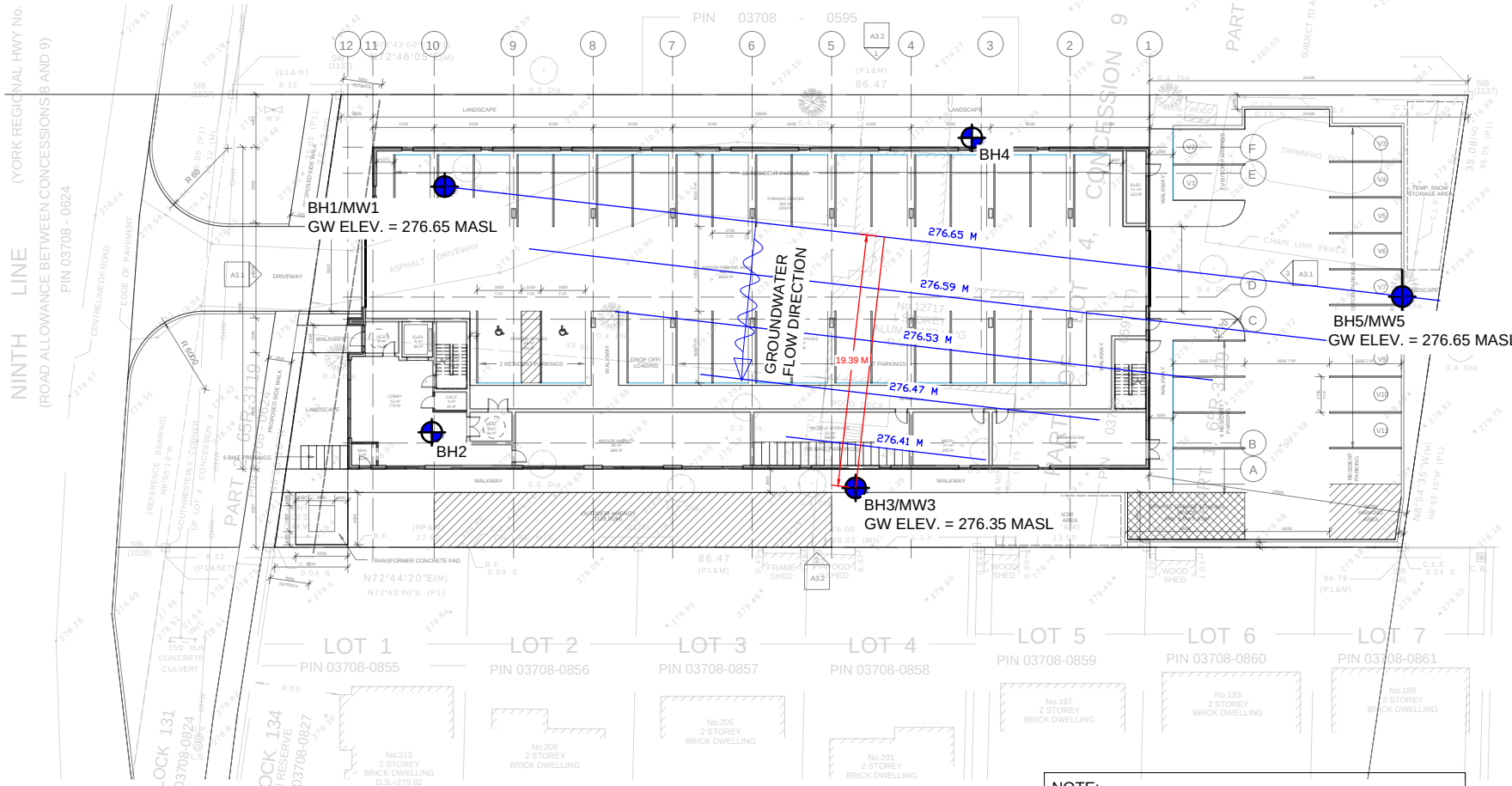
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SCARBOROUGH, ONTARIO M1T 2H6
Ph: 416 492 4000 Fax: 416 492 4001
E-mail address: cesi@cesi.ca

Source: Oak Ridges Moraine Groundwater Program & MECP Data.



CLIENT: ANGIL DEVELOPMENT GROUP INC. 2710 14TH AVENUE MARKHAM, ONTARIO L3R 0J1	PROJECT: HYDROGEOLOGICAL INVESTIGATION 12717 NINTH LINE WHITCHURCH-STOUFFVILLE, ONTARIO L4A 7X3	TITLE: GROUNDWATER CONTOUR AND FLOW DIRECTION (MECP)	SCALE: AS SHOWN DRAWING NO: 12 DATE: JUNE / 2026 PROJECT No: 260052	**CANADA ENGINEERING SERVICES INC.** 39 DAVISBROOK BOULEVARD SCARBOROUGH, ONTARIO M1T 2H6 Ph: 416 492 4000 Fax: 416 492 4001 E-mail address: cesi@cesi.ca



NOTE:
THIS IS DRAWING PREPARED BY REFERENCING THE SITE PLAN BY Z SQUARE CONSULTING INC., DATED JUNE 5, 2026.

LEGEND:

- BOREHOLE
- BOREHOLE WITH MONITORING WELL
- GROUNDWATER FLOW DIRECTION

HYDRAULIC GRADIENT (i):

$i = \Delta H / \Delta L \times 100\%$

$i = ((276.65-276.35) / 19.39) \times 100\%$

$i = 1.55\ \%$

NOTE:
THIS GROUNDWATER CONTOUR WAS PREPARED BASED ON WATER LEVEL READINGS TAKEN ON-SITE ON JUNE 2, 2026, WHICH IS THE SAME DAY THE HIGHEST GROUNDWATER LEVEL WAS RECORDED.

SCALE

0 2.5 5 12.5 METERS

CLIENT:
ANGIL DEVELOPMENT GROUP INC.

2710 14TH AVENUE
MARKHAM, ONTARIO
L3R 0J1

PROJECT:
HYDROGEOLOGICAL INVESTIGATION

12717 NINTH LINE
WHITCHURCH-STOUFFVILLE, ONTARIO
L4A 7X3

TITLE:
GROUNDWATER CONTOUR AND FLOW DIRECTION FROM THE RECORDED WATER LEVEL AT SITE

SCALE:	DATE:
AS SHOWN	JUNE / 2026
DRAWING NO:	PROJECT No:
13	260052

CANADA ENGINEERING SERVICES INC.
39 DAVISBROOK BOULEVARD
SCARBOROUGH, ONTARIO M1T 2H6
Ph: 416 492 4000 Fax: 416 492 4001
E-mail address: cesi@cesi.ca

Project No: 200015

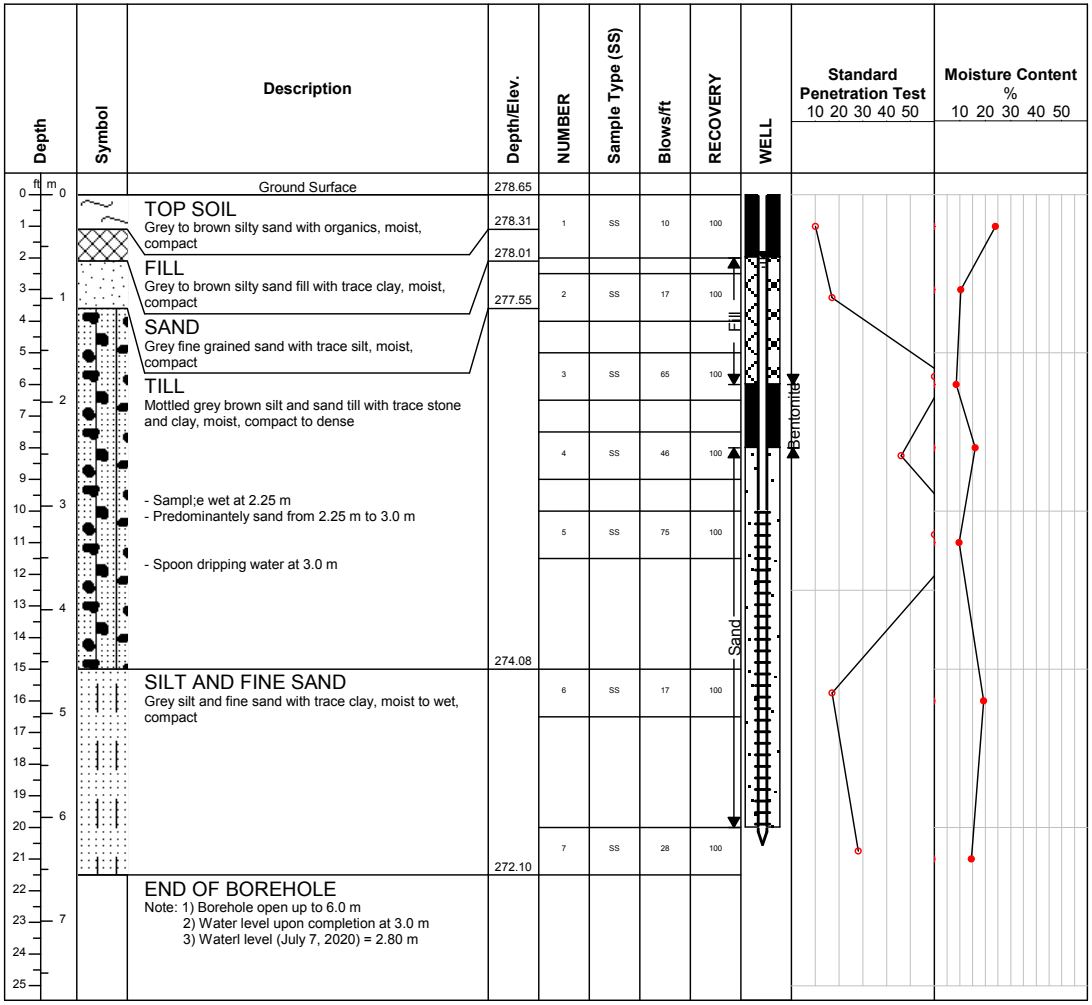
Log of Borehole No. 1

Project: Proposed Residential Development

Client: Angil Development Group Inc.

Technologist: Y.G.

Location: 12717 Ninth Line, Stouffville, Ontario



Drill Method: Track Mounted Drill Rig

Drill Date: 4th June, 2020

Hole Size: 150 mm diameter

Canada Engineering Services Inc.
39 Davisbrook Blvd.
Scarborough, Ontario
M1T 2H6

Checked By: R.J.

Datum: Referenced to the northwest corner of the property line with elevation of 278.5 m

Project No: 200015

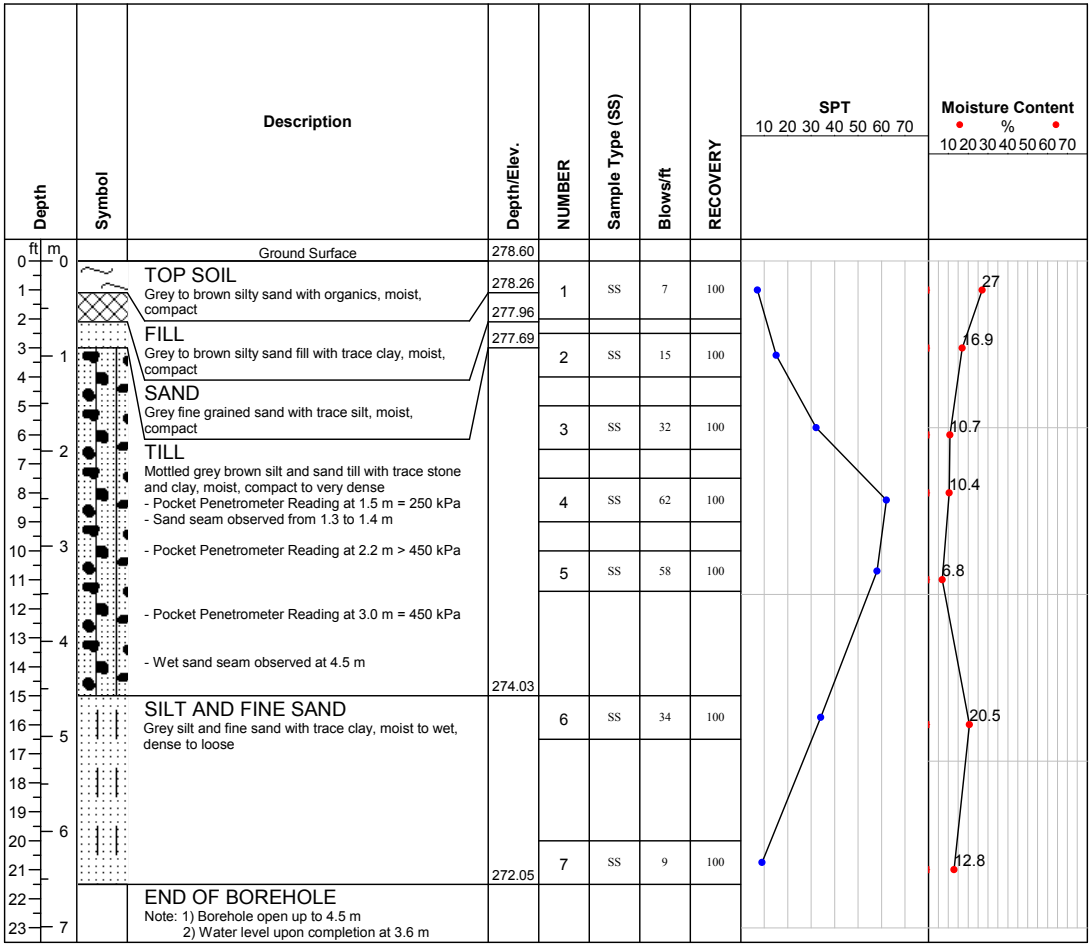
Log of Borehole No. 2

Project: Proposed Residential Development

Client: Angil Development Group Inc.

Technologist: Y.G.

Location: 12717 Ninth Line, Stouffville, Ontario



Drill Method: Track Mounted Drill Rig

Drill Date: 5th June, 2020

Hole Size: 150 mm diameter

Canada Engineering Services Inc.
39 Davisbrook Blvd.
Scarborough, Ontario
M1T 2H6

Checked By: R.J.

Datum: Referenced to the northwest corner of the property line with elevation of 278.5 m

Project No: 200015

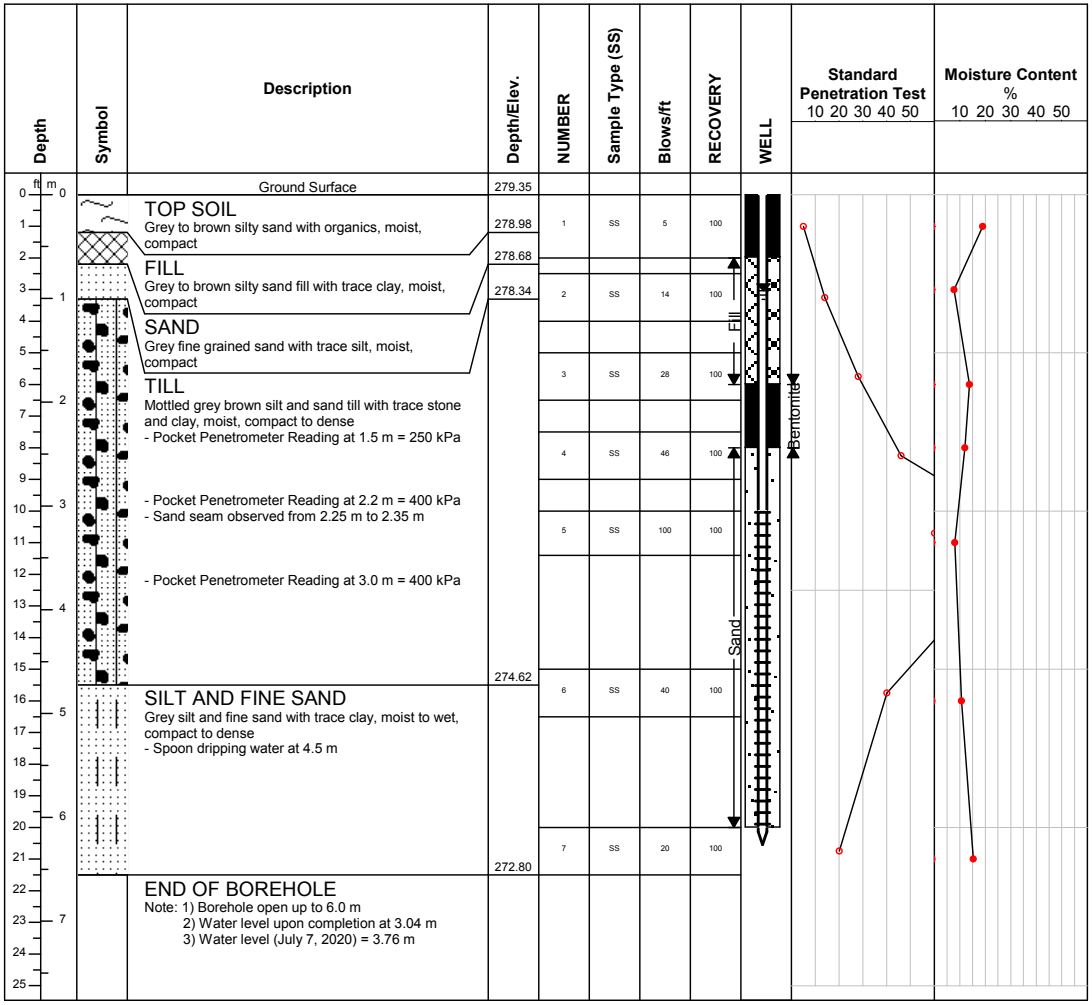
Log of Borehole No. 3

Project: Proposed Residential Development

Client: Angil Development Group Inc.

Technologist: Y.G.

Location: 12717 Ninth Line, Stouffville, Ontario



Drill Method: Track Mounted Drill Rig

Drill Date: 5th June, 2020

Hole Size: 150 mm diameter

Canada Engineering Services Inc.
39 Davisbrook Blvd.
Scarborough, Ontario
M1T 2H6

Checked By: R.J.

Datum: Referenced to the northwest corner of the property line with elevation of 278.5 m

Project No: 200015

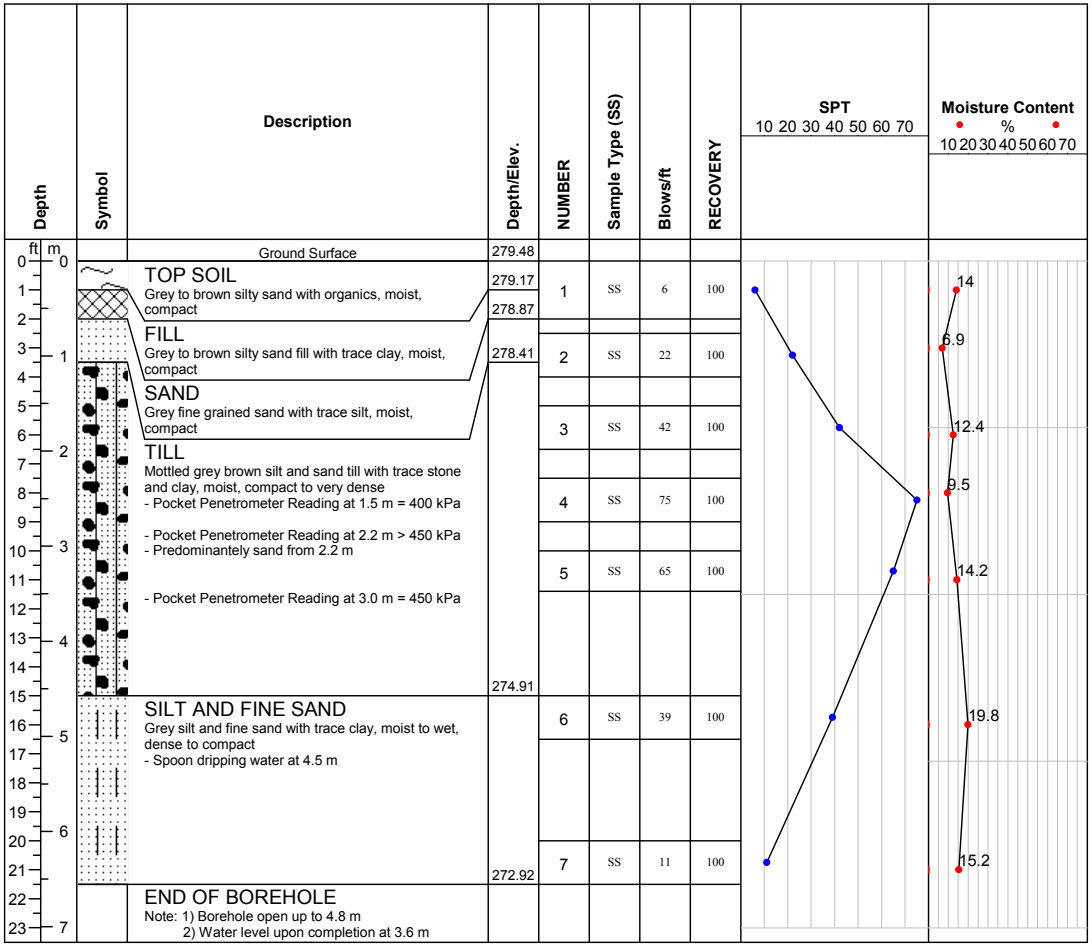
Log of Borehole No. 4

Project: Proposed Residential Development

Client: Angil Development Group Inc.

Technologist: Y.G.

Location: 12717 Ninth Line, Stouffville, Ontario



Drill Method: Track Mounted Drill Rig

Drill Date: 4th June, 2020

Hole Size: 150 mm diameter

Canada Engineering Services Inc.
39 Davisbrook Blvd.
Scarborough, Ontario
M1T 2H6

Checked By: R.J.

Datum: Referenced to the northwest corner of the property line with elevation of 278.5 m

Project No: 200015

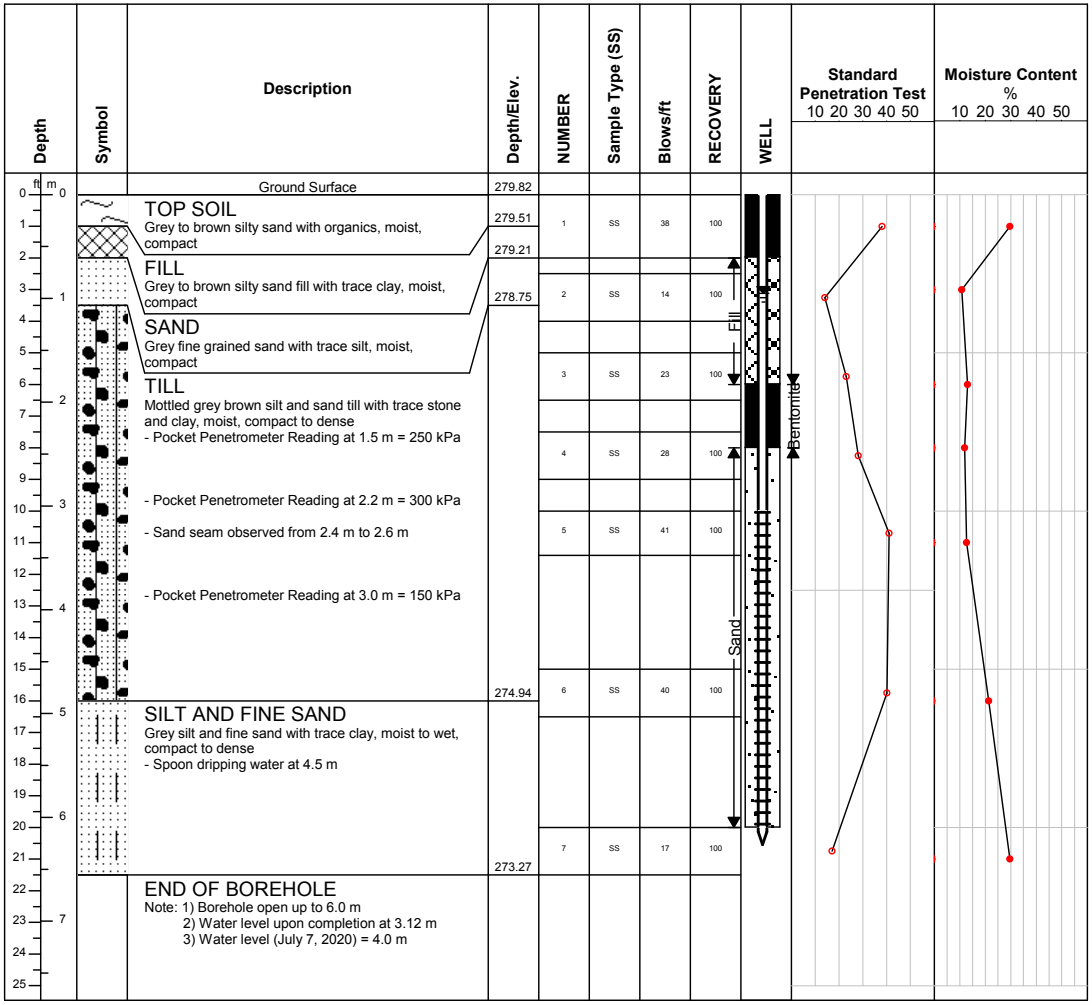
Log of Borehole No. 5

Project: Proposed Residential Development

Client: Angil Development Group Inc.

Technologist: Y.G.

Location: 12717 Ninth Line, Stouffville, Ontario



Drill Method: Track Mounted Drill Rig

Drill Date: 4th June, 2020

Hole Size: 150 mm diameter

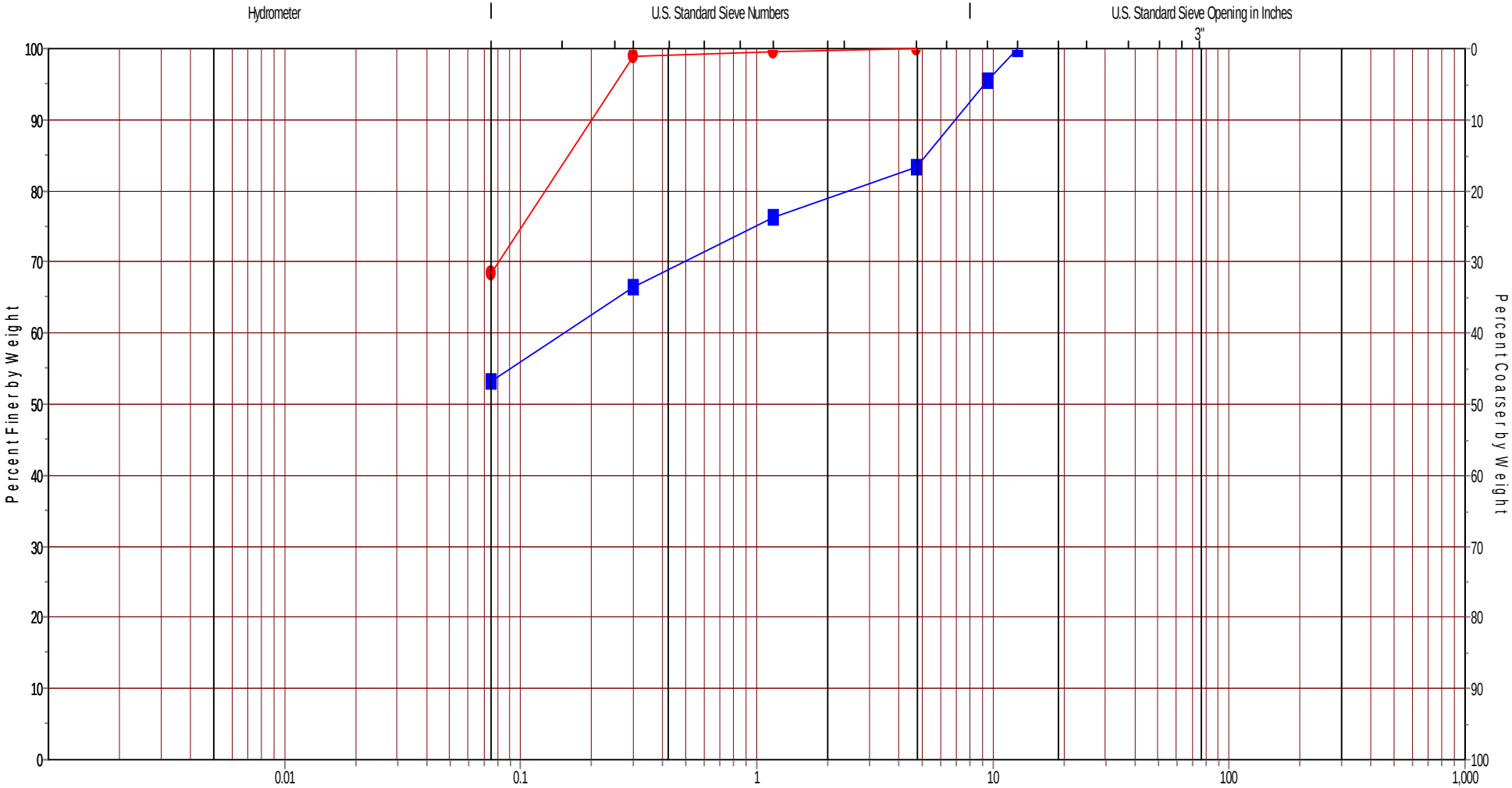
Canada Engineering Services Inc.
39 Davisbrook Blvd.
Scarborough, Ontario
M1T 2H6

Checked By: R.J.

Datum: Referenced to the northwest corner of the property line with elevation of 278.5 m

Figure 1	Project No.: 260052	GRAINSIZE DISTRIBUTION GRAPH
	Location: 12717 Ninth Line, Stouffville, Ontario	Tested By: YG
	Client: Angil Development Group Inc.	Test Date: 6/9/2020

Symbol	Sample No.	% Clay	% Silt	% Fine Sand	% Medium Sand	% Coarse Sand	% Fine Gravel	% Coarse Gravel	% Cobbles
■	BH2SA3-5ft	<53.2	<53.2	13.3	9.9	7.3	16.7	0.0	0.0
●	BH5SA6-15ft	<68.4	<68.4	30.5	0.8	0.4	0.0	0.0	0.0



Unified Soil Classification System

SILT or CLAY		SAND			GRAVEL		COBBLES	BOULDERS
Clay	Silt	fine	medium	coarse	fine	coarse		

GEOTECHNICAL SYMBOLS AND TERMS USED IN BOREHOLE/TEST PIT LOGS

Soil Description

Terminology describing soil types:

Topsoil	-	Mixture of soil and humus capable of supporting good vegetative growth
Peat	-	Fibrous fragments of visible and invisible decayed organic matter
Till	-	Unstratified and unsorted glacial deposit which may include any particle sizes Such as clay, silt, sand, stone, cobbles and boulders
Fill	-	Materials not identified as deposited by natural geological processes

Terminology describing soil structure:

Desiccated	-	Having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	-	Material breaks along plane of fracture
Varved	-	Composed of regular alternating layers of silt and clay
Laminated	-	Alternating layers of beds less than 6 mm thick
Stratified	-	Alternating layers of beds greater than 6 mm thick
Blocky	-	Material can be broken into small and hard angular lumps
Lensed	-	Irregular shaped pockets of soil having different particle size, texture, or colour from materials above and below
Well Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly Graded		Predominantly one grain size

Soil descriptions and classification are based on the Unified Soil Classification System (USCS) (ASTM D-2488), which classifies soils on the basis of engineering properties. The system divides soils into three major categories: (1) coarse grained, (2) fine-grained, and (3) highly organic. The soil is then subdivided based on either gradation or plasticity characteristics. This system provides a group symbol (eg. SM) and group name (eg. silty sand) for identification. The classification excludes particles larger than 76 mm.

Terminology describing materials outside the USCS, (eg. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present:

Trace	- Trace sand, trace silt, etc.	Less than 10%
Some	- Some sand, some silt, etc.	10 - 20%
Adjective	- Gravelly, sandy, silty, clayey, etc.	20 - 30%
“And”	- and gravel, and silt, etc.	> 35%
Noun	- Gravel, Sand, Silt, Clay	> 35% and main fraction

The standard terminology to describe cohesionless soils includes the compactness as determined by the Standard Penetration Test “N” -value.

Compactness	“N” Value
Very Loose	< 4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	> 50

GEOTECHNICAL SYMBOLS AND TERMS USED IN BOREHOLE/TEST PIT LOGS

The standard terminology to describe cohesive soils includes consistency, which is based on undrained shear strength as measured by in-situ vane tests, penetrometer tests, unconfined compression tests or similar field and laboratory analysis. Standard Penetration Test "N" values can also be used to provide an approximate indication of the consistency and shear strength of fine grained, cohesive soils.

Consistency	Undrained Shear Strength (kPa)	"N" Value	Field Identification
Very Soft	< 12.5	< 2	Easily penetrated several cm by the fist
Soft	12.5 - 25	2 - 4	Easily penetrated several cm by the thumb
Firm	25 - 50	4 - 8	Can be penetrated several cm by the thumb with moderate effort
Stiff	50 - 100	8 - 15	Readily indented by the thumb but penetrated only with great effort
Very Stiff	100 - 200	15 - 30	Readily indented by the thumb nail
Hard	> 200	> 30	Indented with difficulty by the thumbnail

Note: "N" Value - The Standard Penetration Test records the number of blows of a 140 lb (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler 1 foot (305 mm). For split spoon samples where full penetration is not achieved, the number of blows is reported over the sampler penetration in millimeters (eg. 50/75).

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:



Asphalt Concrete Topsoil Fill Peat Clay Silt Sand Gravel

WATER LEVEL MEASUREMENTS



Open Borehole or Test Pit — Monitoring Well, Piezometer or Standpipe

SAMPLE TYPE

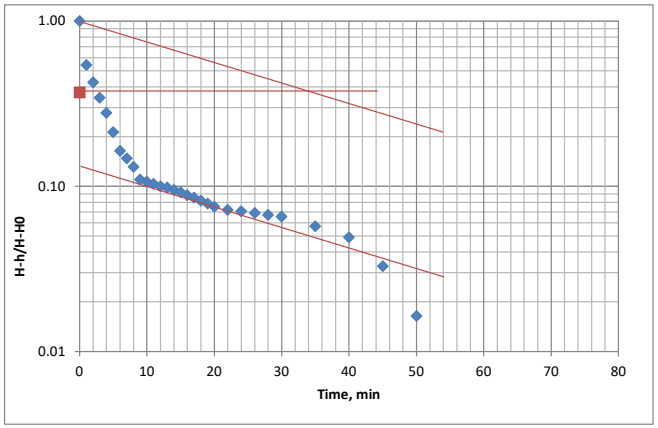
SS	Split spoon sample (obtained from the Standard Penetration Test)	WS	Wash sample
TW	Thin Wall Sample or Shelby Tube	HQ (65.5 mm)	Rock core samples
PS	Piston sample	NQ (47.6 mm)	(With diameter in mm)
GS	Grab sample	BQ (36.5 mm)	obtained with the use of
AS	Auger sample	Etc.	standard size diamond
BS	Bulk sample		drilling bits

APPENDIX C

Slug Test Result

Test Location :	MW1	Test Date :	07/20/2020
Testing Depth:	3.1-6.1	Test Formation:	Silt and Sand
Initial Ground Water Depth, H :	2.8		
Starting Water Depth, H_0 :	2.19		

Time Interval, (min)	Water Level, h (m)	H-h/(H-H_0)
0	2.19	1.00
1	2.47	0.54
2	2.54	0.43
3	2.59	0.34
4	2.63	0.28
5	2.67	0.21
6	2.70	0.16
7	2.71	0.15
8	2.72	0.13
9	2.73	0.11
10	2.74	0.11
11	2.74	0.10
12	2.74	0.10
13	2.74	0.10
14	2.74	0.10
15	2.74	0.09
16	2.75	0.09
17	2.75	0.09
18	2.75	0.08
19	2.75	0.08
20	2.75	0.08
22	2.76	0.07
24	2.76	0.07
26	2.76	0.07
28	2.76	0.07
30	2.76	0.07
35	2.77	0.06
40	2.77	0.05
45	2.78	0.03
50	2.79	0.02
55	2.80	0.00
60	2.80	0.00
65	2.80	0.00

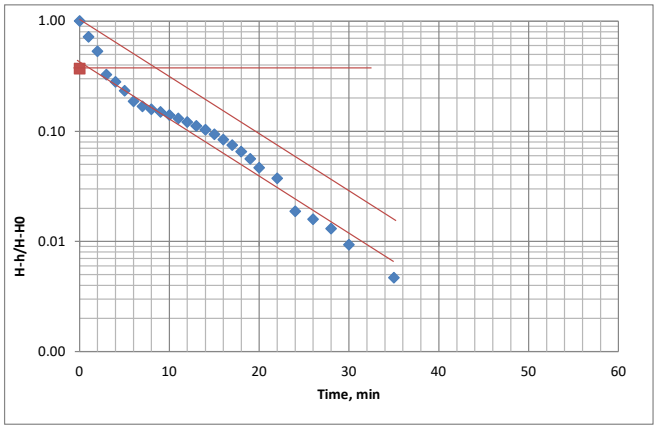


T_0 (sec) =	2040	at 0.37
Standpipe Radius, r (m) =	0.025	
Screen Radius, R (m) =	0.025	
Screen length, L (m) =	3	
F factor =	3.937135	
Permeability, k (m/sec) =	2.4E-07	

Slug Test Result

Test Location :	MW3	Test Date :	07/20/2020
Testing Depth:	3.1-6.1	Test Formation:	Silt and Sand
Initial Ground Water Depth, H :	3.76		
Starting Water Depth, H_0 :	2.69		

Time Interval, (min)	Water Level, h (m)	H-h/(H-H_0)
0	2.69	1.00
1	2.99	0.72
2	3.19	0.53
3	3.41	0.33
4	3.46	0.28
5	3.51	0.23
6	3.56	0.19
7	3.58	0.17
8	3.59	0.16
9	3.60	0.15
10	3.61	0.14
11	3.62	0.13
12	3.63	0.12
13	3.64	0.11
14	3.65	0.10
15	3.66	0.09
16	3.67	0.08
17	3.68	0.07
18	3.69	0.07
19	3.70	0.06
20	3.71	0.05
22	3.72	0.04
24	3.74	0.02
26	3.74	0.02
28	3.75	0.01
30	3.75	0.01
35	3.76	0.00
40	3.76	0.00
45	3.76	0.00
50	3.76	0.00

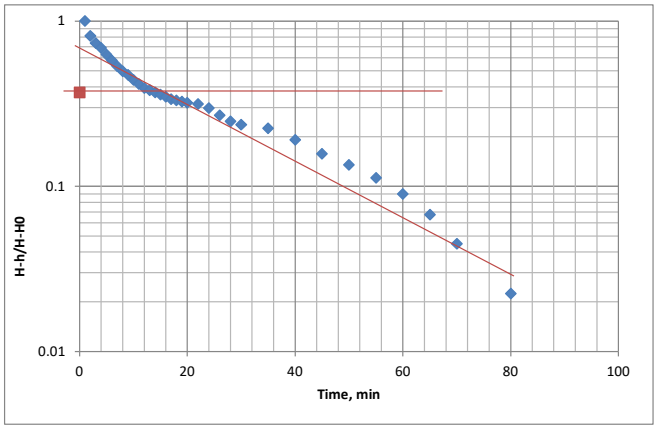


T_0 (sec) =	510	at 0.37
Standpipe Radius, r (m) =	0.025	
Screen Radius, R (m) =	0.025	
Screen length, L (m) =	3	
F factor =	3.937135	
Permeability, k (m/sec) =	9.8E-07	

Slug Test Result

Test Location :	MW5	Test Date :	07/20/2020
Testing Depth:	3.1-6.1	Test Formation:	Silt and Sand
Initial Ground Water Depth, H :	4		
Starting Water Depth, H_0 :	3.11		

Time Interval, (min)	Water Level, h (m)	H-h/(H-H_0)
0	3.11	1.00
1	3.28	0.81
2	3.35	0.73
3	3.39	0.69
4	3.44	0.63
5	3.49	0.58
6	3.53	0.53
7	3.56	0.50
8	3.58	0.47
9	3.61	0.44
10	3.63	0.42
11	3.65	0.39
12	3.66	0.38
13	3.67	0.37
14	3.68	0.36
15	3.69	0.35
16	3.70	0.34
17	3.71	0.33
18	3.71	0.33
19	3.72	0.32
20	3.72	0.31
22	3.74	0.30
24	3.76	0.27
26	3.78	0.25
28	3.79	0.24
30	3.80	0.22
35	3.83	0.19
40	3.86	0.16
45	3.88	0.13
50	3.90	0.11
55	3.92	0.09
60	3.94	0.07
65	3.96	0.04
70	3.98	0.02
80	4.00	0.00
90	4.00	0.00
100	4.00	0.00



T_0 (sec) =	960	at 0.37
Standpipe Radius, r (m) =	0.025	
Screen Radius, R (m) =	0.025	
Screen length, L (m) =	3	
F factor =	3.937135	
Permeability, k (m/sec) =	5.2E-07	

APPENDIX D

Certificate of Analysis

Client: Canada Engineering Services Limited
39 Davisbrook Blvd
Scarborough, Ontario
M1T 2H6
Attention: Mr. Lawrence Yu
PO#:
Invoice to: Canada Engineering Services Limited

Report Number: 1933953
Date Submitted: 2020-07-08
Date Reported: 2020-07-17
Project: 12717 Ninth Line
COC #: 206417

Dear Lawrence Yu:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

APPROVAL: _____
Hongyuan Deng, Inorganics Technician

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: http://www.cala.ca/scopes/2602.pdf.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Certificate of Analysis

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Client: Canada Engineering Services Limited
39 Davisbrook Blvd
Scarborough, Ontario
M1T 2H6
Attention: Mr. Lawrence Yu
PO#:
Invoice to: Canada Engineering Services Limited

Report Number: 1933953
Date Submitted: 2020-07-08
Date Reported: 2020-07-17
Project: 12717 Ninth Line
COC #: 206417

				Lab I.D.	1503274
				Sample Matrix	WW
				Sample Type	
				Sampling Date	2020-07-07
				Sample I.D.	Water 1
Group	**Analyte**	**MRL**	**Units**	**Guideline**	
Anions	F	0.10	mg/L	MAC 10	0.11
	SO4	1	mg/L	MAC 1500	32
General Chemistry	BOD5	1	mg/L	MAC 300	2
	Cyanide (total)	0.005	mg/L	MAC 2	<0.005
	pH	1.00		6.0-10.5	7.87
	Total Suspended Solids	2	mg/L	MAC 350	1390*
Mercury	Hg	0.0001	mg/L	MAC 0.01	<0.0001
Metals	Ag	0.01	mg/L	MAC 5	<0.01
	Al	0.1	mg/L	MAC 50	1.7
	Aqua-Regia Digest				Y
	As	0.02	mg/L	MAC 1	<0.02
	Cd	0.008	mg/L	MAC 0.7	<0.008
	Co	0.01	mg/L	MAC 5	<0.01
	Cr	0.05	mg/L	MAC 2	<0.05
	Cu	0.01	mg/L	MAC 3	<0.01
	Mn	0.01	mg/L	MAC 5	0.12
	Mo	0.01	mg/L	MAC 5	<0.01
	Ni	0.01	mg/L	MAC 2	<0.01
	Pb	0.01	mg/L	MAC 1	<0.01
	Sb	0.01	mg/L	MAC 5	<0.01
	Se	0.02	mg/L	MAC 1	<0.02
	Sn	0.1	mg/L	MAC 5	<0.1
	Ti	0.1	mg/L	MAC 5	<0.1
	Zn	0.04	mg/L	MAC 2	<0.04
Nutrients	Total Kjeldahl Nitrogen	0.100	mg/L	MAC 100	0.577

Guideline = Sanitary Sewer - York *** = Guideline Exceedence**

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Date Reported: 2020-07-17
Project: 12717 Ninth Line
COC #: 206417

Group	Analyte	MRL	Units	Guideline	Lab I.D. 1503274 Sample Matrix WW Sample Type Sampling Date 2020-07-07 Sample I.D. Water 1
Nutrients	Total P	0.020	mg/L	MAC 10	0.173
Oil and Grease	Oil & Grease - Mineral	1	mg/L	MAC 15	<1
	Oil & Grease - Non-mineral	1	mg/L	MAC 150	<1
	Oil & Grease - Total	1	mg/L		<1
PCBs	Polychlorinated Biphenyls (PCBs)	0.1	ug/L	MAC 1	<0.1
Semi-Volatiles	Bis(2-ethylhexyl)phthalate	0.4	ug/L	MAC 12	<0.4
	Di-n-butylphthalate	1.3	ug/L	MAC 80	<1.3
Subcontract	Nonylphenol Ethoxalate (Total)	2.0	ug/L	MAC 200	<2.0
	Nonylphenols (Total)	1.0	ug/L	MAC 20	<1.0
Subcontract-Inorg	Phenols	0.001	mg/L	MAC 1.0	<0.001
VOCs Surrogates	1,2-dichloroethane-d4	0	%		79
	4-bromofluorobenzene	0	%		103
	Toluene-d8	0	%		95
Volatiles	1,1,2,2-tetrachloroethane	0.5	ug/L	MAC 1400	<0.5
	1,2-dichlorobenzene	0.4	ug/L	MAC 50	<0.4
	1,4-dichlorobenzene	0.4	ug/L	MAC 80	<0.4
	Benzene	0.5	ug/L	MAC 10	<0.5
	c-1,2-Dichloroethylene	0.4	ug/L	MAC 4000	<0.4
	Chloroform	0.5	ug/L	MAC 40	<0.5
	Dichloromethane	4.0	ug/L	MAC 2000	<4.0
	Ethylbenzene	0.5	ug/L	MAC 160	<0.5
	m/p-xylene	0.4	ug/L		<0.4
	Methyl Ethyl Ketone (MEK)	10	ug/L	MAC 8000	<10
	o-xylene	0.4	ug/L		<0.4
	Styrene	0.5	ug/L	MAC 200	<0.5

Guideline = Sanitary Sewer - York *** = Guideline Exceedence**

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Certificate of Analysis

eurofins | Environment Testing

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Attention: Mr. Lawrence Yu
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Report Number: 1933953
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Date Reported: 2020-07-17
Project: 12717 Ninth Line
COC #: 206417

Group	Analyte	MRL	Units	Guideline	Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. 1503274 WW 2020-07-07 Water 1
Volatiles	t-1,3-Dichloropropylene	0.2	ug/L	MAC 140	<0.2
	Tetrachloroethylene	0.3	ug/L	MAC 1000	<0.3
	Toluene	0.5	ug/L	MAC 270	<0.5
	Trichloroethylene	0.3	ug/L	MAC 400	<0.3
	Xylene; total	0.5	ug/L	MAC 1400	<0.5

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Attention: Mr. Lawrence Yu
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Report Number: 1933953
Date Submitted: 2020-07-08
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Project: 12717 Ninth Line
COC #: 206417

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 208523 **Analysis/Extraction Date** 2020-07-15 **Analyst** C M **Method** EPA 8081B			
Polychlorinated Biphenyls	<0.1 ug/L	78	60-140
Run No 385996 **Analysis/Extraction Date** 2020-07-09 **Analyst** QT **Method** SM4500-CNC/MOE E3015			
Cyanide (total)	<0.005 mg/L	102	61-139
Run No 386011 **Analysis/Extraction Date** 2020-07-09 **Analyst** A A **Method** MOE E3421			
Oil & Grease - Mineral	<1 mg/L	99	60-120
Oil & Grease - Non-mineral	<1 mg/L		60-120
Oil & Grease - Total	<1 mg/L	100	60-120
Run No 386013 **Analysis/Extraction Date** 2020-07-10 **Analyst** H D **Method** EPA 200.8			
Titanium	<0.1 mg/L	102	80-120
Run No 386026 **Analysis/Extraction Date** 2020-07-14 **Analyst** AG **Method** SM 5210B			
BOD5	<1 mg/L	102	75-125
Run No 386049 **Analysis/Extraction Date** 2020-07-10 **Analyst** MOS **Method** C SM2540			

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Date Submitted: 2020-07-08
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Project: 12717 Ninth Line
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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Total Suspended Solids	<2 mg/L	98	90-110
Run No 386051 **Analysis/Extraction Date** 2020-07-09 **Analyst** TJB **Method** EPA 8260			
Methyl Ethyl Ketone	<10 ug/L	100	60-130
Run No 386058 **Analysis/Extraction Date** 2020-07-09 **Analyst** TJB **Method** EPA 8260			
Tetrachloroethane, 1,1,2,2-	<0.5 ug/L	100	60-130
Dichlorobenzene, 1,2-	<0.4 ug/L	92	60-130
Dichlorobenzene, 1,4-	<0.4 ug/L	111	60-130
Benzene	<0.5 ug/L	97	60-130
Dichloroethylene, 1,2-cis-	<0.4 ug/L	102	60-130
Chloroform	<0.5 ug/L	101	60-130
Methylene Chloride	<4.0 ug/L	113	60-130
Ethylbenzene	<0.5 ug/L	109	60-130
m/p-xylene	<0.4 ug/L	114	60-130
o-xylene	<0.4 ug/L	113	60-130
Styrene	<0.5 ug/L	104	60-130
Dichloropropene,1,3-trans-	<0.2 ug/L	103	60-130

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M1T 2H6
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Report Number: 1933953
Date Submitted: 2020-07-08
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Project: 12717 Ninth Line
COC #: 206417

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Tetrachloroethylene	<0.3 ug/L	108	60-130
Toluene	<0.5 ug/L	106	60-130
Trichloroethylene	<0.3 ug/L	107	60-130
Run No 386059 **Analysis/Extraction Date** 2020-07-10 **Analyst** TJB **Method** EPA 8260			
Xylene Mixture			
Run No 386119 **Analysis/Extraction Date** 2020-07-10 **Analyst** SKH **Method** EPA 351.2			
Total Kjeldahl Nitrogen	<0.100 mg/L	100	70-130
Run No 386120 **Analysis/Extraction Date** 2020-07-10 **Analyst** SKH **Method** SM 4110			
SO4	<1 mg/L	100	90-110
Run No 386122 **Analysis/Extraction Date** 2020-07-10 **Analyst** QT **Method** SM2320,2510,4500H/F			
F	<0.10 mg/L	95	90-110
pH		100	90-110
Run No 386130 **Analysis/Extraction Date** 2020-07-10 **Analyst** AET **Method** SUBCONTRACT P-INORG			
Phenols	<0.001 mg/L		69-132

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Attention: Mr. Lawrence Yu
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Report Number: 1933953
Date Submitted: 2020-07-08
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COC #: 206417

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 386143 **Analysis/Extraction Date** 2020-07-13 **Analyst** H D **Method** EPA 200.8			
Silver	<0.01 mg/L	100	70-130
Aqua-Regia Digest			
Arsenic	<0.02 mg/L	96	70-130
Cadmium	<0.008 mg/L	103	70-130
Cobalt	<0.01 mg/L	98	70-130
Chromium Total	<0.05 mg/L	98	70-130
Copper	<0.01 mg/L	101	70-130
Molybdenum	<0.01 mg/L	95	70-130
Nickel	<0.01 mg/L	100	70-130
Lead	<0.01 mg/L	76	70-130
Antimony	<0.01 mg/L	111	70-130
Selenium	<0.02 mg/L	113	70-130
Sn	<0.1 mg/L	104	70-130
Zinc	<0.04 mg/L	89	70-130
Run No 386151 **Analysis/Extraction Date** 2020-07-13 **Analyst** SKH **Method** M SM3112B-3500B			

Guideline = Sanitary Sewer - York *** = Guideline Exceedence**

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Mercury	<0.0001 mg/L	95	76-123
Run No 386193 **Analysis/Extraction Date** 2020-07-14 **Analyst** H D **Method** EPA 200.8			
Aluminum	<0.1 mg/L	99	70-130
Manganese	<0.01 mg/L	91	70-130
Run No 386224 **Analysis/Extraction Date** 2020-07-09 **Analyst** C M **Method** B 625/P 8270			
Bis(2-ethylhexyl)phthalate	<0.4 ug/L	88	20-140
Di-n-butylphthalate	<1.3 ug/L	74	20-140
Run No 386278 **Analysis/Extraction Date** 2020-07-15 **Analyst** SKH **Method** EPA 365.1			
Total P	<0.020 mg/L	96	80-120
Run No 386377 **Analysis/Extraction Date** 2020-07-14 **Analyst** REE **Method** SUBCONTRACT-A			
Nonylphenol Ethoxalate (Total)			
Nonylphenols (Total)	<1.0 ug/L	80	

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Sample Comment Summary

Sample ID: 1503274 Water 1 Metals analysis was performed on an aqua-regia digest of the sample material, except for Titanium.

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eurofins 206417

STANDARD CHAIN-OF-CUSTODY

146 Colonnade Road, Unit #8, Ottawa, ON, K2E 7Y1 - Phone: 613-727-5692, Fax: 613-727-5222

Eurofins Workorder #: 1933953

CLIENT INFORMATION

Company: Canada Engineering Services Inc.
Contact: Lawrence Yu
Address: 39 Davisbrook Blvd, Toronto, ON
Telephone: 416 4924000 Cell: 647 886 2108
Email: #1: lawrence@cesi.ca
Email: #2: ram@cesi.ca
Project: 12717 Ninth Line Quote #:

INVOICE INFORMATION (SAME AS CLIENT INFORMATION: YES ☑ NO ☐)

Company: Fax:
Contact: Email: #1:
Address: Email: #2:
Telephone: PO #:

TURN-AROUND TIME (Business Days)

☐ 1 Day* (100%) ☐ 2 Day** (50%) ☐ 3-5 Days (25%) ☑ 5-7 Days (Standard)

Please contact Lab in advance to determine rush availability.
*For results reported after rush due date, surcharges will apply: before 12:00 - 100%, after 12:00 - 50%.
**For results reported after rush due date, surcharges will apply: before 12:00 - 50%, after 12:00 - 25%.

REGULATION/GUIDELINE REQUIRED

☑ Sanitary Sewer, City: Stouffville
☑ Storm Sewer, City: Stouffville
☐ ODWSOG
☐ PWQO
☐ O. Reg 347/558
☐ Other:
☐ None

combined sewers by-law York region

☐ O. Reg 153
Table # ___, Course / Fine, Surface / subsurface.
Type: Com-Ind / Res-Park / Agri / GW / All Other / Sediment
☐ Excess Soil, Table: ___ Type: ___

The sample results from this submission will form part of a formal Record of Site Condition (RSC) under O.Reg. 153/04
☐ Yes ☑ No

The optimal temperature conditions during transport should be less than 10°C. Sample(s) cannot be frozen, unless otherwise indicated or agreed upon with the Laboratory. Note that this COC is not to be used for drinking water samples. The COC must be complete upon submission of the samples, there will be a $25 surcharge if required information is missing (required fields are shaded in grey).

Sample ID	Date/Time Collected	Sample Matrix	# of Containers	O.Reg.153 parameters: PHC F1 - F4	BTEX	VOCs	PAHs	PCBs	Metals + Inorganics	Metals only	Combined sewer by-law	RN# (Lab Use Only)
Water 1	July 7 /2020 4:00pm	GW	12								✓	1503274

PRINT / SIGN / DATE/TIME / TEMP (°C)

	PRINT	SIGN	DATE/TIME	TEMP (°C)
Sampled By:	Lawrence Yu	Lawrence Yu	July 8 / 12:00	
Relinquished By:				
Received By:	Victor Gallant	V.G.	07/08/20 11:44 a.m.	17.1 °C

COMMENTS:

CUSTODY SEAL: ☐ YES ☐ NO Ice packs submitted: ☑ Yes ☐ No