Hydrogeological Assessment
Proposed Residential Development
11 Main Street

Puslinch, Ontario

WDD Main Street Inc.
499 Brant Street
Burlington, Ontario
L7R 2G5

August 28, 2024
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ENGLOBE

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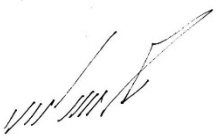

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1 Introduction

Englobe was retained by WDD Main Street Inc. to conduct a Hydrogeological Assessment for the proposed residential subdivision development at 11 Main Street, in the Town of Puslinch, Ontario (the 'Site').

The Site is bounded by vacant lands (wooded lots) to the south, Residential properties and Badenoch Street to the north, residential buildings to the west and a mixed residential and agricultural property to the east. The Site is irregular in shape with a total area of approximately 231,040 m^2 (57.1 acres). A Site location plan is provided in **Figure 1**.

Based on a review of the Draft Plan of Subdivision, drawing D14 dated June 9, 2024, prepared by Weston Consulting, it is understood that the proposed development would include a residential subdivision proposed within the north portion of the Site. The proposed subdivision consists of 21 single detached dwellings, a storm water management block, and internal roadways. Plan review indicates that residential lots will range in size from 0.197 ha to 0.382 ha. It is understood that each proposed dwelling will rest on a single basement level extending to the footprint of the proposed building.

The study was undertaken to assess the hydrogeological conditions of the Site and to provide general information regarding the hydrogeological impact of the proposed development on the local groundwater regime. The report addresses the following areas:

- Identifying the geological and hydrogeological setting of the Site;
- Confirming groundwater level(s) and flow direction(s) beneath the Site;
- Evaluating the pre- and post-development water balance for the Site;
- Completion of a servicing assessment including a review of well records to assess aquifer characteristics and the feasibility of individual private water supply wells, and a nitrate impact assessment to evaluate the feasibility of subsurface sewage disposal, and potential sewage treatment requirements.
- Identifying potential impacts to the nearby groundwater receptors including water supply wells and natural heritage features as a result of site servicing;
- Providing a mitigation plan for the potential impacts to the groundwater receptors and/or natural heritage features, if applicable;

The Township of Puslinch requires that a hydrogeological assessment be completed as below (Township of Puslinch, 2019):

- A hydrogeological study will be required for most new development applications to demonstrate the suitability of the site for development of private services.
- The hydrogeological study report will be prepared by a qualified professional (i.e. professional hydrogeologist or engineer) and will generally include details regarding the site setting, desktop geological and hydrogeological information, and results from a field investigation program established by the qualified professional to support the development including results from test pits, boreholes, sampling, pumping tests, monitoring wells and well surveys, as required.

- The hydrogeological study report will review the availability and sustainability of adequate groundwater supplies with respect to both quantity and quality, including any potential interference to existing water users or sensitive receptors (e.g., wetlands, watercourses).

2 Scope of Work

The following tasks were undertaken to address the requirements of the hydrogeological investigation:

- *Review of available background information*. A review of available geotechnical and hydrogeologic information for the site was conducted, including topographic mapping, geologic mapping, a search of the Ministry of the Environment Conservation and Parks online water well record database, applicable regulations including source water protection, Township of Puslinch official plans, areas regulated by the local conservation authority, and results of previous hydrogeological and geotechnical investigations completed at the site.

- *Groundwater Monitoring and Sampling*. Groundwater monitoring was completed in July 2024 following significant rainfall events to assess seasonal fluctuations in groundwater in comparison with groundwater levels obtained in August/September 2022. Groundwater quality sampling was completed to assess the general water quality for completed monitoring wells within the unconfined shallow groundwater and for surface water within Bronte Creek crossing the western extent of the Site. Groundwater/surface water analysis was competed for general inorganics and metals parameters wit results compared to O. Reg. 169/03.

- *Water Balance Assessment*. A water balance assessment was completed for the proposed development to compare the pre and post development conditions at the site given the proposed increase in impervious cover across the site following development. Recommendations were provided for the implementation of Low Impact Development techniques given the observed shallow soil and groundwater conditions at the site to maintain pre-development rates of infiltration under a Best Management Practice approach.

- *Preliminary Well Servicing Study*. A preliminary well servicing feasibility review was competed based on the results of shallow groundwater sampling, the likelihood for groundwater impacts due to land use was assessed. Aquifer yield was evaluated through a review of MECP well records. Recommendations for further study were provided to meet requirements of MOE Procedure D-5-5, and requirements from the local municipality.

- *Septic Impact Assessment*. A septic impact assessment was completed to evaluate the expected impact of subsurface sewage disposal on shallow groundwater in accordance with MOE Procedure D-5-4, as provided in the predictive assessment calculations for both on-site and off-site impacts.

3 Site Description

3.1 Site Description and Physiography

The site is located within the County of Wellington, and the Township of Puslinch at the municipal address of 11 Main Street in Morriston, Ontario. The site is located immediately south of Main Street extending east to south of Ochs Street and immediately south of residential dwellings fronting to Badennoch Street as indicated in the attached **Figure 1**. Land uses in the vicinity of the site consist of residential dwellings within the urban limits of Morriston. Residential dwellings fall to the north and west of the Site, with lands to the east and south consisting of undeveloped woodlot. The Site and surrounding vicinity are serviced with private water supply wells and private subsurface sewage disposal.

The Site is located within physiographic regions of Southern Ontario known as the Horseshoe Moraines (within the north, central, and west portions) and partially in Flamborough Plain (within the southeast and east portions). The Horseshoe Moraines within the vicinity of the Site comprises a Till Moraines, and Flamborough Plain consists of Limestone Plains physiographic feature.

The Horseshoe Moraines consist of the largest concentration of sand and gravel in Southern Ontario. Structurally, within the southwestern portion of the region, the Horseshoe Moraines consist of two to three morainic ridges composed of pale brown, hard, calcareous, fine-textured till, with moderate degrees of stoniness. (Chapman and Putnam, 1984). **Figure 4** shows the location of the Site within the regional physiography map.

The ground surface elevation was measured between 319.2 and 313.0 masl at the borehole locations drilled within the footprint to the proposed subdivision area. A review of a surface topography map for the Site and surrounding area indicates that the topography of the Site is sloping downwards in a northwest direction. As such, it is anticipated that generated runoff (if it is not managed) will flow in a northwesterly direction. **Figure 5** illustrates the topography of the Site and surrounding area.

3.2 Site Geology and Hydrogeology

The current understanding of the surficial geological setting of the Site is based on scientific work conducted by the OGS (OGS, 2003). The Site and surrounding area are mapped within Till consisting of stone-poor, sandy silt to silty sand-textured till. **Figure 3** illustrates the mapped surficial geology for the Site and the surrounding area.

Bedrock was not contacted over the current subsurface investigation. However, a review of the nearby MECP well records (MECP Well ID 6709771) indicates that the bedrock can be contacted approximately 24 m below ground surface. Bedrock within the vicinity of the Site is mapped within the Guelph Formation comprising dolostone (OGS, 2007).

The major underlying geologic units consist of grey coloured limestone/dolostone of the Guelph Formation followed by brown to black limestone/dolostone of the Amabel Formation, white and gray sandstones and shale of the Clinton and Cataract Groups and red shale of the Queenston Formation. The Guelph formation is characterized with a relatively massive dolostone cap rock, followed by fractures water bearing limestones.

The Guelph formation is expected to provide a confined to semi-confined groundwater aquifer. The underlying Amabel Formation also provides a water bearing aquifer for local residential and agricultural uses. It is expected that the contact between the Guelph and Amabel Formations consists of a highly fractured contact providing adequate water quantity and quality for residential use. Underlying sandstones of the Clinton/Cataract Group and shale of the Queenston Formation are not used for water supply.

The Site is located within Bronte Creek Watershed within the jurisdiction of Conservation Halton. The headwaters of the Bronte Creek are generated to the northwest of the Site and flows southeasterly direction crossing the southwest portion of the Site. The Bronte Creek Watershed is about 300 km^2 of mostly rural land that includes parts of Burlington, Oakville, Milton, Hamilton and Wellington County. The main branch of Bronte Creek is 48 kilometres long and there are 12 tributaries that feed into the creek. Many of the people who live and work in the Bronte Creek watershed are dependent on groundwater sources for drinking water and agricultural purposes (Conservation Halton Website, 2022).

The MNRF's database was reviewed for any natural heritage features including, watercourses, bodies of water, wetland features, Area of Natural and Scientific Interest (ANSI) and wooded areas. **Figure 6** shows the location of the Site within the surrounding Natural Heritage Features.

Record review indicates that there are wetland features and wooded areas near the Site. Records of wetland features, evaluated provincial as per Ontario Wetland Evaluation System (OWES), are scattered around the Site with a closest record (Beverly Swamp Wetland Complex) mapped near the southwest limits of the Site (approximately 260 m away from the Site boundary). A record of wetland feature evaluated as Other is mapped within the central potion of the Site extending to the south. Additionally, two records of unevaluated wetland feature are located within the west and southwest portions of the Site. Furthermore, records for wooded areas are scattered around and within the Site.

3.3 Review of Planning Policies

The Wellington County's Official Plan sets up policies that deal with legislative and administrative concerns, guides physical growth, and addresses social, economic, and environmental concerns. The Official Plan provides land use planning designations and identifies areas of environmental significance where more stringent policies may apply for development applications.

Schedule A7 (Puslinch) of the Wellington County Official Plans were reviewed on August 21, 2024 for the current study. A review of the draft plan of subdivision dated June 6, 2024, indicates that the Site is located within the secondary urban centre of Morriston, identified as a Greenbelt Town/Village. Schedule B7 (Puslinch) indicates the Site land use as a secondary urban centre, with areas to the south of the site designated as greenlands, and core greenlands (associated with Bronte Creek). Schedue C7 (Puslinch) indicates the Site does not fall within a wellhead protection area. The Paris Galt Moraine policy area falls immediately north of the Site.

Conservation Halton Regulated Area online mapping was reviewed on August 21, 2024. The Site is partially located within a Conservation Halton Regulated Area (along the south limit of the Site boundary). As such, it is anticipated that a permit from the Conservation Halton under O. Reg. 162/06 will be required for the proposed development.

3.4 Private Well Review

MECP well record database was reviewed for records located within a radius of 500 m from the approximate Site boundary (Study Area). The location of the well records is presented on **Figure 7**. A total of two hundred and twenty-eight (228) wells were located within the Study Area. A summary of data obtained from record review is presented in **Table 3-1** and **Appendix B**.

Table 3-1- MECP Well Record Summary

Number of the Well Records	228
Well Type	
Drilled Well	184 (81%)
Other method	24 (11%)
Unknown	20 (8%)
Target Aquifer	
Overburden	43 (19%)
Shallow Bedrock (Depth less than 36.5 m)	76 (33%)
Deep Bedrock (Depth greater than 36.5 m)	31 (14%)
No Data	78 (34%)
Depth Ranges	
Less than 10.7 m (Less than 35 ft)	16 (7%)
10.7 m to 30.5 m (35 ft to 100 ft)	61 (26%)
Greater than 30.5 m (Greater than 100 ft)	79 (35%)
No Data	72 (32%)
Water Use (Final Status)	
Observation Well/Test Hole/Monitoring	14 (6%)
Domestic/Livestock	194 (85%)
Alteration	7 (3%)
Abandoned - Quality	1 (0%)
Abandoned - Other	6 (3%)
Commercial/Public	6 (3%)
Pumping Rate	
18.9 L/min or less (5.0 G/min of less)	6 (3%)
22.9 L/min - 56.7 L/min (6.0 G/min - 15 G/min)	70 (31%)
60.5 L/min - 113.4 L/min (16 G/min - 30 G/min)	56 (25%)
Greater than 113.4 L/min (Greater than 30 G/min)	3 (1%)
No Data	93 (40%)
Reported Static Water Level	
Less than 6.1 m (20 ft)	23 (10%)
6.1 m to 11.0 m (20 ft to 36 ft)	47 (21%)
Greater than 11.0 m (36 ft)	132 (58%)
Unknown	26 (11%)

The above summary indicates that most local wells are drilled wells registered as domestic supply wells. Four (4) records of water supply wells are also listed within the Site (Record nos. 177, 178, 185 and 186 on **Figure 7** and **Appendix B**). These wells are situated along the central northern property limit and are wells for properties adjacent to the Site.

Based on a review of local well records, the primary water supply aquifer consists of overburden deposits expected at the contact between overburden and bedrock, or within the Guelph Formation at depths less than 30.5 m below existing grades. Wells were also noted within deep bedrock understood to be the Amabel

Formation at depths typically greater than 35.1 m below existing grades. Reported flow rates are typically greater than 18.9 L/min and are expected to range from 37.8 L/min to 75.6 L/min, considered suitable for residential supply.

3.5 Climate Conditions

The following general climate data was obtained from historical climate data available online through Environment Canada. Annual precipitation data was used from the Guelph Turf Grass Institute Weather Station located approximately 14 kilometers north from the site. Average precipitation values were used over the period of 1998 to 2024. Climate conditions expected for the site are summarized as follows:

- Precipitation 958 mm/a
- Evapotranspiration 611 mm/a
- Water Surplus 347 mm/a

Infiltration of precipitation at the site is expected to be controlled by soil type at the site which consists of silty sand overlying clayey silt till. Infiltration rates were determined based on typical ground water recharge rates for various soil textures provided within the "MOEE Hydrogeological Technical Information Requirements for Land Development Application", (MOEE, 1995), Table 3 (page 4-63). Based on an annual water surplus of 347 mm per year the annual rates for infiltration and runoff at the site were estimated a 208 mm and 139 mm respectively.

Potential evapotranspiration (611 mm/a) was calculated following the Thornthwaite method as below:

$$PET\ (cm/month) = 1.6\ (L/12)\ (10T_a/I)^a$$

Where: L is the average day length

T_a is the average daily temperature

$I = \Sigma\ (T_a/5)^{1.5}$

$a = (6.75 \times 10^{-7})\ I^3 - (7.71 \times 10^{-5})\ I^2 + (1.792 \times 10^{-2})\ I + 0.49$

Values for average day length and average daily temperature were obtained online from the Environment Canada climate normals for 1994 – 2022 for the Guelph Turf Grass Institute Weather Station. The climate reported above is typical for Southern Ontario with annual total precipitation exceeding the mean annual evapotranspiration.

It is noted that the above are average values, which are representative in a regional context. There will be seasonal and annual variations in these values. However, the average values will govern long-term ground water recharge and discharge rates at the site. Therefore, average values are considered appropriate for the assessment of the hydrogeological conditions at the site.

3.6 Summary of Subsurface Investigation

Borehole drilling and monitoring well installation were conducted in conjunction with a geotechnical investigation on August 16, 2022. The program consisted of the drilling of five boreholes and the installation of four monitoring wells across the Site. The approximate locations of boreholes are shown on **Figure 2**.

The following Site stratigraphy is based on encountered stratigraphy within completed boreholes and noted findings in the field. It should be noted that the subsurface conditions are confirmed at borehole locations only, and may vary at other locations. The boundaries between the various strata represent an inferred transition rather than a precise plane of geological change. This summary is intended to correlate the data to assist in the interpretation of the subsurface conditions at the Site. For more specific subsurface details, refer to the enclosed Borehole Logs and a geological cross-section in **Appendix A**.

Boreholes were completed to various depths between 6.6 m to 8.1 m below grade (elevations ranging from 313.3 m to 306.4 m). The subsurface conditions encountered at the Site generally consisted of sand fill overlying silty sand and clayey silt (within BH1) to the completed depth of investigation. The following is a general description of the major stratigraphic units and ground water conditions observed in the boreholes completed at the Site.

3.7 Earth Fill

Earth fill materials, consisting of sand, with some gravel and trace amounts of rootlets were encountered at the surface layer in each borehole and extended to a depth of 0.8 mbgs (elevations ranging from 319.1 m to 312.2 m).

Fill material is loose to dense in consistency and brown in color. The in-situ moisture contents of the fill samples ranged from 2 to 7 percent by mass, indicating a moist condition.

3.8 Silty Sand to Sand and Silt

Silty sand to Sand and Silt deposits, with trace amounts of clay and gravel was encountered beneath the earth fill zone in each borehole and extended to the depths ranging from 6.1 m to the full depth of investigation except for BH1 where silty sand deposits extended to a depth of 6.1 mbgs, or an elevation of 306.9 m.

Silty sand to sand and silt is loose to very dense in consistency and brown in color. The in-situ moisture contents of the silt soil samples ranged from 0 to 22 percent by mass, indicating a moist to wet condition.

3.9 Clayey Silt

Stratum of clayey Silt deposits, with trace amount of sand was encountered beneath the silty sand to sand and silt deposits in Borehole 1 approximately 6.1 mbgs, (elevation of 306.9 m) and extended to the depth of 6.6 mbgs (306.4 m).

It is very stiff in consistency and brown in color. The in-situ moisture content of the clayey silt sample was 15 percent by weight, indicating a moist condition.

3.10 Ground Water Conditions

A groundwater monitoring program was completed between August 24th, 2022 extending to September 19th, 2022 as a part of the hydrogeological assessment. Four (4) monitoring wells installed for the hydrogeological assessment were considered for monitoring program.

Monitoring wells were developed on August 24th, 2022 and the groundwater levels were measured using an interface probe (Solinst Interface Metre, Model 122).

Additional groundwater monitoring was completed in 2024 following significant rainfall events to evaluate seasonal fluctuations in groundwater and expected seasonal high groundwater elevations for the Site. High groundwater conditions were monitored on July 18, 2024, which were measured following significant precipitation on July 10, 2024, of 59 mm, and July 16, 2024, of 56.7 mm, with monthly precipitation for July 2024 of 166.2 mm (average monthly rainfall of 80 mm). Precipitation was recorded at the Guelph Turf Grass Institute Weather Station, located approximately 14 km northwest of the site and obtained online through the Environment Canada website.

While groundwater monitoring is not taken within the period of seasonal high groundwater conditions, given the high intensity precipitation over the month of July 2024, monitoring results are considered representative of seasonal high conditions.

The measured groundwater levels, along with other monitoring wells details and findings, are presented in **Appendix C**. A summary of the groundwater observations is provided in **Table 3-2**:

Table 3-2- Static Groundwater Level Monitoring

Well ID		Screen Interval	24-Aug-22	7-Sep-22	19-Sep-22	18-Jul-24	06-Aug-24
BH1	mbgs	3.6-6.6	Dry	Dry	Dry	3.93	3.98
	masl	309.4-306.4	Dry	Dry	Dry	309.04	308.99
BH2	mbgs	6.1-7.6	6.64	6.72	6.76	5.61	5.64
	masl	312.1-310.6	311.54	311.46	311.42	312.57	312.54
BH3	mbgs	4.6-7.6	5.22	5.33	5.42	4.29	4.35
	masl	312.5-309.5	311.93	311.82	311.73	312.86	312.80
BH5	mbgs	4.6-6.1	5.13	5.21	5.21	4.40	4.44
	masl	312.2-310.7	311.67	311.59	311.59	312.40	312.36

Notes: mbgs: metres below ground surface
masl: metres above sea level

As shown in **Table 6-1**, the highest and lowest stabilized shallow groundwater levels were measured at elevations of 312.57 m and 312.86 m at monitoring wells BH3 and BH2, respectively.

3.11 Groundwater Flow Pattern

Groundwater flow pattern was interpreted using groundwater levels measured in the monitoring wells on July 18, 2024. **Figure 8** presents the interpreted groundwater flow pattern. Groundwater elevations are noted highest at BH3 at an elevation of 312.8 m which forms a local groundwater divide with groundwater flow to the east of the site directed to the tributary of Bronte Creek and associated wetlands, and flow to the west directed to Bronte Creek. Local groundwater flow will be influenced by topography and surface water features. Residential properties along Badenoch Street north of the site are considered as upgradient of the site, with Bronte Creek, and associated tributaries and wetlands located downgradient.

3.12 In-Situ Hydraulic Conductivity Testing

Hydraulic conductivity of the screen native subgrade was assessed at each of the completed monitoring well locations. Hydraulic conductivity analysis was determined based on falling and rising head single well response test (SWRT) tests. The results of the SWRT and rising head tests were analysed using the Bouwer and Rice method (1976). The results of the analysis are presented in **Appendix D**, with a summary of the findings provided in **Table 3-3** below:

Table 3-3 – Hydraulic Conductivity Based on In-Situ Hydraulic Conductivity Tests

Monitoring Well	Well Screen Elevation (masl)	Screened Geological Unit	Hydraulic Conductivity (m/s)	Test Method
BH2	312.1 to 310.6	Silty Sand to Silt and Sand	1.21×10^{-6}	Rising Head Test
BH3	312.5 to 309.5	Silty Sand to Silt and Sand	1.18×10^{-6}	Falling Head Test

A review of the findings suggests a moderate to low hydraulic conductivity for the silty sand to silt and sand layer within the screened intervals.

3.13 Summary of Water Quality Analysis

Groundwater quality sampling was completed within monitoring wells BH1, BH2, BH3, and BH5 and surface water sampling was competed from Bronte Creek at the southwest extent of the site. Analysis was completed for general inorganic parameters and dissolved metals (total metals for surface water analysis), with results compared to the Ontario Drinking Water Standards and Operational Objectives (O.Reg. 169/04).

Groundwater and surface water samples were submitted to Agat Laboratories of Mississauga, a CALA accredited third party laboratory, for analysis. All samples were collected in laboratory supplied bottles appropriate for the analysis completed. Collected samples were stored on ice in suppled coolers for transport to the laboratory. Sample temperatures were confirmed between 5.3 to 6.1 ^{o}C upon arrival. A summary of the results of groundwater and surface water sampling and laboratory certificates of analysis are provided in the attached **Appendix E**, with **Table 1** provided a summary of analysis in comparison with O.Reg. 169/03.

Groundwater quality analysis indicated elevated hardness levels within all collected samples, considered representative given the limestone bedrock and high calcium carbonate content of soils and bedrock. Samples from BH3 were observed to have elevated levels of sodium (117 mg/L), chloride (202 mg/L), total dissolved solids (824 mg/L) and nitrate (6.01 mg/L) relative to other obtained groundwater samples, not in exceedance of drinking water standards. Surface water sampling indicated elevated concentrations of sodium (309 mg/L), chloride (476 mg/L), and total dissolved solids (1,200 mg/L).

Shallow groundwater quality was observed to be within drinking water standards and is not considered to represent a potential source of contamination for the underlying bedrock aquifer. Further soils across the site were noted to consist of silty sand to sand and silt overlying clayey silt with bedrock depth reported through well records at depths of approximately 24 m (80 feet). It is expected that the underlying bedrock aquifer is geologically isolated from surrounding land use impacts including subsurface sewage disposal and agricultural uses.

4 Water Balance Assessment

Based on a review of the Draft Plan of Subdivision, drawing D14 dated June 9, 2024, prepared by Weston Consulting, it is understood that the proposed development would include a residential subdivision proposed within the north portion of the Site. The proposed subdivision consists of 21 single detached dwellings, a storm water management block, and internal roadways. Plan review indicates that residential lots will range in size from 0.197 ha to 0.382 ha. It is understood that each proposed dwelling will rest on a single basement level extending to the footprint of the proposed building.

The pre-development site is considered undeveloped. The following area breakdown for the Site is expected given the current draft plan of subdivision:

- Single Detached Residential 4.436 ha
- Storm Water Management 0.345 ha
- Environmental Protection Lands 17.131 ha
- Additional Lands 0.059 ha
- Roads 1.133 ha
    - **TOTAL 23.104 ha**

The total developable area of the site is considered at 5.973 hectares, given the coverage of Environmental Protection Lands which are to be maintained following site development.

Soil conditions for the site were evaluated based on a series of five boreholes completed by Englobe in August 2022 as summarized in Section 3.6 above. Regional climate conditions were based on historical weather records accessed online from Environment Canada and are summarized in Section 3.5 above.

Based on the proposed development plan it is expected that an increase in impervious areas at the site following development will result in an overall increase in the rate of runoff of precipitation at the site with a corresponding decrease in both infiltration and evapotranspiration. The following **Table 4-1** provides a summary of the calculated water balance given the site conditions and the proposed plan of development:

Table 4-1 - Summary of Site Water Balance

	Precipitation (m^3/a)	Evapotranspiration (m^3/a)	Infiltration (m^3/a)	Runoff (m^3/a)
Pre-Development	221,336	141,165	48,103	32,068
Post-Development	221,336	119,838	39,484	62,014

An infiltration deficit of approximately 8,619 m^3 is expected following site development. It is expected that the pre-development water balance at the site can be maintained following a Best Management Practice approach utilizing proposed site grading and through directing rooftop runoff to infiltration where feasible. It is understood that an infiltration gallery is proposed within the SWP block, near the headwall structure HW3. It is expected that the gallery will be sufficiently sized to meet the pre-development infiltration targets following site development. It is expected that the mitigated water balance will be further assessed as part of detailed design, once storm water management designs for the developed Site are finalized. The detailed water balance for the site is provided in the attached **Table 2**.

4.1 Water Balance Targets

Under the pre-development scenario the site is considered largely impervious. The predicted annual groundwater infiltration volume, providing recharge for shallow groundwater at the site under current pre-development land use is estimated at 48,103 m^3. Under the post-development scenario rates of evapotranspiration and infiltration are expected to decrease and the rate of runoff of precipitation will increase due to the increase in impermeable surface across the project area. Under the current plan of development, the un-mitigated infiltration across the site is anticipated at 39,484 m^3 following site development with a post development annual infiltration deficit estimated at 8,619 m^3.

It is expected that roof leaders for residential lots will discharge overland for infiltration. For the purposes of consideration of the mitigated water balance it was considered that the discharge of roof runoff to the rear yard area would account for half of the discharge from 50% of rooftop coverage (total of 25% runoff reduction), It is expected that front yards draining 50% of rooftop runoff would drain to the ROW and would be directed to the SWP block. It is expected that through discharging roof runoff to overland flow that an additional 4,781 m^3 of runoff would be directed to infiltration.

The remaining pre-development infiltration deficit of approximately 3,838 m^3 would be directed to infiltration through the implementation of an infiltration gallery within the SWMP block at the proposed headwall HW3 structure. It is understood that the infiltration gallery design will be provided as part of detailed design. Infiltration testing within the area proposed for an infiltration gallery will be required once the location and design have been finalized.

Given the hydrogeological function of the site to provide recharge for shallow groundwater, with groundwater discharge expected to Bronte Creek, and associated tributaries and wetland areas. The primary water balance consideration following site development for underlying ground water would be for the maintenance of the pre-development rates of infiltration across the site following a Best Management Practice approach. We are of the understanding that an infiltration galley has been proposed for the development to meet the development target for maintaining rates of per-development infiltration across the Site following development. Details of the infiltration gallery are provided in the FSR prepared by Crozier.

5 Servicing Assessment

5.1 Private Water Supply Considerations

Confirmation of potable water for the purpose of water servicing for residential demand is proposed to be completed as part of detailed design under a condition of draft plan approval. For the purposes of obtaining approvals for the draft plan of sub-division the feasibility of water servicing was assessed through a review of well yield provided within surrounding well records as summarized in Section 3.4 above.

Under Procedure D-5-5 the minimum well yield required for residential supply would be based on the per-person requirement of 450 L/day, with peak demand based on a rate of 3.75 L/min over a period of 120 minutes. Based on the expected design of 4-bedroom dwellings with five residents the expected daily water demand would be 18.75 L/day, with a daily volume of 2,250 L/day.

Domestic potable supply wells are reported to be completed within overburden deposits expected to consist of sand and gravel to gravel directly overlying limestone bedrock at depths ranging from 22 to 25 m below grade, or within the shallow bedrock at depths less than 30.5 m. It is anticipated that overburden deposits will provide for flow rates of at least 18.9 L/day (approximately 3% of 228 well records provided for flows of 18.9 L/min or less). Bedrock has expected yields of 37.8 L/min or greater (upwards of 113.4 L/min).

Given that daily residential demand requirements are expected below the expected yield for shallow bedrock it is expected that water taking would not result in significant drawdown, and as such, interference effects between wells competed for proposed lots and for existing private water supply wells is expected to be minimal. Further confirmation of water servicing will be competed through the completion of a well survey, test well drilling, monitoring, and completion of pumping tests and groundwater sampling.

The following scope of work will be required for confirmation of private water servicing for the proposed residential lots, which will be completed and reported under separate reporting, proposed to be submitted as part of the detailed design submission for the proposed development:

- *Private Well Survey*: A private well survey would be completed for properties completed within a 250 m radius of the Site. The private well survey will be completed to verify locations of private water supply wells and to interview residents regarding the construction details and operation history for installed private water supply wells. As part of the well survey permission for well monitoring will be requested during the test well program detailed below.
- *Establish On-Site and Off-Site Well Montoring Program*: A network of both on-site and off-site monitoring wells will be established prior to the start of pumping tests for on-site test wells. Shallow monitoring well locations on-site would be monitored, including off-site private wells where permission to monitor is provided by the property owner. Water levels would be monitored the week prior, during, and one week following completion of well testing. Consideration would be provided for the installation of datalogging pressure transducers within selected wells over the duration of monitoring.

- *Completion of Test Wells*: Three test wells will be completed on-site, in compliance with guidelines within Procedure D-5-5 given the developable area of 5.973 ha (three test wells for sites of 15 ha or less). Test wells will be located such that they can be used for the proposed development. The target depth for test wells will depend primarily on the conditions encountered. It is expected to drill test wells to the top of bedrock. If yields are not expected to meet residential demand wells will be extended within bedrock deposits. It is expected that well depth will not extend past depths of 30.5 m, however, it is expected that deeper bedrock deposits will provide for suitable residential supply if necessary. If adequate yields are not encountered within shallow bedrock well casing will be extended into deep bedrock to maintain separation between shallow and deep bedrock aquifers.
- *Completion of Pumping Tests*: Pumping tests for each of the three completed test wells will be completed simultaneously to confirm suitable yield and groundwater quality for residential supply. Pumping tests will be completed over the duration of six-hours or extended to withdrawal twice the daily residential demand (4,500 L) at the expected sustainable yield determined during test well drilling/well development.
- *Groundwater Sampling Program*: Groundwater sampling would be competed for each test well over three sampling events to confirm potability for residential use and to assess the for the potential degradation of groundwater quality wit taking. Groundwater quality would be analyzed for O.Reg. 169/03 including Schedule 1 and partial Schedule 2 (metals and inorganics) parameters. Groundwater sampling would be completed for private monitoring wells prior to and following completion of testing for potential parameters of concern including microbiology, nitrate, sodium, and chloride.

5.2 Sewage System Design for Proposed Development

The highest stabilized groundwater level was recorded at an elevation of 312.86 m, or 4.29 m below existing grades, in monitoring well BH3 on July 18, 2024. The highest groundwater level should be considered for designing the base of the proposed septic bed.

The percolation rate of the subsoil profile beneath the Site was confirmed by T-Time testing completed on three available soil samples as summarized in the **Table 5-1**:

Table 5-1 - Percolation Rate using T-Time Test

BH ID	Sample ID	Depth (mbgs)	Elevation (masl)	Soil Media	Percolation Time (min/cm)	Estimated Percolation Rate(mm/h)
1	7	6.10	306.9	Clayey Silt, trace sand	58	10.3
3	7	2.30	314.8	Silt and Sand, trace clay	45	13.3
5	3	1.54	315.3	Silty Sand, trace clay	11	54.5

mbgs- metres below ground surface
masl- metres above sea level

Shallow native soils underlying tile beds consist of silty sand with expected percolation rates (T-times) of 11 min/cm. Preliminary tile bed design is proposed to consist of a conventional Class IV in-ground leaching bed with advance tertiary treatment (with standard tertiary treatment for lots 1 and 12), for subsurface discharge of sewage effluent. Preliminary design parameters are provided for the construction of Class IV

leaching beds with tertiary treatment to service residential lots. It is anticipated that maximum peak sewage flows from the new septic systems will be approximately 3,600 L/day based the proposed servicing design prepared by Crozier. The length of distribution pipe, given that tertiary treatment units are proposed for residential lots are based on the following equation:

$$L=QT/300$$

Where: L is the length of distribution pipe in metres
Q is the design sewage flows (3,600 L/day)
T is the percolation rate of the underlying native subgrade (11 min/cm)

Given the sanitary design flows and the expected percolation rate for the shallow native subgrade leaching beds are expected to be comprised of 132 m of distribution pipe, which is expected to consist of 11 runs or 12 m pipe. With 1.6 m between runs of pie leaching bed dimensions are expected at 16 m by 12 m.

Based on the review of the sewage needs estimates provided for the proposed residential development, being below 10,000 litres per day, no approval for a proposed sewage works from the MECP is anticipated. An approval for the proposed on-site septic sewage system can likely be obtained through the Ontario Building Code through the local municipality.

Given the prevalent soil conditions (silty sand) it is expected that the tile bed will be constructed as an in-ground bed. Setbacks from the tile bed and sewage treatment facility will be required as follows:

Table 5-2 - Summary of Setback Clearances

	Distribution Pipe Clearances (m)
Structure	5
Well with a watertight casing to a depth of 6 m	15
Any other well	30
Surface water	15
Spring not used as a source of potable water	15
Property line	3

6 Nitrate Loading Impact Assessment

A nitrate loading impact assessment was conducted for nitrate to determine the anticipated concentration that can be predicted at the hydraulically down-gradient Site boundary based on the establishment of individual on-site septic sewage system to service each proposed residential lot. The assessment is based on The Ministry of the Environment Conservation and Parks (MECP) guideline D-5-4 for individual on-site sewage systems. The assessment assumes natural attenuation for nitrate in shallow groundwater through dilution from infiltration of precipitation and from sewage system loading due to the proposed residential dwellings.

A monthly water balance model (the Thornthwaithe water-balance program) provided by the U.S. Geological Survey (USGS, 2007) was used to determine the average infiltration rate at the Site. The long-term precipitation data were collected from the Canadian Climate Normal between 1981 and 2010 from the Government of Canada website for the Guelph Turfgrass Institute weather station located approximately 14 km to the north of the Site.

The approximate infiltration rate for the Site was determined, based on the 30-year climate normal for precipitation. A mass balance calculation was completed for nitrate at the Site, which was assessed based on use of both conventional and tertiary treatment for sewage effluent input to septic leaching beds, with the concentration of nitrate loading to groundwater set at 40 mg/L for use of conventional effluent treatment, at 20 mg/L for tertiary effluent treatment, and at 15 mg/L for advanced tertiary effluent treatment, respectively.

Background nitrate concentration was measured at monitoring wells BH2, BH3 and BH5. Groundwater samples were collected on February 7, 2023. Upon sampling, bottles were placed in ice and packed in a cooler at about 4.0° C for shipment to the analytical laboratory. Sample analysis was performed by SGS, a third-party laboratory accredited by the Canadian Association for Laboratory Accreditation (CALA). The samples were compared to confirm nitrite, nitrate, Total Phosphorous (TP), ammonia and pH of the groundwater beneath the Site. Nitrate concentrations in shallow groundwater were assessed based on sampling completed on August 6, 2024, with nitrate concentrations in groundwater measured at 0.37, 1.54, 6.10, and 1.66 mg/L within BH1, BH2, BH3, and BH5 respectively.

A total of 21 residential lots are proposed with lot size ranging from 1,940 m^2 to 3,820 m^2. Septic leaching beds are proposed with approximate dimensions of 16 m by 23 m. As such, an area of 368 m^2 was considered as the septic bed area for the current assessment. The average flow rate of 1,000 L/day per residence was considered for the nitrate loading impact assessment.

Nitrate loading was assessed on a single lot basis based on the expected infiltration rate, given the proposed lot area. Nitrate loading calculations were assessed as follows:

$$C_{pb} = [(Ci \times Vi) + (Cs \times Vs)]/[Vi + Vs]$$

Where:

Ci = concentration of nitrate in precipitation, taken at 0.1 mg/L.

Vi= Annual volume of recharge (i.e. lot area less impervious surfaces x annual infiltration rate (liters)).

Cs = Nitrate concentration in sewage set at 40 mg/L for conventional septic systems, at 20 mg/L for septic systems having tertiary treatment, and at 15 mg/L for advanced tertiary treatment system.

Vs = Volume of sewage where 1,000 L/day of sewage has been considered for each lot.

Cpb = Concentration of nitrate modeled for the Site boundary based on the mass balance approach

Based on the mass balance calculation, the predicted nitrate concentration assessed for the down-gradient lot boundary for each lot is calculated without considering background nitrate in groundwater. Details are presented in the following **Table 6-1:**

Table 6-1 - Predicted Nitrate Concentration at Down-Gradient Property Limit (Without Background)

Lot Size (m^2)	Lot No	Conventional Treatment (40 mg/L)	Tertiary Treatment (20 mg/L)	Advanced Tertiary Treatment (15 mg/L)
1,940	18	17.57 mg/L	8.81 mg/L	6.62 mg/L
1,950	19, 20	17.52 mg/L	8.79 mg/L	6.60 mg/L
1,960	15	17.47 mg/L	8.76 mg/L	6.59 mg/L
1,970	16, 17, 21	17.42 mg/L	8.74 mg/L	6.57 mg/L
1,980	7	17.37 mg/L	8.71 mg/L	6.55 mg/L
1,990	4	17.32 mg/L	8.69 mg/L	6.53 mg/L
2,000	6, 8, 9, 11	17.27 mg/L	8.66 mg/L	6.51 mg/L
2,020	2	17.17 mg/L	8.62 mg/L	6.48 mg/L
2,030	13	17.12 mg/L	8.59 mg/L	6.46 mg/L
2,040	3	17.08 mg/L	8.57 mg/L	6.44 mg/L
2,050	10	17.03 mg/L	8.54 mg/L	6.42 mg/L
2,060	5	16.98 mg/L	8.52 mg/L	6.40 mg/L
2,090	14	16.84 mg/L	8.45 mg/L	6.35 mg/L
2,530	1	15.02 mg/L	7.54 mg/L	5.67 mg/L
3,820	12	11.41 mg/L	5.74 mg/L	4.32 mg/L

The total predicted nitrate concentration was assessed for the down-gradient lot boundary for each lot including the geometric mean of background nitrate. The geomean of the nitrate concentration in groundwater was calculated at 1.55 mg/L based on nitrate concentrations measured in August 2024. Total anticipated nitrate concentration for the down-gradient of the lots is summarized in the following **Table 6-2**:

Table 6-2 – Total Predicted Nitrate Concentration at Down-Gradient Property Limit

Lot Size (m^2)	Lot No	Conventional Treatment (40 mg/L)	Tertiary Treatment (20 mg/L)	Advanced Tertiary Treatment (15 mg/L)
1,940	18	19.12 mg/L	10.36 mg/L	8.17 mg/L
1,950	19, 20	19.07 mg/L	10.34 mg/L	8.15 mg/L
1,960	15	19.02 mg/L	10.31 mg/L	8.14 mg/L
1,970	16, 17, 21	18.97 mg/L	10.29 mg/L	8.12 mg/L
1,980	7	18.92 mg/L	10.26 mg/L	8.10 mg/L
1,990	4	18.87 mg/L	10.24 mg/L	8.08 mg/L
2,000	6, 8, 9, 11	18.82 mg/L	10.21 mg/L	8.06 mg/L
2,020	2	18.72 mg/L	10.17 mg/L	8.03 mg/L
2,030	13	18.67 mg/L	10.14 mg/L	8.01 mg/L

Lot Size (m^2)	Lot No	Conventional Treatment (40 mg/L)	Tertiary Treatment (20 mg/L)	Advanced Tertiary Treatment (15 mg/L)
2,040	3	18.63 mg/L	10.12 mg/L	7.99 mg/L
2,050	10	18.58 mg/L	10.09 mg/L	7.97 mg/L
2,060	5	18.53 mg/L	10.07 mg/L	7.95 mg/L
2,090	14	18.39 mg/L	10.00 mg/L	7.90 mg/L
2,530	1	16.57 mg/L	9.09 mg/L	7.22 mg/L
3,820	12	12.96 mg/L	7.29 mg/L	5.87 mg/L

Example calculations are provided in the attached **Appendix F**. Based on the completed nitrate impact calculations it is expected that standard tertiary treatment (20 mg/L of nitrate) would be acceptable to meet a concentration of 10 mg/L at the downgradient property boundary for lots 1 and 12, and advanced tertiary treatment (15 mg/L of nitrate) would be required for the remainder of lots (0.194 ha to 0.209 ha).

It should be noted that additional dilution from assessed groundwater underflow beneath the Site has not been considered for the assessment (all above mentioned scenarios), so the results are considered a conservative evaluation.

7 Environmental Impact Analysis

Environmental impacts for sewage disposal at the Site were assessed given the requirements for tertiary treatment as discussed in Section 6.0 above. Bronte Creek south of the site was considered as the primary effluent receiver for septic effluent. The primary parameters of concern for surface water were considered as nitrate and total phosphorus. The target criteria for nitrate to surface water considered is the nitrate limit of 2.93 mg/L based on the Canadian Water Quality Guidelines (CWQG) and total phosphorus concentrations of 0.03 mg/L for rivers and streams from the Provincial Water Quality Objectives (PWQO).

Surface water sampling was completed for Bronte Creek south of the site on August 6, 2024. Concentrations of nitrate in surface water were measured at 1.92 mg/L, and total phosphorus concentrations were non detectable (i.e., <0.02 mg/L). Nitrate impacts to surface water were evaluated based on a site wide mass balance approach as determined by the following equation:

$$C_{PB} = (V_s \times L \times C_s)/[(I \times A) + (Vs \times L)]$$

Where: C_{PB} is the concentration of nitrate at the property boundary (mg/L);
V_s is the average annual sewage flow per lot (365 m^3/yr);
L is the number of proposed lots (21);
C_s is the effluent nitrate concentration (15 mg/L);
I is the infiltration rate for the native subgrade consisting of silty sand (0.175 m/yr); and,
A is the site area (231,040 m^2).

Based on the above equation the nitrate concentration expected towards Bronte Creek flowing immediately south of the Site is expected at 2.39 mg/L provided advanced tertiary treatment systems are utilized for residential lots as recommended under Section 5.0 above. Nitrate impacts to surface water in exceedance of the CWQG limit of 2.93 mg/L are not expected due to the proposed development.

Potential impacts to surface water because of total phosphorus were evaluated through the assessment of potential travel times for sewage effluent given the measured hydraulic conductivity of 1.2 x 10^{-6} m/s for silty sand deposits as measured at BH2 and BH3. It is expected that separation distances from proposed residential lots to Bronte Creek range from approximately 30 m for lots backing to buffers surrounding Bronte Creek (i.e., Lots 1, 2, and 7) to approximately 150 m for lots towards the norther property limit (i.e., Lots 15, 16, and 17). The expected travel time for sewage effluent is expected to range from 0.8 years to 4 years based on the separation distances from proposed lots to Bronte Creek. It is expected that soils will have attenuative capacity to allow for dilution of total phosphorus such that significant impacts to surface water is not expected.

Potential impacts to groundwater because of microbial pathogens from the sewage effluent were also considered. A risk of contamination from microbial pathogens exists within areas where high rates of groundwater flow are expected including coarsely textured soils or fractured or karstic bedrock environments. Given the prevalent soil conditions of silty sand overlying clayey silt, and the depth to bedrock impacts to groundwater due to microbial pathogens is not expected.

8 Summary and Conclusions

Based on the results of the investigation, the following summary and conclusions are provided:

i. The Site is located within physiographic regions of Southern Ontario known as the Horseshoe Moraines (within the north, central, and west portions) and partially in Flamborough Plain (within the southeast and east portions). The Horseshoe Moraines within the vicinity of the Site comprises a Till Moraines, and Flamborough Plain consists of Limestone Plains physiographic feature. The Site is located within Bronte Creek Watershed within the jurisdiction of Conservation Halton. The headwaters of the Bronte Creek are generated to the northwest of the Site and flows southeasterly direction crossing the southwest portion of the Site.

ii. Based on a review of local well records, the primary water supply aquifer consists of overburden deposits expected at the contact between overburden and bedrock, or within the Guelph Formation at depths less than 30.5 m below existing grades. Wells were also noted within deep bedrock understood to be the Amabel Formation at depths typically greater than 35.1 m below existing grades. Reported flow rates are typically greater than 18.9 L/min and are expected to range from 37.8 L/min to 75.6 L/min, considered suitable for residential supply.

iii. Boreholes were completed to various depths between 6.6 m to 8.1 m below grade (elevations ranging from 313.3 m to 306.4 m). The subsurface conditions encountered at the Site generally consisted of sand fill overlying silty sand and clayey silt (within BH1) to the completed depth of investigation.

iv. Groundwater elevations are noted highest at BH3 at an elevation of 312.8 m which forms a local groundwater divide with groundwater flow to the east of the site directed to the tributary of Bronte Creek and associated wetlands, and flow to the west directed to Bronte Creek. Local groundwater flow will be influenced by topography and surface water features. Residential properties along Badenoch Street north of the site are considered as upgradient of the site, with Bronte Creek, and associated tributaries and wetlands located downgradient.

v. Hydraulic conductivity testing was carried out within monitoring wells installed at BH2 and BH3, screened within silty sand. Hydraulic conductivity of the shallow native subgrade was measures at 1.2×10^{-6} m/s.

vi. Shallow groundwater quality was observed to be within drinking water standards and is not considered to represent a potential source of contamination for the underlying bedrock aquifer. Further soils across the site were noted to consist of silty sand to sand and silt overlying clayey silt with bedrock depth reported through well records at depths of approximately 24 m (80 feet). It is expected that the underlying bedrock aquifer is geologically isolated from surrounding land use impacts including subsurface sewage disposal and agricultural uses.

vii. An infiltration deficit of approximately 8,619 m^3 is expected following site development. It is expected that the pre-development water balance at the site can be maintained following a Best Management Practice approach utilizing proposed site grading and through directing rooftop runoff to infiltration where feasible. It is understood that an infiltration gallery is proposed within the SWP block, near the headwall structure HW3.

viii. Based on a review of well records groundwater yields typically range from 37.8 L/min to 94.5 L/min, with the expected water demand of 18.9 L/min to meet peak demand. Given that daily residential demand requirements are expected below the expected yield for shallow bedrock it is expected that water taking would not result in significant drawdown, and as such, interference effects between wells competed for proposed lots and for existing private water supply wells is expected to be minimal. Further confirmation of water servicing will be competed through the completion of a well survey, test well drilling, monitoring, and completion of pumping tests and groundwater sampling.

ix. Given the sanitary design flows of 3,600 L/day, with use of tertiary treatment units, and the expected percolation rate for the shallow native subgrade of 11 min/cm for silty sand soils, leaching beds are expected to be comprised of 132 m of distribution pipe, which is expected to consist of 11 runs of 12 m pipe. With 1.6 m between runs of pie leaching bed dimensions are expected at 16 m by 12 m.

x. Based on the completed nitrate impact calculations it is expected that standard tertiary treatment (20 mg/L of nitrate) would be acceptable to meet a concentration of 10 mg/L at the downgradient property boundary for lots 1 and 12, and advanced tertiary treatment (15 mg/L of nitrate) would be required for the remainder of lots (0.194 ha to 0.209 ha).

xi. Surface water sampling was completed for Bronte Creek south of the site on August 6, 2024. Concentrations of nitrate in surface water were measured at 1.92 mg/L, and total phosphorus concentrations were non detectable (i.e., <0.02 mg/L).

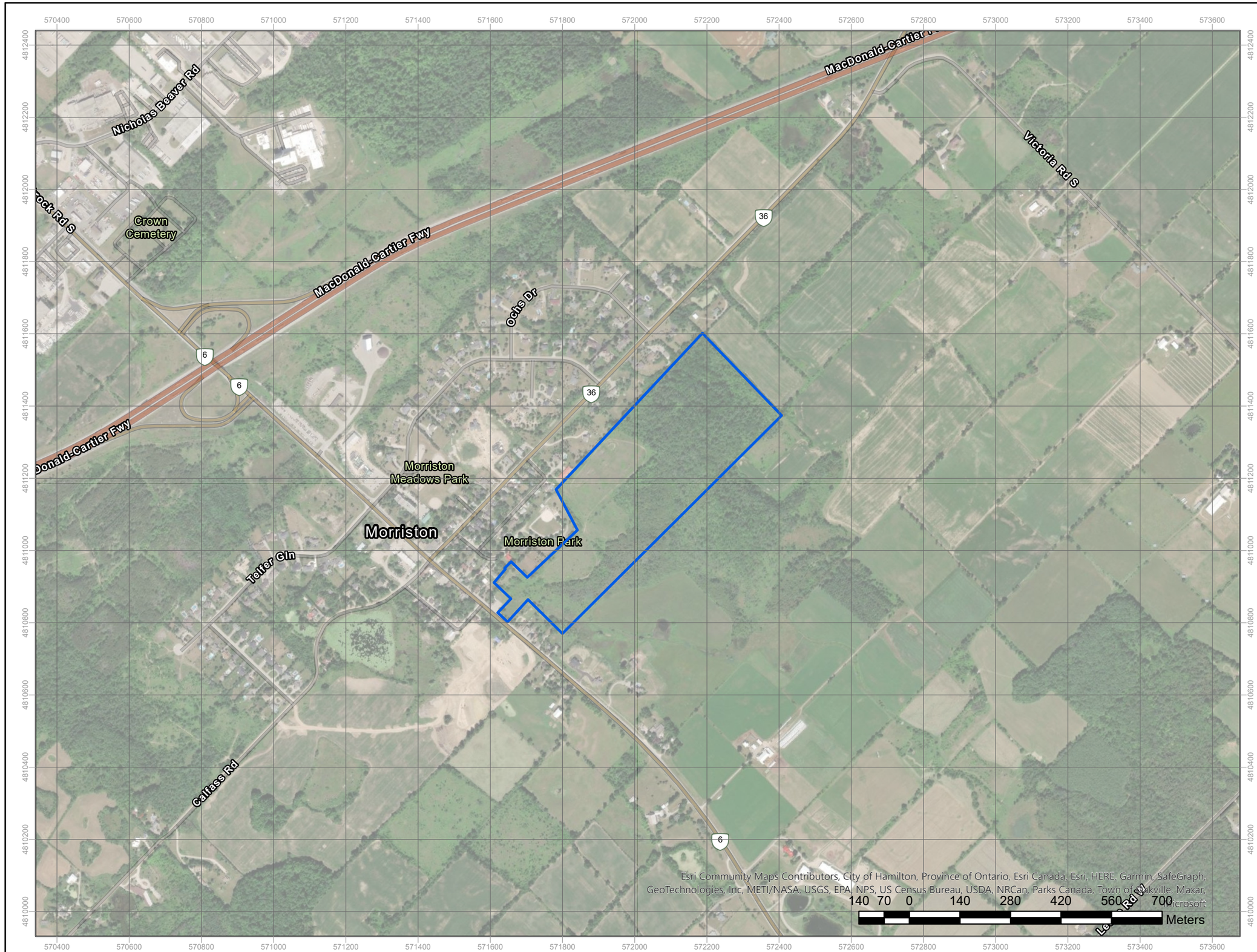
xii. Based on completion of a mass balance analysis given the site area of 23.104 ha the nitrate concentration expected towards Bronte Creek flowing immediately south of the Site is expected at 2.39 mg/L provided advanced tertiary treatment systems are utilized capable of reducing nitrate concentrations in sewage effluent to 15 mg/L. Nitrate impacts to surface water in exceedance of the CWQG limit of 2.93 mg/L are not expected due to the proposed development.

xiii. The expected travel time for sewage effluent is expected to range from 0.8 years to 4 years based on the separation distances from proposed lots to Bronte Creek. It is expected that soils will have attenuative capacity to allow for dilution of total phosphorus such that significant impacts to surface water is not expected.

xiv. Potential impacts to groundwater because of microbial pathogens from the sewage effluent were also considered. A risk of contamination from microbial pathogens exists within areas where high rates of groundwater flow are expected including coarsely textured soils or fractured or karstic bedrock environments. Given the prevalent soil conditions of silty sand overlying clayey silt, and the depth to bedrock impacts to groundwater due to microbial pathogens is not expected.

Figures and Tables

ENGLOBE



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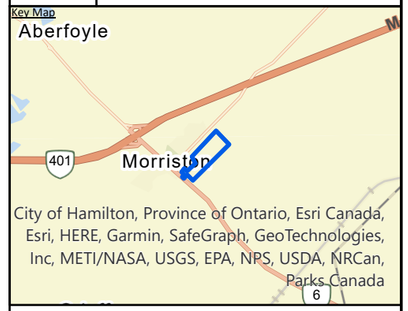
References:

ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/ Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community.Basemaps

Key Map



Notes:

Legend:

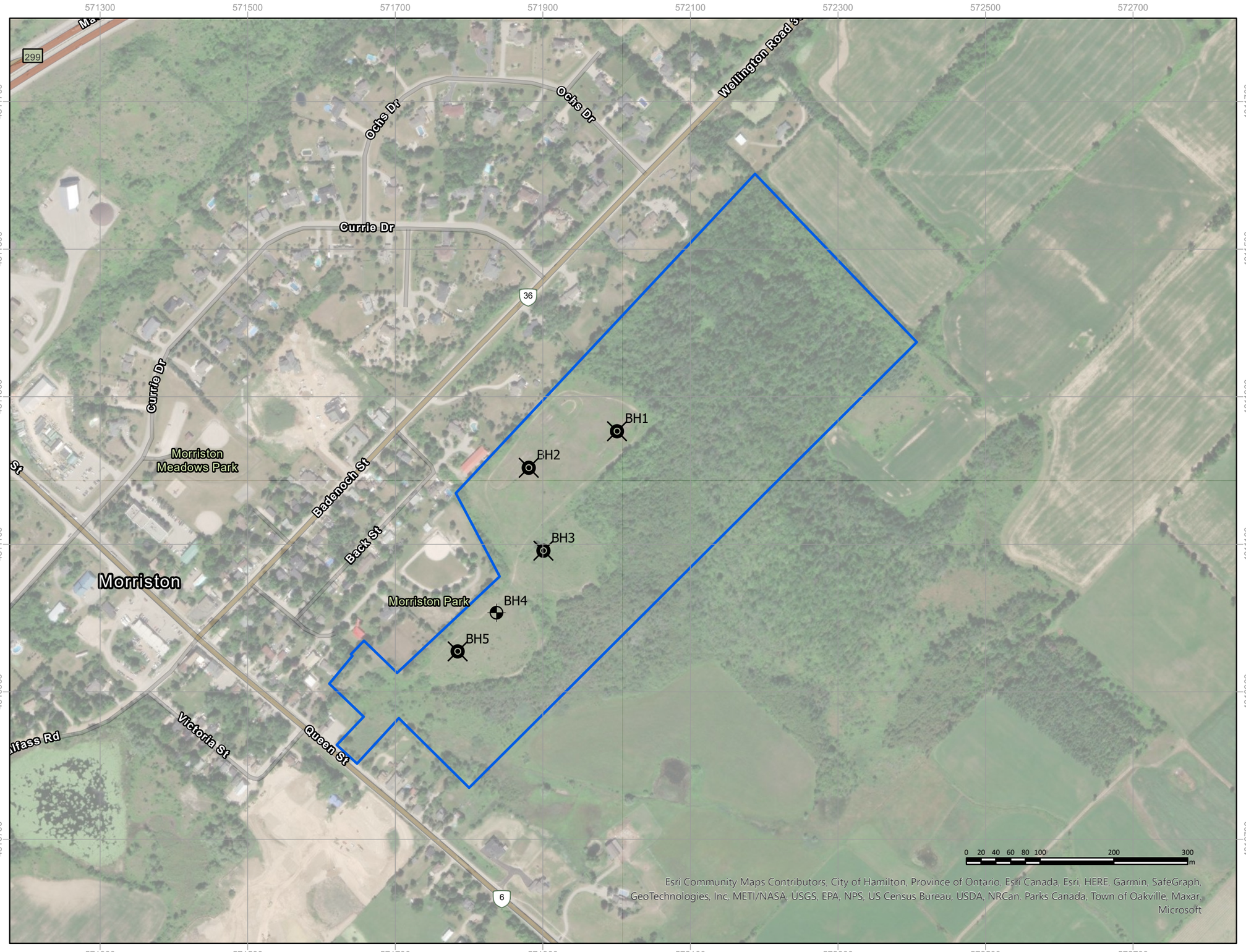
Approximate Site Boundary

Project Title:
Hydrogeological Assessment

Site Location:
11 Main Street, Puslinch, Ontario

Figure Title:
Site Location Plan

Designed By: RG	*File No.:* 1-22-0482-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 1
Date: October 2022	



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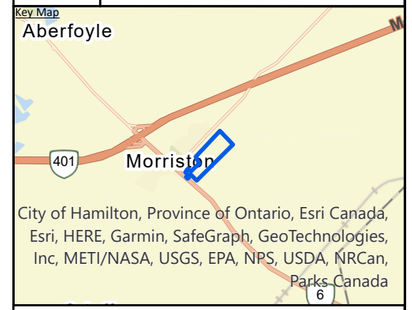
References:

ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/ Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community.Basemaps

Key Map



Notes:

Legend:

- Approximate Site Location
- Approximate Borehole Location
- Approximate Monitoring Well Location

Project Title:
Hydrogeological Assessment

Site Location:
11 Main Street, Puslinch, Ontario

Figure Title:
Borehole and Monitoring Well Plan

Designed By: RG	*File No.:* 1-22-0482-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 2
Date: October 2022	

570500 571000 571500 572000 572500 573000 573500

4812000 4811500 4811000 4810500 4810000

NICHOLAS BEAVER RD
401 HWY
401 HWY
VICTORIA RD S
WELLINGTON 46 RD
HWY 401
HWY 401
HWY 6
OCHS DR
WINER CRT
WELLINGTON 36 RD
CURRIE DR
LAING CRT
BACK ST
QUEEN ST
TELFER GLEN ST
VICTORIA ST
CHURCH ST
SETTLERS CRT
CALFASS RD
HWY 6
LESLIE RD W

6
6
6
5b
20

0 50 100 200 300 400 m

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N W E S

References:

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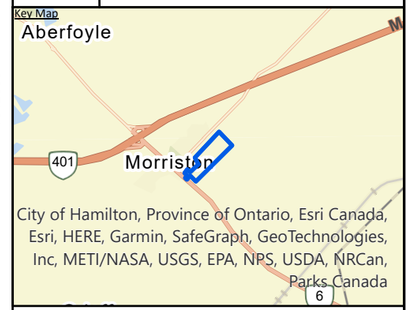
Key Map



Notes:

Legend:

- Approximate Site Location
- 5b: Stone-poor, carbonate-derived silty to sandy till
- 6: Ice-contact stratified deposits
- 20: Organic deposits
- Collector
- Expressway / Highway
- Freeway
- Local / Street
- Ramp

Project Title:
Hydrogeological Assessment

Site Location:
11 Main Street, Puslinch, Ontario

Figure Title:
Surficial Geology Map

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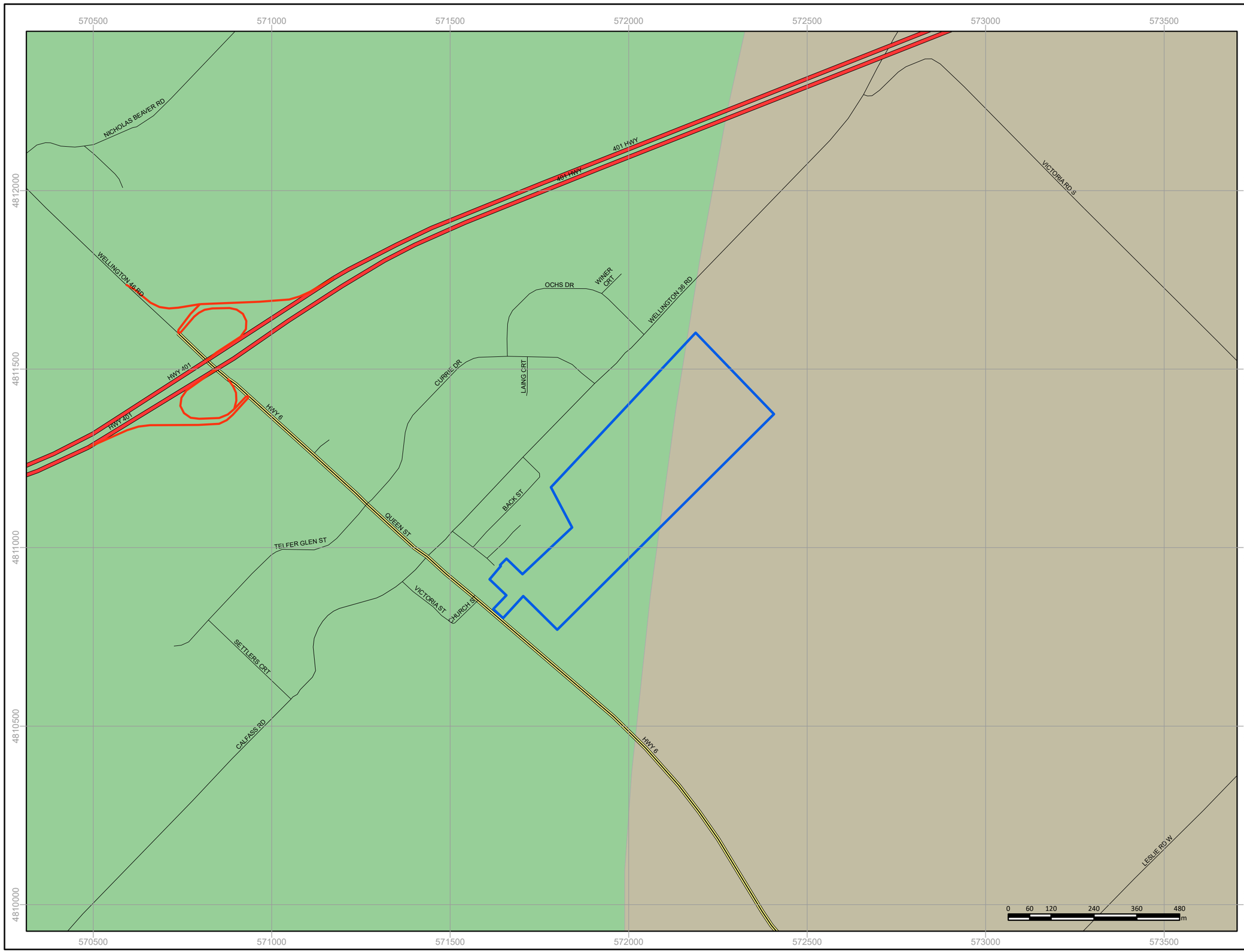
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 3
Date: October 2022	



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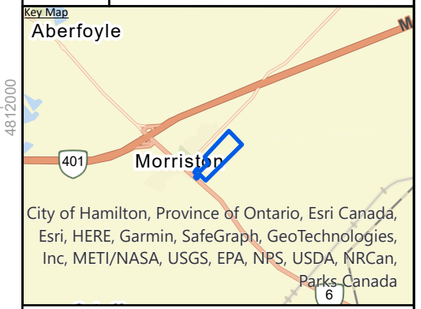
N W E S

References:

Key Map



Notes:

Legend:

- Approximate Site Location
- Collector
- Expressway / Highway
- Freeway
- Local / Street
- Ramp
- 5, Horseshoe Moraines
- 6, Flamborough Plain

Project Title:
Hydrogeological Assessment

Site Location:
11 Main Street, Puslinch, Ontario

Figure Title:
Physiography Map

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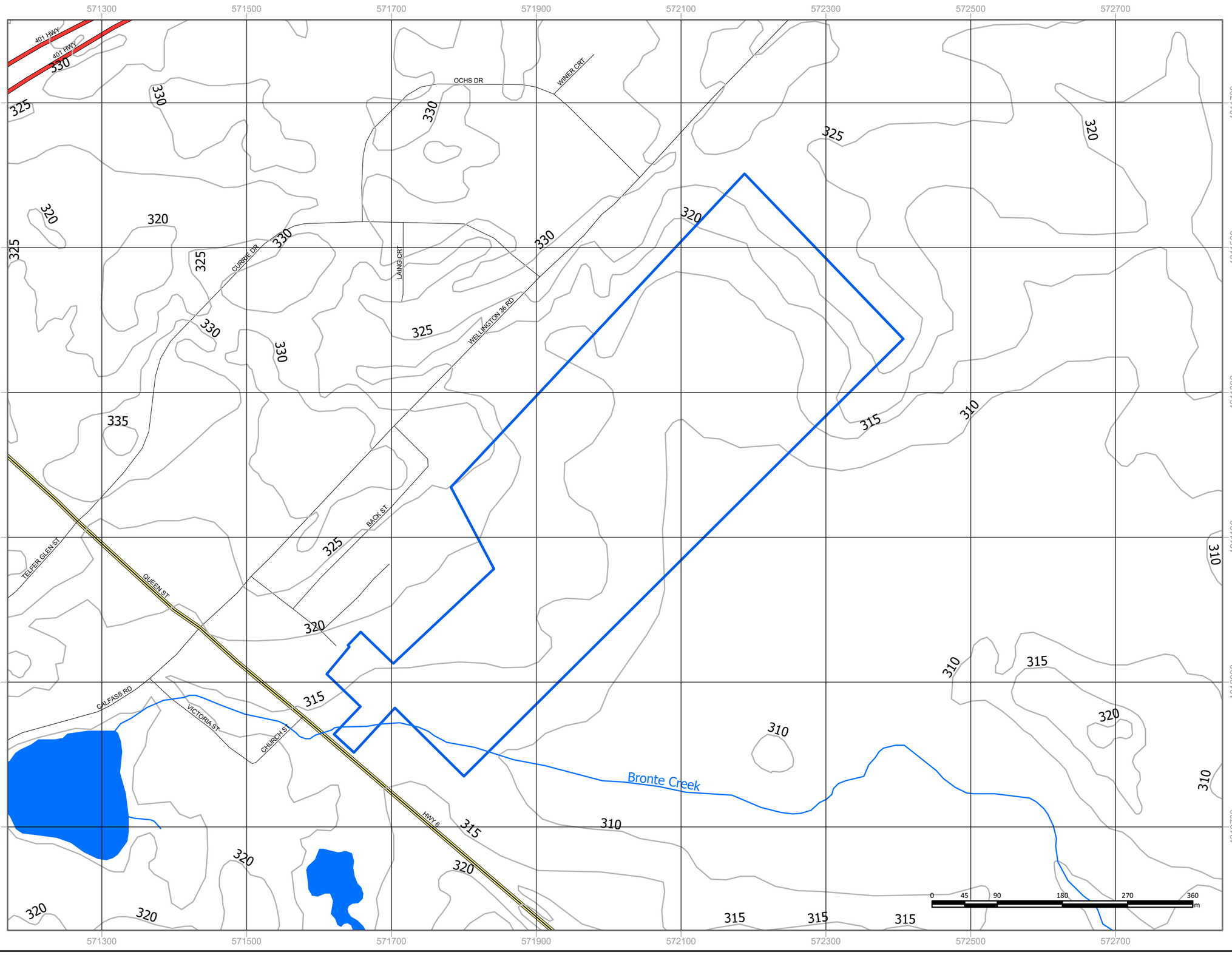
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 4
Date: October 2022	



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References:

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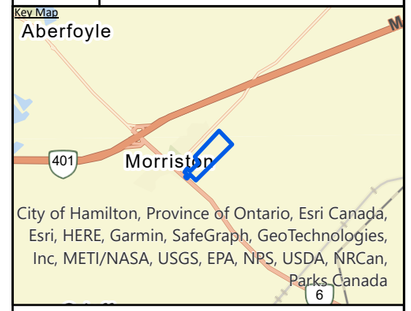
Key Map



Notes:

Legend:

- Approximate Site Location
- City of Brantford; Topographic Contours
- Collector
- Expressway / Highway
- Freeway
- Local / Street
- Ramp
- Watercourse

Project Title:
Hydrogeological Assessment

Site Location:
11 Main Street, Puslinch, Ontario

Figure Title:
Topography Map

Designed By: RG	*File No.:* 1-22-0482-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 5
Date: October 2022	

570500 571000 571500 572000 572500 573000 573500

4812000 4811500 4811000 4810500 4810000

NICHOLAS BEAVER RD
401 HWY
401 HWY
VICTORIA RD S
WELLINGTON 46 RD
OCHS DR
WINER CRT
WELLINGTON 36 RD
HWY 401
HWY 401
HWY 6
CURRIE DR
LAING CRT
QUEEN ST
BACK ST
TELFER GLEN ST
VICTORIA ST
CHURCH ST
SETTLERS CRT
CALFASS RD
HWY 6
Bronte Creek
Bronte Creek
LESLIE RD W

0 50 100 200 300 400 500 m

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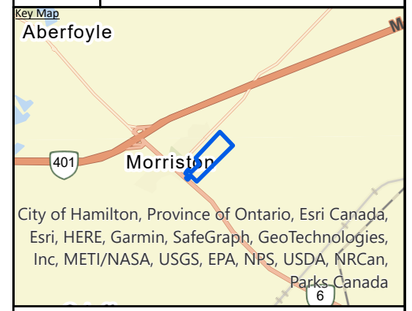
Consulting Geotechnical & Environmental Engineering
Construction Materials, Inspection & Testing

N W E S

References:

Key Map



Notes:

Legend:

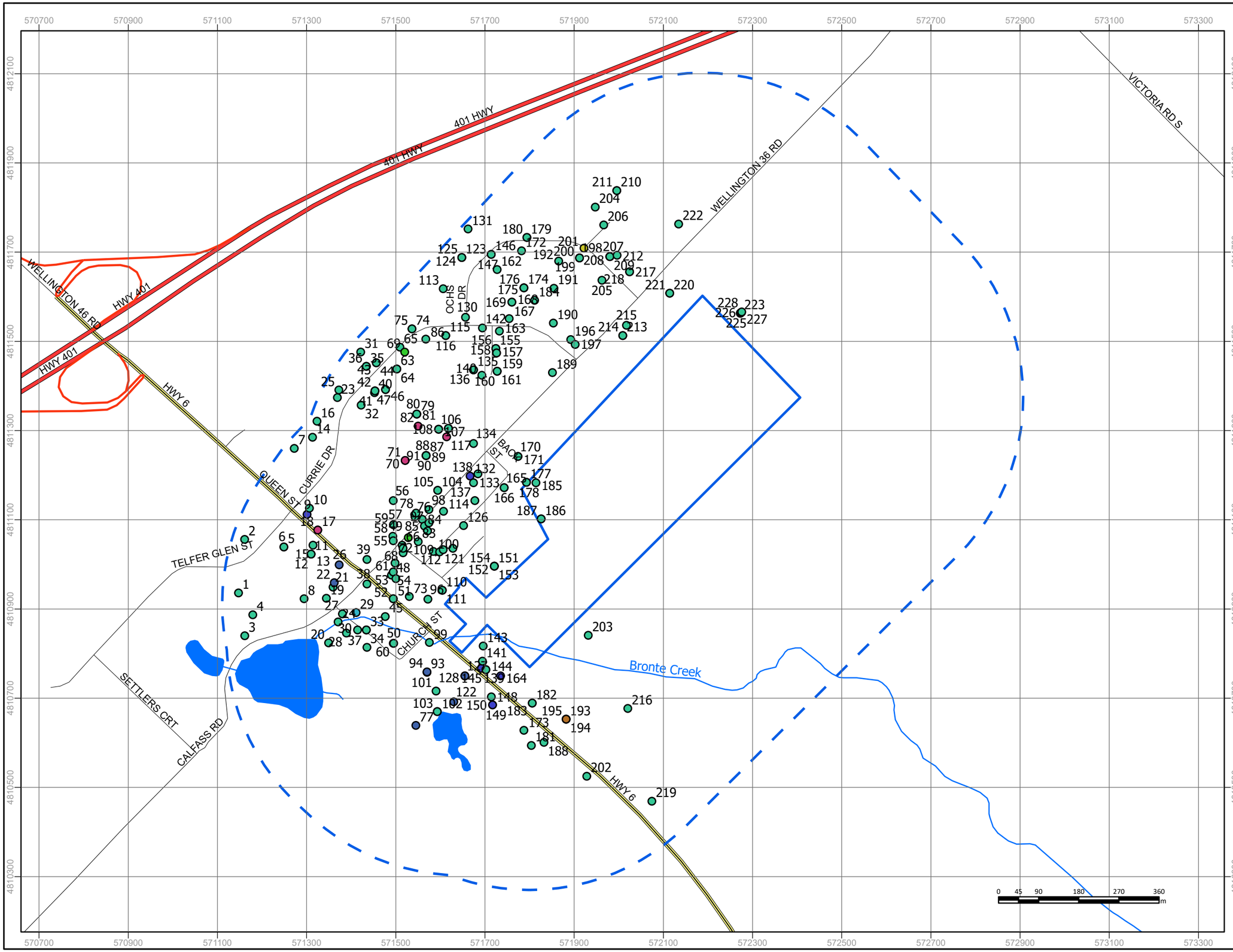
- Approximate Site Location
- Collector
- Expressway / Highway
- Freeway
- Local / Street
- Ramp
- Water Body
- Watercourse
- Wetland Features-Evaluated-Other
- Wetland Features-Evaluated-Provincial
- Wetland Features-Not evaluated
- Wooded Area

Project Title:
Hydrogeological Assessment

Site Location:
11 Main Street, Puslinch, Ontario

Figure Title:
Natural Heritage Feature Map

Designed By: RG	*File No.:* 1-22-0482-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 6
Date: October 2022	



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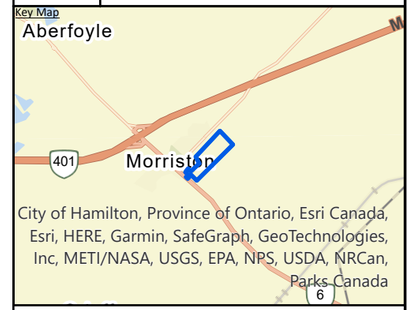
N W E S

References:

ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community produced by Terraprobe Inc. Copyright (c) Queen's Printer 2020. Water Well Information System Ministry of the Environment, Conservation and Parks, 2020

Key Map



Notes:

Legend:

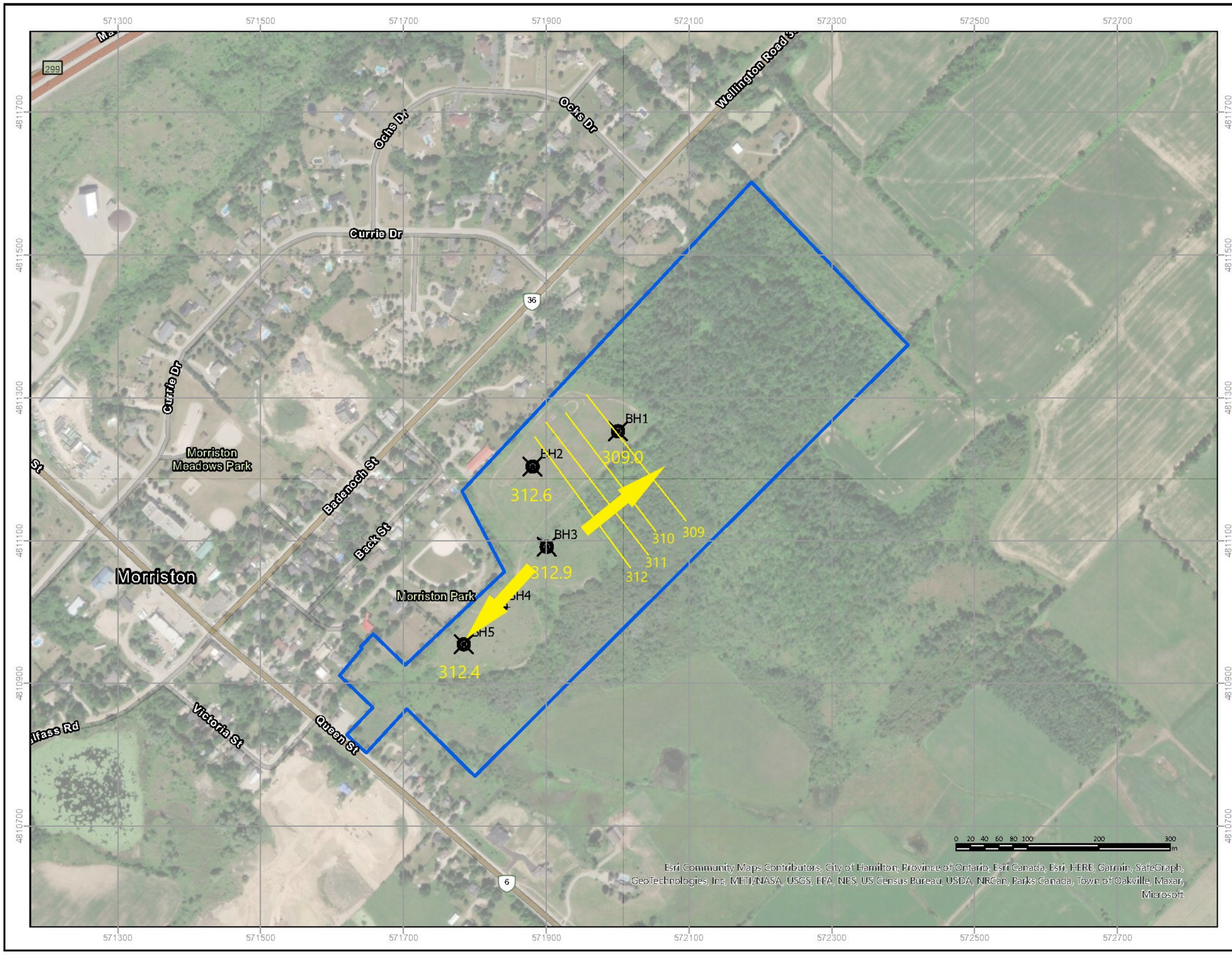
- Approximate Site Location
- Approximate Study Area; 500m
- Unknown
- Abandoned-Other
- Abandoned-Quality
- Alteration
- Observation Wells
- Other Status
- Test Hole
- Water Supply
- Watercourse
- Collector
- Expressway / Highway
- Freeway
- Local / Street
- Ramp

Project Title:
Hydrogeological Assessment

Site Location:
11 Main Street, Puslinch, Ontario

Figure Title:
MECP Well Records Map

Designed By: RG	*File No.:* 1-22-0482-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 7
Date: October 2022	



eNGLOBE

References:

ESRI, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/ Airbus Ds, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Basemaps

Key Map

Notes:

Legend:

- Approximate Site Location
- Approximate Borehole Location
- Approximate Monitoring Well Location
- 309.0 - Groundwater Elevation July 18, 2024
- Groundwater Contour (1.0 m Interval)
- Inferred Groundwater Flow Direction

Project Title:
Hydrogeological Assessment

Site Location:
11 Main Street, Puslinch, Ontario

Figure Title:
Groundwater Flow Direction Plan

Designed By: RG	*File No.:* 1-22-0482-46
Drawn By: SSK	*Scale:* As Shown
Reviewed By: BW	*Figure No.:* 8
Date: August 2024	

Table 1: Results of Groundwater/Surface Water Quality Analysis
Proposed Residential Development
11 Main Street
Puslinch, Ontario

Sampling Date/Time								
Well Location				BH1	BH2	BH3	BH5	BC Surface
	ODWS	AO/OG	Units					
INORGANICS								
Ammonia as N			mg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Electrical Conductivity			µS/cm	588	567	1,310	524	2,490
Total Organic Carbon			mg/L	1.0	0.7	1.0	0.8	8.8
Ortho Phosphate as P			mg/L	<0.10	<0.10	<0.10	<0.10	<0.26
Total Phosphorus			mg/L	<0.02	<0.02	<0.02	<0.02	<0.02
pH		6.5-8.5	pH	7.76	7.82	7.68	7.80	8.00
Sulphate		500	mg/L	6.89	14.4	26.9	3.35	22.8
Fluoride	1.0		mg/L	0.08	0.08	<0.05	0.08	<0.05
Bromide	1.5		mg/L	<0.05	<0.05	<0.05	<0.05	<0.11
Alkalinity (as CaCO3)		30-500	mg/L	257	281	347	281	357
Chloride		250	mg/L	34.4	17.3	202	4.70	476
Nitrite as N	1.0		mg/L	<0.05	<0.05	<0.05	<0.05	<0.11
Nitrate as N	10.0		mg/L	0.37	1.54	6.10	1.66	1.92
True Colour		5	TCU	<2.50	<2.50	<2.50	<2.50	15.5
Turbidity		5	NTU	0.7	0.8	<0.5	1.0	8.2
Ammonia-Un-ionized (Calculated)			mg/L	n/a	n/a	n/a	n/a	<0.000002
Bicarbonate (as CaCO3)			mg/L	257	281	347	281	357
Total Dissolved Solids		500	mg/L	362	354	824	290	1,200
Carbonate (as CaCO3)			mg/L	<5	<5	<5	<5	<5
Hydroxide (as CaCO3)			me/L	<5	<5	<5	<5	<5
Hardness (as CaCO3) (Calculated)		80-100	mg/L	306	321	452	301	412
Langelier Index (Calculated)			N/A	0.796	0.915	0.976	0.897	1.27
Saturation pH (Calculated)			N/A	6.96	6.90	6.70	6.90	6.73
Dissolved Aluminum		0.1	mg/L	<0.004	0.007	0.004	0.009	0.004
Dissolved Antimony	0.006		mg/L	<0.001	<0.001	<0.001	<0.001	<0.003
Dissolved Arsenic	0.025		mg/L	<0.001	<0.001	<0.001	<0.001	<0.003
Dissolved Barium	1		mg/L	0.016	0.054	0.071	0.010	0.090
Dissolved Beryllium			mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.001
Dissolved Boron			mg/L	0.137	0.166	0.169	0.144	0.193
Dissolved Cadmium	0.005		mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Calcium			mg/L	76.5	74.1	112	70.0	109
Dissolved Chromium	0.05		mg/L	<0.002	<0.002	<0.002	<0.002	<0.003
Dissolved Cobalt			mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Dissolved Copper		1	mg/L	<0.001	<0.001	<0.001	<0.001	0.006
Dissolved Iron		0.3	mg/L	<0.020	<0.020	<0.020	<0.020	1.29
Dissolved Lead	0.01		mg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0034
Dissolved Magnesium			mg/L	27.9	33.0	41.9	30.6	34.0
Dissolved Manganese		0.05	mg/L	<0.002	<0.002	0.005	<0.002	0.294
Dissolved Mercury			mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Molybdenum			mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Dissolved Nickel			mg/L	<0.001	0.001	0.001	<0.001	<0.003
Dissolved Potassium			mg/L	<0.50	0.93	2.75	<0.50	5.68
Dissolved Selenium	0.01		mg/L	<0.001	<0.001	0.001	<0.001	<0.002
Dissolved Silver			mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Sodium		20/200	mg/L	12.2	10.4	117	3.99	309
Dissolved Strontium			mg/L	0.062	0.074	0.123	0.052	0.282
Dissolved Thallium			mg/L	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
Dissolved Tin			mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Dissolved Titanium			mg/L	<0.003	<0.003	<0.003	<0.003	<0.010
Dissolved Tungsten			mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Dissolved Uranium	0.02		mg/L	<0.0005	0.0012	<0.0005	<0.0005	<0.0005
Dissolved Vanadium			mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Dissolved Zinc		5	mg/L	0.006	<0.005	0.048	0.018	0.050
Dissolved Zirconium			mg/L	<0.004	<0.004	<0.004	<0.004	<0.004

NTU - Nephelometric Turbidity Unit
TCU - True Colour Unit
ODWS - Ontario Drinking Water Standards
AO/OG - Aesthetic Objectives/ Operational Guidelines

TABLE 2: DETAILED WATER BALANCE - 11 MAIN STREET, PUSLINCH, ONTARIO

1. Climate Information

Precipitation	958	mm/a
Evapotranspiration	611	mm/a
Water Surplus	347	mm/a

2. Infiltration Rates

Table 2 Approach - Infiltration Factors	
Flat and Rolling Land	0.15
Open Sandy Loam and Clay and Loam	0.3
Cover-Cultivated and Wooded Areas	0.15
TOTAL	0.6

Infiltration (0.6 x 347)	208	mm/a
Run-off (347 - 208)	139	mm/a

3. Property Statistics

Single Detached Residential	4.44	ha	44,360	m^2
Storm Water Management	0.35	ha	3,450	m^2
Environmental Protection Lands	17.13	ha	171,310	m^2
Additional Lands	0.06	ha	590	m^2
Roads	1.13	ha	11,330	m^2
TOTAL	23.10	ha	231,040	m^2

4. Lot Coverage

Single Detached Residential

Roof Coverage (50% of 44,360 m^2)	2.22	ha	22,180	m^2
Driveway Coverage (10% of 44,360 m^2)	0.44	ha	4,436	m^2
Landscape (40% of 44,360 m^2)	1.77	ha	17,744	m^2
TOTAL	4.44	ha	44,360	m^2

TABLE 2: DETAILED WATER BALANCE - 11 MAIN STREET, PUSLINCH, ONTARIO

5. Annual Pre-Development Water Balance

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Undeveloped	231,040	221,336	141,165	48,103	32,068

6. Annual Post-Development Water Balance (Un-Mitigated)

Land Use	Area (m^2)	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Building Coverage (Residential)	22,180	21,248	2,125	nil	19,124
Hard surfaces (Roads, Driveways, SWM)	19,216	18,409	1,841	nil	16,568
Pervious Areas (Environmental Protection Lands, Additional Lands)	189,644	181,679	115,872	39,484	26,323
TOTAL	231,040	221,336	119,838	39,484	62,014

Evaporation from impervious areas assumed at 10%

7. Comparison of Pre-Development and Post-Development

	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	221,336	141,165	48,103	32,068
Unmitigated Post-Development	221,336	119,838	39,484	62,014

8. Estimated Post-Development Infiltration Deficit

Volume of post-development infiltration	39,484
Volume of pre-development Infiltration	48,103
Deficit from pre to post-development infiltration	8,619

9. Mitigation Measures

Additional infiltration due to roof downspouts to grade (25% of rooftop runoff)	4,781

	Precipitation (m^3)	Evapotranspiration (m^3)	Infiltration (m^3)	Run-Off (m^3)
Pre-Development	221,336	141,165	48,103	32,068
Mitigated Post-Development	221,336	119,838	44,265	27,287

TABLE 2: DETAILED WATER BALANCE - 11 MAIN STREET, PUSLINCH, ONTARIO

Evapotranspiration Calculations*

PET (cm/month) = $1.6\ (L/12)\ (10T_a/I)^{a}$

L average day length (Waterloo Airport Weather Station)*

T_a average daily temperature (Waterloo Airport Weather Station)*

I $\Sigma\ (T_a/5)^{1.5}$

a $(6.75 \times 10^{-7})\ I^3 - (7.71 \times 10^{-5})\ I^2 + (1.792 \times 10^{-2})\ I + 0.49$

	L (hrs)	Ta (°C)	$(T_a/5)^{1.5}$	PET
January	9.2	-6.0		0
February	10.4	-5		0
March	11.9	-1		0
April	13.4	6	1.3	2.8
May	14.7	13	4.2	7.4
June	15.4	19	7.4	11.9
July	15.1	22.0	9.2	13.7
August	13.9	20	8.0	11.4
September	12.5	17	6.3	8.5
October	11.0	10	2.8	4.1
November	9.7	4	0.7	1.3
December	9.0	-2		0

I = 39.95725

a = 1.125999

PET = 611.4 mm/a

*Potential Evapotranspiration follows the Thornthwaite Equation as published in:
Thornthwaite, C. W. (1948). "An Approach Toward a Rational Classification of Climate". Geographical Review 38 (1): 55-94.
*Average day length data for Collingwood Area obtained online from timeanddate.com
*Average monthly temperature obtained online from Environment Canada (monthly averages from 1994-2022)

Appendix A
Borehole Logs

ENGLOBE

Terraprobe

ABBREVIATIONS AND TERMINOLOGY

SAMPLING METHODS

AS	auger sample
CORE	cored sample
DP	direct push
FV	field vane
GS	grab sample
SS	split spoon
ST	shelby tube
WS	wash sample

PENETRATION RESISTANCE

Standard Penetration Test (SPT) resistance ('N' values) is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a standard 50 mm (2 in.) diameter split spoon sampler for a distance of 0.3 m (12 in.).

Dynamic Cone Test (DCT) resistance is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a conical steel point of 50 mm (2 in.) diameter and with 60° sides on 'A' size drill rods for a distance of 0.3 m (12 in.)."

COHESIONLESS SOILS

Compactness	'N' value
very loose	< 4
loose	4 – 10
compact	10 – 30
dense	30 – 50
very dense	> 50

COHESIVE SOILS

Consistency	'N' value	Undrained Shear Strength (kPa)
very soft	< 2	< 12
soft	2 – 4	12 – 25
firm	4 – 8	25 – 50
stiff	8 – 15	50 – 100
very stiff	15 – 30	100 – 200
hard	> 30	> 200

COMPOSITION

Term (e.g)	% by weight
trace silt	< 10
some silt	10 – 20
silty	20 – 35
sand *and* silt	> 35

TESTS AND SYMBOLS

MH	mechanical sieve and hydrometer analysis
w, w_c	water content
w_L, LL	liquid limit
w_P, PL	plastic limit
I_P, PI	plasticity index
k	coefficient of permeability
γ	soil unit weight, bulk
G_s	specific gravity
φ'	internal friction angle
c'	effective cohesion
c_u	undrained shear strength

▽	Unstabilized water level
▼	1st water level measurement
▼	2nd water level measurement
▼	Most recent water level measurement
3.0+	Undrained shear strength from field vane (with sensitivity)
C_c	compression index
c_v	coefficient of consolidation
m_v	coefficient of compressibility
e	void ratio
PID	photoionization detector
FID	flame ionization detector

FIELD MOISTURE DESCRIPTIONS

Damp	refers to a soil sample that does not exhibit any observable pore water from field/hand inspection.
Moist	refers to a soil sample that exhibits evidence of existing pore water (e.g. sample feels cool, cohesive soil is at plastic limit) but does not have visible pore water
Wet	refers to a soil sample that has visible pore water

LOG OF BOREHOLE 1

Terraprobe

Project No.	: 1-22-0482-01	Client	: Wdd Main Street	Originated by	: AA
Date started	: August 16, 2022	Project	: 11 Main Street	Compiled by	: FM
Sheet No.	: 1 of 1	Location	: Puslinch, Ontario	Checked by	: SZ

Position : E: 572000, N: 4811253 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)
0	313.0	**GROUND SURFACE**					313
		FILL, sand, some gravel, trace rootlets, dense, brown, moist		1	SS	35	
	312.2						
1	0.8	**SILTY SAND**, trace clay, trace gravel, compact, brown, moist		2	SS	24	312
				3	SS	21	
2				4	SS	17	311
3				5	SS	19	310
4							309
5				6	SS	25	308
6	306.9						307
	6.1	**CLAYEY SILT**, trace sand, very stiff, brown, moist		7	SS	27	
	306.4						
	6.6	**END OF BOREHOLE**					

Penetration Test Values (Blows / 0.3m) — Dynamic Cone: 10 20 30 40

Undrained Shear Strength (kPa) — Unconfined, Pocket Penetrometer, Field Vane, Lab Vane: 40 80 120 160

Moisture / Plasticity — Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL): 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)

GR	SA	SI	CL
0	3	72	25

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 24, 2022	dry	n/a
Sep 7, 2022	dry	n/a
Sep 19, 2022	dry	n/a

file: 1-22-0482-01 bh logs.gpj

LOG OF BOREHOLE 2

Terraprobe

Project No.	: 1-22-0482-01	Client	: Wdd Main Street	Originated by	: AA
Date started	: August 16, 2022	Project	: 11 Main Street	Compiled by	: FM
Sheet No.	: 1 of 1	Location	: Puslinch, Ontario	Checked by	: SZ

Position : E: 571881, N: 4811204 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	318.2	**GROUND SURFACE**				
		FILL, sand, some gravel, trace rootlets, loose, brown, moist		1	SS	8
	317.4					
	0.8	**SILTY SAND to SILT AND SAND**, trace clay, trace gravel, compact to very dense, brown, moist		2	SS	32
1				3	SS	53
2				4	SS	23
3				5	SS	50 / 150mm
4				6	SS	69
5						
6		...wet below		7	SS	60
7						
8	310.1			8	SS	57
	8.1	**END OF BOREHOLE**				

Elevation Scale (m): 318, 317, 316, 315, 314, 313, 312, 311

Penetration Test Values (Blows / 0.3m) — Dynamic Cone: 10, 20, 30, 40

Undrained Shear Strength (kPa) — Unconfined, Pocket Penetrometer, Field Vane, Lab Vane: 40, 80, 120, 160

Moisture / Plasticity — Plastic Limit (PL), Natural Water Content (MC), Liquid Limit (LL): 10, 20, 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) — GR SA SI CL

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 24, 2022	7.6	310.6
Sep 7, 2022	7.7	310.5
Sep 19, 2022	7.7	310.5

file: 1-22-0482-01 bh logs.gpj

LOG OF BOREHOLE 3

Terraprobe

Project No.	: 1-22-0482-01	Client	: Wdd Main Street	Originated by	: AA
Date started	: August 16, 2022	Project	: 11 Main Street	Compiled by	: FM
Sheet No.	: 1 of 1	Location	: Puslinch, Ontario	Checked by	: SZ

Position : E: 571901, N: 4811091 (UTM 17T)
Elevation Datum : Geodetic
Rig type : Track-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
0	317.1	**GROUND SURFACE**					317
		FILL, sand, some gravel, trace rootlets, compact, brown, moist		1	SS	11	
	316.3						
	0.8	**SILTY SAND to SILT AND SAND**, trace clay, trace gravel, compact to very dense, brown, moist		2	SS	28	316
1				3	SS	16	
2				4	SS	43	315
3				5	SS	56	314
4				6	SS	76	313
5							312
6		...wet below		7	SS	53	311
7							310
	309.3			8	SS	50 / 150mm	
	7.8	**END OF BOREHOLE**					

Penetration Test Values (Blows / 0.3m)
× Dynamic Cone
10 20 30 40
Undrained Shear Strength (kPa)
○ Unconfined + Field Vane
● Pocket Penetrometer ■ Lab Vane
40 80 120 160

Moisture / Plasticity
Plastic Limit | Natural Water Content | Liquid Limit
PL MC LL
10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments
GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL
0 36 59 5

Borehole was dry and caved to 7.2 m below ground surface upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 24, 2022	6.2	310.9
Sep 7, 2022	6.3	310.8
Sep 19, 2022	6.4	310.7

file: 1-22-0482-01 bh logs.gpj

LOG OF BOREHOLE 4

Terraprobe

Project No.	: 1-22-0482-01	Client	: Wdd Main Street	Originated by	: AA
Date started	: August 16, 2022	Project	: 11 Main Street	Compiled by	: FM
Sheet No.	: 1 of 1	Location	: Puslinch, Ontario	Checked by	: SZ

Position : E: 571837, N: 4811007 (UTM 17T)
Elevation Datum : Geodetic
Rig type : Track-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	319.9	**GROUND SURFACE**				
		FILL, sand, some gravel, trace rootlets, compact, brown, moist		1	SS	12
	319.1					
	0.8	**SILTY SAND**, trace clay, trace gravel, loose to compact, brown, moist		2	SS	10
1						
				3	SS	11
2						
				4	SS	8
3						
				5	AS	
4						
				6	AS	
5						
6				7	AS	
	313.3					
	6.6	**END OF BOREHOLE**				

Elevation Scale (m): 319, 318, 317, 316, 315, 314

Penetration Test Values (Blows / 0.3m) — Dynamic Cone: 10, 20, 30, 40
Undrained Shear Strength (kPa) — Unconfined, Pocket Penetrometer, Field Vane, Lab Vane: 40, 80, 120, 160

Moisture / Plasticity — Plastic Limit, Natural Water Content, Liquid Limit
PL, MC, LL: 10, 20, 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)
GR SA SI CL

Borehole was dry and open upon completion of drilling.

file: 1-22-0482-01 bh logs.gpj

LOG OF BOREHOLE 5

Terraprobe

Project No.	: 1-22-0482-01	Client	: Wdd Main Street	Originated by	: AA
Date started	: August 16, 2022	Project	: 11 Main Street	Compiled by	: FM
Sheet No.	: 1 of 1	Location	: Puslinch, Ontario	Checked by	: SZ

Position : E: 571785, N: 4810955 (UTM 17T) Elevation Datum : Geodetic

Rig type : Track-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	316.8	**GROUND SURFACE**				
		FILL, sand, some gravel, trace rootlets, compact, brown, moist		1	SS	19
	316.0					
	0.8	**SILTY SAND**, trace clay, trace gravel, compact to dense, brown, moist		2	SS	26
1				3	SS	29
2				4	SS	31
3		...gravelly sand		5	SS	32
4				6	SS	42
5		...wet below		7	SS	24
6	310.2					
	6.6	**END OF BOREHOLE**				

Elevation Scale (m): 316, 315, 314, 313, 312, 311

Penetration Test Values (Blows / 0.3m): Dynamic Cone; 10 20 30 40

Undrained Shear Strength (kPa): Unconfined, Pocket Penetrometer, Field Vane, Lab Vane; 40 80 120 160

Moisture / Plasticity: Plastic Limit, Natural Water Content, Liquid Limit; PL MC LL; 10 20 30

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT)

GR SA SI CL

0 73 26 1

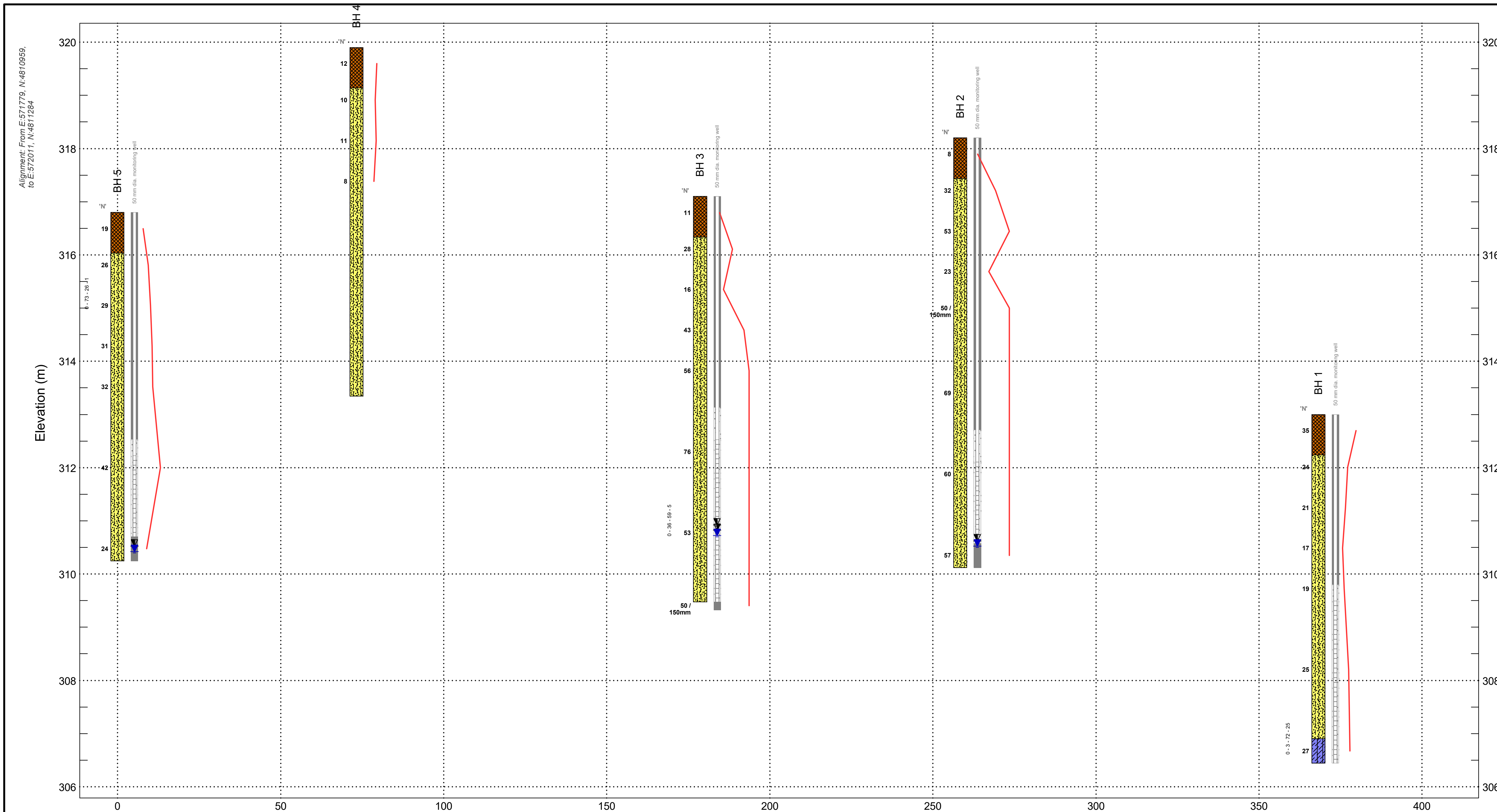
Borehole was dry and caved to 6.1 m below ground surface upon completion of drilling.

50 mm dia. monitoring well installed.

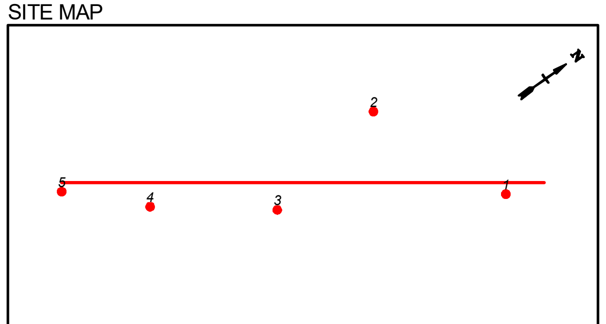
WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Aug 24, 2022	6.3	310.5
Sep 7, 2022	6.4	310.4
Sep 19, 2022	6.4	310.4

file: 1-22-0482-01 bh logs.gpj



SITE MAP



LITHOLOGY GRAPHIC LEGEND

- Fill
- Silty Sand
- Clayey Silt

INTERPRETIVE LEGEND

- WL on completion of drilling
- Stabilized WL, most recent
- FILL
- GRAVELS (gravel to gravelly sand)
- SILT TO SAND (not till)
- COHESIONLESS TILLS
- COHESIVE SOILS (clayey silt to clay, incl. tills)
- DISTURBED/REWORKED SOILS

Terraprobe

11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title: **SUBSURFACE PROFILE**

File No.: **1-22-0482-46**

Report: ISECTION - TABLOID - ELEV

Terraprobe

T-TIME ANALYSIS
TEST REPORT

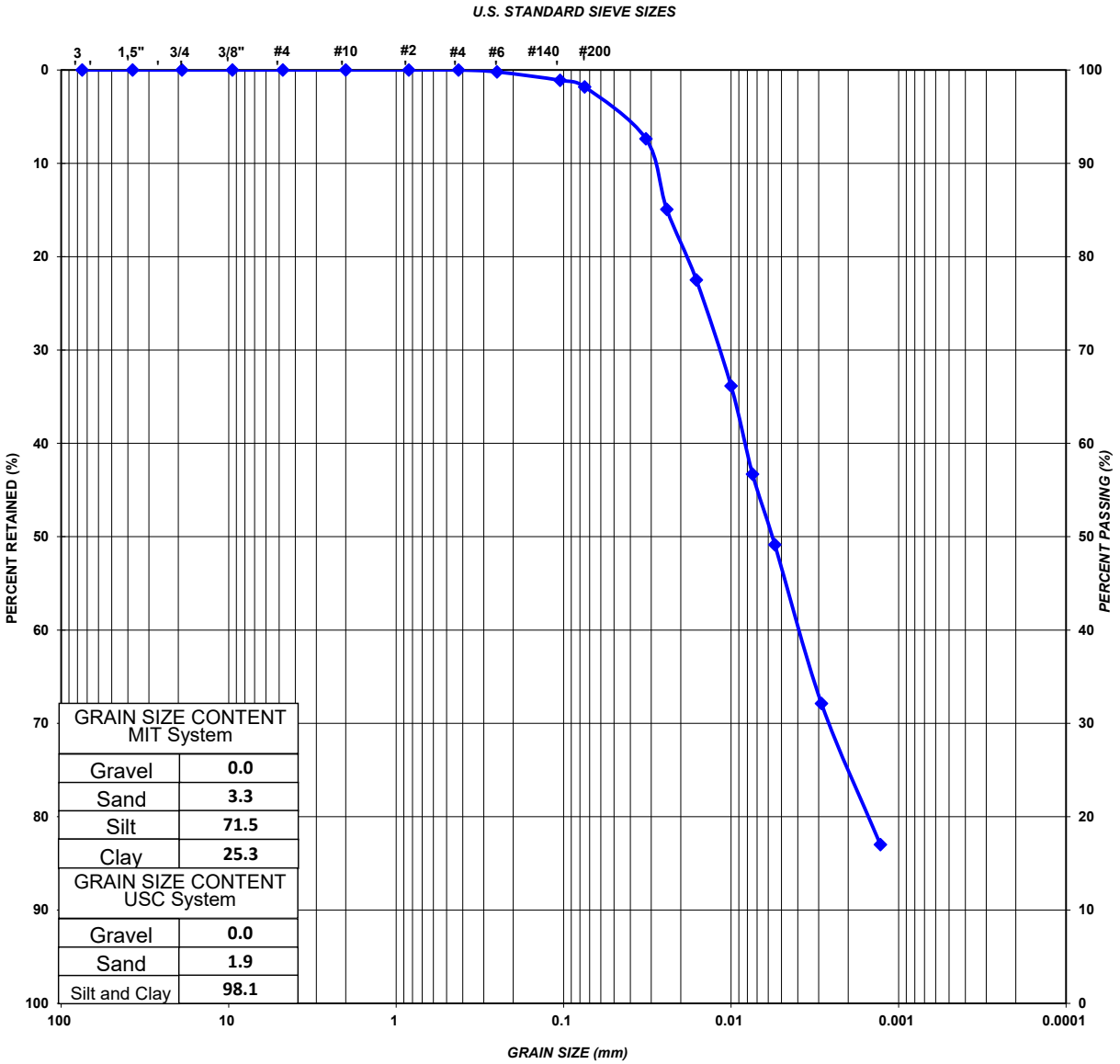
PROJECT: **11 Main Street, Puslinch, Ontario**
LOCATION: **Greater Toronto Area, On.**
CLIENT: **Wdd Main Street**
CONTACT: **Narjes**
SOIL SAMPLE: **1-7**
20' - 21'6"
MIT DESCRIPTION: **CLAYEY SILT, trace sand**
USC SYMBOL: **CH**

FILE NO.: **1-22-0482**
LAB NO.: **1259**
SAMPLE DATE: **16-Aug-22**
SAMPLED BY: **A.A.**

**** To be read in conjunction with cover letter only ****

Estimated rate of Percolation = 58 min/cm

GRAIN SIZE DISTRIBUTION



GRAIN SIZE CONTENT MIT System	
Gravel	0.0
Sand	3.3
Silt	71.5
Clay	25.3
GRAIN SIZE CONTENT USC System	
Gravel	0.0
Sand	1.9
Silt and Clay	98.1

MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY
			SAND				
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY	
	GRAVEL		SAND				

Terraprobe

T-TIME ANALYSIS
TEST REPORT

PROJECT: **11 Main Street, Puslinch, Ontario**
LOCATION: **Greater Toronto Area, On.**
CLIENT: **Wdd Main Street**
CONTACT: **Narjes**
SOIL SAMPLE: **3-7**
20' - 21'6"
MIT DESCRIPTION: **SILT AND SAND, trace clay**
USC SYMBOL: **ML**

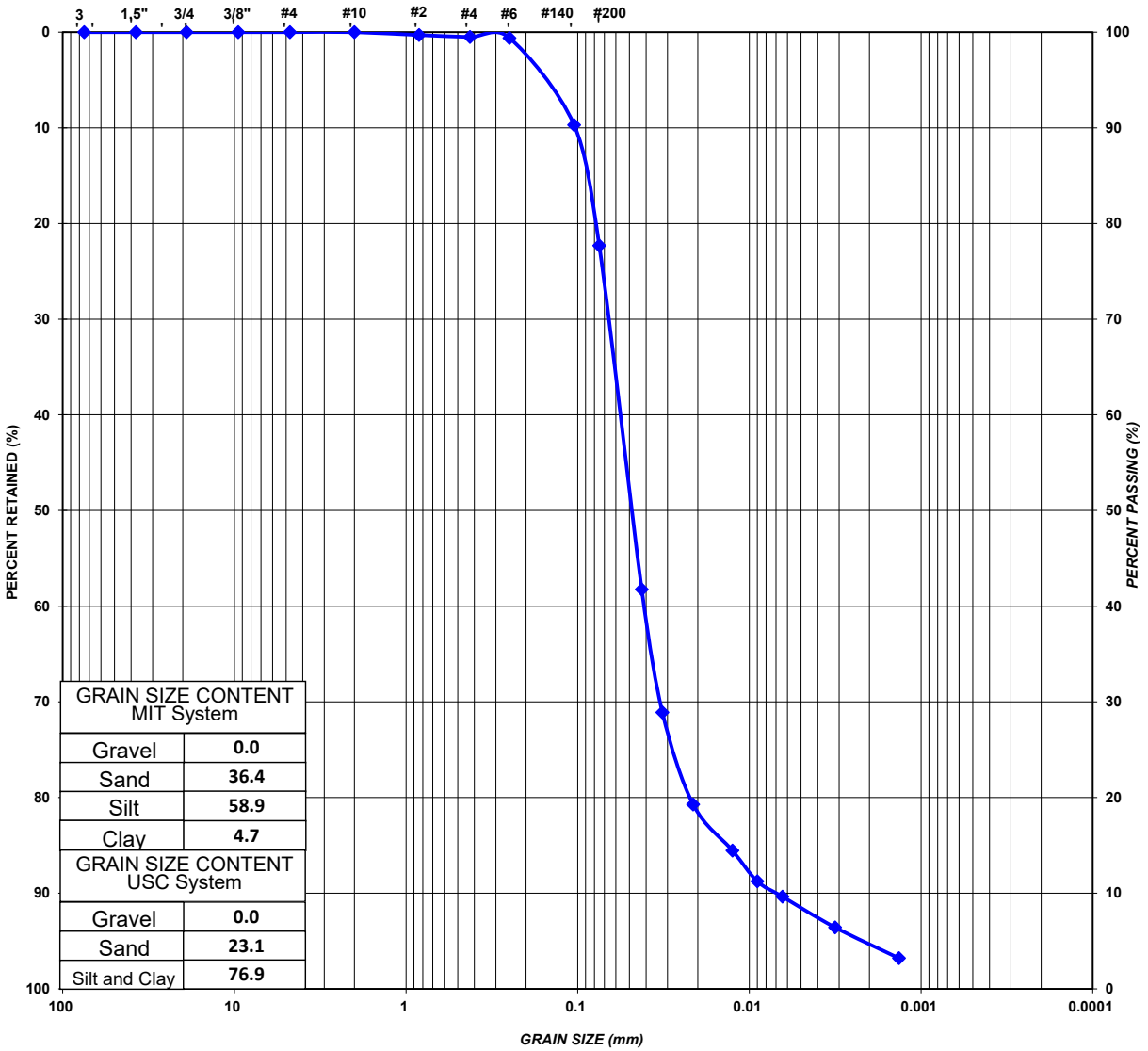
FILE NO.: **1-22-0482**
LAB NO.: **1259**
SAMPLE DATE: **16-Aug-22**
SAMPLED BY: **A.A.**

**** To be read in conjunction with cover letter only ****

Estimated rate of Percolation = 45 min/cm

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



GRAIN SIZE CONTENT MIT System	
Gravel	0.0
Sand	36.4
Silt	58.9
Clay	4.7
GRAIN SIZE CONTENT USC System	
Gravel	0.0
Sand	23.1
Silt and Clay	76.9

MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY
			SAND				
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY	
	GRAVEL		SAND				

Terraprobe

T-TIME ANALYSIS
TEST REPORT

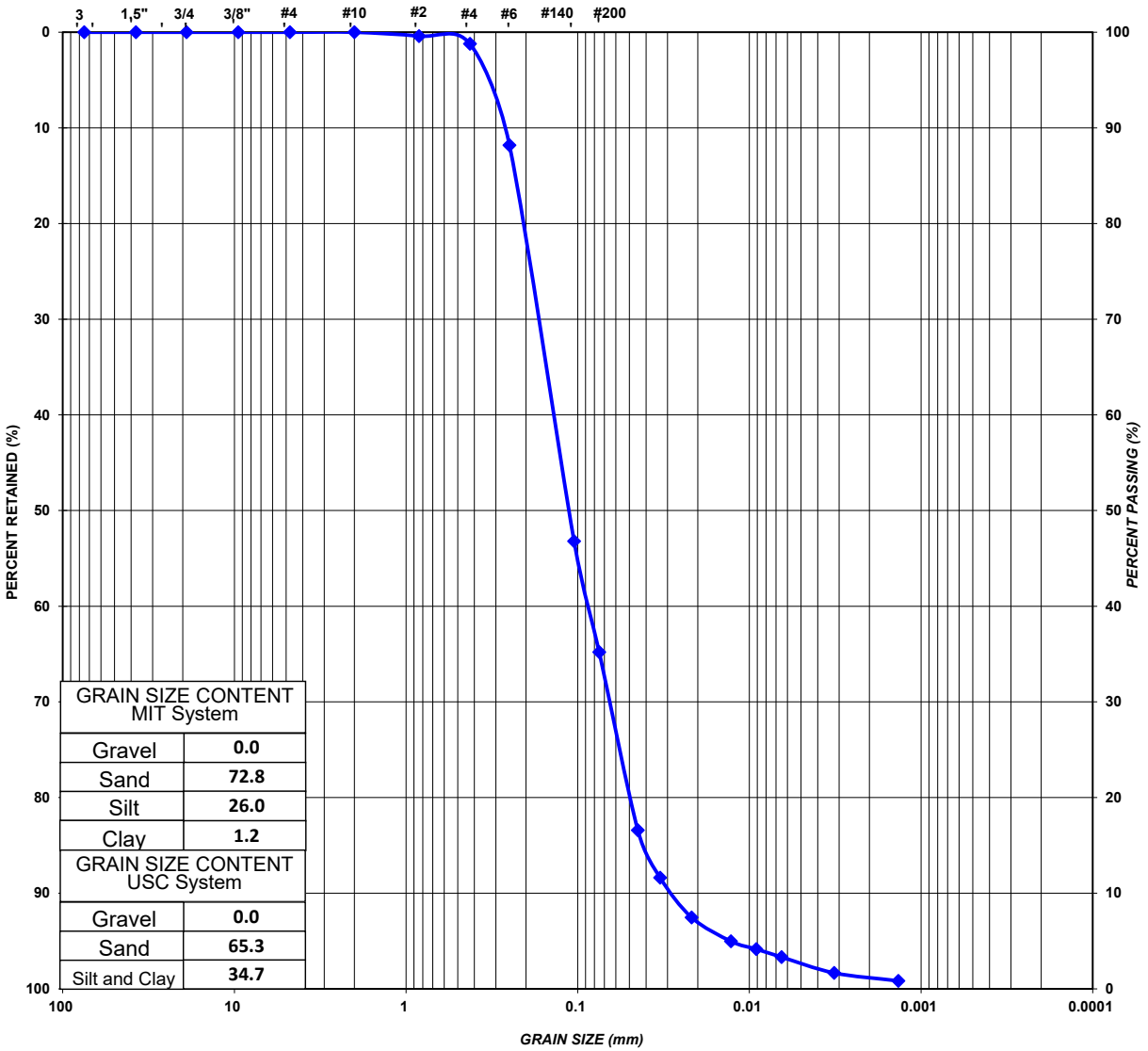
PROJECT: **11 Main Street, Puslinch, Ontario**
LOCATION: **Greater Toronto Area, On.**
CLIENT: **Wdd Main Street**
CONTACT: **Narjes**
SOIL SAMPLE: **5-3**
5' - 6'6"
MIT DESCRIPTION: **SILTY SAND, trace clay**
USC SYMBOL: **SM**

FILE NO.: **1-22-0482**
LAB NO.: **1259**
SAMPLE DATE: **16-Aug-22**
SAMPLED BY: **A.A.**

**** To be read in conjunction with cover letter only ****
Estimated rate of Percolation = 11 min/cm

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



GRAIN SIZE CONTENT MIT System	
Gravel	0.0
Sand	72.8
Silt	26.0
Clay	1.2
GRAIN SIZE CONTENT USC System	
Gravel	0.0
Sand	65.3
Silt and Clay	34.7

MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY
			SAND				
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY	
	GRAVEL		SAND				

Appendix B
Well Record Summary

ENGLOBE

MECP Well Records Summary

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Date Completed	Well Use	Static Water Level (m)**	Pumping Rate (L/min)	Stratigraphy (Depth in m)
1	6709780	Rotary (Air)	33.5	5/17/1989	Domestic	13.4	113.4	Clay/Sand (3.0) Sand/Gravel 12.2) Clay/Sand (29.6) Sand/Gravel (32.0) Rock (32.5)
2	6713657	Rotary (Air)	25.0	3/14/2001	Domestic	16.2	75.6	Clay/Stones (17.7) Sand (18.9) Clay/Gravel 24.4) Gravel (25.0)
3	6711904	Rotary (Air)	20.1	6/13/1995	Domestic	6.1	75.6	Clay/Stones (19.5) Gravel (20.1)
4	6702532	Cable Tool	25.9	9/11/1965	Domestic	7.3	37.8	Clay/Gravel (25.3) Rock (25.9)
5	7355755	Other Method	32.9	2/7/2020	Domestic	13.9	113.4	Gravel (12.2) Clay (27.4) Sand/Gravel (32.9)
6	7355755	Other Method	-	2/7/2020	Domestic	13.9	-	-
7	6710042	Rotary (Air)	26.2	8/3/1989	Domestic	16.8	56.7	Clay/Stones (15.2) Sand/Gravel (25.0) Gravel (26.2)
8	6704402	Cable Tool	32.6	8/17/1972	Domestic	7.6	37.8	Clay/Stones (29.6) Limestone (32.6)
9	6713746	Not Known	-	4/20/2001	Abandoned-Other	-	-	-
10	6705095	Cable Tool	31.1	2/22/1974	Domestic	13.7	75.6	Clay/Stones (30.2) Limestone (31.1)
11	7266806	Rotary (Air)	-	6/9/2016	Domestic	9.2	-	-
12	7266806	Rotary (Air)	-	6/9/2016	Domestic	9.2	-	-
13	7266806	Rotary (Air)	30.5	6/9/2016	Domestic	9.2	56.7	Clay/Stones (22.9) Clay/Sand (25.9) Rock (30.5)
14	6710043	Rotary (Air)	31.7	8/3/1989	Domestic	18.9	75.6	Clay/Stones (9.1) Sand 13.7) Clay (29.0) Gravel (31.7)
15	6707386	Rotary (Air)	35.1	5/7/1980	Commerical	12.2	37.8	Sand (3.0) Clay/Gravel (31.4) Limestone (35.1)
16	6711008	Rotary (Air)	32.3	9/4/1992	Domestic	18.0	94.5	Sand/Gravel (6.1) Clay/Gravel (16.8) Sand (31.7) Gravel (32.3)
17	7039012	-	-	11/24/2006	Abandoned-Other	-	-	-
18	6715891	Other Method	5.2	8/10/2006	Observation Wells	-	-	Sand/Silt (5.2)
19	6704817	Cable Tool	24.1	10/18/1973	Domestic	6.7	37.8	Clay/Stones (9.1) Clay/Sand (21.3) Sand/Gravel (24.1)
20	6702538	Cable Tool	17.7	8/6/1958	Domestic	8.2	31.5	Clay/Gravel (15.2) Gravel (17.7)
21	6709646	Cable Tool	29.0	3/13/1989	Commerical	8.5	75.6	Sand/Gravel (9.1) Clay/Sand (20.7) Sand/Gravel (25.9) Limestone (29.0)
22	7122871	Other Method	3.1	4/24/2009	Test Hole	-	-	Clay/Silt (3.1)
23	6714059	Rotary (Air)	31.1	4/19/2002	Domestic	14.9	75.6	Clay/Stones (12.2) Sand (19.8) Clay/Gravel (26.8) Limestone (31.1)
24	6714286	Air Percussion	24.7	11/14/2002	Domestic	10.4	45.4	Clay/Sand (9.1) Sand/Gravel (12.8) Clay/Sand (24.1) Sand/Gravel (24.7)
25	6711101	Rotary (Air)	32.0	1/7/1993	Domestic	14.9	94.5	Sand/Gravel (31.4) Limestone (32.0)
26	7122870	Other Method	4.3	4/24/2009	Test Hole	-	-	Clay/Silt (4.3)
27	6702537	Cable Tool	11.0	5/5/1959	Domestic	3.7	11.3	Clay/Gravel (9.1) Sand/Gravel (10.4) Gravel (11.0)
28	6702541	Cable Tool	42.1	5/26/1956	Domestic	5.8	30.2	Clay/Stones (22.9) Gravel (28.0) Limestone (42.1)
29	7190638	-	-	8/18/2012	Abandoned-Quality	-	-	-
30	6703703	Cable Tool	40.2	6/26/1970	Domestic	5.5	37.8	Sand (2.1) Clay/Stones (14.3) Gravel (15.8) Clay/Sand (29.0) Brown Rock (35.0) Black Rock (40.2)
31	6711087	Rotary (Air)	32.6	7/20/1992	Public	18.3	75.6	Clay/Stones (32.0) Limestone (32.6)
32	6710084	Rotary (Air)	43.0	11/1/1989	Domestic	16.8	56.7	Clay/Stones (27.1) Brown Rock (36.6) Dark Brown Rock (43.0)
33	7190634	Rotary (Convent.)	29.3	8/16/2012	Domestic	4.8	113.4	Clay/Silt (4.0) Sand/Gravel (22.9) Limestone (29.3)

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Date Completed	Well Use	Static Water Level (m)**	Pumping Rate (L/min)	Stratigraphy (Depth in m)
34	7190634	Rotary (Convent.)	6.1	8/16/2012	Domestic	4.8	-	-
35	6713656	Rotary (Air)	-	3/22/2001	Domestic	14.3	-	-
36	6713656	Rotary (Air)	37.2	3/22/2001	Domestic	14.3	113.4	Clay/Stones (26.2) Red-Brown Limestone (29.0) Brown Limestone (37.2)
37	6709991	Cable Tool	26.2	9/16/1989	Domestic	9.2	37.8	Sand/Gravel (18.3) Gravel (25.3) Limestone (26.2)
38	6702539	Cable Tool	25.6	8/3/1958	Domestic	7.6	56.7	Clay/Gravel (21.3) Sand/Gravel (22.9) Limestone (25.6)
39	6702661	Cable Tool	31.7	9/15/1951	Domestic	7.6	-	Clay (6.1) Silt/Sand (24.4) Rock (31.7)
40	6712162	Rotary (Air)	29.3	9/30/1996	Domestic	16.2	56.7	Clay/Stones (27.7) Limestone (29.3)
41	6710177	Rotary (Air)	-	12/8/1989	Domestic	16.8	-	-
42	6710177	Rotary (Air)	43.0	12/8/1989	Domestic	16.8	56.7	Clay/Stones (30.8) Brown Rock (38.1) Dark Brown Rock (43.0)
43	6711440	Rotary (Air)	-	6/7/1994	Domestic	14.6	-	-
44	6711440	Rotary (Air)	31.4	6/7/1994	Domestic	14.6	94.5	Clay/Gravel (27.7) Limestone (31.4)
45	6709858	Rotary (Air)	18.9	6/23/1989	Domestic	5.8	56.7	Clay/Stones (9.1) Sand/Gravel (18.9)
46	6713367	Rotary (Air)	-	6/8/2000	Domestic	15.3		
47	6713367	Rotary (Air)	43.6	6/8/2000	Domestic	15.3	94.5	Sand (6.7) Clay (29.9) Gravel (30.8) Limestone (43.6)
48	6702667	Cable Tool	24.7	8/25/1951	Domestic	0.0	-	Clay (6.1) Silt/Sand (24.4) Gravel (24.7)
49	6702662	Cable Tool	32.0	7/19/1961	Domestic	16.8	26.5	Clay/Gravel (30.5) Gravel (32.0)
50	6708055	Cable Tool	15.2	10/11/1983	Domestic	6.4	37.8	Clay/Stones (14.6) Sand (14.9) Gravel (15.2)
51	6703313	Cable Tool	-	10/7/1968	Domestic	4.0	-	-
52	6703313	Cable Tool	30.8	10/7/1968	Domestic	4.0	75.6	Clay (18.3) Sand/Gravel (21.3) Clay/Gravel (25.6) Rock (30.8)
53	6706778	Rotary (Air)	-	8/8/1978	Domestic	6.4	-	-
54	6706778	Rotary (Air)	31.4	8/8/1978	Domestic	6.4	75.6	Clay/Gravel (22.6) Sand (25.3) Limestone (31.4)
55	6704136	Cable Tool	28.0	11/17/1971	Domestic	12.2	37.8	Clay/Stones (26.8) Limestone (28.0)
56	6703850	Cable Tool	32.0	7/9/1970	Domestic	14.3	26.5	Sand (6.1) Clay/Sand (24.4) Samd (25.9) Clay/Gravel (27.7) Limestone (32.0)
57	7320421	Rotary (Air)	-	8/8/2018	Domestic	14.6	-	-
58	7320421	Rotary (Air)	-	8/8/2018	Domestic	14.6	-	-
59	7320421	Rotary (Air)	28.4	8/8/2018	Domestic	14.6	56.7	Clay/Stones (28.0) Rock (28.4)
60	6702540	Cable Tool	42.7	9/4/1953	Domestic	7.0	25.5	Clay/Gravel (16.5) Sand (18.9) Gravel (23.2) Clay (27.1) Gravel (27.7) Brown Rock (40.8) Black Rock (42.7)
61	6702665	Cable Tool	32.0	12/28/1966	Domestic	10.7	75.6	Clay/Gravel (28.3) Rock (32.0)
62	6702674	Cable Tool	26.5	3/9/1964	Domestic	16.8	30.2	Clay/Sand (18.3) Sand/Gravel (25.9) Gravel (26.5)
63	6711149	Rotary (Air)	-	3/11/1993	Domestic	15.9	-	-
64	6711149	Rotary (Air)	32.0	3/11/1993	Domestic	15.9	75.6	Clay/Sand/Stones (26.2) Rock (32.0)
65	6711006	Rotary (Air)	32.3	8/31/1992	Domestic	14.6	94.5	Clay/Sand/Gravel (28.7) Limestone (32.3)
66	6708057	Cable Tool	30.5	10/19/1983	Domestic	12.2	94.5	Sand/Gravel (5.5) Clay (21.9) Sand/Gravel (27.4) Limestone (30.5)
67	6702671	Cable Tool	34.7	8/11/1959	Domestic	11.3	11.3	Clay/Gravel (32.9) Limestone (34.7)

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Date Completed	Well Use	Static Water Level (m)**	Pumping Rate (L/min)	Stratigraphy (Depth in m)
68	6702672	Cable Tool	26.8	9/1/1960	Domestic	7.6	56.7	Clay/Stones (2.8) Limestone (26.8)
69	7297218	-	-	10/4/2017	Alteration	-	-	-
70	7271832	-	10.7	6/15/2016	Abandoned-Other	-	-	-
71	7155300	Other Method	10.7	11/3/2010	Monitoring	-	-	Sand/Silt (10.7)
72	7311547	-	-	4/10/2018	Alteration	-	-	-
73	6702666	Cable Tool	27.4	8/19/1951	Domestic	7.6	-	Clay (6.1) Sand/Silt (24.4) Gravel (27.4)
74	6712401	Rotary (Air)	-	10/29/1997	Domestic	13.7	-	-
75	6712401	Rotary (Air)	36.6	10/29/1997	Domestic	13.7	94.5	Clay/Stones (19.8) Sand/Gravel (29.0) Clay/Gravel (32.0) Limestone (36.6)
76	7342709	-	-	9/10/2019	Alteration	-	-	-
77	7133961	-	3.0	9/10/2009	Monitoring	-	-	Gravel (1.5) Silt/Stones (3.0)
78	6709100	Rotary (Air)	32.0	11/26/1987	Domestic	15.6	56.7	Gravel (9.1) Clay/Gravel (27.4) Rock (32.0)
79	7323682	Other Method	31.1	10/29/2018	Domestic	19.5	75.6	Clay/Gravel (21.3) Sand/Gravel (28.3) Limestone (31.1)
80	7323682	Other Method	-	10/29/2018	Domestic	-	-	-
81	7323682	Other Method	-	10/29/2018	Domestic	-	-	-
82	7155301	Other Method	10.7	11/3/2010	Monitoring	-	-	Fill (2.4) Sand/Gravel (10.7)
83	6711667	Air Percussion	28.3	12/8/1994	Domestic	15.9	37.8	Sand/Gravel (4.6) Clay/Sand (24.9) Sand/Gravel 27.7) Limestone (28.3)
84	6702668	Cable Tool	18.3	9/25/1951	Domestic	9.2	18.9	Clay/Gravel (8.5) Sand/Gravel (12.2) Clay/Stones (15.2) Sand (17.1) Gravel (18.3)
85	6702673	Cable Tool	32.0	9/8/1962	Domestic	18.3	15.1	Clay/Stones (29.0) Limestone (32.0)
86	6711129	Rotary (Air)	32.0	2/25/1993	Domestic	4.6	94.5	Sand/Gravel (20.1) Clay (26.8) Sand/Gravel (28.6) Limestone (32.0)
87	7119802	Rotary (Air)	-	1/3/2009	Domestic	-	-	-
88	7119802	Rotary (Air)	-	1/3/2009	Domestic	-	-	-
89	7119802	Rotary (Air)	-	1/3/2009	Domestic	-	-	-
90	7119802	Rotary (Air)	-	1/3/2009	Domestic	-	-	-
91	7119802	Rotary (Air)	-	1/3/2009	Domestic	-	-	-
92	7119802	Rotary (Air)	50.3	1/3/2009	Domestic	20.6	75.6	Clay/Stones (33.5) Sand (34.7) Light Brown Limestone (43.3) Dark Brown Limestone (50.3)
93	7314681	-	3.0	7/4/2018	Monitoring	-	-	Sand/Gravel (1.5) Silt/Stones (3.0)
94	7133961	-	3.0	9/10/2009	Monitoring	-	-	Sand/Gravel (1.5) Silt/Stones (3.0)
95		Cable Tool	-	8/27/1987	Domestic	16.8	-	-
96	6710612	Cable Tool	23.5	5/2/1991	Domestic	0.6	181.4	Clay/Gravel (13.7) Sand/Gravel (21.9) Limestone (23.5)
97	6706256	Cable Tool	36.6	12/24/1976	Domestic	17.7	37.8	Clay/Gravel (32.2) Limestone (36.6)
98	6707588	Cable Tool	32.9	2/26/1981	Domestic	16.5	37.8	Prevoiusly Dug (8.2) Clay (32.3) Limestone (32.9)
99	6702536	Cable Tool	12.5	6/16/1961	Domestic	3.1	18.9	Clay/Gravel (10.7) Gravel (12.5)
100	6711879	Rotary (Air)	30.8	11/9/1995	Domestic	13.4	94.5	Clay/Stones (24.1) Limestone (30.8)
101	6705423	Cable Tool	20.4	1/20/1975	Domestic	6.7	37.8	Clay/Sand (6.7) Sand/Gravel (20.1) Gravel (20.4)

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Date Completed	Well Use	Static Water Level (m)**	Pumping Rate (L/min)	Stratigraphy (Depth in m)
102	7362434	Rotary (Air)	-	6/24/2020	Domestic	4.9	-	-
103	7362434	Rotary (Air)	32.9	6/24/2020	Domestic	4.9	45.4	Clay/Gravel (31.1) Rock (32.9)
104	6715529	Rotary (Convent.)	-	5/9/2005	Domestic	18.8		-
105	6715529	Rotary (Convent.)	33.0	5/9/2005	Domestic	18.8	45.0	Sand (9.1) Silt/Clay (27.4) Clay/Stones (32.3) Sand/Gravel (33.2)
106	7299228	Other Method	-	10/23/2017	Domestic	-	-	-
107	7299228	Other Method	-	10/23/2017	Domestic	-	-	-
108	7299228	Other Method	31.4	10/23/2017	Domestic	18.3	113.4	Clay/Gravel (27.4) Sand/Gravel (28.6) Limestone (31.4)
109	6702670	Cable Tool	36.0	5/1/1958	Domestic	10.7	22.1	Clay/Stones (18.3) Sand/Gravel 35.1) Limestone (36.0)
110	6709771	Cable Tool	-	6/8/1989	Domestic	-	-	-
111	6709771	Cable Tool	27.4	6/8/1989	Domestic	7.3	37.8	Sand/Gravel (4.3) Clay/Sand (16.5) Sand/Gravel (24.1) Limestone (27.4)
112	6702669	Cable Tool	36.6	12/6/1951	Domestic	7.0	37.8	Clay (18.3) Gravel (24.4) Rock (36.6)
113	6710040	Rotary (Air)	27.4	11/11/1989	Domestic	16.5	75.6	Clay/Gravel (26.8) Limestone (27.4)
114	7166392	-	35.7	7/12/2011	Alteration	16.8	-	-
115	6713223	Rotary (Air)	-	12/21/1999	Domestic	-	-	-
116	6713223	Rotary (Air)	43.3	12/21/1999	Domestic	21.4	56.7	Clay/Gravel (9.1) Sand/Gravel (16.8) Clay/Gravel (28.3) Light Brown Limestone (33.5) Dark Brown Limestone (43.3)
117	7154838	Other Method	7.6	11/3/2010	Observation Wells	-	-	Silt/Sand 7.6)
118	7353621	Other Method	-	1/27/2020	Domestic	-	-	-
119	7353621	Other Method	-	1/27/2020	Domestic	-	-	-
120	7353621	Other Method	34.1	1/27/2020	Domestic	18.9	86.9	Clay/Stones (9.1) Sand/Gravel (12.1) Clay (22.9) Gravel (28.0) Limestone (34.1)
121	7114627	Other Method	24.3	10/22/2008	Domestic	10.4	45.4	Clay/Stones (21.3) Rock (24.3)
122	7133961	-	3.0	9/10/2009	Monitoring	-	-	Sand/Gravel (1.5) Silt/Stones (3.0)
123	6713365	Rotary (Air)	-	6/9/2000	Domestic	-	-	-
124	6713365	Rotary (Air)	-	6/9/2000	Domestic	-	-	-
125	6713365	Rotary (Air)	37.2	6/9/2000	Domestic	16.8	94.5	Clay/Stones (29.3) Limestone (37.2)
126	7114629	Other Method	27.1	10/21/2008	Domestic	11.6	56.7	Clay/Stones (24.4) Rock (27.1)
127	7314679	-	3.0	7/4/2018	Monitoring	-	-	-
128	7133961	-	-	9/10/2009	Monitoring	-	-	-
129	7133961	Auger	3.0	9/10/2009	Monitoring	-	-	Sand/Gravel (1.5) Silt/Stones (3.0)
130	6711985	Rotary (Air)	30.5	6/15/1996	Domestic	18.3	75.6	Clay/Gravel (29.6) Limestone (30.5)
131	6713863	Rotary (Air)	31.1	9/26/2001	Domestic	18.0	94.5	Clay Stones (27.7) Limestone (31.1)
132	6714294	-	-	10/21/2002	Alteration	-	-	-
133	6707595	Rotary (Air)	31.7	10/6/1981	Domestic	16.8	75.6	Clay/Gravel 7.6) Gravel (12.2) Clay (30.8) Gravel (31.7)
134	6710473	Air Percussion	36.6	11/13/1990	Domestic	19.2	37.8	Sand/Gravel 18.9) Clay (25.3) Sand/Gravel (33.8) Limestone (36.6)
135	6710111	Rotary (Air)	-	11/16/1989	Domestic	-	-	-

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Date Completed	Well Use	Static Water Level (m)**	Pumping Rate (L/min)	Stratigraphy (Depth in m)
136	6710111	Rotary (Air)	43.3	11/16/1989	Domestic	14.9	56.7	Clay/Gravel (25.6) Ligh Brown Rock (33.5) Dark Brown Rock (43.3)
137	6712163	Rotary (Air)	25.9	10/2/1996	Domestic	12.5	56.7	Silt/Stones 6.1) Clay/Gravel (24.4) Limestone (25.9)
138	6703544	Rotary (Convent.)	38.1	7/30/1969	Domestic	16.5	37.8	Sand/Gravel (14.6) Clay/Stones (30.8) Limestone (38.1)
139	6715615	-	-	12/15/2005	Abandoned-Other	-	-	-
140	6713456	Rotary (Air)	21.3	8/14/2000	Domestic	14.0	75.6	Clay/Stones (18.3) Gravel (21.3)
141	6708111	Rotary (Air)	23.8	6/18/1984	Domestic	0.6	75.6	Clay/Sand (21.3) Limestone (23.8)
142	6710485	Rotary (Air)	43.0	10/3/1990	Domestic	16.5	37.8	Clay/Gravel (22.9) Sand (25.9) Cly/Gravel (27.1) Light Brown Rock (35.1) Dark Brown Rock (43.0)
143	6710046	Rotary (Air)	28.6	9/18/1989	Domestic	4.6	75.6	Clay/Gravel (18.3) Silt/Gravel (28.3) Limestone (28.6)
144	7114630	Other Method	-	10/20/2008	Domestic	1.8		
145	7114630	Other Method	23.8	10/20/2008	Domestic	1.8	56.7	Clay/Stones (3.0) Sand/Gravel (9.1) Clay/Gravel (23.2) Rock (23.8)
146	6712564	Rotary (Air)	-	1/1/1998	Domestic	-	-	-
147	6712564	Rotary (Air)	43.0	1/1/1998	Domestic	17.4	56.7	Clay/Gravel (25.9) Sand/Gravel (29.9) Light Brown Limestone (36.6) Dark Brown Limestone (43.0)
148	6707594	Rotary (Air)	29.9	9/23/1981	Domestic	6.7	283.5	Clay/Sand (27.7) Limestone (29.9)
149	7133961	-	3.0	9/10/2009	Monitoring	-	-	Sand/Gravel (1.5) Silt/Stones (3.0)
150	7314680	-	4.5	7/4/2018	Abandoned-Other	-	-	-
151	7204352	Rotary (Convent.)	-	6/15/2013	Domestic	-	-	-
152	7204352	Rotary (Convent.)	-	6/15/2013	Domestic	-	-	-
153	7204352	Rotary (Convent.)	-	6/15/2013	Domestic	-	-	-
154	7204352	Rotary (Convent.)	32.6	6/15/2013	Domestic	7.6	56.7	Clay/Stones 24.1) Limestone (32.6)
155	6712259	Rotary (Air)	-	6/10/1997	Domestic	-	-	-
156	6712259	Rotary (Air)	36.6	6/10/1997	Domestic	14.6	113.4	Sand (1.5) Clay/Sand (26.5) Limestone (36.6)
157	6713196	Rotary (Air)	-	11/25/1999	Domestic	-	-	-
158	6713196	Rotary (Air)	37.5	11/25/1999	Domestic	18.3	75.6	Clay/Gravel 16.8) Sand/Gravel 28.3) Light Brown Limestone (35.1) Dark Brown Limestone (37.5)
159	6711486	Rotary (Air)	-	8/2/1994	Domestic	16.2	-	-
160	6711486	Rotary (Air)	-	8/2/1994	Domestic	16.2	-	-
161	6711486	Rotary (Air)	42.1	8/2/1994	Domestic	16.2	56.7	Clay/Gravel 28.3) Sand/Gravel (29.6) Limestone (42.1)
162	6710494	Rotary (Air)	22.3	7/20/1990	Domestic	12.8	75.6	Clay/Stones (18.3) Gravel (22.3)
163	6712255	Rotary (Air)	29.0	5/27/1997	Domestic	16.5	94.5	Clay/Sand (24.4) Sand/Gravel (27.1) Limestone (29.0)
164	7274863	Other Method	-	11/7/2016	Abandoned-Other	-	-	-
165	7138233	Other Method	-	12/10/2009	Domestic	-	-	-
166	7138233	Other Method	36.0	12/10/2009	Domestic	16.5	75.6	Clay/Stones (3.7) Sand/Gravel (12.2) Clay (24.4) Sand/Gravel (29.6) Rock (36.0)
167	6710415	Rotary (Air)	29.9	5/28/1990	Domestic	18.0	56.7	Clay/Gravel (28.6) Limestone (29.9)
168	6709785	Rotary (Air)	-	6/12/1989	Domestic	-	-	-
169	6709785	Rotary (Air)	43.0	6/12/1989	Domestic	15.9	56.7	Clay/Stones (18.3) Gravel (29.6) Light Brown Rock (35.1) Dark Brown Rock (43.0)

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Date Completed	Well Use	Static Water Level (m)**	Pumping Rate (L/min)	Stratigraphy (Depth in m)
170	6714759	Rotary (Air)	-	11/17/2003	Domestic	-	-	-
171	6714759	Rotary (Air)	30.5	11/17/2003	Domestic	17.0	61.0	Clay/Stones (6.1) Sand/Gravel (15.0) Clay/Gravel (27.0) Rock (30.5)
172	6712723	Rotary (Air)	30.8	9/28/1998	Domestic	18.9	56.7	Clay/Stones 13.7) Sand/Gravel (22.9) Clay/Gravel (28.7) Gravel (30.8)
173	6702546	Cable Tool	30.5	9/9/1966	Livestock	10.7	75.6	Previously Dug (13.7) Clay/Sand 19.3) Rock (30.5)
174	6712370	Rotary (Air)	-	10/28/1997	Domestic	12.2	-	-
175	6712370	Rotary (Air)	-	10/28/1997	Domestic	12.2	-	-
176	6712370	Rotary (Air)	42.7	10/28/1997	Domestic	12.2	75.6	Clay/Gravel (29.3) Light Brown Limestone (35.1) Dark Brown Limestone (42.7)
177	7112768	Rotary (Air)	-	9/24/2008	Commerical	-	-	-
178	7112768	Rotary (Air)	30.5	9/24/2008	Commerical	12.5	37.8	Clay/Stones (4.6) Sand/Gravel (11.6) Clay (22.9) Sand/Gravel (25.9) Rock (30.5)
179	6713015	Rotary (Air)	-	6/29/1999	Domestic	-	-	-
180	6713015	Rotary (Air)	43.6	6/29/1999	Domestic	19.2	75.6	Clay/Gravel (22.9) Sand/Gravel (30.2) Light Brown Limestone (35.1) Dark Brown Limestone (43.6)
181	7319287	-	22.6	9/18/2018	Alteration	10.1	30.2	-
182	7285591	Air Percussion	-	12/20/2016	Domestic	-	-	-
183	7285591	Air Percussion	26.2	12/20/2016	Domestic	4.9	94.5	Clay/Sand (25.3) Limestone (26.2)
184	6708415	Cable Tool	39.6	4/30/1986	Domestic	16.2	37.8	Clay/Stones (29.3) Ligh Brown Rock (37.5) Dark Brown Rock (39.6)
185	6707089	Cable Tool	27.1	9/24/1979	Commerical	10.7	37.8	Clay/Sand (22.3) Rock (27.1)
186	6714637	Rotary (Air)	-	9/30/2003	Domestic	6.4		
187	6714637	Rotary (Air)	25.0	9/30/2003	Domestic	6.4	94.5	Clay/Stones (16.5) Limestone (25.0)
188	6702545	Cable Tool	27.4	6/23/1964	Domestic	9.2	18.9	Sand/Gravel (9.1) Gravel (18.2) Clay/Sand (26.8) Rock (27.4)
189	6702663	Cable Tool	27.4	11/10/1964	Domestic	12.2	37.8	Clay/Stones (24.4) Rock (27.4)
190	6709927	Rotary (Air)	32.3	9/1/1989	Domestic	21.4	56.7	Fill (1.5) Clay/Gravel (30.2) Rock (32.3)
191	6714293	Rotary (Air)	29.0	11/12/2002	Domestic	19.5	68.0	Clay/Stones (26.8) Gravel (29.0)
192	6712487	Rotary (Air)	32.0	2/3/1998	Domestic	13.7	56.7	Clay/Stones (29.0) Gravel (32.0)
193	7254633	Rotary (Convent.)	-	9/18/2015	Domestic	-	-	-
194	7254633	Rotary (Convent.)	-	9/18/2015	Domestic	-	-	-
195	7254633	Rotary (Convent.)	31.4	9/18/2015	Domestic	6.7	151.2	Fill (2.7) Clay/Stones (28.7) Limestone (31.4)
196	6710440	Air Percussion	33.5	9/11/1990	Domestic	20.1	56.7	Clay/Gravel (11.3) Sand/Gravel 31.7) Limestone (33.5)
197	6710353	Air Percussion	34.1	5/8/1990	Domestic	6.7	113.4	Sand/Gravel (7.3) Clay/Gravel (24.1) Sand/Gravel 32.6) Limestone (34.1)
198	6712610	Rotary (Air)	-	7/29/1998	Domestic	20.1		
199	6712610	Rotary (Air)	-	7/29/1998	Domestic	20.1		
200	6712610	Rotary (Air)	43.0	7/29/1998	Domestic	20.1	94.5	Clay/Stones (27.4) Sand/Gravel 30.5) Clay/Gravel (33.2) Light Brown Limestone (36.6) Dark Brown Limestone (43.0)
201	7332571	-	-	3/25/2019	Alteration	-	-	-
202	6705869	Rotary (Convent.)	19.8	7/24/1975	Livestock	5.2	75.6	Clay/Stones (17.4) Limestone (19.8)
203	6707677	Cable Tool	46.6	6/29/1982	Domestic	9.2	37.8	Clay/Gravel (27.1) Rock (46.6)

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Date Completed	Well Use	Static Water Level (m)**	Pumping Rate (L/min)	Stratigraphy (Depth in m)
204	6710281	Rotary (Air)	36.9	4/24/1990	Domestic	13.4	56.7	Clay/Stones (12.2) Sand/Gravel (27.4) Clay/Sand (29.9) Light Brown Rock (35.1) Dark Brown Rock (36.9)
205	6711984	Rotary (Reverse)	31.5	6/18/1996	Domestic	13.4	56.7	Clay/Sand (19.8) Clay/Gravel (31.4) Gravel (31.5)
206	6710282	Rotary (Air)	36.3	4/23/1990	Domestic	12.2	75.6	Clay/Stones (13.7) Sand/Gravel (30.8) Light Brown Rock (33.5) Dark Brown Rock (36.3)
207	6712612	Rotary (Air)	-	7/24/1998	Domestic	-	-	-
208	6712612	Rotary (Air)	-	7/24/1998	Domestic	-	-	-
209	6712612	Rotary (Air)	73.5	7/24/1998	Domestic	25.9	75.6	Clay/Stones (21.3) Sand/Gravel (25.9) Clay/Gravel (32.3) Light Brown Limestone (33.5) Dark Brown Limestone (73.5)
210	6713827	Air Percussion	-	9/6/2001	Domestic	-	-	-
211	6713827	Air Percussion	31.1	9/6/2001	Domestic	14.9	94.5	Clay/Sand (17.7) Sand/Gravel (28.0) Limestone (31.1)
212	6711290	Rotary (Air)	31.4	9/7/1993	Domestic	12.8	75.6	Clay/Stones (10.7) Sand/Gravel (30.5) Gravel (31.4)
213	7199020	Rotary (Convent.)	-	3/6/2013	Domestic	-	-	-
214	7199020	Rotary (Convent.)	43.0	3/6/2013	Domestic	15.9	45.4	Clay/Stones (7.0) Sand/Stones (20.4) Clay/Stones (42.7) Limestone (43.0)
215	6711803	Rotary (Air)	48.8	8/17/1995	Domestic	18.3	56.7	Clay/Stones (15.2) Sand/Gravel (29.0) Light Brown Rock (38.1) Dark Brown Rock (48.8)
216	6704652	Cable Tool	24.4	6/27/1973	Domestic	7.0	37.8	Clay/Stones (23.5) Gravel (24.4)
217	6710441	Air Percussion	-	9/10/1990	Domestic	-	-	-
218	6710441	Air Percussion	37.8	9/10/1990	Domestic	21.0	56.7	Clay/Gravel (25.0) Sand/Gravel (34.7) Limestone (37.8)
219	6702675	Cable Tool	22.9	6/4/1965	Domestic	9.2	30.2	Clay (10.7) Silty Sand (20.1) Rock (22.9)
220	6712182	Rotary (Convent.)	-	1/7/1997	Domestic	-	-	-
221	6712182	Rotary (Convent.)	51.8	1/7/1997	Domestic	12.8	37.8	Sand/Gravel (4.9) Clay/Gravel (26.8) Brown Limestone (46.9) Grey Limestone (51.8)
222	6703857	Cable Tool	24.4	7/22/1970	Domestic	8.5	37.8	Clay/Stones (18.3) Silt/Sand (21.3) Clay/Gravel (24.1) Gravel (24.4)
223	6714525	Rotary (Air)	-	4/7/2003	Domestic	-	-	-
224	6714525	Rotary (Air)	27.7	4/7/2003	Domestic	11.9	56.7	Clay/Stones (22.3) Limestone (27.7)
225	6713406	Rotary (Air)	25.6	7/18/2000	Domestic	10.4	37.8	Clay/Stones (22.9) Sand/Gravel (25.6)
226	6712999	Rotary (Air)	30.5	6/15/1999	Domestic	9.2	56.7	Clay/Stones (26.8) Rock (30.5)
227	6709990	Cable Tool	27.7	10/19/1989	Domestic	3.1	37.8	Sand/Gravel (7.3) Gravel (13.1) Clay/Gravel (21.3) Gravel (26.5) Limestone (27.7)
228	6713220	Rotary (Air)	24.4	12/2/1999	Domestic	11.3	75.6	Clay/Stones (11.6) Sand/Gravel (18.9) Rock (24.4)

*MECP WWID: Ministry of the Environment , Conservation and Parks Water Well Records Identification

**metres below ground surface

Appendix C
Results of Groundwater Monitoring

ENGLOBE

11 Main Street, Puslinch

Groundwater Depths (m below ground surface)

Monitoring Well ID	Ground Elevation (m asl)	Well Depth (m bgs)	Well Screen Top Depth (m bgs)	1st GW Monitoring Event*	2nd GW Monitoring Event	3rd GW Monitoring Event	4th GW Monitoring Event	5th GW Monitoring Event
				Water Depth Aug 24, 2022 (m bgs)	Water Depth Sept 7, 2022 (m bgs)	Water Depth Sept 19, 2022 (m bgs)	Water Depth July 18, 2024 (m bgs)	Water Depth August 6, 2024 (m bgs)
BH1	313.0	6.6	3.6	Dry	Dry	Dry	3.93	3.98
BH2	318.2	7.6	6.1	6.64	6.72	6.76	5.61	5.64
BH3	317.1	7.6	4.6	5.22	5.33	5.42	4.29	4.35
BH5	316.8	6.1	4.6	5.13	5.21	5.21	4.40	4.44

Groundwater Elevations (m above sea level)

Monitoring Well ID	Ground Elevation (m asl)	Well Screen Bottom Elevation (m asl)	Well Screen Top Elevation (m asl)	1st GW Monitoring Event*	2nd GW Monitoring Event	3rd GW Monitoring Event	4th GW Monitoring Event	5th GW Monitoring Event
				Groundwater Level Elevation Aug 24, 2022 (m asl)	Groundwater Level Elevation Sept 7, 2022 (m asl)	Groundwater Level Elevation Sept 19, 2022 (m asl)	Groundwater Level Elevation July 18, 2024 (m asl)	Groundwater Level Elevation August 6, 2024 (m asl)
BH1	313.0	306.4	309.4	Dry	Dry	Dry	309.04	308.99
BH2	318.2	310.6	312.1	311.54	311.46	311.42	312.57	312.54
BH3	317.1	309.5	312.5	311.93	311.82	311.73	312.86	312.80
BH5	316.8	310.7	312.2	311.67	311.59	311.59	312.40	312.36

mbgs - meters below ground surface

masl - meters above sea level

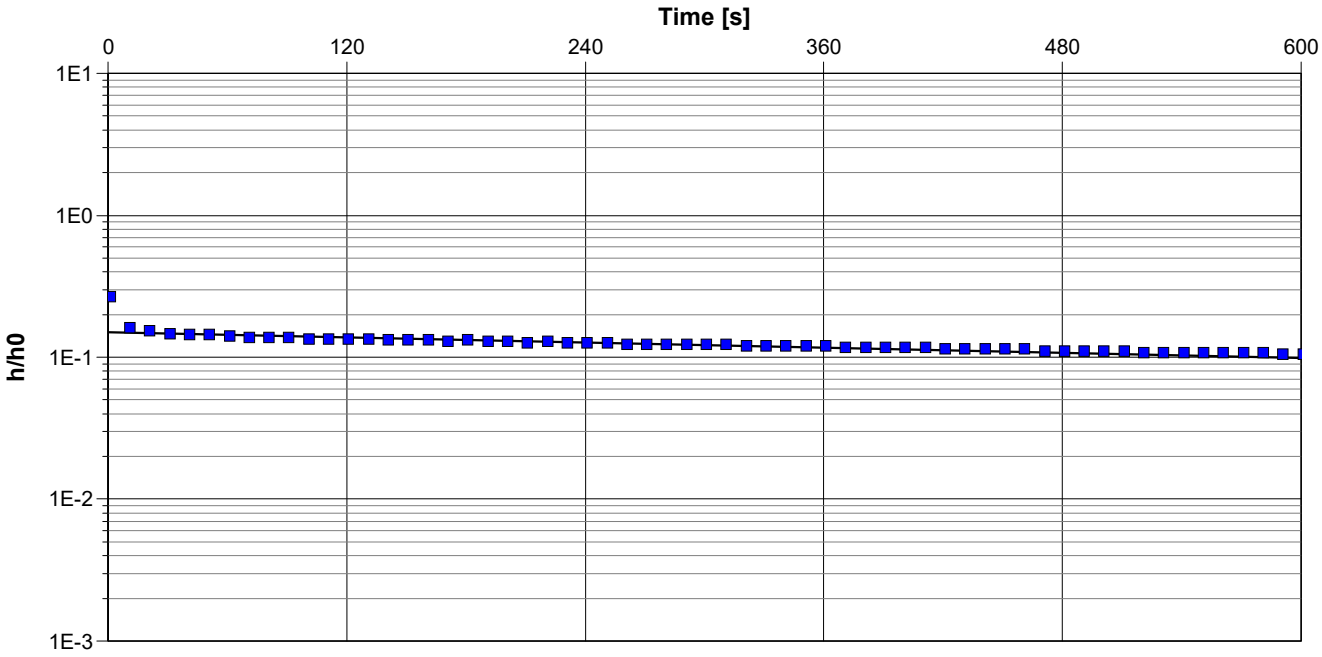
*Indicates that the groundwater has not been stabilized yet

Appendix D
Results of Hydraulic Conductivity Testing

ENGLOBE

	Slug Test Analysis Report	Appendix D
	Project: 11 Main Street	
	Number: 1-22-0482-46	
	Client:	

Location: 11 Main street	Slug Test: BH2	Test Well: BH2
Test Conducted by: AA		Test Date: 10/17/2022
Analysis Performed by: RG	RHT - BH2	Analysis Date: 10/17/2022
Aquifer Thickness: 2.00 m		

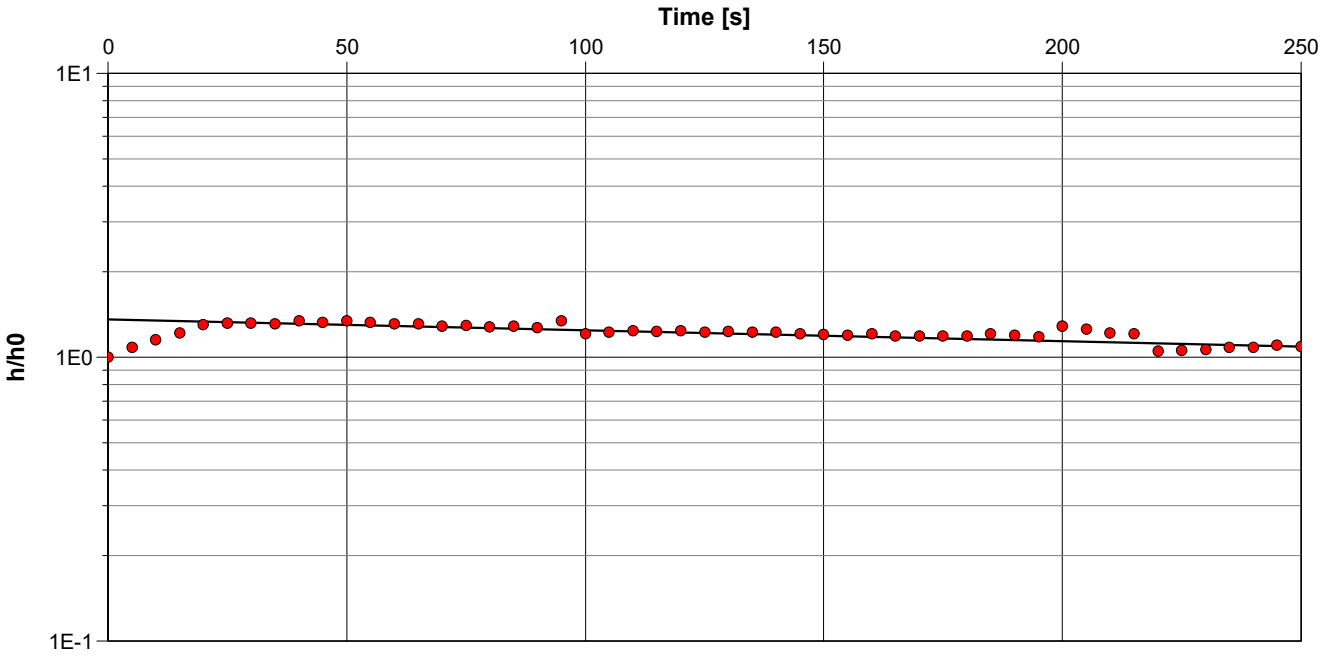


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH2	1.21×10^{-6}	

	Slug Test Analysis Report	Appendix D
	Project: 11 Main Street	
	Number: 1-22-0482-46	
	Client:	

Location: 11 Main street	Slug Test: BH3	Test Well: BH3
Test Conducted by: AA		Test Date: 10/17/2022
Analysis Performed by: RG	FHT - BH3	Analysis Date: 11/11/2022
Aquifer Thickness: 7.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH3	1.18×10^{-6}	

Appendix E
Laboratory Certificates of Analysis

ENGLOBE

AGAT Laboratories

5835 COOPERS AVENUE
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CANADA L4Z 1Y2
TEL (905)712-5100
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CLIENT NAME: ENGLOBE CORP.
20, CARLSON COURT
ETOBICOKE, ON M9W 7K6
416 301-5909
ATTENTION TO: Paul Raepple
PROJECT: T1220482.003
AGAT WORK ORDER: 24T182195
WATER ANALYSIS REVIEWED BY: Yris Verastegui, Inorganic Team Lead
DATE REPORTED: Aug 12, 2024
PAGES (INCLUDING COVER): 15
VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This Certificate shall not be reproduced except in full, without the written approval of the laboratory.*
- *The test results reported herewith relate only to the samples as received by the laboratory.*
- *Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.*
- *All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.*
- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

TOC

DATE RECEIVED: 2024-08-06 **DATE REPORTED: 2024-08-12**

		SAMPLE DESCRIPTION:		BH1	BH2	BH3	BH5	BC Surface
		SAMPLE TYPE:		Water	Water	Water	Water	Water
		DATE SAMPLED:		2024-08-06	2024-08-06	2024-08-06	2024-08-06	2024-08-06
Parameter	Unit	G / S	RDL	6055636	6055693	6055694	6055695	6055696
Total Organic Carbon	mg/L		0.5	1.0	0.7	1.0	0.8	8.8

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Analysis performed at AGAT Halifax (unless marked by *)

Certified By: Iris Verástegui

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AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

Water Quality Assessment (mg/L) Groundwater

DATE RECEIVED: 2024-08-06

DATE REPORTED: 2024-08-12

		SAMPLE DESCRIPTION:		BH1	BH2		BH3		BH5
		SAMPLE TYPE:		Water	Water		Water		Water
		DATE SAMPLED:		2024-08-06	2024-08-06		2024-08-06		2024-08-06
Parameter	Unit	G / S	RDL	6055636	6055693	RDL	6055694	RDL	6055695
Electrical Conductivity	µS/cm		2	588	567	2	1310	2	524
pH	pH Units		NA	7.76	7.82	NA	7.68	NA	7.80
Saturation pH (Calculated)				6.96	6.90		6.70		6.90
Langelier Index (Calculated)				0.796	0.915		0.976		0.897
Hardness (as CaCO3) (Calculated)	mg/L		0.5	306	321	0.5	452	0.5	301
Total Dissolved Solids	mg/L		10	362	354	10	824	10	290
Alkalinity (as CaCO3)	mg/L		5	257	281	5	347	5	281
Bicarbonate (as CaCO3)	mg/L		5	257	281	5	347	5	281
Carbonate (as CaCO3)	mg/L		5	<5	<5	5	<5	5	<5
Hydroxide (as CaCO3)	mg/L		5	<5	<5	5	<5	5	<5
Fluoride	mg/L		0.05	0.08	0.08	0.05	<0.05	0.05	0.08
Chloride	mg/L		0.10	34.4	17.3	0.12	202	0.10	4.70
Nitrate as N	mg/L		0.05	0.37	1.54	0.05	6.10	0.05	1.66
Nitrite as N	mg/L		0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05
Bromide	mg/L		0.05	<0.05	<0.05	0.05	<0.05	0.05	<0.05
Sulphate	mg/L		0.10	6.89	14.4	0.10	26.9	0.10	3.35
Ortho Phosphate as P	mg/L		0.10	<0.10	<0.10	0.10	<0.10	0.10	<0.10
Ammonia as N	mg/L		0.02	<0.02	<0.02	0.02	<0.02	0.02	<0.02
Total Phosphorus	mg/L		0.02	<0.02	<0.02	0.02	<0.02	0.02	<0.02
True Colour	TCU		2.50	<2.50	<2.50	2.50	<2.50	2.50	<2.50
Turbidity	NTU		0.5	0.7	0.8	0.5	<0.5	0.5	1.0
Dissolved Calcium	mg/L		0.05	76.5	74.1	0.05	112	0.05	70.0
Dissolved Magnesium	mg/L		0.05	27.9	33.0	0.05	41.9	0.05	30.6
Dissolved Potassium	mg/L		0.50	<0.50	0.93	0.50	2.75	0.50	<0.50
Dissolved Sodium	mg/L		0.05	12.2	10.4	0.05	117	0.05	3.99
Dissolved Aluminum	mg/L		0.004	<0.004	0.007	0.004	0.004	0.004	0.009
Dissolved Antimony	mg/L		0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001
Dissolved Arsenic	mg/L		0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001
Dissolved Barium	mg/L		0.002	0.016	0.054	0.002	0.071	0.002	0.010
Dissolved Beryllium	mg/L		0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005

Certified By: Iris Verástegui

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Certificate of Analysis

AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

Water Quality Assessment (mg/L) Groundwater

DATE RECEIVED: 2024-08-06

DATE REPORTED: 2024-08-12

		SAMPLE DESCRIPTION:		BH1	BH2		BH3		BH5
		SAMPLE TYPE:		Water	Water		Water		Water
		DATE SAMPLED:		2024-08-06	2024-08-06		2024-08-06		2024-08-06
Parameter	Unit	G / S	RDL	6055636	6055693	RDL	6055694	RDL	6055695
Dissolved Boron	mg/L		0.010	0.137	0.166	0.010	0.169	0.010	0.144
Dissolved Cadmium	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Chromium	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Cobalt	mg/L		0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005
Dissolved Copper	mg/L		0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001
Dissolved Iron	mg/L		0.020	<0.020	<0.020	0.020	<0.020	0.020	<0.020
Dissolved Lead	mg/L		0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0005	<0.0005
Dissolved Manganese	mg/L		0.002	<0.002	<0.002	0.002	0.005	0.002	<0.002
Dissolved Mercury	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Molybdenum	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Nickel	mg/L		0.001	<0.001	0.001	0.001	0.001	0.001	<0.001
Dissolved Selenium	mg/L		0.001	<0.001	<0.001	0.001	0.001	0.001	<0.001
Dissolved Silver	mg/L		0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Dissolved Strontium	mg/L		0.005	0.062	0.074	0.005	0.123	0.005	0.052
Dissolved Thallium	mg/L		0.0003	<0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003
Dissolved Tin	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Titanium	mg/L		0.003	<0.003	<0.003	0.003	<0.003	0.003	<0.003
Dissolved Tungsten	mg/L		0.010	<0.010	<0.010	0.010	<0.010	0.010	<0.010
Dissolved Uranium	mg/L		0.0005	<0.0005	0.0012	0.0005	<0.0005	0.0005	<0.0005
Dissolved Vanadium	mg/L		0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002
Dissolved Zinc	mg/L		0.005	0.006	<0.005	0.005	0.048	0.005	0.018
Dissolved Zirconium	mg/L		0.004	<0.004	<0.004	0.004	<0.004	0.004	<0.004

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6055636-6055695 Metals analysis completed on a filtered sample.
Dilution required, RDL has been increased accordingly.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: Iris Verástegui

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Certificate of Analysis

AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2024-08-06

DATE REPORTED: 2024-08-12

		SAMPLE DESCRIPTION:		BC Surface
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-08-06
Parameter	Unit	G / S	RDL	6055696
Electrical Conductivity	µS/cm		2	2490
pH	pH Units	6.5-8.5	NA	8.00
Saturation pH (Calculated)				6.73
Langelier Index (Calculated)				1.27
Hardness (as CaCO3) (Calculated)	mg/L		0.5	412
Total Dissolved Solids	mg/L		10	1200
Alkalinity (as CaCO3)	mg/L		5	357
Bicarbonate (as CaCO3)	mg/L		5	357
Carbonate (as CaCO3)	mg/L		5	<5
Hydroxide (as CaCO3)	mg/L		5	<5
Fluoride	mg/L		0.05	<0.05
Chloride	mg/L		0.49	476
Nitrate as N	mg/L		0.14	1.92
Nitrite as N	mg/L		0.11	<0.11
Bromide	mg/L		0.11	<0.11
Sulphate	mg/L		0.38	22.8
Ortho Phosphate as P	mg/L		0.26	<0.26
Ammonia as N	mg/L		0.02	<0.02
Ammonia-Un-ionized (Calculated)	mg/L	0.02	0.000002	<0.000002
Total Phosphorus	mg/L	*	0.02	<0.02
True Colour	TCU		2.50	15.5
Turbidity	NTU		0.5	8.2
Total Calcium	mg/L		0.20	109
Total Magnesium	mg/L		0.10	34.0
Total Potassium	mg/L		0.50	5.68
Total Sodium	mg/L		0.10	309
Aluminum-dissolved	mg/L	*	0.004	0.004
Total Antimony	mg/L	0.020	0.003	<0.003
Total Arsenic	mg/L	0.1	0.003	<0.003
Total Barium	mg/L		0.002	0.090

Certified By: Iris Verástegui

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AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2024-08-06

DATE REPORTED: 2024-08-12

		SAMPLE DESCRIPTION:		BC Surface
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2024-08-06
Parameter	Unit	G / S	RDL	6055696
Total Beryllium	mg/L	*	0.001	<0.001
Total Boron	mg/L	0.2	0.010	0.193
Total Cadmium	mg/L	0.0002	0.0001	<0.0001
Total Chromium	mg/L		0.003	<0.003
Total Cobalt	mg/L	0.0009	0.0005	<0.0005
Total Copper	mg/L	0.005	0.002	**0.006**
Total Iron	mg/L	0.3	0.050	**1.29**
Total Lead	mg/L	*	0.0005	0.0034
Total Manganese	mg/L		0.002	0.294
Total Mercury	mg/L		0.0001	<0.0001
Total Molybdenum	mg/L	0.040	0.002	<0.002
Total Nickel	mg/L	0.025	0.003	<0.003
Total Selenium	mg/L	0.1	0.002	<0.002
Total Silver	mg/L	0.0001	0.0001	<0.0001
Total Strontium	mg/L		0.005	0.282
Total Thallium	mg/L	0.0003	0.0003	<0.0003
Total Tin	mg/L		0.002	<0.002
Total Titanium	mg/L		0.010	<0.010
Total Tungsten	mg/L	0.030	0.010	<0.010
Total Uranium	mg/L	0.005	0.0005	<0.0005
Total Vanadium	mg/L	0.006	0.002	<0.002
Total Zinc	mg/L	0.030	0.020	**0.050**
Total Zirconium	mg/L	0.004	0.004	<0.004
Lab Filtration Aluminum Dissolved				1

Certified By: Iris Verástegui

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AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

Water Quality Assessment - PWQO (mg/L)

DATE RECEIVED: 2024-08-06 **DATE REPORTED: 2024-08-12**

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to PWQO * Variable - refer to guideline reference document
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

6055696 Dissolved Aluminum analysis performed on a lab filtered container.
Dilution required, RDL has been increased accordingly.
Un-ionized Ammonia detection limit is a calculated RDL. The calculation of Un-ionized Ammonia is based on lab measured parameters (ammonia as N, pH and temperature).Values are reported as calculated.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By: Iris Verástegui

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Exceedance Summary

AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

CLIENT NAME: ENGLOBE CORP.

ATTENTION TO: Paul Raepple

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
6055696	BC Surface	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Copper	mg/L	0.005	0.006
6055696	BC Surface	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Iron	mg/L	0.3	1.29
6055696	BC Surface	ON PWQO	Water Quality Assessment - PWQO (mg/L)	Total Zinc	mg/L	0.030	0.050

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

Water Analysis

RPT Date: Aug 12, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Water Quality Assessment (mg/L) Groundwater															
Electrical Conductivity	6055350		488	499	2.2%	< 2	106%	90%	110%						
pH	6055350		7.70	7.87	2.2%	NA	100%	90%	110%						
Total Dissolved Solids	6056576		1460	1470	0.7%	< 10	102%	80%	120%						
Alkalinity (as CaCO3)	6055350		150	151	0.7%	< 5	97%	80%	120%						
Bicarbonate (as CaCO3)	6055350		150	151	0.7%	< 5	NA								
Carbonate (as CaCO3)	6055350		<5	<5	NA	< 5	NA								
Hydroxide (as CaCO3)	6055350		<5	<5	NA	< 5	NA								
Fluoride	6049956		<0.05	<0.05	NA	< 0.05	104%	70%	130%	103%	80%	120%	105%	70%	130%
Chloride	6049956		25.2	25.4	0.8%	< 0.10	95%	70%	130%	103%	80%	120%	102%	70%	130%
Nitrate as N	6049956		<0.05	<0.05	NA	< 0.05	97%	70%	130%	99%	80%	120%	96%	70%	130%
Nitrite as N	6049956		<0.05	<0.05	NA	< 0.05	94%	70%	130%	98%	80%	120%	95%	70%	130%
Bromide	6049956		<0.05	<0.05	NA	< 0.05	99%	70%	130%	100%	80%	120%	98%	70%	130%
Sulphate	6049956		9.75	9.80	0.5%	< 0.10	95%	70%	130%	100%	80%	120%	96%	70%	130%
Ortho Phosphate as P	6049956		<0.10	<0.10	NA	< 0.10	94%	70%	130%	99%	80%	120%	92%	70%	130%
Ammonia as N	6053504		<0.02	<0.02	NA	< 0.02	109%	70%	130%	100%	80%	120%	102%	70%	130%
Total Phosphorus	6048025		0.03	0.03	NA	< 0.02	101%	70%	130%	99%	80%	120%	84%	70%	130%
True Colour	6043561		33.5	34.8	3.8%	< 2.5	103%	90%	110%						
Turbidity	6055350		34.4	36.8	6.7%	< 0.5	113%	80%	120%						
Dissolved Calcium	6055636	6055636	76.5	75.5	1.3%	< 0.05	101%	70%	130%	100%	80%	120%	105%	70%	130%
Dissolved Magnesium	6055636	6055636	27.9	27.8	0.4%	< 0.05	104%	70%	130%	105%	80%	120%	104%	70%	130%
Dissolved Potassium	6055636	6055636	<0.50	0.56	NA	< 0.50	101%	70%	130%	100%	80%	120%	103%	70%	130%
Dissolved Sodium	6055636	6055636	12.2	12.0	1.7%	< 0.05	101%	70%	130%	106%	80%	120%	104%	70%	130%
Dissolved Aluminum	6055636	6055636	<0.004	<0.004	NA	< 0.004	98%	70%	130%	107%	80%	120%	113%	70%	130%
Dissolved Antimony	6055636	6055636	<0.001	<0.001	NA	< 0.001	103%	70%	130%	104%	80%	120%	107%	70%	130%
Dissolved Arsenic	6055636	6055636	<0.001	<0.001	NA	< 0.001	97%	70%	130%	98%	80%	120%	106%	70%	130%
Dissolved Barium	6055636	6055636	0.016	0.017	6.1%	< 0.002	101%	70%	130%	103%	80%	120%	103%	70%	130%
Dissolved Beryllium	6055636	6055636	<0.0005	<0.0005	NA	< 0.0005	99%	70%	130%	104%	80%	120%	113%	70%	130%
Dissolved Boron	6055636	6055636	0.137	0.139	1.4%	< 0.010	101%	70%	130%	108%	80%	120%	110%	70%	130%
Dissolved Cadmium	6055636	6055636	<0.0001	<0.0001	NA	< 0.0001	101%	70%	130%	100%	80%	120%	105%	70%	130%
Dissolved Chromium	6055636	6055636	<0.002	<0.002	NA	< 0.002	96%	70%	130%	100%	80%	120%	102%	70%	130%
Dissolved Cobalt	6055636	6055636	<0.0005	<0.0005	NA	< 0.0005	96%	70%	130%	101%	80%	120%	100%	70%	130%
Dissolved Copper	6055636	6055636	<0.001	<0.001	NA	< 0.001	99%	70%	130%	99%	80%	120%	99%	70%	130%
Dissolved Iron	6055636	6055636	<0.020	<0.020	NA	< 0.010	101%	70%	130%	103%	80%	120%	108%	70%	130%
Dissolved Lead	6055636	6055636	<0.0005	<0.0005	NA	< 0.0005	97%	70%	130%	99%	80%	120%	98%	70%	130%
Dissolved Manganese	6055636	6055636	<0.002	<0.002	NA	< 0.002	99%	70%	130%	102%	80%	120%	105%	70%	130%
Dissolved Mercury	6055636	6055636	<0.0001	<0.0001	NA	< 0.0001	99%	70%	130%	103%	80%	120%	95%	70%	130%
Dissolved Molybdenum	6055636	6055636	<0.002	<0.002	NA	< 0.002	102%	70%	130%	106%	80%	120%	107%	70%	130%
Dissolved Nickel	6055636	6055636	<0.001	<0.001	NA	< 0.001	96%	70%	130%	99%	80%	120%	100%	70%	130%
Dissolved Selenium	6055636	6055636	<0.001	<0.001	NA	< 0.001	106%	70%	130%	98%	80%	120%	109%	70%	130%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.
AGAT WORK ORDER: 24T182195
PROJECT: T1220482.003
ATTENTION TO: Paul Raepple
SAMPLING SITE:11 Main St, Puslinch ON
SAMPLED BY:MG, SF

Water Analysis (Continued)

RPT Date: Aug 12, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Dissolved Silver	6055636	6055636	<0.0001	<0.0001	NA	< 0.0001	98%	70%	130%	100%	80%	120%	99%	70%	130%
Dissolved Strontium	6055636	6055636	0.062	0.065	4.7%	< 0.005	98%	70%	130%	104%	80%	120%	105%	70%	130%
Dissolved Thallium	6055636	6055636	<0.0003	<0.0003	NA	< 0.0003	98%	70%	130%	101%	80%	120%	100%	70%	130%
Dissolved Tin	6055636	6055636	<0.002	<0.002	NA	< 0.002	103%	70%	130%	105%	80%	120%	104%	70%	130%
Dissolved Titanium	6055636	6055636	<0.003	<0.003	NA	< 0.002	98%	70%	130%	107%	80%	120%	106%	70%	130%
Dissolved Tungsten	6055636	6055636	<0.010	<0.010	NA	< 0.010	97%	70%	130%	97%	80%	120%	99%	70%	130%
Dissolved Uranium	6055636	6055636	<0.0005	<0.0005	NA	< 0.0005	93%	70%	130%	96%	80%	120%	97%	70%	130%
Dissolved Vanadium	6055636	6055636	<0.002	<0.002	NA	< 0.002	97%	70%	130%	106%	80%	120%	107%	70%	130%
Dissolved Zinc	6055636	6055636	0.006	0.008	NA	< 0.005	99%	70%	130%	99%	80%	120%	103%	70%	130%
Dissolved Zirconium	6055636	6055636	<0.004	<0.004	NA	< 0.004	97%	70%	130%	100%	80%	120%	99%	70%	130%
Water Quality Assessment - PWQO (mg/L)															
Electrical Conductivity	6055350		488	499	2.2%	< 2	106%	90%	110%						
pH	6055350		7.70	7.87	2.2%	NA	100%	90%	110%						
Total Dissolved Solids	6056576		1460	1470	0.7%	< 10	102%	80%	120%						
Alkalinity (as CaCO3)	6055350		150	151	0.7%	< 5	97%	80%	120%						
Bicarbonate (as CaCO3)	6055350		150	151	0.7%	< 5	NA								
Carbonate (as CaCO3)	6055350		<5	<5	NA	< 5	NA								
Hydroxide (as CaCO3)	6055350		<5	<5	NA	< 5	NA								
Fluoride	6049956		<0.05	<0.05	NA	< 0.05	104%	70%	130%	103%	80%	120%	105%	70%	130%
Chloride	6049956		25.2	25.4	0.8%	< 0.10	95%	70%	130%	103%	80%	120%	102%	70%	130%
Nitrate as N	6049956		<0.05	<0.05	NA	< 0.05	97%	70%	130%	99%	80%	120%	96%	70%	130%
Nitrite as N	6049956		<0.05	<0.05	NA	< 0.05	94%	70%	130%	98%	80%	120%	95%	70%	130%
Bromide	6049956		<0.05	<0.05	NA	< 0.05	99%	70%	130%	100%	80%	120%	98%	70%	130%
Sulphate	6049956		9.75	9.80	0.5%	< 0.10	95%	70%	130%	100%	80%	120%	96%	70%	130%
Ortho Phosphate as P	6049956		<0.10	<0.10	NA	< 0.10	94%	70%	130%	99%	80%	120%	92%	70%	130%
Ammonia as N	6053504		<0.02	<0.02	NA	< 0.02	109%	70%	130%	100%	80%	120%	102%	70%	130%
Total Phosphorus	6046590		0.04	0.04	NA	< 0.02	95%	70%	130%	101%	80%	120%	105%	70%	130%
True Colour	6043561		33.5	34.8	3.8%	< 2.5	103%	90%	110%						
Turbidity	6055350		34.4	36.8	6.7%	< 0.5	113%	80%	120%						
Total Calcium	6055350		45.0	38.7	15.1%	< 0.20	89%	70%	130%	94%	80%	120%	110%	70%	130%
Total Magnesium	6055350		21.2	19.7	7.3%	< 0.10	106%	70%	130%	109%	80%	120%	95%	70%	130%
Total Potassium	6055350		0.90	0.83	NA	< 0.50	102%	70%	130%	105%	80%	120%	98%	70%	130%
Total Sodium	6055350		37.3	34.8	6.9%	< 0.10	102%	70%	130%	109%	80%	120%	115%	70%	130%
Aluminum-dissolved	6055696	6055696	0.004	<0.004	NA	< 0.004	102%	70%	130%	108%	80%	120%	114%	70%	130%
Total Antimony	6055350		<0.003	<0.003	NA	< 0.003	103%	70%	130%	107%	80%	120%	109%	70%	130%
Total Arsenic	6055350		0.005	0.005	NA	< 0.003	99%	70%	130%	104%	80%	120%	107%	70%	130%
Total Barium	6055350		0.066	0.063	4.7%	< 0.002	99%	70%	130%	103%	80%	120%	105%	70%	130%
Total Beryllium	6055350		<0.001	<0.001	NA	< 0.001	102%	70%	130%	112%	80%	120%	104%	70%	130%
Total Boron	6055350		0.173	0.169	2.3%	< 0.010	101%	70%	130%	116%	80%	120%	102%	70%	130%

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Quality Assurance

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

Water Analysis (Continued)

RPT Date: Aug 12, 2024			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Total Cadmium	6055350		<0.0001	<0.0001	NA	< 0.0001	97%	70%	130%	100%	80%	120%	99%	70%	130%
Total Chromium	6055350		<0.003	<0.003	NA	< 0.003	99%	70%	130%	101%	80%	120%	101%	70%	130%
Total Cobalt	6055350		<0.0005	<0.0005	NA	< 0.0005	98%	70%	130%	101%	80%	120%	98%	70%	130%
Total Copper	6055350		0.183	0.186	1.6%	< 0.002	98%	70%	130%	100%	80%	120%	94%	70%	130%
Total Iron	6055350		5.17	5.19	0.4%	< 0.050	100%	70%	130%	103%	80%	120%	102%	70%	130%
Total Lead	6055350		0.0091	0.0089	2.2%	< 0.0005	97%	70%	130%	99%	80%	120%	97%	70%	130%
Total Manganese	6055350		0.031	0.031	0.0%	< 0.002	101%	70%	130%	104%	80%	120%	106%	70%	130%
Total Mercury	6055350		<0.0001	<0.0001	NA	< 0.0001	99%	70%	130%	103%	80%	120%	96%	70%	130%
Total Molybdenum	6055350		0.008	0.008	NA	< 0.002	102%	70%	130%	106%	80%	120%	106%	70%	130%
Total Nickel	6055350		<0.003	0.003	NA	< 0.003	98%	70%	130%	100%	80%	120%	99%	70%	130%
Total Selenium	6055350		<0.002	<0.002	NA	< 0.002	97%	70%	130%	104%	80%	120%	107%	70%	130%
Total Silver	6055350		<0.0001	<0.0001	NA	< 0.0001	99%	70%	130%	99%	80%	120%	98%	70%	130%
Total Strontium	6055350		1.33	1.28	3.8%	< 0.005	101%	70%	130%	105%	80%	120%	100%	70%	130%
Total Thallium	6055350		<0.0003	<0.0003	NA	< 0.0003	100%	70%	130%	102%	80%	120%	101%	70%	130%
Total Tin	6055350		0.003	0.003	NA	< 0.002	105%	70%	130%	105%	80%	120%	105%	70%	130%
Total Titanium	6055350		<0.010	<0.010	NA	< 0.010	99%	70%	130%	93%	80%	120%	100%	70%	130%
Total Tungsten	6055350		<0.010	<0.010	NA	< 0.010	97%	70%	130%	98%	80%	120%	96%	70%	130%
Total Uranium	6055350		<0.0005	<0.0005	NA	< 0.0005	93%	70%	130%	97%	80%	120%	99%	70%	130%
Total Vanadium	6055350		<0.010	<0.010	NA	< 0.002	100%	70%	130%	104%	80%	120%	106%	70%	130%
Total Zinc	6055350		0.264	0.256	3.1%	< 0.020	100%	70%	130%	100%	80%	120%	111%	70%	130%
Total Zirconium	6055350		<0.004	<0.004	NA	< 0.004	95%	70%	130%	98%	80%	120%	98%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate NA: results are under 5X the RDL and will not be calculated.

TOC

Total Organic Carbon	6056775		<0.5	<0.5	NA	< 0.5	99%	80%	120%	NA	80%	120%	98%	80%	120%

Comments: If RPD value is NA, the results of the duplicates are less than 5x the RDL and the RPD will not be calculated.

Certified By: Iris Verástegui

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Total Organic Carbon	INOR-121-6026	SM 5310 B	TOC ANALYZER
Electrical Conductivity	INOR-93-6000	modified from SM 2510 B	PC TITRATE
pH	INOR-93-6000	modified from SM 4500-H+ B	PC TITRATE
Saturation pH (Calculated)		SM 2320 B	CALCULATION
Langelier Index (Calculated)		SM 2330B	CALCULATION
Hardness (as CaCO3) (Calculated)	MET-93-6105	modified from EPA SW-846 6010C & 200.7 & SM 2340 B	CALCULATION
Total Dissolved Solids	INOR-93-6028	modified from EPA 1684,ON MOECC E3139,SM 2540C,D	BALANCE
Alkalinity (as CaCO3)	INOR-93-6000	Modified from SM 2320 B	PC TITRATE
Bicarbonate (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Carbonate (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Hydroxide (as CaCO3)	INOR-93-6000	modified from SM 2320 B	PC TITRATE
Fluoride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Chloride	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite as N	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Bromide	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ortho Phosphate as P	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Ammonia as N	INOR-93-6059	modified from SM 4500-NH3 H	LACHAT FIA
Total Phosphorus	INOR-93-6057	modified from LACHAT 10-115-01-3A	LACHAT FIA
True Colour	INOR-93-6074	modified from SM 2120 B	LACHAT FIA
Turbidity	INOR-93-6000	modified from SM 2130 B	PC TITRATE
Dissolved Calcium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Dissolved Potassium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Sodium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP/MS
Dissolved Aluminum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Antimony	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Arsenic	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Barium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Beryllium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Boron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cadmium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Chromium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Cobalt	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Copper	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Dissolved Iron	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Lead	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Manganese	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Dissolved Molybdenum	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Nickel	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Selenium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Silver	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Strontium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Thallium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tin	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Titanium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Tungsten	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Uranium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Vanadium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zinc	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Dissolved Zirconium	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Ammonia-Un-ionized (Calculated)		MOE REFERENCE, PWQOs Tab 2	CALCULATION
Total Phosphorus	INOR-93-6022	modified from SM 4500-P B and SM 4500-P E	SPECTROPHOTOMETER
Total Calcium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Magnesium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Potassium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Total Sodium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP/MS
Aluminum-dissolved	MET-93-6103	modified from EPA 200.8 and EPA 3005A	ICP-MS
Total Antimony	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Arsenic	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Barium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Beryllium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS

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Method Summary

CLIENT NAME: ENGLOBE CORP.

AGAT WORK ORDER: 24T182195

PROJECT: T1220482.003

ATTENTION TO: Paul Raepple

SAMPLING SITE:11 Main St, Puslinch ON

SAMPLED BY:MG, SF

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Boron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cadmium	MET -93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Chromium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Cobalt	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Copper	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Iron	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Lead	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Manganese	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Mercury	MET-93-6100	modified from EPA 245.2 and SM 3112 B	CVAAS
Total Molybdenum	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Nickel	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Selenium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Silver	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Strontium	INOR-93-6003	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Thallium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tin	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Titanium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Tungsten	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Uranium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Vanadium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zinc	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Total Zirconium	MET-93-6103	modified from EPA 200.8, 3005A, 3010A & 6020B	ICP-MS
Lab Filtration Aluminum Dissolved	SR-78-9001		FILTRATION

AGAT Laboratories

Have feedback? Scan here for a quick survey!

5835 Coopers Avenue
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Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 24T182195

Cooler Quantity: 1 large

Arrival Temperatures: 5.5 | 5.3 | 6.1

Depot Temperatures: | |

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: bagged ice

Report Information:

Company:

Contact:

Address:

Phone: Fax:

Reports to be sent to:

1. Email:

2. Email:

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Regulation 406
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture

☐ Regulation 558

☐ CCME

☐ Sewer Use ☐ Sanitary ☐ Storm
Region

☐ Prov. Water Quality Objectives (PWQO)

☐ Other
Indicate One

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☑ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT

**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CSR

Project Information:

Project: T1220482.003

Site Location: 11 Main St Puslinch, ON

Sampled By: MG + SF

AGAT Quote #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a **Record of Site Condition (RSC)**? ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company: Englobe

Contact: Paul Raepple

Address: 20 Carlson Ct Etobicoke

Email: Paul.Raepple@englobecorp.com

Legal Sample ☐

Sample Matrix Legend

GW	Ground Water	**SD**	Sediment
O	Oil	**SW**	Surface Water
P	Paint	**R**	Rock/Shale
S	Soil		

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	VOC	PAHs	PCBs: Arocolors ☐	O. Reg 406: Regulation 406 Characterization Package pH, Metals, BTEX, F1-F4	O. Reg 406: EC, SAR	O. Reg 406: Regulation 406 SPLP Rainwater Leach mSPLP: ☐ Metals ☐ VOCs ☐ SVOCs ☐ OC	O. Reg 558: Landfill Disposal Characterization TCLP: TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Corrosivity: ☐ Moisture ☐ Sulphide	WSA							Potentially Hazardous or High Concentration (Y/N)
1. BH1	Aug 6/24	AM/PM		GW		Y												✓						
2. BH2	Aug 6/24	AM/PM		GW		Y												✓						
3. BH3	Aug 6/24	AM/PM		GW		Y												✓						
4. BH5	Aug 6/24	AM/PM		GW		Y												✓						
5. BC-surface	Aug 6/24	AM/PM		SW		N												✓						
6.		AM/PM																						
7.		AM/PM																						
8.		AM/PM																						
9.		AM/PM																						
10.		AM/PM																						
11.		AM/PM																						

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Susha Fountain	Aug 6/24				
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

'24 AUG 6 5:40PM

Page ____ of ____

N°: T-160876

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

FINAL REPORT

CA40056-FEB23 R---

T1220482.002, 11 Main St. Pushinch

Prepared for

Terraprobe Inc

FINAL REPORT

CA40056-FEB23 R---

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Terraprobe Inc	Project Specialist	Maarit Wolfe, Hon.B.Sc
		Laboratory	SGS Canada Inc.
Address	11 Indell Lane Brampton, ON L6T 3Y3. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Rachel Geddam	Telephone	705-652-2000
Telephone	(905) 796-2650	Facsimile	705-652-6365
Facsimile	(905) 796-2250	Email	Maarit.Wolfe@sgs.com
Email	rgeddam@terraprobe.ca	SGS Reference	CA40056-FEB23
Project	T1220482.002, 11 Main St. Pushinch	Received	02/07/2023
Order Number		Approved	02/13/2023
Samples	Ground Water (3)	Report Number	CA40056-FEB23 R---
		Date Reported	02/13/2023

COMMENTS

Temperature of Sample upon Receipt: 4 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes

Chain of Custody Number: 028748

SIGNATORIES

Maarit Wolfe, Hon.B.Sc

TABLE OF CONTENTS

FINAL REPORT

CA40056-FEB23 R---

Client: Terraprobe Inc
Project: T1220482.002, 11 Main St. Pushinch
Project Manager: Rachel Geddam
Samplers: Saiyajit Manami

MATRIX: WATER

Sample Number				5	6	7	
Sample Name				BH2	BH3	BH5	
Sample Matrix				Ground Water	Ground Water	Ground Water	
Sample Date				07/02/2023	07/02/2023	07/02/2023	
Parameter	**Units**	**RL**		**Result**	**Result**	**Result**	
General Chemistry							
Ammonia+Ammonium (N)	as N mg/L	0.1		< 0.1	0.4	0.1	
Metals and Inorganics							
Phosphorus (total)	mg/L	0.03		0.36	< 0.03	0.44	
Nitrite (as N)	as N mg/L	0.03		< 0.03	< 0.03	< 0.03	
Nitrate (as N)	as N mg/L	0.06		2.54	6.01	0.31	
Nitrate + Nitrite (as N)	as N mg/L	0.06		2.54	6.01	0.31	
Other (ORP)							
pH	No unit	0.05		7.74	7.77	7.88	

QC SUMMARY

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0082-FEB23	as N mg/L	0.1	<0.1	0	10	101	90	110	98	75	125
Ammonia+Ammonium (N)	SKA0108-FEB23	as N mg/L	0.1	<0.1	0	10	97	90	110	90	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate + Nitrite (as N)	DIO0160-FEB23	mg/L	0.06	<0.06	NA		NA			NA		
Nitrite (as N)	DIO0160-FEB23	mg/L	0.03	<0.03	ND	20	96	90	110	92	75	125
Nitrate (as N)	DIO0160-FEB23	mg/L	0.06	<0.06	0	20	99	90	110	99	75	125

QC SUMMARY

pH

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0122-FEB23	No unit	0.05	NA	0		100			NA		

Phosphorus by SFA

Method: SM 4500-P J I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total)	SKA0080-FEB23	mg/L	0.03	<0.03	1	10	100	90	110	80	75	125

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Results relate only to the sample tested.
Data reported represent the sample as submitted to SGS. Solid samples expressed on a dry weight basis.
"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.
Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act and Excess Soil Quality" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated.

SGS Canada Inc. statement of conformity decision rule does not consider uncertainty when analytical results are compared to a specified standard or regulation.

This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

SGS Industries & Environment - Lakefield: 185 Concession St., Lakefield, ON K0L 2H0 Phone: 705-652-2000 Fax: 705-652-6365 Web: www.sgs.com/environment
- London: 657 Consortium Court, London, ON, N6E 2S8 Phone: 519-672-4500 Toll Free: 877-848-8060 Fax: 519-672-0361

No: 028748
Page 1 of 1

Laboratory Information Section - Lab use only

Received By: Nicole Brigant
Received By (signature):
Received Date: Feb / 7 / 23 (mm/dd/yy)
Received Time: 11 : 45 (hr : min)
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐
Cooling Agent Present: Yes ☑ No ☐ Type: Ice
Temperature Upon Receipt (°C) 4.4.4
LAB LIMS #: CA40056-Feb23

REPORT INFORMATION

Company: Terraprobe Inc
Contact: Rachel Geddam
Address: 11 Indell Lane
Brampton
Phone: 905 796 2650
Fax: 905 796 2250
Email: rgeddam@terraprobe.ca

INVOICE INFORMATION

☐ (same as Report Information)
Company:
Contact:
Address:
Phone:
Email:

Quotation #:
P.O. #:
Project #: T122004482.002
Site Location/ID: 11 main St. Puslinch

TURNAROUND TIME (TAT) REQUIRED

☑ Regular TAT (5-7days)
TAT's are quoted in business days (exclude statutory holidays & weekends).
Samples received after 6pm or on weekends: TAT begins next business day

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days
PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

Specify Due Date:
*NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
☐ Table 1 ☐ Res/Park Soil Texture:
☐ Table 2 ☐ Ind/Com ☐ Coarse
☐ Table 3 ☐ Agri/Other ☐ Medium/Fine
☐ Table _____ Appx. _____
Soil Volume ☐ <350m3 ☐ >350m3

Other Regulations:
☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ MMER
☐ CCME ☐ Other:
☐ MISA
☐ ODWS Not Reportable *See note

Sewer By-Law:
☐ Sanitary
☐ Storm
Municipality:

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX
1	BH2	Feb 07/23	10:45	3	water
2	BH3	"	9:00	3	
3	BH5	"	8:00	3	
4					
5					
6					
7					
8					
9					
10					
11					
12					

	Field Filtered (Y/N)	Metals & Inorganics (incl CrVI, CN, Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water)	Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI	ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	PAHs only	SVOCs all incl PAHs, ABNs, CPs	PCBs Total ☐ Aroclor ☐	F1-F4 + BTEX	F1-F4 only no BTEX	VOCs all incl BTEX	BTEX only	Pesticides Organochlorine or specify other	Other (please specify)				Sewer Use: Specify pkg:	Water Characterization Pkg General ☐ Extended ☐	SPLP Specify tests	TCLP Specify tests	COMMENTS:
													Nitrates	NH3	phos	pH					
1													✓	✓	✓						
2													✓	✓	✓						
3													✓	✓	✓						

SPLP: ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN
TCLP: ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.

Observations/Comments/Special Instructions

Sampled By (NAME): Satyajit Manani Signature: Date: 02 / 07 / 2023 (mm/dd/yy) Pink Copy - Client
Relinquished by (NAME): Satyajit Manani Signature: Date: 02 / 07 / 2023 (mm/dd/yy) Yellow & White Copy - SGS

Revision #: 1.6
Date of Issue: 02 May 2022

Appendix F
Nitrate Mass Balance Calculations

ENGLOBE

CONVENTIONAL EFFLUENT TREATMENT (40 mg/L)

Subject Site Information

Proposed Development: Residential Lot 18			
Total Site Area	1,940.00	m^2	(Draft Plan of Subdivision-Weston Consulting, June 9, 2024)
Net Area for recharge (Assuming impervious surfaces will be managed on site)	1,940.00	m^2	

Calculation of Infiltration Rate

Annual Water Surplus (after interception)	402.65	mm/yr	**Infiltr Factors:**	
former MOE infiltration factor (total)	0.60		Slope	Rolling Land (0.2)
Weighted infiltration to soil	241.59	mm/yr	cover	Cultivated Land (0.1)
			soil	Silty Sand (0.3)

Nitrate going into the system

Concentration of nitrate in precipitation	0.1	mg/L	Source: G.K.Rutherford
Net Area for recharge (Assuming impervious surfaces will be managed on site)	1,940.00	m^2	Considers Entire Site Recharges Groundwater
Infiltration of soil	0.24159	m/yr	
Annual Infiltration to site (volume)	468.68	m^3/yr	
volume of recharge to soil/groundwater table	**468,684.60**	L/yr	

Nitrate exiting leaching bed system

Concentration of nitrate in septic bed effluent	**40**	mg/L	Assumed Conventional Loading System
Proposed Area for septic bed	368.00	m^2	23x16 m as per email received from Crozier on Feb. 13, 2023
	1000	L/day	Average sewage flow
Assumed loading rate of sewage system	365.00	m^3/yr	
assuming residential development	**365,000.00**	L/yr	

Calculated Concentration at Site Boundary based on conventional sewage systems	**17.57**	mg/L	**>10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)

Geomean background nitrate in groundwater	1.55	mg/L	
Alernate calculation considering geomean background nitrate in groundwater (@1.68 mg/L)	**19.12**	mg/L	**>10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)

results assume no dilution resulting from groundwater underflow

*Source: G.K. Rutherford, A Preliminary Study of the Composition of Precipitation in Southern Ontario, Department of Geography, Queen's University, Kingston, Ontario, Canada. Received April 14, 1967.

TERTIARY EFFLUENT TREATMENT (20 mg/L)

Subject Site Information

Proposed Development: Residential Lot 18			
Total Site Area	1,940.00	m^2	(Draft Plan of Subdivision-Weston Consulting, June 9, 2024)
Net Area for recharge (Assuming impervious surfaces will be managed on site)	1,940.00	m^2	

Calculation of Infiltration Rate

Annual Water Surplus (after interception)	402.65	mm/yr	**Infiltr Factors:**	
former MOE infiltration factor (total)	0.60		Slope	Rolling Land (0.2)
Weighted infiltration to soil	241.59	mm/yr	cover	Cultivated Land (0.1)
			soil	Silty Sand (0.3)

Nitrate going into the system

Concentration of nitrate in precipitation	0.1	mg/L	Source: G.K.Rutherford
Net Area for recharge (Assuming impervious surfaces will be managed on site)	1,940.00	m^2	Considers Entire Site Recharges Groundwater
Infiltration of soil	0.24159	m/yr	
Annual Infiltration to site (volume)	468.68	m^3/yr	
volume of recharge to soil/groundwater table	**468,684.60**	L/yr	

Nitrate exiting leaching bed system

Concentration of nitrate in septic bed effluent	**20**	mg/L	Assumed Tertiary Loading System
Proposed Area for septic bed	368.00	m^2	23x16 m as per email received from Crozier on Feb. 13, 2023
	1000.00	L/day	1000 L/day Average flow as per email received on February 16, 2023.
Assumed loading rate of sewage system	365.00	m^3/yr	
assuming commercial development	**365,000.00**	L/yr	

Calculated Concentration at Site Boundary based on conventional sewage systems	**8.81**	mg/L	**<10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)

Geomean background nitrate in groundwater	1.55	mg/L	
Alernate calculation considering average background nitrate in groundwater (@1.68 mg/L)	**10.36**	mg/L	**>10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)

results assume no dilution resulting from groundwater underflow

*Source: G.K. Rutherford, A Preliminary Study of the Composition of Precipitation in Southern Ontario, Department of Geography, Queen's University, Kingston, Ontario, Canada. Received April 14, 1967.

ADVIANCED TERTIARY EFFLUENT TREATMENT (15 mg/L)

Subject Site Information

Proposed Development: Residential Lot 18			
Total Site Area	1,940.00	m^2	(Draft Plan of Subdivision-Weston Consulting, June 9, 2024)
Net Area for recharge (Assuming impervious surfaces will be managed on site)	1,940.00	m^2	

Calculation of Infiltration Rate

Annual Water Surplus (after interception)	402.65	mm/yr	**Infiltr Factors:**	
former MOE infiltration factor (total)	0.60		Slope	Rolling Land (0.2)
Weighted infiltration to soil	241.59	mm/yr	cover	Cultivated Land (0.1)
			soil	Silty Sand (0.3)

Nitrate going into the system

Concentration of nitrate in precipitation	0.1	mg/L	Source: G.K.Rutherford
Net Area for recharge (Assuming impervious surfaces will be managed on site)	1,940.00	m^2	Considers Entire Site Recharges Groundwater
Infiltration of soil	0.24159	m/yr	
Annual Infiltration to site (volume)	468.68	m^3/yr	
volume of recharge to soil/groundwater table	**468,684.60**	L/yr	

Nitrate exiting leaching bed system

Concentration of nitrate in septic bed effluent	**15**	mg/L	Assumed Advanced Tertiary Loading System
Proposed Area for septic bed	368.00	m^2	23x16 m as per email received from Crozier on Feb. 13, 2023
	1000.00	L/day	Average sewage flow
Assumed loading rate of sewage system	365.00	m^3/yr	
assuming commercial development	**365,000.00**	L/yr	

Calculated Concentration at Site Boundary based on conventional sewage systems	**6.62**	mg/L	**<10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)

Geomean background nitrate in groundwater	1.55	mg/L	
Alernate calculation considering geomean background nitrate in groundwater (@1.68 mg/L)	**8.17**	mg/L	**<10 mg/L** (Maximum Permitted Concentration of Nitrate at Property Boundary, based on ODWS)

results assume no dilution resulting from groundwater underflow

*Source: G.K. Rutherford, A Preliminary Study of the Composition of Precipitation in Southern Ontario, Department of Geography, Queen's University, Kingston, Ontario, Canada. Received April 14, 1967.