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A REPORT TO
ACORN NE STOUFFVILLE INC.

A HYDROGEOLOGICAL ASSESSMENT AND PRE- AND POST-DEVELOPMENT WATER BALANCE ASSESSMENT

12749 TENTH LINE
TOWN OF WITCHURCH-STOUFFVILLE

REFERENCE NO. 2103-W118

May 14, 2026

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Issues and Revisions Registry

SEL Reference No:	Modification	Date	Description of the issues and/or revision
2103-W118	Draft	November 2021	Preliminary Limited Hydrogeological Assessment for review
2103-W118	Draft 2	September 2023	Limited Hydrogeological Assessment for review
2103-W118	Draft 3	October 2023	Limited Hydrogeological Assessment for review and incorporation of New Plans
2103-W118	Draft 4	May 8, 2026	Hydrogeological Assessment based on a review of the revised plans and incorporation of the groundwater quality Test results and pre- and post-development water balance assessment
2103-W118	Final	May 14, 2026	The report is issued for submission.

1.0 EXECUTIVE SUMMARY

Soil Engineers Ltd. (SEL) was retained by Acorn NE Stouffville Inc. to conduct a Hydrogeological Assessment for the proposed residential development, known as the Acorn South Parcel, which is located at 12749 Tenth Line in the Town of Whitchurch-Stouffville (Subject Site).

Based on the Conceptual Site Plan prepared by Bousfields Inc., dated February 12, 2026, the Subject Site is proposed to be developed as a residential subdivision comprising townhouse blocks and a school block. The subdivision will be serviced by municipal infrastructure and paved roadways. The remaining of the Subject Site consists of a stormwater management facility and designated environmental lands. The area bounded by the Reesor Creek Valley to the west and the York Durham Line to the east is identified as a future development area, for which no development concept is currently available.

The current investigation revealed that:

- A review of the manually recorded groundwater level from the monitoring wells that are installed within the silty clay and silty clay till material ranges from 285.58 masl to 290.09 masl recorded in BH/MW 5 and 1. Furthermore, a review of the manually recorded groundwater levels from the monitoring wells that are installed within the silty sand unit ranges from 284.95 masl to 287.42 masl recorded in BH/MW 9 and 11.
- The estimated hydraulic conductivity for the silty clay till and silty clay unit ranges from 1.1 x 10^{-6} m/sec to 7.5 x 10^{-6} m/sec, and for the sandy silt ranges from 1.4 x 10^{-6} m/sec to 2.5 x 10^{-6} m/sec, that were utilized for the current assessment.
- The groundwater quality results indicate exceedances of Total Suspended Solids (TSS) when the water quality samples were compared to the York Region Storm Sewer Use By-Law (2021 102) limits. However, a review of the analytical results indicates that groundwater quality meets the York Region Sanitary Sewer Use By-Law.
- The groundwater quality results compared to the PWQO limits indicates that exceedances were reported in Nonylphenol, Polychlorinated Biphenyls (PCBs) – Total and Bis(2-ethylhexyl)phthalate at the detection limits. This indicates that any short-term construction dewatering discharge or long-term foundation drainage would require pre-treatment to lower the elevated parameters before being released into the nearby natural feature system.
- The estimated short-term construction dewatering flow rates including groundwater seepage with a safety factor of 1.5 and storm event for underground services (50 m by 2 m active excavation trench) and townhouse blocks (one block that will be constructed below shallow groundwater table) is 29,650 L/day and 33,200 L/day, respectively which are below the MECP EASR threshold; therefore, EASR registration is not required for these activities, provided construction is phased. However, the proposed stormwater management pond (SWMP) has an estimated dewatering rate

of 258,700.00 L/day considering groundwater seepage with a safety factor of 2.0 and storm event, which exceeds the threshold. Therefore, EASR registration with the MECP is required. In all cases, a discharge agreement with the Region of York is necessary for discharge to the municipal sewer system, and additional permits may be required for discharge to nearby watercourses within regulated areas.

- The estimated long-term foundation drainage flow rate (4,200 L/day) is well below the MECP PTTW threshold of 379,000 L/day; therefore, obtaining a permit from the MECP is not required. Adequate vertical separation (minimum 0.6 m) between footings and groundwater levels should be maintained in accordance with the Town of Whitchurch-Stoufville's policy requirements. The current assessment is based on preliminary grading and assumptions of seasonally high groundwater levels, and may be refined once final grading and design details are available.
- Short-term discharge water quality results indicate that Total Suspended Solids (TSS) exceed the York Region Storm Sewer Use By-Law limits, though groundwater meets the York Region's Sanitary Sewer Use By-Law. Therefore, pre-treatment is required prior to discharge to the storm system. Additionally, Nonylphenol, PCBs, and Bis(2-ethylhexyl)phthalate) exceed PWQO limits at detection levels. As such, a pre-treatment is required during dewatering activities if the discharge water will be directed to the natural features.
- The maximum anticipated preliminary conceptual Zone of Influence (ZOI) for dewatering extends up to 7.4, 5.1 and 16.2 meters from the dewatering area for the installation of underground services, townhouse blocks and Storm Water Management Pond within the Subject Site, respectively. Considering above:
    - A review of the records indicates that there are no structures located within the preliminary ZOI for the proposed underground services, townhouse blocks and Storm Water Management Pond. Therefore, potential risk for the ground settlement is not anticipated for the proposed construction at the Subject Site.
    - Based on the review, no natural features are located within the conceptual ZOI. Therefore, no impacts to the natural features are anticipated. However, this assessment and associated recommendations should be reviewed and confirmed once the detailed design for the Subject Site becomes available.
    - A review of the MECP well records indicates that there are no records for water supply wells that are registered within the conceptual ZOI for dewatering. Considering the current available data, significant impacts to water supply wells are not anticipated for the proposed Subject Site. However, completion of a private water supply well is recommended in advance of, during and post-construction. The private water supply well monitoring should be completed a couple of months ahead of construction.

- A review of the findings indicates that a total decrease of 20,934.02 m^3/year and 13,451.15 m^3/year for ET and infiltration, respectively, and an increase of 34,385.17 m^3/year for runoff are expected for the post-development Site.

2.0 INTRODUCTION

2.1 Site Location and Project Description

Soil Engineers Ltd. (SEL) was retained by Acorn NE Stouffville Inc. to conduct a Hydrogeological Assessment for the proposed residential development at a property with municipal address of 12749 Tenth Line, in Town of Whitchurch-Stouffville (The Subject Site). The Subject Site, known as the Acorn South Parcel. The location of the subject site is presented on **Drawing 1**.

The Subject Site is located to the east side of Tenth Line approximately 740 m north of Bethesda Side Road, in which the property boundary spans from Tenth Line in the west, to the York Durham Line in the east. The Subject site was previously used for agricultural land usage, but now comprises a vacant farm field. The neighbouring properties consist, mainly of farm fields and associated houses and structures to the north, east and west, and south of the Subject Site.

Based on the Conceptual Site Plan prepared by Bousfields Inc., dated February 12, 2026, the Subject Site is proposed to be developed as a residential subdivision comprising townhouse blocks and school blocks. These uses will be serviced by municipal infrastructure and paved roadways. The remaining of the Subject Site consists of a stormwater management facility and designated environmental lands. The area bounded by the Reesor Creek Valley to the west and the York Durham Line to the east is identified as a future development area, for which no development concept is currently available.

2.2 Project Objectives

The current hydrogeological assessment report presents the regional and local setting of the Subject Site. The findings of the fieldwork, including subsoil investigation, groundwater level monitoring, groundwater quality assessment and hydraulic conductivity testing, are presented in the report. Potential needs for short-term dewatering control are assessed, and hydrogeological impacts of the proposed development to the nearby groundwater receptors, including water supply wells, natural heritage features, and structures, are assessed (if applicable). This report provides comments on the potential impacts of the proposed development and the nearby structures. Furthermore, potential needs for long-term foundation drainage control were assessed. Comments and recommendations are provided on any needs for posting Environmental Activity and Sector Registry (EASR) and filling Permit to Take Water (PTTW) with the Ministry of the Environment, Conservation and Parks (MECP).

The current report is prepared in consideration of the Ontario Water Resource Act, Ontario Regulation 387/04.

2.3 Scope of Work

The scope of work for the hydrogeological assessment is summarized below:

- *Background Review:* Available background geological and hydrogeological information for the Subject Site, including topographic mapping, surface geological, natural heritage features databases, Toronto and Region Conservation Authority (TRCA) regulated area plans, and MECP water well records were reviewed.
- *Fieldwork:* Fieldwork includes inspecting the subject site and surrounding properties concerning the natural features, groundwater receptors, and structures, as well as installing and development of six (6) Monitoring wells in 2021. Furthermore, in-situ hydraulic conductivity testing (Single Well Response Tests/slug tests) was completed in the available monitoring wells. Additionally, two (2) sets of untreated groundwater samples were collected and submitted to a CALA-accredited laboratory to characterize groundwater quality in comparison with the Region of York Storm and Sanitary Sewer Use By-Law standards and Provincial Water Quality Objectives (PWQO) standards. This was conducted to assess disposal and management options for any anticipated short-term construction dewatering or long-term foundation drainage control, if applicable.
- *Short-Term Dewatering Needs:* Based on a review of the available design drawings, findings of the current subsurface investigation, and recommendations provided in the geotechnical investigation report (if available), short-term dewatering flow rate including groundwater seepage, and anticipated water that should be collected over potential storm events was calculated. Potential need for a mitigation plan was discussed to mitigate potential short-term dewatering impacts to the nearby groundwater receptors (including natural heritage features and water supply wells), and structures, if applicable.
- *Long-term foundation Drainage Control Requirement:* Based on a review of the available design drawings, findings of the current subsurface investigation, and recommendations provided in the geotechnical investigation report, the total long-term foundation drainage flow rate, including groundwater seepage, and anticipated flow from infiltration source was estimated, if applicable.
- *Permit Requirements:* Considering the estimated short-term construction dewatering long-term foundation drainage flow rates, recommendations were provided on any need for posting on the EASR, or filling PTTW with the MECP, if required.
- *Pre- and post-development Water Balance Assessment:* A pre- and post-development water balance assessment was completed as a part of the current assessment based on a review of the TRCA water balance tool and the statistics provided to our office.

3.0 APPLICABLE REGULATIONS AND OFFICIAL PLANS

The regulations and policies relevant to this hydrogeological assessment and the location of the Subject Site within the official plans are summarized below.

3.1 Toronto Regional Conservation Authority (TRCA) Policies and Regulation (O. Reg. 41/24)

Under Section 28 of the Conservation Authorities Act, local conservation authorities are mandated to protect the health and integrity of the regional greenspace system and to maintain or improve the hydrological and ecological functions performed by valley and stream corridors. The TRCA, through its regulatory mandate, is responsible for issuing permits under Ontario Regulation (O. Reg.) 41/24, Development, Interference with Wetlands and Alterations to Shorelines and Watercourses for development proposals or Site alteration work to shorelines and watercourses within the regulated areas.

TRCA Regulated Area online mapping was reviewed on May 4, 2026. It is our understanding that eastern portion of the Subject Site, identified as Environmental lands are located within a TRCA Regulated Area, specifically at the tributary of Reesor creek. As such, it is anticipated that obtaining a permit from the TRCA under O. Reg. 41/42 (or the applicable updated Conservation Authorities Act regulations) may be required if the proposed development encroach into the regulated area of the Subject Site.

3.2 Clean Water Act

The MECP mandates the protection of existing and future sources of drinking water under the Clean Water Act, 2006 (CWA). Initiatives under the CWA include the delineation of Wellhead Protection Areas (WHPAs), significant groundwater recharge areas (SGRAs) and Highly Vulnerable Aquifers (HVAs), as well as the assessment of drinking water quality and quantity threats within Source Protection Regions. Source Protection Plans are developed under the CWA and include the restriction and prohibition of certain types of activities and land uses within WHPAs.

Based on the regional-scale source water protection mapping (Source Water Protection Information Atlas) provided by the MECP on May 4, 2026, the Subject Site is not located within an Issue Contributing Area (ICA), Intake Protection Zone and Event Based Area. Record review indicates that the Majority of the Subject Site is located within Wellhead Protection Area B (WHPA-B) with a vulnerability score of 10 and Northeast corner of the Subject Site near York Durham Line it is located within Well Head Protection Area C with the Vulnerability score of 8. Furthermore, the Subject Site is also located within the WHPA-Q1 and WHPA-Q2 areas associated with a moderate stress level. It is also partially located within a Significant Groundwater Recharge Area (SGRA), and a Highly Vulnerable Aquifer (HVA) with a vulnerability score

of 6. Since the Subject Site is located within the WHPA Q1 and Q2 the Pre- and Post Development Water Balance Assessment is provided in the **Section 9.0** of the current report.

4.0 METHODOLOGY

4.1 Borehole Advancement and Monitoring Well Installation

The field work for the borehole drilling and monitoring well construction was performed between April 7 and April 17 of 2021. It consisted of the drilling of sixteen (16) boreholes (BH) and the installation of six (6) monitoring wells (MW); one within each of Boreholes 1, 5, 9, 11, 15 and 16. The borehole and monitoring well locations are shown on **Drawing 2**, enclosed.

Borehole drilling and monitoring well construction were completed by a licensed water well contractor in each investigation phase, under the full-time supervision of SEL's geotechnical supervisor who logged the soil strata encountered during borehole advancement and collected representative soil samples for textural classification. The boreholes were drilled using a track-mounted drill rig equipped with continuous-flight, solid-stem augers. Detailed descriptions of the encountered subsoil and groundwater conditions, as well as a grain size distribution graph, are provided by SEL and presented on the borehole and monitoring well logs, in the enclosed **Appendix A**.

The monitoring wells were constructed using 50-mm diameter Trilock pipes and 3.1 m long 10-slot well screens, which were installed in each of the selected geotechnical boreholes. All monitoring wells were equipped with monument steel protective casings. The boreholes were checked for the presence of groundwater and the occurrence of cave-in upon completion of drilling.

The UTM coordinates and ground surface elevations at the monitoring wells' locations, as well as the monitoring well construction details, are presented in **Table 4-1**. The ground surface elevations and horizontal coordinates at the monitoring well locations were determined at the time of the investigation, using a (Trimble Geoexplorer unit TSC3) Global Navigation Satellite System.

Table 4-1 Monitoring Well Installation Details

Monitoring Well ID	Installation Date	UTM Coordinates (m)		Ground El. (masl)	Screen Interval (mbgs)	Soil in the Screen Interval	Casing Dia. (mm)	Protective Casing Type
		Easting	Northing					
BH/MW 1	April 7, 2021	641658.34	4871895.85	290.56	3.1 – 6.1	Silty Clay Till	50	Monument
BH/MW 5	April 7, 2021	641774.95	4871987.04	289.88	3.1 – 6.1	Silty Clay Till and Silty Sand	50	Monument
BH/MW 9	April 9, 2021	641943.23	4871945.74	292.02	7.7 – 10.7	Silty Sand	50	Monument
BH/MW 11	April 13, 2021	641882.63	4872110.38	293.16	7.7 – 10.7	Silty Sand	50	Monument
BH/MW 15	April 17, 2021	642156.50	4872092.25	291.40	3.1 – 6.1	Silty Clay Till	50	Monument
BH/MW 16	April 17, 2021	642126.72	4872173.26	291.30	3.1 – 6.1	Silty Clay Till	50	Monument

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

4.2 MECP Water Well Records Review

MECP Water Well Records (WWRs) were reviewed for the registered wells located within a 500 m radius of the Subject Site. The water well records indicate that Ninety (90) wells are located within the 500 m zone of influence of the Study Area relative to the Subject Site. The findings of the MECP well records are summarized in **Section 5.6** of the current report.

4.3 Groundwater Monitoring

The groundwater levels in the monitoring wells were measured manually on twenty-five (25) occasions during the study period, on the following dates: April 21, May 28, June 29, and July 27, August 31, September 30, October 30, November 30 and December 23 of 2021; July 21, November 23 and December 28 of 2023; January 24, February 28, March 12, April 1, May 22, June 25, July 25, August 28, September 25, October 23, November 27 of 2024; December 23, 2025 and January 6, 2026. These measurements were taken to record the fluctuation of the stabilized groundwater table beneath the Subject Site with the results presented in **Section 7.1**.

4.4 In-Situ Hydraulic Conductivity Test

In-situ hydraulic conductivity testing was conducted in six (6) monitoring well with sufficient groundwater. The in-situ hydraulic conductivity test (falling head and rising head) provides an estimated hydraulic conductivity (K) for the subsoil strata at the depth of the well screen. The monitoring well was developed in advance of the test. Well development involves the purging and removal of groundwater from the monitoring well to remove remnants of clay, silt, and other debris introduced into the monitoring well during construction, and to induce the flow of formation groundwater through the well screen, thereby improving the transmissivity of the subsoil strata formation at the well screen depth.

The in-situ falling head hydraulic conductivity test involves the placement of a slug of known volume into the monitoring well, below the water table, to displace the groundwater level upward. The in-situ rising head hydraulic conductivity test involves removing a volume of water from the monitoring well to displace the groundwater level downward. The rate at which the water level recovers to static conditions (rising head/falling head) is tracked manually using a water level tape and a data logger. A slug test in a monitoring well with a partially submerged screen may exhibit a double straight-line effect due to filter pack drainage. Therefore, the data that represents the filter pack around the screen is eliminated during the interpretation of the slug test. The rate at which the water table recovers to static conditions is used to estimate the K value for the water-bearing strata formation at the well screen depth using the Bouwer and Rice method (1976). The findings of the hydraulic conductivity testing are presented in **Section 7.2.1** of the current report.

4.5 Groundwater Quality Assessment

Groundwater quality assessment was completed by SEL on January 7, 2026. One (1) set of groundwater samples was collected from one (1) selected monitoring well (BH/MW 302) to characterize its quality for evaluation against the Region of York Sanitary and Storm Sewer Use By-Law (2021-102) parameters. This is performed to assess whether any anticipated dewatering effluent can be disposed of into the Region of York Storm or Sanitary Sewer system during construction. Based on the results, recommendations for any pre-treatment for any dewatering effluent can be developed, if required. Additionally, one (1) set of groundwater quality samples was collected from the same monitoring well (BH/MW 302) to characterize its quality for evaluation against the Provincial Water Quality Objectives (PWQO). This is performed to assess whether any anticipated dewatering effluent can be disposed of into the nearby natural feature system

The sample analysis was performed by SGS Canada Inc., and the results of the analysis are discussed in **Section 7.3** of the current report.

4.6 Review of Regional Data and Available Reports for the Subject Site

The maps, data, and documents provided by the MECP, Ontario Geological Survey (OGS), Ministry of Natural Resources (MNR), Oak Ridges Moraine Groundwater Program (ORMGP), and TRCA were reviewed. Additionally, an issued geotechnical report was reviewed at the time of preparation of the current hydrogeological assessment report, with the findings summarized in S**ections 5** and **6**.

5.0 REGIONAL AND LOCAL SITE SETTING

5.1 Regional Geology

The current understanding of the surface geological setting of the Subject Site is based on scientific work conducted by the OGS (OGS, 2003). Majority of the Subject Site is located within an area mapped as Halton Till deposits (5d), comprising of clay to silt-textured till derived from the glaciolacustrine deposits or shale. **Drawing 3** illustrates the mapped surficial geology for the Subject Site and the surrounding area.

The Oak Ridges Moraine Groundwater Program (ORMGP) produced a cross-sectional geological map to aid in the characterization of the general area. Considering the regional cross-section, it is understood that the overburden units prevalent in this area are as follows, with the youngest unit at the top:

- *Undifferentiated Sediments:* Undifferentiated sediments present on the ground surface, with an approximate thickness of between 0.9 m and 1.9 m.
- *Halton Till (Upper Till):* The Halton Till is mainly comprised of sandy silt to clayey silt till interbedded with silt, clay, and some discontinuous sand and gravel lenses. It was deposited approximately 12,500 years ago. Based on cross-section, the Halton Till or equivalent can be contacted beneath the undifferentiated sediments with an approximate thickness ranging between 28.2 m and 32.7 m.
- *Oak Ridges Moraine:* The Oak Ridges Aquifer Complex (ORAC) is a regionally significant aquifer in southern Ontario. The majority of the aquifer's recharge occurs at the crest of the moraine north of the Subject Site. It is primarily composed of interbedded fine sand and silt deposits with localized coarse sand and gravel deposits. The ORAC is approximately 90 m thick beneath the crest of the moraine but thins out rapidly towards the margins. The approximate thickness of the ORAC could reach between 26.1 m and 29.9 m beneath the Subject Site.
- *Newmarket Till:* The Newmarket Till is a regionally extensive till formation that acts as an aquitard separating the Oak Ridges Aquifer Complex (ORAC) from the underlying Thorncliffe Formation. Based on the ORMGP cross-section, Upper New Market Till, is mapped beneath the ORAC, with the approximate thickness ranging from 3.2 to 7.4 m. The Inter-Newmarket Sediment is mapped beneath the Upper New Market Till. The approximate thickness of the Inter-Newmarket Sediment ranges from 5.4 m to 7.3 m for the Subject Site. Lower Newmarket Till is mapped beneath the Inter-Newmarket Sediment. The approximate thickness of the Lower Newmarket Till ranges from 24.9 to 28.4 m for the Subject Site.
- *Thorncliffe Formation:* The Thorncliffe Formation consists of glaciofluvial and glaciolacustrine sand and silt deposited approximately 30,000 to 50,000 years ago. The Thorncliffe Formation shows a considerable variation in grain size and thickness, both locally and regionally. It acts as a

regional aquifer. Based on the ORMGP cross-section, the approximate thickness of the Thorncliffe at the Subject Site is 21.1 to 27.5 m for the Subject Site.

- *Sunnybrook Drift:* The Sunnybrook Drift consists of silt to silty clay materials deposited 45,000 years ago and acts as a regional aquitard. The thickness of the Sunnybrook Drift is generally less than 10 m to 20 m. The approximate thickness of the Sunnybrook drift at the Subject Site ranges from 27.2 to 27.5 m for the Subject Site.
- *Scarborough Formation:* The Scarborough Formation is composed of clay, silt, and sand sediments in a deltaic sequence. It acts as an aquifer of regional extent. This unit is mostly found within bedrock valleys and thins laterally away from the valleys. Based on the ORMGP cross-section, the thickness of the Scarborough Formation approximately ranges from 0.1 to 9.3 m from southwest to northeast of the Subject Site.

The underlying bedrock at The Study Area is the Blue Mountain Formation, which consists of shale along with minor limestone (OGS, 2007). A review of the ORMGP cross-section indicates that the bedrock could be contacted approximately 137.1 to 171.9 mbgs beneath the Subject Site.

5.2 Regional Physiography

The Subject Site is located within a regional physiography of Southern Ontario known as the South Slope. The South Slope within the vicinity of the Subject Site comprises a drumlinized Till Plains (Chapman and Putnam, 1984). **Drawing 4** shows the location of the Subject Site within the regional physiography map.

5.3 Regional Topography and Drainage

A review of the regional topography map presented on **Drawing 5** indicates that the topography of the Subject Site slopes gently from the west, north and south towards the center and to the east, in general within the west side of the cleek towards Reesor Creek. It slopes to west within the east portion of the Subject Site towards Reesor Creek. The ground surface elevation ranges approximately between 288.2 meters above sea level (masl) and 293.16 masl, based on the ground surface elevations measured at the borehole and monitoring well locations.

5.4 Watershed Setting

The Subject Site is located within the Duffins Creek Watershed which falls within the Toronto and Region Conservation Authority (TRCA) jurisdiction.

5.5 Local Surface Water and Natural Heritage Features

The MNR database was reviewed for any natural heritage features, including watercourses, bodies of water, Area of Natural and Scientific Interest (ANSI) and wooded areas. The location of the Subject Site within the surrounding Natural Heritage Features is shown on **Drawing 6**.

Based on the record review, the Subject Site is situated within the Oak Ridges Moraine (Settlement Area) planned area. One record of ponded water body was identified on the Subject Site during the spring. Subsequent observations conducted in the summer and late fall indicated that the ponded area was dry.

A watercourse, Reesor creek, and associated wooded areas are mapped to the east portion of the Subject Site. The record review indicates the presence of an unevaluated wetland feature (not evaluated as per the Ontario Wetland Evaluation System - OWES) associated with the creek are located alongside of the creek on the Subject Site.

5.6 Ground Water Resources (MECP Well Records)

The MECP well record database was reviewed for records located within a radius of 500 m from the approximate Subject Site. The records indicate that Ninety (90) well records are located within the Study Area. A summary of data obtained from the records review is presented in **Table 5-1**.

The location of the well records, based on the UTM coordinates provided by the records, are shown on **Drawing 7**. Details of the MECP water well records that were reviewed are provided in **Appendix B**.

Table 5-1 MECP Well Record Summary

Water Use (Final Status)	
Final Status	**Number of Records**
Observation Wells	26
Unknown	21
Other Status	18
Water Supply	17
Test Hole	4
Abandoned-Other	2
Dewatering	2

The above summary indicates that there are Seventeen (17) records of water supply wells located within the 500 m from the Subject Site. However, there is no record of water supply well within the Subject Site.

5.7 Active Permit to Take Water Application Record Review

The MECP website was reviewed for active Permit to Take Water (PTTW) records within a 1.0 km radius of the subject site on March 24, 2026. The record review indicates there is one (1) active PTTW within this search radius.

Table 5-2 Summary of the nearby Active PTTW

Permit Holder	Permit Number	Purpose	Source Type	Maximum Taking	Distance from Site
The Regional Municipality of York	6555-CANK9P	Water Supply (Municipal)	Ground Water	2,946,240 L/day	0.90 km

6.0 SOIL LITHOLOGY AND SUBSURFACE INVESTIGATION

The investigation has revealed that beneath the topsoil and ploughed soil, the Subject Site is underlain by strata of silty clay, silty clay till and silty sand extending to the maximum termination depth of the investigation at 11.2 mbgs during the investigation. Information regarding the borehole logs is presented in **Appendix A**. The approximate locations of the boreholes are shown on **Drawing 2**. Additionally, a key plan and geological cross-sections are presented on **Drawings 8-1**, **8-2A** and **8-2B**, respectively.

6.1 Topsoil

The Subject Site was a farm field in the past, with topsoil or ploughed earth at the ground surface. The thickness of topsoil ranges from 20 to 40 cm and the thickness for the ploughed earth ranges from 35 to 80 cm. The topsoil horizon contains a high composition of roots and humus.

6.2 Silty Clay and Silty Clay Till

The silty clay deposits were contacted near the ground surface of Boreholes 2, 5, 6, 12 and 13, extending to depths of 1.5 to 4.0 m below prevailing ground surface. Silty clay till deposits were contacted in all of the boreholes at various depths, except Boreholes 12 and 14. The moisture contents for the subsoil range from 5% to 25% which can be considered as damp to very moist. The silty clay and silty clay till have a soft to hard consistency. Grain size analyses were performed on two (2) subsoil samples with the gradation curves being provided on **Figure 17**. The silty clay till unit has a permeability of about 10^{-7} cm/sec.

6.3 Silty Sand

The silty sand deposit was generally encountered below the silty clay and clay till deposits, extending to the termination depth of the boreholes 3, 4, 5, 7, 9 to 12, and 14. It is fine grained with a trace of clay. The silty sand has a very loose to very dense, consistency, being generally dense. The moisture contents for the subsoil samples ranges from 5% to 26%. The silty sand is generally in a saturated state. Grain size analyses were performed on three (3) subsoil samples with the gradations being plotted on **Figure 18**. The estimated permeability for the silty sand ranges from 10^{-4} to 10^{-3} cm/sec.

7.0 LOCAL HYDROGEOLOGICAL STUDY

7.1 Monitoring Well Development and Groundwater Level Monitoring

The groundwater levels in the monitoring wells were measured manually on twenty-five (25) occasions during the study period, on the following dates: April 21, May 28, June 29, and July 27, August 31, September 30, October 30, November 30 and December 23 of 2021; July 21, November 23 and December 28 of 2023; January 24, February 28, March 12, April 1, May 22, June 25, July 25, August 28, September 25, October 23, November 27 of 2024; December 23, 2025 and January 6, 2026.

These measurements were taken to record the fluctuation of the stabilized shallow groundwater table beneath the Subject Site. Details of the groundwater monitoring program is presented in **Appendix C-1**.

A review of the manually recorded groundwater level from the monitoring wells that are installed within the silty clay and silty clay till material ranges from 285.58 masl to 290.09 masl recorded in BH/MWs 5 and 1, respectively. Furthermore, a review of the manually recorded groundwater levels from the monitoring wells that are installed within the silty sand unit ranges from 284.95 masl to 287.42 masl recorded in BH/MW 9 and 11, respectively.

Two (2) selected monitoring wells BH/MW 5 and 16 were equipped with digital transducer to record groundwater fluctuation over two (2) monitoring programs. The interpreted hydrographs are presented in **Appendix C-2**.

Long-Term Groundwater Monitoring in BH/MW 5: The first monitoring program in BH/MW-5 was conducted between April 29, 2021 and July 23, 2022. A review of the monitoring results indicates that the shallow groundwater table generally declined during the summer and early fall of 2021, followed by a rise through late fall and winter, with peak levels observed in the spring of 2022. The highest and lowest shallow groundwater table elevations were approximately 288.2 masl and 285.49 masl, recorded on March 25, 2022 and September 25, 2021 respectively. The interpreted hydrograph indicates that the shallow groundwater table increases in response to precipitation events with a delayed response.

The second monitoring program in BH/MW-5 was conducted between November 23, 2023 and January 7, 2026. A review of the groundwater level data indicates that the shallow groundwater table exhibited a seasonal pattern, with declining levels during late summer and early fall, followed by recovery through late fall and winter and peak levels during the spring months. Groundwater levels generally rose through the winter and early spring of 2024, declined through the summer and fall of 2024, and subsequently increased again during the winter and spring of 2025 before declining through late summer and fall. The highest and lowest shallow groundwater table elevations were approximately 288.06 masl and 285.42 masl, recorded on April 14, 2024 and December 19, 2025 respectively. The interpreted hydrograph indicates that the shallow groundwater table increases in response to precipitation events with a delayed response.

Long-Term Groundwater Monitoring in BH/MW 16: The monitoring program in BH/MW-16 was conducted between November 23, 2023 and January 7, 2026. A review of the monitoring results indicates that the shallow groundwater table generally increased through the winter months and spring, followed by a gradual decline during the summer and early fall, exhibiting a consistent seasonal pattern. Groundwater levels rose through late fall and winter into spring of 2024, declined through summer and fall of 2024, and again increased during winter and spring of 2025 before declining through late summer and fall of 2025. The highest and lowest shallow groundwater table elevations were approximately 289.21 masl and 286.85 masl, recorded on April 14, 2024 and December 19, 2025, respectively. The interpreted hydrograph indicates that the shallow groundwater table increases in response to precipitation events with a delayed response.

A review of the shallow groundwater table recorded during the monitoring program between 2019 and 2026 in the monitoring wells installed within the glacial till (Halton Till or equivalent) indicates that the shallow groundwater table is under impression of precipitation and it responds with a delay due to the relatively low permeability of the glacial till. The shallow groundwater table decreases during dry seasons and increases again during wet seasons and snow melting. The fluctuation rate varies based on the sand seems appearance in the glacial till that facilitates shallow groundwater flow.

7.2 Hydraulic Conductivity Testing

7.2.1 Single Well Response Test

The In-situ hydraulic conductivity testing was conducted in six (6) monitoring wells with sufficient groundwater. All the boreholes and monitoring wells underwent a single well response testing (SWRT) to assess the hydraulic conductivity (K) for saturated shallow aquifer or water-bearing units at the depths of the well screens. Each monitoring well was equipped with a digital transducer to record the fluctuation to complete the SWRT. The results of the SWRT tests are presented in **Appendix D**, with a summary of the findings provided in **Table 7-1**.

Table 7-1 A Summary of Falling Head Hydraulic Conductivity Testing

Well ID	Ground El. (masl)	Monitoring Well Depth (mbgs)	Screen Interval (mbgs)	Screened Soil Strata	Hydraulic Conductivity (K in m/sec)	Test Method
BH/MW 1	290.56	6.1	3.1 – 6.1	Silty Clay Till	5.7×10^{-7}	Falling Head
BH/MW 5	289.88	6.1	3.1 – 6.1	Silty Clay Till and Silty Sand	1.4×10^{-7}	Falling Head
BH/MW 9	292.02	10.7	7.7 – 10.7	Silty Sand	1.4×10^{-5}	Falling Head
BH/MW 11	293.16	10.7	7.7 – 10.7	Silty Sand	2.5×10^{-5}	Falling Head
BH/MW 15	291.40	6.1	3.1 – 6.1	Silty Clay Till	1.1×10^{-6}	Falling Head
BH/MW 16	291.30	6.1	3.1 – 6.1	Silty Clay Till	7.5×10^{-7}	Falling Head

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

7.2.2 Hydraulic Conductivity Test Using Grain Size Distribution Graphs

The Hazen Equation method was adopted to estimate the hydraulic conductivity (K) for different soil layers which may contain groundwater during the seasonal high-water table (spring) period, or if they are not encountered within the screen intervals.

The Hazen Equation method relies on the interrelationship between hydraulic conductivity and effective grain size, d_{10}, in the soil media. This empirical relation predicts a power-law relation with K, as follow:

$$K = Ad_{10}^2$$

where;

d_{10}: Value of the soil grain size gradation curve as determined by sieve analysis, whereby 10% by weight of the soil particles are finer and 90% by weight of the soil particles are coarser.

A: Coefficient; it is equal to 1 when K in cm/sec and d_{10} is in mm

The Hazen Equation estimation provides an indication of the groundwater yield capacity for saturated soil strata at the depths where soils samples were selected for grain size analysis. The grain size distribution graphs prepared for the geotechnical investigation were used to estimate the hydraulic conductivity, with the details are presented in **Appendix A**. The results of the Hazen equation are provided in **Table 7-2**, below.

Table 7-2 A Summary of Hydraulic Conductivity Using Hazen Equation

Monitoring Well/Sample ID	Soil Sample Depth (mbgs)	Soil Sample Elevation (masl)	Soil Strata	Hydraulic Conductivity (m/s)
BH 3/10	11	281.3	Silty Fine Sand, a trace of clay	2.0×10^{-6}
BH 11/7	6.3	286.9	Silty Fine Sand, a trace of clay	6.8×10^{-6}
BH 12/6	4.8	286.6	Silty Fine Sand, a trace of clay	7.8×10^{-6}

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

7.3 Groundwater Quality

One (1) set of groundwater samples was collected for analysis from the monitoring well BH/MW 1 on January 7, 2026, by SEL. The samples were submitted for analysis and evaluation against the York Region Sanitary and Storm Sewer Use By-Law (2021-102) parameters. Upon sampling, all of the bottles were placed in a cooler for shipment to the analytical laboratory. Sample analysis was performed by SGS Canada Inc., which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Results of the analysis are provided in **Appendix E**, with a discussion of the findings provided below. The chain of custody number for the submitted samples that underwent analysis is 046407.

Table 7-3 Groundwater Quality Exceedance Results (Unfiltered Sample) – York Region Storm

Exceeded Parameter	Groundwater Quality Results (Unfiltered Sample) (mg/L)	York Region Storm Sewer Use By-Law	Detection Limit (mg/L)
Total Suspended Solids (TSS)	64	15	2

The results indicate exceedances of Total Suspended Solids (TSS) when the water quality samples were compared to the York Region Storm Sewer Use By-Law (2021-102) limits. However, a review of the analytical results indicates that groundwater quality meets the York Region Sanitary Sewer Use By-Law.

If the collected groundwater is proposed to be discharged to the York Region storm sewer system, pre-treatment would be required to ensure compliance with the by-law limits. This would apply to any short-term construction dewatering activities or long-term foundation drainage prior to discharge to the Region of York storm sewer system.

Additionally, one (1) set of groundwater samples was collected for analysis compared to PWQO from the monitoring well BH/MW 1 on January 7, 2026, by SEL. Upon sampling, all of the bottles were placed in a cooler for shipment to the analytical laboratory. Sample analysis was performed by SGS Canada Inc., which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Results of the analysis are provided in **Appendix E**, with a discussion of the findings provided below. The chain of custody number for the submitted samples that underwent analysis is 046407.

Table 7-4 Groundwater Quality Exceedance Results (Unfiltered Sample) – PWQO

Exceeded Parameter	Groundwater Quality Results (Unfiltered Sample) (mg/L)	Provincial Water Quality Objective (PWQO)	Detection Limit (mg/L)
Nonylphenol	< 0.001	0.00004	0.001
Bis(2-ethylhexyl) phthalate	< 0.002	0.0006	0.002
Polychlorinated Biphenyls	< 0.0001	0.000001	0.0001

The results indicated that exceedances were reported in Nonylphenol, Polychlorinated Biphenyls (PCBs) – Total and Bis(2-ethylhexyl)phthalate are reported at the detection limits. This indicates that any short-term construction dewatering discharge or long-term foundation drainage would require pre-treatment to lower the elevated parameters before being released into the nearby natural feature system.

The assessment above is provided solely for comparing groundwater quality against the limits set by the York Region Sewer Use By-Law Standards and PWQO. Any discharge should adhere to the respective policies of the jurisdiction. The final design for any dewatering effluent pre-treatment system is the responsibility of the contractors responsible for construction.

8.0 DISCHARGE WATER CONTROL

8.1 A Review of Proposed Development Plans

Based on the Conceptual Site Plan prepared by Bousfields Inc., dated February 12, 2026, the Subject Site is proposed to be developed as a residential subdivision comprising townhouse blocks and school blocks. The subdivision will be serviced by municipal infrastructure and paved roadways. The remainder of the Subject Site consists of a stormwater management facility and designated environmental lands. The area bounded by the Reesor Creek Valley to the west and the York Durham Line to the east is identified as a future development area, for which no development concept is currently available. The reviewed plans are presented in **Appendix F**. Additionally, a preliminary grading plan prepared by SCS Consulting Group, dated April 2026, was reviewed.

The detailed designs are not available for review at the time of the preparation of this report. Therefore, the preliminary dewatering assessment is provided for each component, and once the detailed design becomes available for review, the following assessment should be updated.

8.2 A Review of The Geotech Report

A review of the Geotechnical Investigation report prepared by SEL, dated April 2026, indicates that:

- The topsoil must be removed prior to project construction. It can be reused for general landscaping purposes only.
- The ploughed soil should be further assessed to determine its suitability for reuse at the time of construction. Badly weathered or ploughed soils with a high concentration of topsoil must be sub-excavated and sorted.
- In accordance with the Town of Whitchurch-Stouffville requirement, the underside of footings should be founded at least 0.6 m above the seasonal high groundwater level and be provided with a perimeter drainage system connected to a positive outlet.

Townhouse Blocks

- Conventional spread and strip footings can be used to support the house structures. The footings must be placed onto the engineered fill or sound native soil below the weathered/ploughed soil.

School Building

- The school is anticipated to be slab-on-grade. Once the school layout becomes available, additional boreholes must be completed to assess and verify the ground condition. For the design of the school on conventional spread and strip footings, the underside of the footings should be maintained at least 0.6 m above the groundwater level.

8.3 Dewatering Calculation Methodology

Short-Term Dewatering Calculation: The pumping rate calculation for the construction of the proposed underground servicing trench excavation and the basements was performed based on the assumption that each excavation acts as a trench, considering the dimensions of the proposed excavation boxes. The calculation was based on the equations provided by Powers et al. (2007). For this analysis, steady-state flow into an open excavation is assumed. Additionally, the equations of radial flow have the following assumptions:

- Ideal aquifer conditions (homogeneous, isotropic, uniform thickness and has infinite areal extent)
- Fully penetrating pumping well
- Only lateral flow to the pumping well

The following equations were used for open trenches or single wells and are based on unconfined aquifer conditions (Powers et. al., 2007):

Where:

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

Q = Anticipated pumping Rate (m^3/day)

K = Hydraulic Conductivity (m/day)

H = Distance from the static water level to the bottom of the saturated aquifer (m)

h = Depth of water in the well while pumping (m)

R_o = Distance from a point of greatest drawdown to a point where there is zero drawdown (radius of influence) (m)

r_s = Distance to the points from the centre of the trench, assumed to be half of the trench width (m) for Trench base calculation and the Equivalent radius of excavation (m) for Single well.

X = Trench Length (m)

L = Distance from a line source to the trench, Ro (m)/2

The calculated pumping rate was multiplied by a factor of safety of 1.5 for the excavation limited to till unit and 2.0 for the excavation extends to the silty sand unit to account for uncertainties and natural variability in the range of hydraulic conductivity.

8.3.1 Conceptual Zone of Influence for Dewatering

Furthermore, the conceptual Zone of Influence (ZOI) for dewatering, also known as Radius of Influence (R_0), was calculated based on the anticipated maximum drawdown required and the highest hydraulic conductivity recorded at the Subject Site using Sichardt's relationship. The equation used is shown as:

$$R_0 = 3000 \times dH \times K^{0.5}$$

Where:

R_0 = Zone of Influence for dewatering (m)

dH = the drawdown (m)

K = the hydraulic conductivity (m/s)

8.3.2 Stormwater Flow Estimates

The amount of runoff that could accumulate in the construction excavation was also considered for any construction dewatering needs assessment.

Additional dewatering may be required to maintain the dry condition of the excavation during and following significant precipitation events. Therefore, the dewatering flow rates at the Subject Site should also include removing stormwater from the excavation. A review of the intensity duration frequency curve (IDF curve) for the year 2010 for the coordinates 43° 59' 15" N, 79° 13' 45" W which are within the Subject Site the rainfall depth considering 2-year storm event over a 3-hour period per day is approximately 30.98 mm and a 100-year storm event over a 12-hour period per day is 103.2 mm. The data was taken from the Ministry of Transportation's (MTO) website. The accumulated runoff associated with rainfall events within the anticipated excavations for the proposed underground basement structure was calculated using the estimated rainfall depth multiplied by the estimated area of the proposed excavation footprint area for the building.

8.4 Preliminary Short-term Dewatering Flow Estimate

8.4.1 Proposed School Block and Future Development Block

Based on the review of the provided drawings, details for the proposed school block and future development blocks were not available at the time of the investigation. Therefore, recommendations related to these developments can be assessed once the detailed design becomes available.

8.4.2 Proposed Underground Services

The following assumptions are considered for the dewatering assessment for the installation of the underground services;

- It is understood that the proposed development will be provided with the underground services.
- The highest recorded groundwater levels obtained from the nearby monitoring wells were utilized for the current assessment.
- The hydraulic conductivity of 5.7×10^{-7} m/sec estimated using in-situ hydraulic conductivity testing was considered for silty clay till.
- The length of the active trench for underground services was assumed to be 50 meters at a nearby monitoring well location as the details were not available at the time of preparation of this report.
- The storm event of 2 years was also considered for the short-term construction dewatering flow rate estimates.
- The dewatering target for the proposed excavation was considered 1.0 m below the proposed deepest excavation trench to facilitate excavation and construction in dry and stable subsoil conditions.
- The depth of the excavation for the underground services was assumed 4 m below proposed centerline grading of the nearby road. as the details were not available for review.

Based on the aforementioned assumptions and the reviewed plans, groundwater seepage is anticipated along the proposed alignments in the vicinity of BH/MWs 1 and 5. **Table 8-3** presents the details considered for the current assessment.

Table 8-1 Summary of the preliminary Short-Term Dewatering – Proposed Underground Services

	BH/MW 1	BH/MW 5	BH/MW 9	BH/MW 11
Proposed Grading El. (masl)	291.82	291.61	291.61	291.52
Assumed Invert El. (masl)	287.82	287.61	287.61	287.52
Open Trench Dimensions (m)	2.0 x 50	2.0 x 50	2.0 x 50	2.0 x 50
The highest Recorded Groundwater Level (masl)	290.09	287.47	286.37	287.42
Anticipated Groundwater Seepage (L/day)	15,300.0	NE	NE	NE
Anticipated Groundwater Seepage with S. F. 1.5 (L/day)	22,950.0	NE	NE	NE
Anticipated Storm Water (L/day)	3,100.0	3,100.0	3,100.0	3,100.0
Total Anticipated Short-Term Dewatering Flow Rate (L/day)	26,050.0	3,100.0	3,100.0	3,100.0
Anticipated Conceptual ZOI for Dewatering (m)	5.4	NE	NE	NE
Maximum Anticipated Drawdown (m)	2.37	NE	NE	NE

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

The summary of construction dewatering flow rates for the underground services is presented in **Appendix F** (**Pages 1**).

The maximum anticipated dewatering flow rate, including groundwater seepage with a safety factor of 1.5 during storm events with a duration of 3 hr/day for up to 50 m of active excavation trench for the proposed underground service installation, can reaches up to 26,050.0 L/day. Furthermore, as presented in **Table 8-1**. Near the BH/MW 5the construction of the services are assumed to completed above shallow groundwater table, where the anticipated discharge flow that is only expected during storm event can reach up to 3,100.0 L/day for an open trench with dimensions of 2.0 m by 50.0 m.

Furthermore, the estimated flow rates are based on highest recorded shallow groundwater levels from the nearby monitoring wells. As such, if excavation and construction of the proposed underground services are completed during summer and fall, lower groundwater seepage is expected.

Additionally, a potential 100-year storm event with a duration of 12 hours is expected to reach up to 10,400.0 L/day, considering a maximum active trench with dimensions and width as mentioned in the above tables (2.0 m x 50 m).

8.4.3 Proposed Townhouse Development

The followings are the assumptions and proposed development details for the preliminary short-term construction dewatering estimate for the proposed townhouse blocks.

- The proposed residential development will include townhouse blocks, as indicated in the development plan.
- It is understood that the residential units will be provided with one-level basement structures. The base of excavation for the construction of the proposed basements (underside of the footings) was considered at a depth of 3.0 metres below the proposed grading level.
- Excavation boxes with different dimensions were considered for proposed blocks as specified in **Table 8-2**.
- For the assessment of the short-term dewatering flow rate, the highest recorded shallow groundwater elevation from the interpreted groundwater contour map located in the vicinity of the proposed blocks or the residential structure was utilized.
- The highest recorded groundwater levels in the nearby monitoring wells were utilized for the current assessment.
- The storm event of 2 years 3 months was also considered for the short-term construction dewatering.

The comparison of the groundwater contour map against the assumed base of the excavation for the construction of the basements indicates that groundwater seepage control will not be required for the construction of the majority of the townhouse blocks, except for the townhouses near the BH/MW 1 area. However, the storm flow rates during construction are calculated and are provided in **Table 8-2**.

Table 8-2 - Summary of the preliminary Short-Term Dewatering – Proposed Townhouse Blocks

	BH/MW 1 Stacked TH	BH/MW 1 B2B TH	BH/MW 1 RLTH	BH/MW 5 B2B TH	BH/MW 5 RLTH	BH/MW 9 RLTH	BH/MW 9 OSTH
Proposed Grading El. (masl)	291.8	291.8	291.8	291.4	291.6	291.6	291.8
Assumed Base of Excavation for Construction of Basement (masl)	288.8	288.8	288.8	288.4	288.6	288.6	288.8
Assumed Excavation Length (m)	37.3	37.8	25.7	41.1	33.6	23.9	32.7
Assumed Excavation Width (m)	20.9	18.2	16.5	20.6	16.5	13.8	16.9
The highest Recorded Groundwater Level (masl)	290.09	290.09	290.09	287.4	287.4	286.4	286.4
Anticipated Groundwater Seepage (L/day)	6,000.0	5,500.0	2,000.0	NE	NE	NE	NE
Anticipated Groundwater Seepage with Safety Factor of 1.5 (L/day)	9,000.0	8,250.0	3,000.0	NE	NE	NE	NE
Anticipated Storm Water (L/day)	24,200.0	21,400.0	13,200.0	26,300.0	17,200.0	10,300.0	17,200.0
Total Anticipated Short-Term Dewatering Flow Rate (L/day)	**33,200.0**	**29,650.0**	**16,200.0**	26,300.0	17,200.0	10,300.0	17,200.0
Anticipated Conceptual ZOI for Dewatering (m)	5.1	5.1	5.1	NE	NE	NE	NE
Maximum Anticipated Drawdown (m)	2.3	2.3	2.3	NE	NE	NE	NE

Notes:
mbgs metres below ground surface
masl metres above sea level
NE: Not Expected

The maximum anticipated dewatering flow rate, including groundwater seepage with a safety factor of 1.5 during storm events with a duration of 3 hr/day for proposed townhouse development can range from 10, 300.0 (only storm water) to 33,200.0 L/day. Furthermore, as presented in **Table 8-1**.

Furthermore, the estimated flow rates are based on highest recorded shallow groundwater levels from the nearby monitoring wells. As such, if excavation and construction of the proposed townhouse development are completed during summer and fall, lower groundwater seepage is expected.

Additionally, a potential 100-year storm event with a duration of 12 hours is expected to range from 58,500.0 L/day to 82,900.0 L/day, considering the active excavation area dimensions outlined in the table above.

As previously stated, the proposed townhouse blocks should be constructed above shallow groundwater table. As such, it is expected that the proposed townhouse blocks within the vicinity of BH.MW1, will be raised above shallow groundwater table, where the groundwater seepage won't be recorded.

8.4.4 Proposed Storm Water Management Pond.

Followings are the assumptions and proposed development details considered for preliminary short-term construction dewatering estimate for the proposed Stormwater Management (SWM) Pond.
The comparison of the highest groundwater level recorded with the proposed base of the excavation for the construction of the proposed SWM Pond indicates that the short-term dewatering management from the groundwater source will be required. The anticipated dewatering flow rates are provided in **Table 8-3**. The summary of the calculation is presented in **Appendix F (Page 3)**.

The following assumptions were used for the dewatering assessment for the proposed SWM Pond,

- The impervious area of the proposed stormwater management pond is 5,905 m^2 based on a review of the pre- and post-development area provided by SCS Consulting Group, and the dimensions of the proposed SWM Pond are estimated based on this information.
- Based on the review of the grading plan, the grade elevation of 289.75 masl was considered for the current assessment. Additionally, the proposed bottom elevation of the pond is at 285.0 masl was considered for the current assessment.
- The estimated hydraulic conductivity of 2.5 x 10^{-6} m/sec for the sandy silt unit was utilized for the current assessment.
- The storm event of 2 years 3 months was also considered for the short-term construction dewatering.
- The dewatering target for the proposed excavation was considered 1.0 m below the deepest excavation to facilitate excavation and construction in dry and stable subsoil conditions.

It is important to note that the current dewatering assessment for the proposed stormwater management pond (SWMP) is based on groundwater level monitoring data from BH/MW 11, located near the proposed SWMP area, as no monitoring wells were installed within the pond footprint. It is recommended that further investigation be undertaken, including the installation of additional monitoring wells within the proposed footprint of the SWMP once the detailed design of the pond is available.

Details of assumptions based on a review of the provided drawings and findings of the current groundwater monitoring and subsurface investigations that were considered for the proposed Storm Water Management Pond are presented in **Table 8-3**.

Table 8-3 - Summary of the preliminary Short-Term Dewatering – Proposed SWM Pond

Assumptions	
Grade El. (masl)	289.75
Proposed Base of Excavation (masl)	285.0
Block Dimensions (m)	95 x 62.2 (5909 m^2)
The highest Recorded Groundwater Level (masl)	287.42
Anticipated Groundwater Seepage (L/day)	37,800.00
Anticipated Groundwater Seepage with S. F. 2.0 (L/day)	75,600.00
Anticipated Storm Water (L/day)	183,100.00
Total Anticipated Short-Term Dewatering Flow Rate (L/day)	258,700.00
Anticipated Conceptual ZOI for Dewatering (m)	16.2
Maximum Anticipated Drawdown (m)	3.42

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

The summary of construction dewatering calculations is presented in **Appendix F (Page 3)**.

The anticipated dewatering flow rates, including groundwater seepage with a safety factor of 2.0 during storm events for the active excavation area Stormwater Management Block that will be constructed below the seasonally high shallow groundwater table, can reach up to 258,700.00 L/day.

The estimated flow rates are based on the highest recorded shallow groundwater table. As such, if excavation and construction of the proposed SWM Pond is completed during the summer and fall, lower groundwater seepage is expected.

Additionally, a potential 100-year storm event with a duration of 12 hours is expected to reach up to 609,900.0 L/day, considering the active excavation area dimensions outlined in the table above.

8.5 Preliminary Long-term Foundation Drainage Flow Estimate

8.5.1 Proposed Townhouse Development

The geotechnical assessment report dated April 2026 indicates that a minimum of 0.6 m separation between the underside of the footing and the seasonal groundwater level should be maintained. However, based on the review of the proposed preliminary road grading, it indicates that near the BH/MW 1 location area, the assumed depth of the basements is below the groundwater table; therefore, based on the town's policy, the 0.6 m separation should be maintained between the underside of the footings and the highest recorded

groundwater levels. However, long-term foundation drainage flow rates have been calculated for the area where the groundwater is above the proposed excavation base. It is important to note that this assessment is based on the preliminary grading, and once the finalized grading is available, this report can be revised.

Based on the soil stratigraphy encountered at the monitoring well screen intervals, the observed groundwater conditions within the monitoring wells installed in the till material are likely influenced by the presence of a low-permeability shallow glacial till partially surrounding the shallow monitoring well screen. The interpreted hydrograph in BH/MW 5 and 16 indicates that the shallow groundwater table increases after precipitation with a delay. The recorded shallow groundwater levels within the screen monitoring wells present the groundwater level in the glacial till that is mainly under impression of the precipitation. Additionally, the groundwater level ranges from 284.95 to 287.42 masl in the deep monitoring wells BH/MW 9 and 11, which were installed within the sandy silt unit.

The following are the assumptions and proposed development details for the preliminary Long-term Foundation Drainage estimate for the proposed townhouse blocks.

- The proposed residential development will include townhouse blocks, as indicated in the development plan.
- It is understood that the residential units will be provided with one-level basement structures. The base of excavation for the construction of the proposed basements (underside of the footings) was considered at a depth of 3.0 metres below the proposed grading level.
- Excavation boxes with different dimensions were considered for proposed blocks as specified in **Table 8-4**.
- For the assessment of the Long-term Foundation Drainage flow rate, the highest recorded shallow groundwater elevation from the interpreted groundwater contour map located in the vicinity of the proposed blocks or the residential structure was utilized.
- The storm event of 2 years 3 months was also considered for the short-term construction dewatering.

The comparison of the highest recorded groundwater levels in the nearby monitoring well, the assumed base of the excavation for the construction of the basements, indicates that groundwater seepage control will not be required except in the area near BH/MW 1 for the construction of the townhouse blocks. The assumptions and the anticipated long-term foundation drainage flow rates are provided in **Table 8-4**.

Table 8-4 - Summary of the preliminary Long-term Foundation Drainage Flow Rates – Proposed Townhouse Blocks

	BH/MW 1 Stacked TH	BH/MW 1 B2B TH	BH/MW 1 RLTH	BH/MW 5 B2B TH	BH/MW 5 RLTH	BH/MW 9 RLTH	BH/MW 9 OSTH
Proposed Grading El. (masl)	291.8	291.8	291.8	291.4	291.6	291.6	291.8
Assumed underside of the Basement Slab (masl)	288.8	288.8	288.8	288.4	288.6	288.6	288.8
Assumed basement Length (m)	37.3	37.8	25.7	41.1	33.6	23.9	32.7
Assumed Basement Width (m)	20.9	18.2	16.5	20.6	16.5	13.8	16.9
The highest Recorded Groundwater Level (masl)	290.09	290.09	290.09	287.4	287.4	286.4	286.4
Anticipated Groundwater Seepage (L/day)	1,600.0	1,600.0	1,100.0	NE	NE	NE	NE
Anticipated Groundwater Seepage with Safety Factor of 1.5 (L/day)	2,400.0	2,400.0	1,650.0	NE	NE	NE	NE
Anticipated Infiltration (L/day)	1,800.0	1,800.0	1,400.0	2,000.0	1,600.0	1,200.0	1,600.0
Total Anticipated Long-Term Foundation Drainage Flow Rate (L/day)	4,200.0	4,200.0	3,050.0	2,000.0	1,600.0	1,200.0	1,600.0
Anticipated Conceptual ZOI (m)	0.6	0.6	0.6	NE	NE	NE	NE
Maximum Anticipated Drawdown (m)	1.3	1.3	1.3	NE	NE	NE	NE

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

The maximum anticipated long-term foundation drainage flow rate, including groundwater seepage with a safety factor of 1.5 and infiltration for the proposed townhouse development, can range from 3,050.0 to 4,200.0 L/day for the townhouse blocks extending below groundwater levels. However, as noted in the Geotechnical Assessment Report, the Town of Whitchurch-Stouffville requires that the underside of footings be founded at a minimum of 0.6 m above the seasonal high groundwater level. Where this criterion cannot be achieved, the basement is required to be waterproofed to eliminate the need for long-term dewatering. Based on this recommendation, it is understood that these design options will be further evaluated during the detailed design stage. Accordingly, the current Hydrogeological Assessment Report may be revised.

8.6 Permit Requirements-Preliminary

Short-Term Construction Dewatering: Based on the recent amendment to O.Reg. 63/16, which came into effect on July 1, 2025, an EASR registration will be required if water takings of more than 50,000 L/day are required. If it is identified that an EASR is required for the Subject Site, a hydrogeological assessment report will need to be submitted in support of the application.

Short-Term Construction Dewatering:

The estimated short-term construction dewatering flow rate from the groundwater source, with a safety factor of 1.5 and a 2-year storm event for the construction and installation of the proposed underground services, reaches up to 29,650.0 L/day, considering an open and active excavation trench with dimensions of 2 m width and 50 m length. As such, filing an EASR with the MECP is not required for the excavation, construction and installation of the underground services if the excavation is completed in phases. Furthermore, the estimated flow rates consider the seasonally high shallow groundwater table. As such, if excavation and construction are completed during dry seasons of a year, the lower construction dewatering flow rates are expected. Obtaining a discharge agreement from the Region of York is required if short-term dewatering effluent is proposed to be conveyed to the region's sewer system.

The estimated short-term construction dewatering flow rate from the groundwater source, with a safety factor of 1.5 and a 2-year storm event for the proposed Townhouse Blocks, reaches up to 33,200.0 L/day for a proposed townhouse block. As such, filing an EASR with the MECP is not required for the proposed construction of the townhouse blocks if the excavation and construction of the blocks are completed over phases. Furthermore, the estimated flow rates considers the seasonally high shallow groundwater table. As such, if excavation and construction are completed during dry seasons of a year, the lower construction dewatering flow rates are expected. Obtaining a discharge agreement from the Region of York is required if short-term dewatering effluent is proposed to be conveyed to the region's sewer system.

The estimated short-term construction dewatering flow rate from the groundwater source, with a safety factor of 2 and a 2-year storm event for the proposed SWM pond, reaches up to 258,700.00 L/day. As such, filing an EASR with the MECP is required for the construction of the proposed SWM pond. Obtaining a discharge agreement from the Region of York is required if short-term dewatering effluent is proposed to be conveyed to the region's sewer system. Obtaining a permit will be required if short-term dewatering effluent is proposed to be conveyed to the nearby Creek, which is located within the TRCA Regulated Area.

Long-Term Foundation Drainage:

As per the recent amendment to O.Reg. 387/04 that came into effect on July 1, 2025, PTTW registration will be required if the water taking exceeds 379,000.0 L/day. The maximum estimated long-term foundation drainage flow rate of 4,200.0 L/day is below the MECP PTTW threshold limit of 379,000.0 L/day for the proposed development. As such, applying for PTTW with MECP is not required. Furthermore, based on the town’s policy, the 0.6 m separation should be maintained between the underside of the footings and the highest recorded groundwater levels. Considering the current preliminary assessment, long-term foundation drainage flow rates have been calculated for the area where the groundwater is above the proposed basements. It is important to note that this assessment is based on the preliminary grading, and once the finalized grading is available, this report can be revised.

8.7 Potential Dewatering Impacts and Mitigation Plan-Preliminary

8.7.1 Short-Term Discharge Water Quality

The dewatering system must be appropriately filtered to prevent the pumping of fines and loss of ground during the dewatering activities.

A review of the groundwater quality results indicates that the concentration of Total Suspended Solids (TSS) exceeds the York Region Storm Sewer Use By-Law. However, the groundwater quality meets the York Region Sanitary Sewer Use By-Law. As such, if the collected groundwater is proposed to be discharged to the York Region storm sewer system, pre-treatment would be required to ensure compliance with the by-law limits. This would apply to any short-term construction dewatering activities or long-term foundation drainage prior to discharge to the Region of York storm sewer system.

Furthermore, the groundwater quality test results indicated that exceedances were reported in Nonylphenol, Polychlorinated Biphenyls (PCBs), and Bis(2-ethylhexyl)phthalate when compared against PWQO parameters, with concentrations reported at the detection limits. This indicates that any short-term construction dewatering discharge or long-term foundation drainage would require pre-treatment to lower the elevated parameters before being released into the nearby natural system.

The assessment above is provided solely for comparing groundwater quality against the limits set by the York Region Sewer Use By-Law Standards and PWQO. Any discharge should adhere to the respective policies of the jurisdiction. The final design for any dewatering effluent pre-treatment system is the responsibility of the contractors responsible for construction.

8.7.2 Ground Settlement

The maximum anticipated preliminary conceptual Zone of Influence (ZOI) for dewatering extends up to 7.4, 5.1 and 16.2 meters from the dewatering area for the installation of underground services, townhouse blocks and Storm Water Management Pond within the Subject Site, respectively.

A review of the records indicates that there are no structures located within the preliminary ZOI for the proposed underground services, townhouse blocks and Storm Water Management Pond. Therefore, potential risks for the ground settlement is not anticipated for the proposed development as the Subject Site.

8.7.3 Surface Water, Wetlands and Areas of Natural Significance

Based on the review, no natural features are located within the conceptual zone of influence; therefore, no impacts are anticipated. However, this assessment and associated recommendations should be reviewed and confirmed once the detailed design for the Subject Site becomes available.

8.7.4 Water Supply Wells and Zone of Influence

A review of the MECP well records indicates that there are no records for water supply wells that are registered within the conceptual ZOI for dewatering. Considering the current available data, significant impacts to water supply wells are not anticipated for the proposed Subject Site. However, completion of a private water supply well is recommended in advance of, during and post-construction. The private water supply well monitoring should be completed a couple of months ahead of construction.

9.0 PRE AND POST DEVELOPMENT WATER BALANCE ASSESSMENT

9.1 Pre- and Post-Development Water Balance Assessment

A pre- and post-development water balance analysis was completed to compare pre-development and post-development hydrological conditions to evaluate potential changes in recharge and runoff volumes due to the proposed development. The discussion below provides details on the methodology used and the results obtained from the analysis. A summary of the calculations is provided in **Appendix G**.

9.2 Site Water Balance Component

A site-scale water balance analysis was completed following the Toronto and Region Source Protection Authority (TRSPA) tool provided by TRCA. The water balance method roughly estimates annual evapotranspiration, infiltration and runoff volumes. The modified water balance components were used for the pre- and post-development water balance analyses. **Table 9-1** summarizes the details for the water balance parameters adopted from the TRSP tool.

Table 9-1 Summary of Water Balance Component

Precipitation (mm/year)	Evapotranspiration (mm/year)	Infiltration (mm/year)	Runoff (mm/year)
867	482	254	131

9.3 Methodology

A site-scale water balance analysis was completed in order to estimate the components of the hydrological cycle for the Subject Site, and was modelled using the following equation:

$$P = DGS + ET + R + I$$

Where:

P= Precipitation, which represents the sum of all rainfall and snowfall
DGS=Change in groundwater storage
ET= Evapotranspiration
R= Runoff
I= Infiltration

Based on the TRCA tool; (https://trca.ca/conservation/drinking-water-source-protection/trspa-water-balance-tool/), the evapotranspiration in pervious areas at the Site is 482 mm/yr, runoff is 131 mm/yr, and infiltration (groundwater recharge) is 254 mm/yr.

Although groundwater storage experiences both gains and losses on a short-term basis, the net change in groundwater storage (DGS) over the long-term is generally zero. For this reason, the change in groundwater storage (zero (0)) has not been included in the water balance calculations.

Evapotranspiration (ET) refers to the transfer of water from vegetation and the soil surface to the atmosphere in the form of water vapour. The term considers evaporation from the soil surface and from man-made surfaces together with transpiration from plants.

9.4 Site Water Balance Component

Water balance analyses were completed for pre-development and post-development conditions, separately, with the details presented below:

9.4.1 Pre-Development Water Balance

The Subject Site was previously used for agricultural land usage, but now comprises a vacant farm field. The neighbouring properties consist mainly of farm fields and associated houses and structures to the north, east and west, and south of the subject site.

Based on a review of the pre- and post-development areas provided via email on March 12, 2026, from SCS Consulting Group, the total Subject Site area is 102,800 $m^{2,}$ out of which the pervious area is 102,800.0 m^2 with no current impervious area. The pre-development water balance for the Subject Site is calculated by multiplying the existing undeveloped Site areas (Landscaped and Existing Green Areas) and existing building and paved area by the various, averaged annualized depth estimates for precipitation, ET, infiltration and runoff. The average annual area-based estimates for each water balance component are summarized in **Table 9-2**.

Table 9-2 Summary of Pre-Development Volumetric Water Balance Components

Pre-Development Site Breakdown Areas	Coverage Area (m^2)	Precipitation (m^3/year)	Evapotranspiration (m^3/year)	Infiltration (m^3/year)	Run off (m^3/year)
Existing Impervious Area	0	0	0	0	0
Existing Pervious Area (Green Area)	102,800.00	89,127.600	49,549.60	26,111.20	13,466.80
Total	**102,800.00**	**89,127.60**	**49,549.60**	**26,111.20**	**13,466.80**

9.4.2 Post-Development Water Balance

The total Subject Site area for the post-development is 102,800.0 $m^{2,}$ out of which the total impervious area and pervious areas of 52,957.0 m^2 and 49,842.70 m^2 are proposed, respectively. The post-development change in impervious areas was obtained by referencing the pre- and post-development plans provided via email on March 12, 2026, from SCS Consulting Group.

The post-development water balance is calculated using the same depth-based components that were used for the pre-development water balance calculations, i.e., average annual precipitation and average annual ET. The estimates for runoff and ET for impervious surfaces are 90% and 10% of the average annual precipitation, respectively. The estimated post-development water balance volumes are provided in **Table 9-3** below. The existing and proposed building coverage area was obtained by reviewing the pre- and post-development plans provided via email on March 12, 2026, from SCS Consulting Group.

Table 9-3 Summary of Post-Development Volumetric Water Balance Components

Post-Development Site Breakdown Areas	Coverage Area (m^2)	Precipitation (m^3/year)	Evapotranspiration (m^3/year)	Infiltration (m^3/year)	Run off (m^3/year)
Proposed Impervious Area (Stacked Townhouse-SKTH)	3,861.00	3,347.49	334.75	0.00	3,012.74
Proposed Impervious Area (Onstreet Townouse - OSTH)	1,305.00	1,131.44	113.15	0.00	1,018.29
Proposed Impervious Area (Rear Lot Townhouse-RLTH)	4,185.00	3,628.40	362.84	0.00	3,265.56
Proposed Impervious Area (Back to Back Townhouse-B2)	8,082.00	7,007.09	700.71	0.00	6,306.38
Proposed Impervious Area (8.5 m Lane Way)	6,710.00	5,817.57	581.76	0.00	5,235.81
Proposed Impervious Area (School Block)	17,352.00	15,044.18	1,504.41	0.00	13,539.77
Proposed Impervious Area (20 m ROW)	5,557.30	4,818.18	481.82	0.00	4,336.36
Proposed Impervious Area (SWM Block)	5,905.00	5,119.63	511.96	0.00	4,607.67
Proposed Pervious Area (Stacked Townhouse-SKTH)	429.00	371.94	206.77	108.97	56.20
Proposed Pervious Area (Onstreet Townouse - OSTH)	435.00	377.15	209.67	110.49	56.99
Proposed Pervious Area (Rear Lot Townhouse-RLTH)	465.00	403.16	224.13	118.11	60.92
Proposed Pervious Area (Back to Back Townhouse-B2)	898.00	778.57	432.84	228.09	117.64
Proposed Pervious Area (School Block)	4,338.00	3,761.04	2,090.92	1,101.85	568.27
Proposed Pervious Area (20 m ROW)	3,782.70	3,279.60	1,823.26	960.81	495.53
Proposed Pervious Area (SWM Block)	5,905.00	5,119.63	2,846.21	1,499.87	773.55
Proposed Pervious Area (Open Space / Environmental Area/ Future Development)	33,590.00	29,122.53	16,190.38	8,531.86	4,400.29
Total	**102,800.00**	**89,127.60**	**28,615.58**	**12,660.05**	**47,851.97**

9.5 Site Water Balance

The volumetric comparisons in evapotranspiration, infiltration and runoff between the pre-developed and post-developed sites are summarized in **Table 8-4**.

Table 9-4 Pre- and Post-Development Volumetric Water Balance Gain/Loss

	Precipitation (m^3/year)	Evapotranspiration (m^3/year)	Infiltration (m^3/year)	Run off (m^3/year)
Pre-Development	89,127.60	49,549.60	26,111.20	13,466.80
Post-Development	89,127.60	28,615.58	12,660.05	47,851.97
Loss (-) and Gain (+)	-	-20,934.02	-13,451.15	34,385.17

A review of the findings indicates that a total decrease of 20,934.02 m^3/year and 13,451.15 m^3/year for ET and infiltration, respectively, and an increase of 34,385.17 m^3/year for runoff are expected for the post-development Site.

Pre- and post-water balance components for the Subject Site were also assessed. The results are presented in **Table 9-5**.

Table 9-5 Pre- and Post-Development Water Balance Components Gain/Loss

Pre-Development Site Breakdown Areas	Precipitation (mm/year)	Evapotranspiration (mm/year)	Infiltration (mm/year)	Run off (mm/year)
Pre-Development	867.00	482.00	254.00	131.00
Post-Development	867.00	278.36	123.15	465.49
Loss (-) and Gain (+)	-	-203.64	-130.85	334.49

A review of **Table 9-5** indicates that a total loss of 203.64 mm/yr or 42 % and 130.85 mm/ye or 52% in ET and infiltration, and a total gain of 334.49 mm/yr or 255% is anticipated in runoff for the post-development Subject Site, respectively.

10.0 CONCLUSIONS AND RECOMMENDATIONS

- The Subject Site is located within an area mapped as Halton Till deposits (5d), comprising of clay to silt-textured till derived from the glaciolacustrine deposits or shale.
- The Subject Site is situated within the Oak Ridges Moraine Settlement Area and the Duffins Creek Watershed, falling under the Toronto and Region Conservation Authority (TRCA) jurisdiction.
- One record of ponded water body was identified on the Subject Site during the spring. Subsequent observations conducted in the summer and late fall indicated that the ponded area was dry. A watercourse, Reesor creek, and associated wooded areas are mapped to the east portion of the Subject Site. The record review indicates the presence of an unevaluated wetland feature (not evaluated as per the Ontario Wetland Evaluation System - OWES) associated with the creek are located alongside of the creek on the Subject Site
- The investigation has revealed that beneath the topsoil and ploughed soil, the site is underlain by strata of silty clay, silty clay till and silty sand extending to the maximum termination depth of the investigation at 11.2 m below ground surface during the investigation.
- A review of the manually recorded groundwater level from the monitoring wells that are installed within the silty clay and silty clay till material ranges from 285.58 masl to 290.09 masl recorded in BH/MW 5 and 1. Furthermore, a review of the manually recorded groundwater levels from the monitoring wells that are installed within the silty sand unit ranges from 284.95 masl to 287.42 masl recorded in BH/MW 9 and 11.
- The estimated hydraulic conductivity for the silty clay till and silty clay unit ranges from 1.1×10^{-6} m/sec to 7.5×10^{-6} m/sec, and for the sandy silt ranges from 1.4×10^{-6} m/sec to 2.5×10^{-6} m/sec, that were utilized for the current assessment.
- The groundwater quality results indicate exceedances of Total Suspended Solids (TSS) when the water quality samples were compared to the York Region Storm Sewer Use By-Law (2021 102) limits. However, a review of the analytical results indicates that groundwater quality meets the York Region Sanitary Sewer Use By-Law.
- The groundwater quality results compared to the PWQO limits indicates that exceedances were reported in Nonylphenol, Polychlorinated Biphenyls (PCBs) – Total and Bis(2-ethylhexyl)phthalate at the detection limits. This indicates that any short-term construction dewatering discharge or long-term foundation drainage would require pre-treatment to lower the elevated parameters before being released into the nearby natural feature system.
- The estimated short-term construction dewatering flow rates including groundwater seepage with a safety factor of 1.5 and storm event for underground services (50 m by 2 m active excavation

trench) and townhouse blocks (one block that will be constructed below shallow groundwater table) is 29,650 L/day and 33,200 L/day, respectively which are below the MECP EASR threshold; therefore, EASR registration is not required for these activities, provided construction is phased. However, the proposed stormwater management pond (SWMP) has an estimated dewatering rate of 258,700.00 L/day considering groundwater seepage with a safety factor of 2.0 and storm event, which exceeds the threshold. Therefore, EASR registration with the MECP is required. In all cases, a discharge agreement with the Region of York is necessary for discharge to the municipal sewer system, and additional permits may be required for discharge to nearby watercourses within regulated areas.

- The estimated long-term foundation drainage flow rate (4,200 L/day) is well below the MECP PTTW threshold of 379,000 L/day; therefore, obtaining a permit from the MECP is not required. Adequate vertical separation (minimum 0.6 m) between footings and groundwater levels should be maintained in accordance with the Town of Whitchurch-Stoufville's policy requirements. The current assessment is based on preliminary grading and assumptions of seasonally high groundwater levels, and may be refined once final grading and design details are available.
- Short-term discharge water quality results indicate that Total Suspended Solids (TSS) exceed the York Region Storm Sewer Use By-Law limits, though groundwater meets the York Region's Sanitary Sewer Use By-Law. Therefore, pre-treatment is required prior to discharge to the storm system. Additionally, Nonylphenol, PCBs, and Bis(2-ethylhexyl)phthalate) exceed PWQO limits at detection levels. As such, a pre-treatment is required during dewatering activities if the discharge water will be directed to the natural features.
- The maximum anticipated preliminary conceptual Zone of Influence (ZOI) for dewatering extends up to 7.4, 5.1 and 16.2 meters from the dewatering area for the installation of underground services, townhouse blocks and Storm Water Management Pond within the Subject Site, respectively. Considering above:
    - A review of the records indicates that there are no structures located within the preliminary ZOI for the proposed underground services, townhouse blocks and Storm Water Management Pond. Therefore, potential risk for the ground settlement is not anticipated for the proposed construction at the Subject Site.
    - Based on the review, no natural features are located within the conceptual ZOI. Therefore, no impacts to the natural features are anticipated. However, this assessment and associated recommendations should be reviewed and confirmed once the detailed design for the Subject Site becomes available.
    - A review of the MECP well records indicates that there are no records for water supply wells that are registered within the conceptual ZOI for dewatering. Considering the current

available data, significant impacts to water supply wells are not anticipated for the proposed Subject Site. However, completion of a private water supply well is recommended in advance of, during and post-construction. The private water supply well monitoring should be completed a couple of months ahead of construction.

- A review of the findings indicates that a total decrease of 20,934.02 m^3/year and 13,451.15 m^3/year for ET and infiltration, respectively, and an increase of 34,385.17 m^3/year for runoff are expected for the post-development Site.

11.0 CLOSURE

We trust that the above-noted information is suitable for your review. If you have any questions regarding this information, please do not hesitate to contact the undersigned.

Yours truly,

SOIL ENGINEERS LTD.

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Project Manager-Hydrogeological Services

Narjes Alijani, M.Sc., P.Geo.
Department Manager-Hydrogeological Services

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6. Ministry of Natural Recourses and Forestry, 2026. Natural Heritage Interactive Map.
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DRAWINGS 1 to 9

REFERENCE NO. 2103-W118

641000
641500
642000
642500

4872500
4872000
4871500

BETHESDA ROAD
10TH LINE
YORK-DURHAM LINE
WEBB ROAD
Reesor Creek
Tributary of Reesor Creek
GREENWOOD ROAD
NOAHS FARM TRAIL
FORSYTH FARM DRIVE
PENNDUTCH CIRCLE
HAMBERSBURG WAY
WALTER ATKINSON AVENUE

D:\Previous gis\GIS 2\2103-W118\

N

References: Ontario Ministry of Natural Resources and Forestry

Key Map

Legend

- Approximate Boundary of Subject Site
- Major Road
- Local Road
- Railway
- Waterbody
- Watercourse

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Site Location Plan

Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line
Town of Whitchurch-Stouffville

Reference No. 2103-W118

Date: April 22, 2026

Scale:
0 30 60 120 180 240 300
Metres

Drawing No. 1

641600
641800
642000
642200
4872200
4872000

BH/MW16
YORK-DURHAM LINE
BH14
BH/MW11
BH/MW15
BH13
BH6
BH8
BH10
BH3
BH12
BH/MW5
BH2
BH7
BH/MW9
10TH LINE
BH/MW1
BH4
Tributary of Reesor Creek

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N

References: Ontario Ministry of Natural Resources and Forestry
Ⓒ King's Printer for Ontario, 2026

Key Map

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community

Legend

- Approximate Boundary of Subject Site
- Major Road
- Local Road
- Waterbody
- Watercourse
- Borehole (10)
- Borehole with Monitoring Well (6)

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Borehole and Monitoring Well Location Plan

Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line
Town of Whitchurch-Stouffville

Reference No. 2103-W118

Date: April 22, 2026

Scale:
0 10 20 40 60 80 100
Metres

Drawing No. 2

641000
641500
642000
642500
4872500
4872000
4871500

BETHESDA ROAD
10TH LINE
YORK/DURHAM LINE
WEBB ROAD
GREENWOOD ROAD
FLUTE STREET
NOAHS FARM TRAIL
DRUM STREET
FORSYTH FARM DRIVE
HORN STREET
CHAMBERSBURG WAY
PENNDUTCH CIRCLE
WALTER ATKINSON AVENUE

5d
8a

D:\Previous gis\GIS 2\2103-W118\

N

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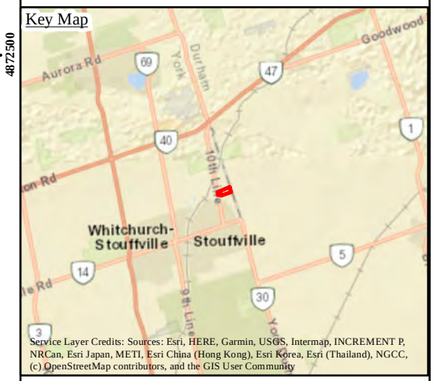
Key Map



Legend

- Approximate Boundary of Subject Site
- Major Road
- Local Road
- Railway
- 5d: Glacial deposits (Halton Till): Consisting of diamicton:
- 8a: Glacial lake deposits: Consisting of clay, silt: foreshore/basinal

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Surface Geology Map

Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line
Town of Whitchurch-Stouffville

Reference No. 2103-W118

Date: April 22, 2026

Scale:
0 60 120 180 240 300
Metres

Drawing No. 3

641000
641500
642000
642500
4872500
4872000
4871500

BETHESDA ROAD
WEBB ROAD
10TH LINE
YORK-DURHAM LINE
GREENWOOD ROAD
DRUM STREET
FLUTE STREET
NOAHS FARM TRAIL
FORSYTH FARM DRIVE
HORN STREET
CHAMBERSBURG WAY
PENNDUTCH CIRCLE
WALTER ATKINSON AVENUE

South Slope

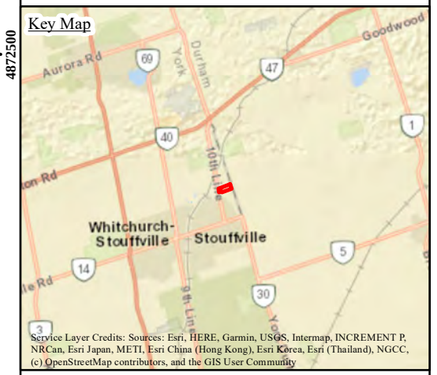
Till Plains
(Drumlinized)

D:\Previous gis\GIS 2\2103-W118\

Source: Chapman, L.J. and Putnam, D.F. 2007. Physiography of Southern Ontario;
Ontario Geological Survey, Miscellaneous Release--Data 228 ISBN 978-1-4249-5158-1

N

Key Map



Legend

- Approximate Boundary of Subject Site
- Major Road
- Local Road
- Railway
- Region Boundary
- Till Plains (Drumlinized)

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Physiographic Map

Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line
Town of Whitchurch-Stouffville

Reference No. 2103-W118

Date: April 22, 2026

Scale:
0 30 60 120 180 240 300
Metres

Drawing No. 4

641000 641500 642000 642500

4872500 4872000 4871500

BETHESDA ROAD
10TH LINE
YORK-DURHAM LINE
WEBB ROAD
GREENWOOD ROAD
FLUTE STREET
NOAHS FARM TRAIL
DRUM STREET
FORSYTH FARM DRIVE
HORN STREET
CHAMBERSBURG WAY
PENNDUTCH CIRCLE
WALTER ATKINSON AVENUE
Reesor Creek
Tributary of Reesor Creek

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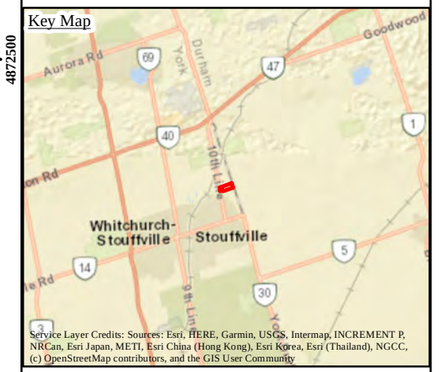
N

References: Ontario Ministry of Natural Resources and Forestry

Key Map



Legend

- Approximate Boundary of Subject Site
- Major Road
- Local Road
- Railway
- Waterbody
- Watercourse
- York - 1 m

Soil Engineers Ltd.

Topographic Map

Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line
Town of Whitchurch-Stouffville

Reference No. 2103-W118

Date: April 22, 2026

Scale:

0 30 60 120 180 240 300
Metres

Drawing No. 5

641000
641500
642000
642500
4872500
4872000
4871500

Natural Linkage Area

Countryside Area

Settlement Area

Rees or Creek

Tributary of Rees or Creek

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N

References: Service Layer Credits: © Natural Heritage Map was Produced by Soil Engineers Ltd. under license from the Ministry of North Development and Mines (MNDM). Copyright© is hold by the King's Printer for Ontario, 2026

Key Map

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Legend

- Approximate Boundary of Subject Site
- Railway
- Watercourse
- Waterbody
- Wooded Area *Wooded Area*
- Wetland (classified as Provincial)
- Wetland (Not evaluated per OWES)
- Oak Ridges Moraine (Countryside Area)
- Oak Ridges Moraine (Natural Linkage Area)
- Oak Ridges Moraine (Settlement Area)

Soil Engineers Ltd.

Natural Features and Protection Area Plan

Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line
Town of Whitchurch-Stouffville

Reference No. 2103-W118

Date: April 22, 2026

Scale:
0 60 120 180 240 300
Metres

Drawing No. 6

641000 641500 642000 642500

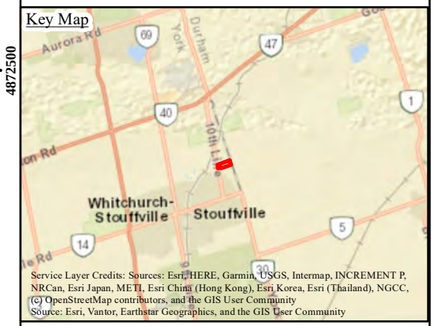
4872500 4872000 4871500

BETHESDA ROAD
WEBB ROAD
10TH LINE
YORK-DURHAM LINE
Reesor Creek
Tributary of Reesor Creek
GREENWOOD ROAD
CLARINET LANE
NOAHS FARM TRAIL
FLUTE STREET
DRUM STREET
FORSYTH FARM DRIVE
PENNDUTCH CIRCLE
THORN STREET
CORONET STREET
CHAMBERSBURG WAY
WALTER ATKINSON AVENUE

D:\Previous gis\GIS 2\2103-W118\

N

Key Map



Legend

- 500 Metres From Subject Site Boundary
- Approximate Boundary of Subject Site
- Waterbody
- Watercourse
- Major Road
- Local Road
- Unknown (21)
- Abandoned-Other (2)
- Dewatering (2)
- Observation Wells (26)
- Other Status (18)
- Test Hole (4)
- Water Supply (17)

Soil Engineers Ltd.

MECP Well Location Plan

Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line
Town of Whitchurch-Stouffville

Reference No. 2103-W118

Date: April 22, 2026

Scale:

0 30 60 120 180 240 300
Metres

Drawing No. 7

641600 641800 642000 642200

4872200 4872000

A A' B B'

BH 14 BH/MW 16 BH/MW 11 BH 13 BH/MW 15 BH 6 BH 8 BH 10 (Projected) BH 3 BH 12 BH/MW 5 (Projected) BH 2 BH 7 BH/MW 9 BH/MW 1 BH 4

YORK-DURHAM LINE

10TH LINE

Tributary of Reesor Creek

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N

References: Ontario Ministry of Natural Resources and Forestry

Key Map

Legend

- Approximate Boundary of Subject Site
- Major Road
- Local Road
- Cross Section
- Waterbody
- Watercourse
- Borehole (10)
- Borehole with Monitoring Well (6)

Soil Engineers Ltd.

Cross-Section Key Plan

Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line
Town of Whitchurch-Stouffville

Reference No. 2103-W118

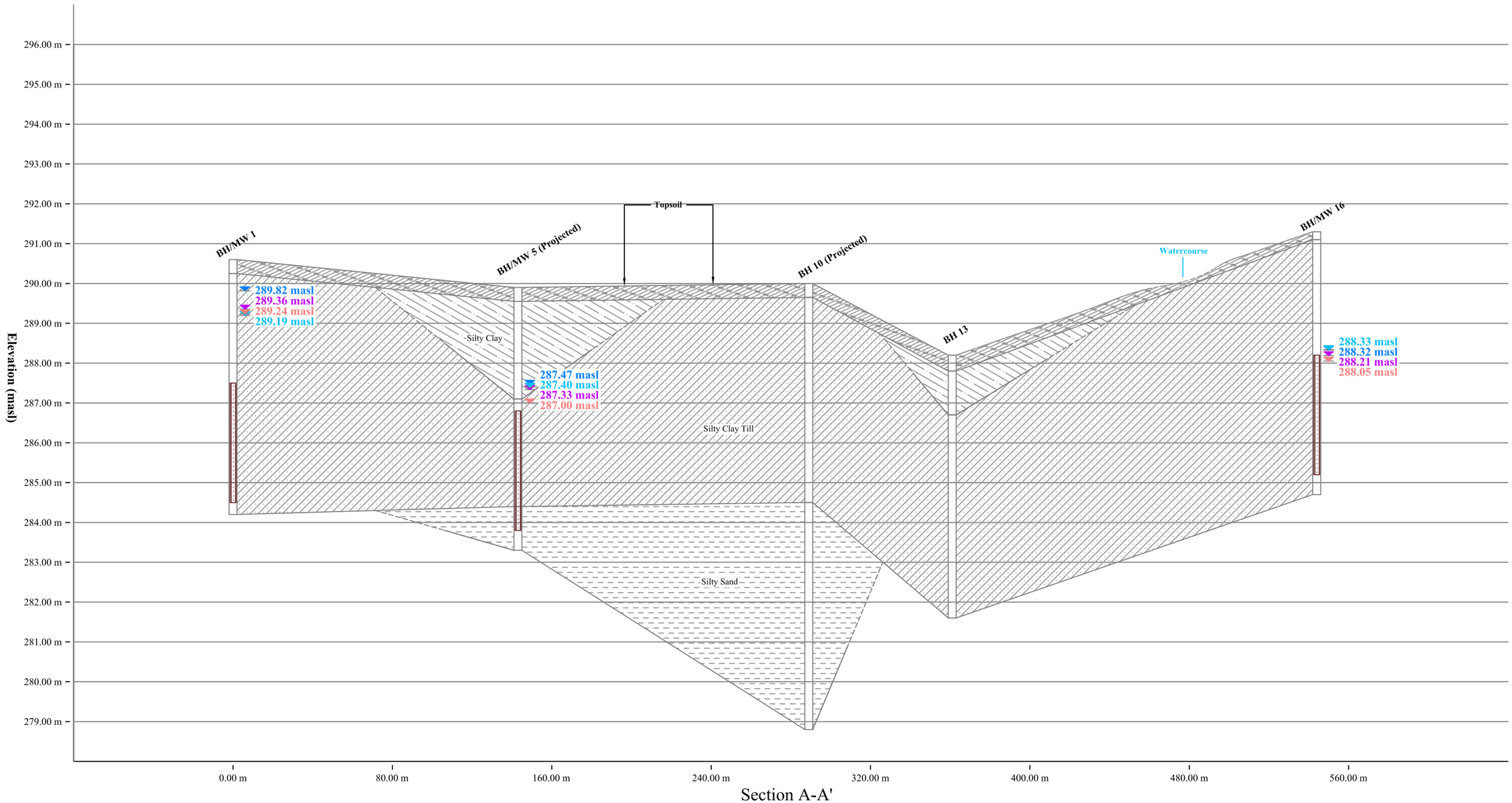
Date: April 22, 2026

Scale:
0 10 20 40 60 80 100
Metres

Drawing No. 2

Southwest
A

Northeast
A'



Section A-A'

Topsoil

Silty Clay

Silty Clay Till

Silty Sand

Watercourse

Screen

Water Table on March 12, 2024

Water Table on April 1, 2024

Water Table on May 22, 2024

Water Table on June 25, 2024

Soil Engineers Ltd.
CONSULTING SOIL, FOUNDATION & ENVIRONMENTAL ENGINEERS

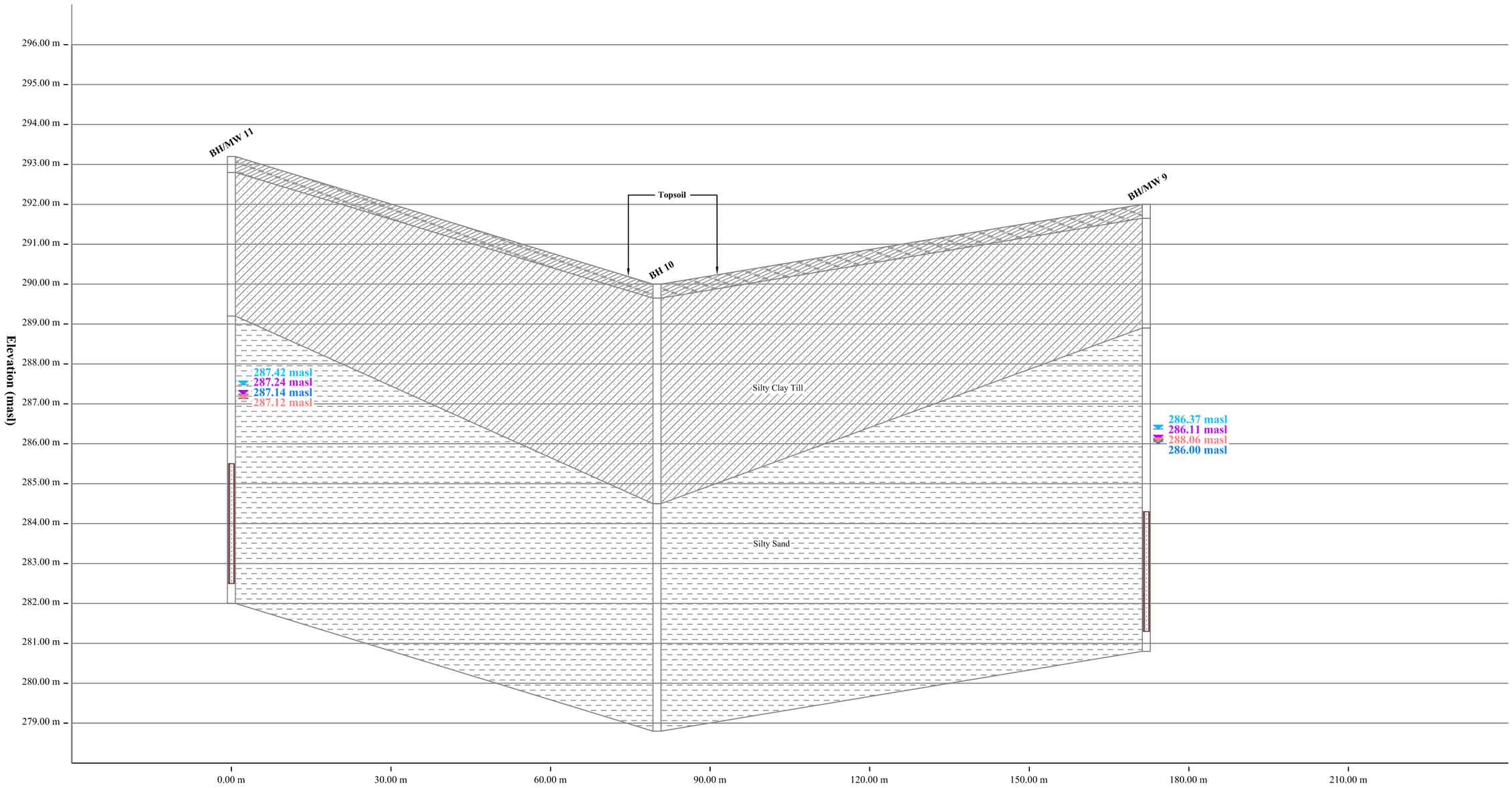
Title: Geological Cross-Section (A-A')

Project: Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line, Town of Whitchurch-Stouffville

Reference No:	Date:	Scale: V	Scale: H	Drawing No.
2103-W118	April, 2026	1:100	1:2000	8-2A

North
B

South
B'



Section B-B'

Topsoil

Silty Clay Till

Silty Sand

Watercourse

Screen

Water Table on March 12, 2024

Water Table on April 1, 2024

Water Table on May 22, 2024

Water Table on June 25, 2024

Soil Engineers Ltd.
CONSULTING SOIL, FOUNDATION & ENVIRONMENTAL ENGINEERS

Title: Geological Cross-Section (B-B')

Project: Hydrogeological Assessment
Proposed Residential Development
12749 Tenth Line, Town of Whitchurch-Stouffville

Reference No:	Date:	Scale: V	Scale: H	Drawing No.
2103-W118	April, 2026	1:100	1:750	8-2B

Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
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BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

Appendix A

BOREHOLE LOGS AND GRAIN SIZE DISTRIBUTION GRAPH

REFERENCE NO. 2103-W118

LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

The abbreviations and terms commonly employed on the borehole logs and figures, and in the text of the report, are as follows:

SAMPLE TYPES

AS Auger sample
CS Chunk sample
DO Drive open (split spoon)
DS Denison type sample
FS Foil sample
RC Rock core (with size and percentage recovery)
ST Slotted tube
TO Thin-walled, open
TP Thin-walled, piston
WS Wash sample

PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

A continuous profile showing the number of blows for each foot of penetration of a 2-inch diameter, 90° point cone driven by a 140-pound hammer falling 30 inches.

Plotted as '—●—'

Standard Penetration Resistance or 'N' Value:

The number of blows of a 140-pound hammer falling 30 inches required to advance a 2-inch O.D. drive open sampler one foot into undisturbed soil.

Plotted as '○'

WH Sampler advanced by static weight
PH Sampler advanced by hydraulic pressure
PM Sampler advanced by manual pressure
NP No penetration

SOIL DESCRIPTION

Cohesionless Soils:

'N' (blows/ft)	Relative Density
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
over 50	very dense

Cohesive Soils:

Undrained Shear Strength (ksf)	'N' (blows/ft)	Consistency
less than 0.25	0 to 2	very soft
0.25 to 0.50	2 to 4	soft
0.50 to 1.0	4 to 8	firm
1.0 to 2.0	8 to 16	stiff
2.0 to 4.0	16 to 32	very stiff
over 4.0	over 32	hard

Method of Determination of Undrained Shear Strength of Cohesive Soils:

x 0.0 Field vane test in borehole; the number denotes the sensitivity to remoulding

△ Laboratory vane test

□ Compression test in laboratory

For a saturated cohesive soil, the undrained shear strength is taken as one half of the undrained compressive strength

METRIC CONVERSION FACTORS

1 ft = 0.3048 metres
1lb = 0.454 kg
1 inch = 25.4 mm
1ksf = 47.88 kPa

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH/MW 1

FIGURE NO.: 1

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 7, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
290.6	Ground Surface							
0.0	**35 cm TOPSOIL**	1	DO	7	0		18	
	Brown, firm to hard ploughed							
	SILTY CLAY TILL	2	DO	19	1		12	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders	3	DO	24	2		10	
		4	DO	26			9	
		5	DO	34	3		9	
		6	DO	30	4		9	
284.2		7	DO	50/15	5		7	
6.4	**END OF BOREHOLE**				6			
	Installed 50 mm Ø PVC monitoring well to 6.1 m with 3.0 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with monument casing				7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			

Water Level Readings:
W.L @ 289.82 masl on Mar 12, 2024
W.L @ 289.36 masl on Apr 01, 2024
W.L @ 289.19 masl on May 22, 2024
W.L @ 289.24 masl on Jun 25, 2024

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 2

FIGURE NO.: 2

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 7, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
289.3	Ground Surface							
0.0	**40 cm TOPSOIL**	1	DO	7	0		23	
	Firm to very stiff							
	SILTY CLAY — — ploughed	2	DO	12	1		21	
	low to medium plasticity — — brown grey occ. sand seams	3	DO	6	2		19	
		4	DO	12			18	
		5	DO	18	3		22	
285.3								
4.0	Grey, hard				4			
	SILTY CLAY TILL	6	DO	72	5		11	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders							
283.0		7	DO	50/15	6		8	
6.3	**END OF BOREHOLE**				7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 3

FIGURE NO.: 3

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 7, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
292.3	Ground Surface							
0.0	**35 cm TOPSOIL**	1	DO	5	0		19	
	Brown, firm to hard							
	SILTY CLAY TILL — ploughed	2	DO	10	1		13	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders	3	DO	9	2		13	
		4	DO	22			9	
		5	DO	34	3		10	
		6	DO	56	4		9	
286.5					5			
5.8	Brown, loose to dense				6		18	
	SILTY SAND	7	DO	48				
	fine grained a trace of clay	8	DO	35	7		21	
		9	DO	7	8		17	
		10	DO	36	9		17	
281.1					10			
11.2	**END OF BOREHOLE**				11			
					12			
					13			
					14			

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 4

FIGURE NO.: 4

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 9, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
291.8	Ground Surface							
0.0	**35 cm TOPSOIL**	1	DO	7	0		16	
	Brown, firm to hard ploughed							
	SILTY CLAY TILL	2	DO	38	1		10	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders	3	DO	28	2		9	
		4	DO	50			13	
		5	DO	56	3		11	
287.8								
4.0	Brown, dense to very dense				4			
	SILTY SAND	6	DO	62	5		13	
	fine grained a trace of clay							
		7	DO	44	6		19	
285.2								
6.6	**END OF BOREHOLE**				7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH/MW 5

FIGURE NO.: 5

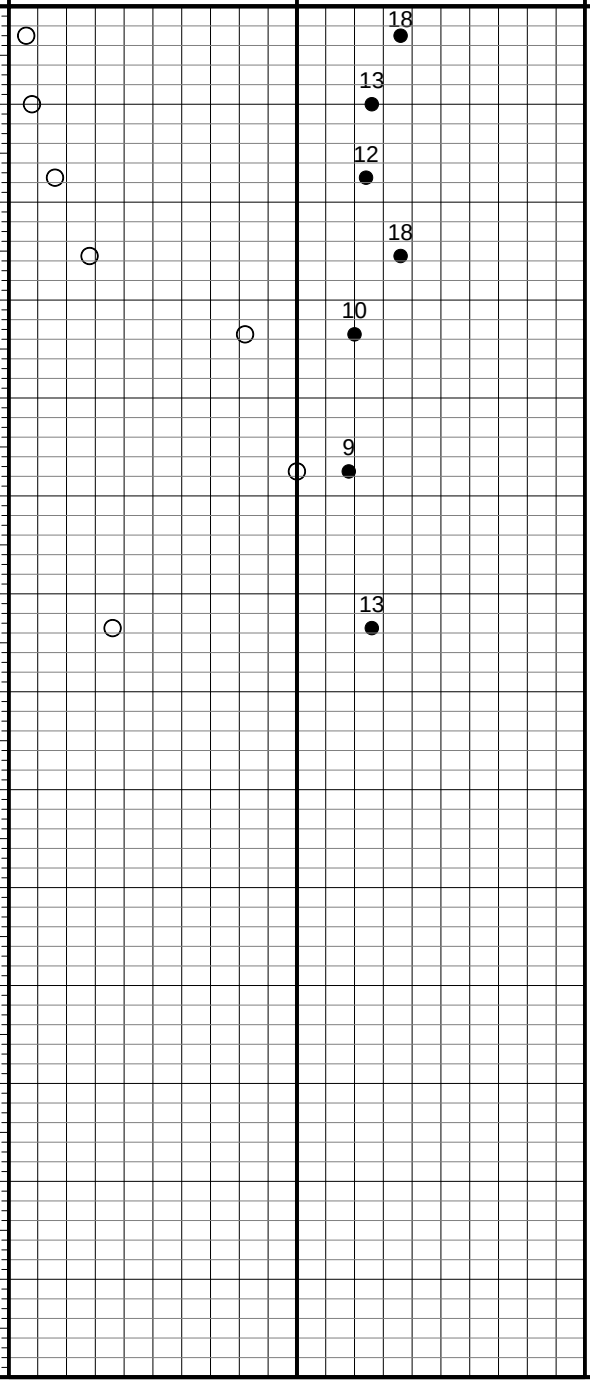
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 7, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
289.9 / 0.0	Ground Surface				
	35 cm TOPSOIL	1	DO	6	0
	Brown, firm to very stiff				
	SILTY CLAY — ploughed	2	DO	8	1
	low to medium plasticity occ. sand seams	3	DO	16	2
287.1		4	DO	28	
2.8	Brown, hard				3
	SILTY CLAY TILL	5	DO	82	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders				4
		6	DO	50/15	5
284.4					
5.5	Brown, dense **SILTY SAND** fine grained a trace of clay	7	DO	36	6
283.3					
6.6	**END OF BOREHOLE**				7
	Installed 50 mm Ø PVC monitoring well to 6.1 m with 3.0 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with monument casing				8 9 10 11 12 13 14



Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 6

FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 8, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
290.2	Ground Surface							
0.0	**35 cm TOPSOIL**	1	DO	4	0		25	
	Brown, firm to very stiff ploughed							
	SILTY CLAY	2	DO	12	1		15	
	medium plasticity							
	occ. sand seams	3	DO	18	2		18	
		4	DO	22			17	
287.1					3			
3.1	Grey, firm to hard	5	DO	12			10	
	SILTY CLAY TILL				4			
	low plasticity							
	a trace of gravel							
	occ. sand seams, cobbles and boulders	6	DO	16	5		10	
		7	DO	6	6		10	
		8	DO	50/15	7		6	
		9	DO	50/15	8		8	
					9			
					10			
279.3		10	DO	50/15			8	
10.9	**END OF BOREHOLE**				11			
					12			
					13			
					14			

Water Level Readings:
W.L @ 287.47 masl on Mar 12, 2024
W.L @ 287.33 masl on Apr 01, 2024
W.L @ 287.40 masl on May 22, 2024
W.L @ 287.00 masl on Jun 25, 2024

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 7

FIGURE NO.: 7

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 9, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
292.0	Ground Surface							
0.0	**35 cm TOPSOIL**	1	DO	5	0		17	
	Brown, firm to hard							
	SILTY CLAY TILL — ploughed	2	DO	14	1		12	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders	3	DO	18	2		10	
		4	DO	50			12	
	— sand layer	5	DO	50/15	3		5	
		6	DO	50/15	4		9	
286.5					5			
5.5	Grey, dense **SILTY SAND** fine grained				6			
285.4	a trace of clay	7	DO	42			17	
6.6	**END OF BOREHOLE**				7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 8

FIGURE NO.: 8

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 8, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
290.1	Ground Surface							
0.0	**35 cm TOPSOIL**	1	DO	5	0		15	
	Firm to hard							
	SILTY CLAY TILL ploughed	2	DO	10	1		11	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders	3	DO	18	2		12	
		4	DO	28			11	
		5	DO	24	3		10	
	brown grey				4			
		6	DO	50/15	5		7	
283.9		7	DO	50/8	6		5	
6.2	**END OF BOREHOLE**				7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH/MW 9

FIGURE NO.: 9

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger (mud rotary)

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 9, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
292.0	Ground Surface							
0.0	**35 cm TOPSOIL**	1	DO	6	0		19	
	Brown, firm to hard							
	SILTY CLAY TILL — ploughed	2	DO	4	1		19	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders	3	DO	15	2		20	
		4	DO	32			15	
288.9					3			
3.1	Brown, dense	5	DO	48			5	
	SILTY SAND fine grained a trace of clay	6	DO	48	4		8	
					5			
		7	DO	32	6		20	
		8	DO	40	7		18	
		9	DO	30	8		20	
					9			
		10	DO	46	10		16	
280.8					11			
11.2	**END OF BOREHOLE**							
	Installed 50 mm Ø PVC monitoring well to 10.7 m with 3.0 m screen Sand backfill from 6.9 to 10.7 m Bentonite seal from 0.0 m to 6.9 m Provided with monument casing				12			
	Water Level Readings: W.L @ 286.00 masl on Mar 12, 2024 W.L @ 286.11 masl on Apr 01, 2024 W.L @ 286.37 masl on May 22, 2024 W.L @ 286.06 masl on Jun 25, 2024				13			
					14			

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 10

FIGURE NO.: 10

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 9, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
290.0	Ground Surface							
0.0	**35 cm TOPSOIL**	1	DO	4	0		20	
	Firm to hard, ploughed							
	SILTY CLAY TILL	2	DO	50/15	1		11	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders	3	DO	13	2		13	
		4	DO	22			10	
		5	DO	60	3		17	
	brown, grey	6	DO	30	4		10	
284.5					5			
5.5	Grey, compact to dense **SILTY SAND** fine grained a trace of clay	7	DO	20	6		20	
		8	DO	17	7		17	
		9	DO	35	8		20	
		10	DO	21	9		17	
278.8					10			
11.2	**END OF BOREHOLE**				11			
					12			
					13			
					14			

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH/MW 11

FIGURE NO.: 11

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger (mud rotary)

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 13, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
293.2	Ground Surface							
0.0	**40 cm TOPSOIL**	1	DO	4	0		15	
	Brown, firm to hard							
	SILTY CLAY TILL — ploughed	2	DO	5	1		13	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders	3	DO	19	2		10	
		4	DO	32			9	
		5	DO	50	3		9	
289.2								
4.0	Brown, dense to very dense				4			
	SILTY SAND	6	DO	56	5		21	
	fine grained a trace of clay				6		16	
		7	DO	68				
		8	DO	46	8		19	
		9	DO	50	9		22	
					10			
		10	DO	50	11		20	
282.0								
11.2	**END OF BOREHOLE**				12			
	Installed 50 mm Ø PVC monitoring well to 10.7 m with 3.0 m screen Sand backfill from 6.9 to 10.7 m Bentonite seal from 0.0 m to 6.9 m Provided with monument casing				13			
	Water Level Readings: W.L @ 287.14 masl on Mar 12, 2024 W.L @ 287.24 masl on Apr 01, 2024 W.L @ 287.42 masl on May 22, 2024 W.L @ 287.12 masl on Jun 25, 2024				14			

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 12

FIGURE NO.: 12

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 8, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
291.4	Ground Surface							
0.0	**35 cm TOPSOIL**	1	DO	6	0		13	
	Brown, firm to hard ploughed							
	SILTY CLAY	2	DO	16	1		18	
	low to medium plasticity							
		3	DO	40	2		15	
289.1								
2.3	Brown, dense	4	DO	36			8	
	SILTY SAND				3			
	fine grained a trace of clay	5	DO	48			6	
					4			
		6	DO	48	5		16	
					6			
284.8		7	DO	44			18	
6.6	**END OF BOREHOLE**				7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 13

FIGURE NO.: 13

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 8, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m^2) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
288.2	Ground Surface							
0.0	**40 cm TOPSOIL**	1	DO	3	0		25	
	Brown, soft to firm							
	SILTY CLAY — ploughed	2	AS	4	1		19	
286.7								
1.5	medium plasticity occ. sand seams Very stiff to hard	3	DO	30	2		14	
	SILTY CLAY TILL	4	DO	38			12	
	low plasticity a trace of gravel — brown/grey occ. sand seams, cobbles and boulders	5	DO	32	3		10	
		6	DO	24	4		15	
		7	DO	48	5		11	
281.6					6			
6.6	**END OF BOREHOLE**				7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH 14

FIGURE NO.: 14

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 8, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
292.4	Ground Surface							
0.0	**40 cm TOPSOIL**	1	DO	5	0		20	
	Brown, loose to very dense							
	SILTY SAND — — ploughed	2	DO	6	1		26	
	fine grained a trace of clay	3	DO	14	2		24	
		4	DO	36			22	
	— — gravelly	5	DO	46	3		8	
		6	DO	64	4		16	
		7	DO	48	5		21	
285.8					6			
6.6	**END OF BOREHOLE**				7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH/MW 15

FIGURE NO.: 15

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 17, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
291.4	Ground Surface							
0.0	**45 cm TOPSOIL**	1	DO	3	0		26	
	Soft to hard — ploughed							
	SILTY CLAY TILL	2	DO	10	1		15	
	low plasticity a trace of clay occ. sand seams, cobbles and boulders	3	DO	8	2		10	
		4	DO	28			15	
		5	DO	20	3		17	
	brown — grey				4			
		6	DO	38	5		8	
					6			
284.8		7	DO	26			22	
6.6	**END OF BOREHOLE**				7			
	Installed 50 mm Ø PVC monitoring well to 6.1 m with 3.0 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with monument casing				8			
					9			
					10			
					11			
					12			
					13			
					14			

Water Level Readings:
W.L @ 287.47 masl on Mar 12, 2024
W.L @ 287.45 masl on Apr 01, 2024
W.L @ 287.61 masl on May 22, 2024
W.L @ 287.45 masl on Jun 25, 2024

Soil Engineers Ltd.

JOB NO.: 2103-W118

LOG OF BOREHOLE:BH/MW 16

FIGURE NO.: 16

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 12749 Tenth Line, Town of Whitchurch-Stouffville

DRILLING DATE: April 17, 2021

El. (m) / Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90	Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40	WATER LEVEL
291.3	Ground Surface							
0.0	**20 cm TOPSOIL**				0			
	Very soft to hard	1	DO	1			16	
	SILTY CLAY TILL — — ploughed	2	DO	7	1		19	
	low plasticity a trace of gravel occ. sand seams, cobbles and boulders	3	DO	14			20	
		4	DO	39	2		11	
		5	DO	37	3		11	
	— — brown grey	6	DO	50	4		13	
284.7		7	DO	80	5			
6.6	**END OF BOREHOLE**				6		16	
	Installed 50 mm Ø PVC monitoring well to 6.1 m with 3.0 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with monument casing				7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			

Water Level Readings:
W.L @ 288.32 masl on Mar 12, 2024
W.L @ 288.21 masl on Apr 01, 2024
W.L @ 288.33 masl on May 22, 2024
W.L @ 288.05 masl on Jun 25, 2024

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GRAIN SIZE DISTRIBUTION

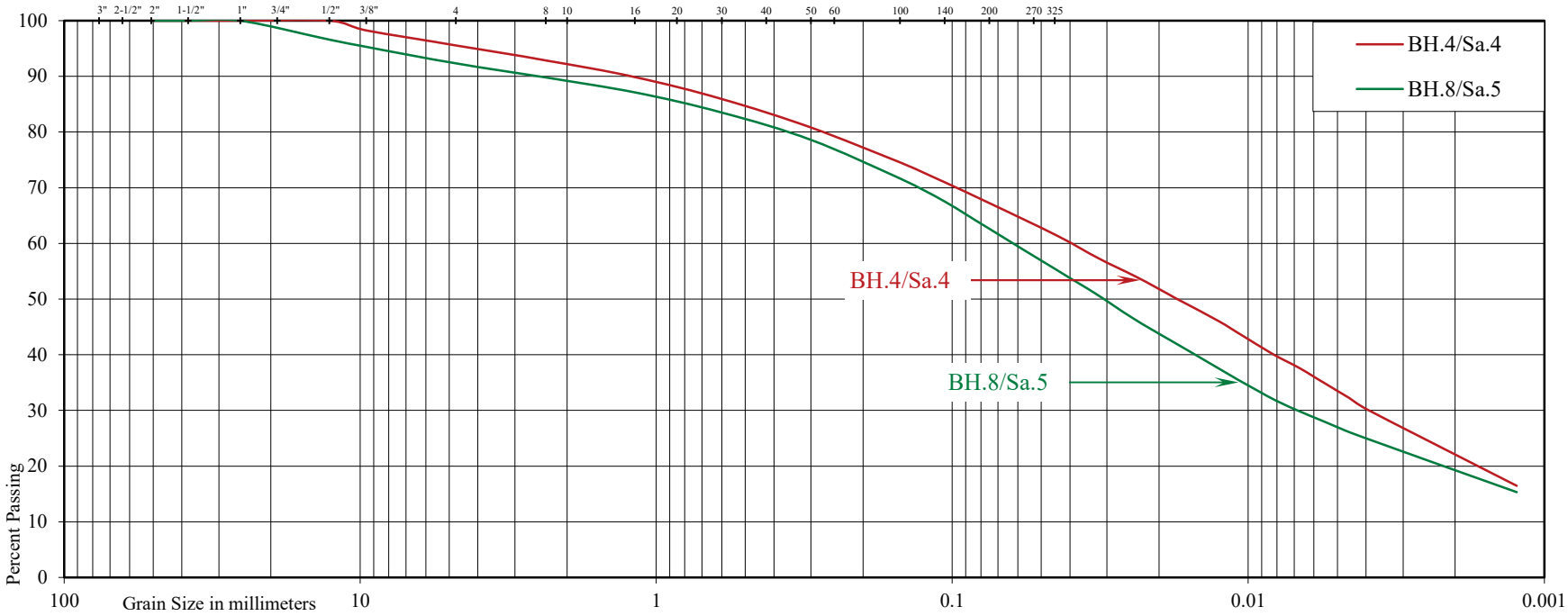
Reference No: 2103-W118

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: 12749 Tenth Line, Town of Whitchurch-Stouffville

Borehole No:	4	8
Sample No:	4	5
Depth (m):	2.5	3.3
Elevation (m):	289.3	286.8

BH./Sa.	4/4	8/5
Liquid Limit (%) =	-	-
Plastic Limit (%) =	-	-
Plasticity Index (%) =	-	-
Moisture Content (%) =	13	24
Estimated Permeability (cm./sec.) =	10^{-7}	10^{-7}

Classification of Sample [& Group Symbol]: SILTY CLAY TILL

sandy, a trace of gravel

Figure: 17

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

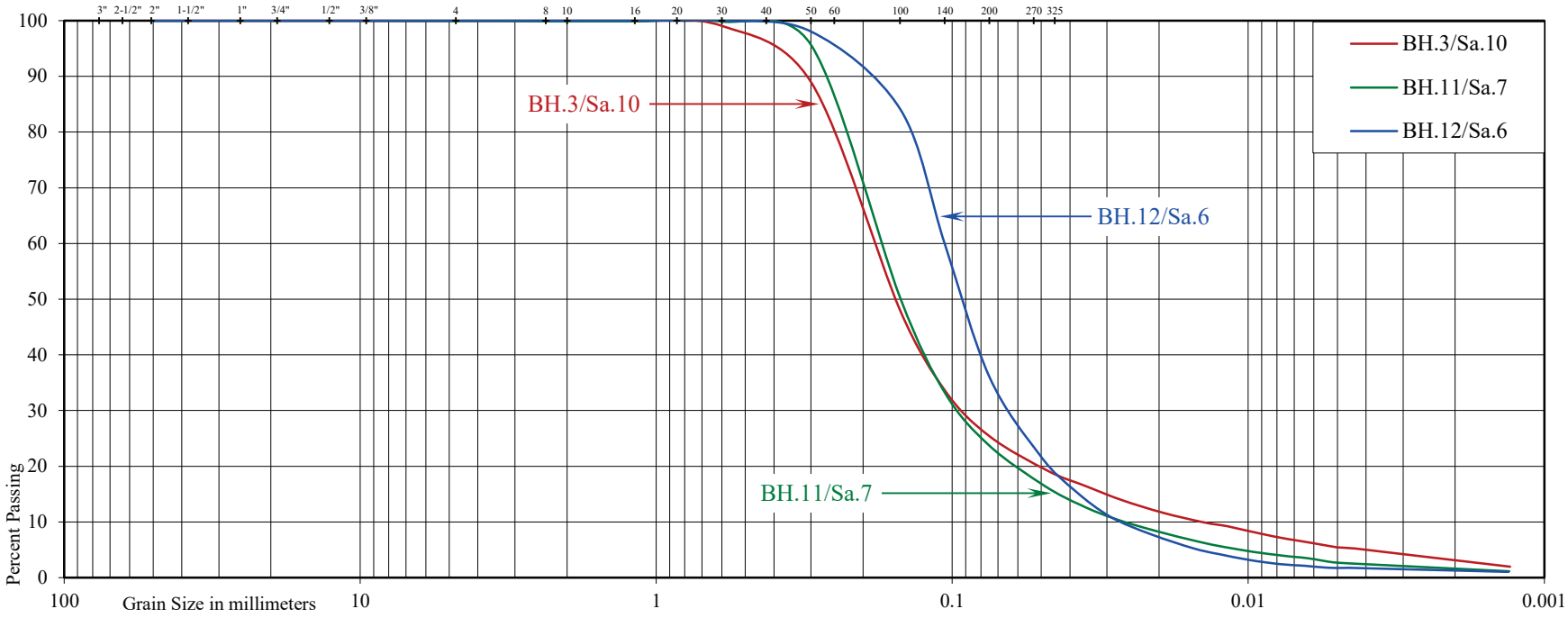
Reference No: 2103-W118

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: 12749 Tenth Line, Town of Whitchurch-Stouffville

Borehole No:	3	11	12
Sample No:	10	7	6
Depth (m):	11.0	6.3	4.8
Elevation (m):	281.3	286.9	286.6

BH./Sa.	3/10	11/7	12/6
Liquid Limit (%) =	-	-	-
Plastic Limit (%) =	-	-	-
Plasticity Index (%) =	-	-	-
Moisture Content (%) =	17	16	16
Estimated Permeability (cm./sec.) =	10^{-4}	10^{-3}	10^{-3}

Classification of Sample [& Group Symbol]: SILTY FINE SAND

a trace of clay

Figure: 18

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Appendix B

MECP WATER WELL RECORDS

REFERENCE NO. 2308-W005

MECP Well Records Summary

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Well Usage		Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**	Date Completed
				Final Status	First Use				
1	1906451	Cable Tool	12.5	Water Supply	Domestic	1.5	11.6	12.5	1981-11-24
2	1912953	Cable Tool	49.1	Water Supply	Domestic	5.8	47.2	49.1	1996-08-15
3	1913749	Cable Tool	25.3	Water Supply	Domestic	7.6	24.4	25.3	1998-07-20
4	4604230	Rotary(Convemt.) (Reverse)	61.3	Test Hole	Not Used	3.7	19.8	23.2	1969-09-10
5	4602706	Rotary(Convemt.) (Reverse)	12.2	Water Supply	Domestic	3.7	10.7	12.2	1962-08-22
6	6908472	Cable Tool	20.7	Water Supply	Domestic	7.0	18.3	20.7	1966-10-16
7	6909354	Cable Tool	10.1	Test Hole	Not Used	-	-	-	1969-06-02
8	6912298	Rotary(Convemt.) (Reverse)	21.9	Water Supply	Domestic	14.6	19.8	21.9	1974-07-11
9	6913320	Rotary(Convemt.) (Reverse)	28.7	Water Supply	Commercial	4.6	25.0	28.7	1976-05-11
10	6914076	Cable Tool	21.3	Water Supply	Domestic	5.5	20.1	21.0	1977-06-17
11	6915555	Rotary(Convemt.) (Reverse)	24.4	Water Supply	Domestic	3.7	18.0	19.8	1980-05-27
12	6924863	Cable Tool	19.5	Water Supply	Domestic	10.7	17.7	19.5	1999-04-12
13	6917898	Cable Tool	19.8	Water Supply	Domestic	5.8	18.9	19.8	1985-09-15
14	6919626	Cable Tool	27.7	Water Supply	Domestic	4.6	22.6	24.4	1988-06-09
15	6920552	Cable Tool	17.7	Water Supply	Domestic	7.6	16.8	17.7	1989-08-10
16	6921454	Cable Tool	21.9	Water Supply	Domestic	11.3	20.7	21.6	1991-04-30
17	6923729	Cable Tool	18.0	Water Supply	Domestic	-0.9	16.2	18.0	1996-09-25
18	6925977	Cable Tool	26.2	Water Supply	-	7.0	2.4	3.4	2001-08-23
19	7109188	Rotary(Air)	27.4	Water Supply	Domestic	11.6	-	-	2007-07-16
20	7149405	-	9.1	Test Hole	Monitoring	-	6.0	9.1	2010-06-12
21	7180245	Rotary(Air)	12.2	Dewatering	-	-0.6	9.1	11.3	2012-04-11
22	7194237	Rotary(Convemt.) (Reverse)	20.0	Observation Wells	Monitoring	-	20.0	15.0	-
23	7194238	Rotary(Convemt.) (Reverse)	20.0	Observation Wells	Monitoring	-	20.0	15.0	-
24	7194248	Rotary(Convemt.) (Reverse)	6.1	Observation Wells	Monitoring	-	4.6	6.1	2012-12-12
25	7194249	Rotary(Convemt.) (Reverse)	20.0	Observation Wells	Monitoring	-	20.0	15.0	-
26	7194250	Rotary(Convemt.) (Reverse)	20.0	Observation Wells	Monitoring	-	20.0	15.0	-
27	7194251	Rotary(Convemt.) (Reverse)	6.1	Observation Wells	Monitoring	-	6.1	4.6	-
28	7205632	-	-	-	-	-	-	-	2013-06-05
29	7205633	-	-	-	-	-	-	-	2013-06-05
30	7205635	-	-	-	-	-	-	-	2013-06-05
31	7205636	-	-	-	-	-	-	-	2013-06-05
32	7212614	Rotary(Convemt.) (Reverse)	13.7	Other Status	Monitoring and Test Hole	-	12.2	13.7	2013-09-05
33	7248277	-	-	Abandoned-Other	-	-	-	-	2015-05-23
34	7258396	Boring	7.6	Observation Wells	Monitoring	-	4.6	7.6	2016-01-14
35	7258397	Boring	4.6	Observation Wells	Monitoring	-	3.0	4.6	2016-01-14
36	7258398	Boring	6.1	Observation Wells	Monitoring	-	3.0	6.1	2016-01-14
37	7258401	Boring	6.1	Observation Wells	Monitoring	-	3.0	6.1	2016-01-15
38	7282181	-	-	-	-	-	-	-	2016-07-22
39	7282195	-	-	-	-	-	-	-	2016-12-01

MECP Well Records Summary

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Well Usage		Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**	Date Completed
				Final Status	First Use				
40	7279554	Rotary(Convemt.) (Reverse)	9.1	Other Status	Monitoring and Test Hole	-	6.1	9.1	2016-10-20
41	7279555	Rotary(Convemt.) (Reverse)	9.1	Other Status	Monitoring and Test Hole	-	6.1	9.1	2016-10-21
42	7279556	Rotary(Convemt.) (Reverse)	9.1	Other Status	Monitoring and Test Hole	-	6.1	9.1	2016-10-21
43	7279557	Rotary(Convemt.) (Reverse)	9.1	Other Status	Monitoring and Test Hole	-	6.1	9.1	2016-10-24
44	7283606	Rotary(Convemt.) (Reverse)	7.6	Other Status	Test Hole	-	6.1	7.6	2016-06-22
45	7295152	Other Method	6.1	Dewatering	Dewatering	-1.2	4.1	6.1	2017-07-12
46	7295153	Other Method	3.3	Observation Wells	Monitoring	-	2.8	3.3	2017-07-11
47	7295154	Other Method	3.3	Observation Wells	Monitoring	-	2.8	3.3	2017-07-06
48	7295155	Other Method	3.3	Observation Wells	Monitoring	-	2.8	3.3	2017-07-10
49	7295156	Other Method	3.4	-	Monitoring	-	2.9	3.4	2017-07-06
50	7295221	Other Method	7.1	-	Dewatering	2.1	5.1	7.1	2017-07-07
51	7299532	-	-	Abandoned-Other	Monitoring	4.9	-	-	2017-10-10
52	7299529	Other Method	29.3	Observation Wells	Monitoring	6.9	21.3	24.4	2017-11-03
53	7314016	Boring	-	Other Status	Test Hole	-	4.6	6.1	2018-04-30
54	7314017	Boring	-	Other Status	Test Hole	-	3.0	4.6	2018-05-01
55	7314018	Boring	-	Other Status	Test Hole	-	6.1	7.6	2018-05-01
56	7314019	Boring	-	Other Status	Test Hole	-	6.1	7.6	2018-04-30
57	7321547	Boring	-	Observation Wells	Test Hole	-	5.2	8.2	2018-09-24
58	7321548	Boring	-	Observation Wells	Test Hole	-	5.2	8.2	2018-09-24
59	7336393	-	-	-	-	-	-	-	2019-04-22
60	7353458	Rotary(Convemt.) (Reverse)	9.8	Other Status	Monitoring and Test Hole	-	6.7	9.8	2019-12-04
61	7353459	Rotary(Convemt.) (Reverse)	7.6	Other Status	Monitoring and Test Hole	-	4.6	7.6	2019-12-05
62	7353460	Rotary(Convemt.) (Reverse)	9.1	Other Status	Monitoring and Test Hole	-	6.1	9.1	2019-12-05
63	7353461	Rotary(Convemt.) (Reverse)	7.9	Other Status	Monitoring and Test Hole	-	4.9	7.9	2019-12-06
64	7354871	Rotary(Convemt.) (Reverse)	9.1	Observation Wells	Monitoring and Test Hole	-	6.1	9.1	2019-12-11
65	7354872	Rotary(Convemt.) (Reverse)	9.1	Observation Wells	Monitoring and Test Hole	-	6.1	9.1	2019-12-11
66	7354873	Rotary(Convemt.) (Reverse)	9.1	Observation Wells	Monitoring and Test Hole	-	6.1	9.1	2019-12-11
67	7360748	-	-	-	-	-	-	-	2020-03-06
68	7360761	-	-	-	-	-	-	-	2020-03-04
69	7361464	Boring	7.9	Observation Wells	Monitoring	-	4.9	7.9	2020-02-11
70	7361465	Boring	9.1	Observation Wells	Monitoring	-	5.8	8.8	2020-02-11
71	7361466	Boring	8.8	Observation Wells	Monitoring	-	5.8	8.8	2020-02-11
72	7361467	Boring	6.1	Observation Wells	Monitoring	-	3.7	5.2	2020-02-11
73	7374635	-	-	-	-	-	-	-	2020-08-11
74	7374637	-	-	-	-	-	-	-	2020-08-12
75	7380336	-	-	-	-	-	-	-	2020-12-07
76	7391893	Rotary(Convemt.) (Reverse)	6.1	Observation Wells	Monitoring	-	3.0	6.1	2021-05-30
77	7398439	H.S.A.	8.2	Other Status	Monitoring and Test Hole	-	5.2	8.2	2021-08-18

MECP Well Records Summary

WELL ID	MECP* WWR ID	Construction Method	Well Depth (m)**	Well Usage		Static Water Level (m)**	Top of Screen Depth (m)**	Bottom of Screen Depth (m)**	Date Completed
				Final Status	First Use				
78	7398440	H.S.A.	8.1	Other Status	Monitoring and Test Hole	-	5.0	8.1	2021-06-19
79	7398441	Boring	12.2	Other Status	Monitoring and Test Hole	-	9.1	12.2	2021-08-18
80	7398442	Boring	8.1	Other Status	Monitoring and Test Hole	-	5.0	8.1	2021-08-17
81	7400893	Boring	6.1	Test Hole	Test Hole	-	3.7	6.7	2021-06-09
82	7402887	-	-	-	-	-	-	-	2021-04-17
83	7412138	-	-	-	-	-	-	-	2021-12-16
84	7429150	-	-	-	-	-	-	-	2022-09-06
85	7429151	-	-	-	-	-	-	-	2022-09-06
86	7429152	-	-	-	-	-	-	-	2022-09-06
87	7435307	-	-	-	-	-	-	-	2022-03-16
88	7439519	-	-	-	-	-	-	-	2022-09-30
89	7482923	H.S.A.	7.6	Observation Wells	Monitoring	-	4.6	7.6	2024-05-08
90	7482944	Other Method	146.3	Observation Wells	Monitoring	50.1	122.0	128.1	2024-07-02

Notes:

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

**Metres below ground surface

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90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

Appendix C-1

Groundwater Level Monitoring Summary

REFERENCE NO. 2103-W118

BH/MW	Ground Level Elevation (masl)	Units	28-Apr-21	28-May-21	29-Jun-21	27-Jul-21	31-Aug-21	30-Sep-21	30-Oct-21	30-Nov-21	23-Dec-21	21-Jul-23	23-Nov-23	28-Dec-23	24-Jan-24	28-Feb-24	12-Mar-24	1-Apr-24	22-May-24	25-Jun-24	25-Jul-24	28-Aug-24	25-Sep-24	23-Oct-24	27-Nov-24	23-Dec-25	6-Jan-26
1	290.56	mbgs	1.66	2.23	2.51	2.24	3.00	1.83	1.21	1.56	1.29	1.59	2.13	0.69	0.47	0.73	0.74	1.20	1.37	1.32	1.71	1.52	2.37	2.88	2.24	1.22	1.43
		masl	288.90	288.33	288.05	288.32	287.56	288.73	289.35	289.00	289.27	288.97	288.43	289.87	290.09	289.83	289.82	289.36	289.19	289.24	288.85	289.04	288.19	287.68	288.32	289.34	289.13
5	289.88	mbgs	3.52	3.61	3.95	4.02	4.27	4.30	3.71	3.48	2.65	2.85	3.85	2.79	3.06	2.59	2.41	2.55	2.48	2.88	2.86	2.79	3.41	3.71	3.95	3.73	3.72
		masl	286.36	286.27	285.93	285.86	285.61	285.58	286.17	286.40	287.23	287.03	286.03	287.09	286.82	287.29	287.47	287.33	287.40	287.00	287.02	287.09	286.47	286.17	285.93	286.15	286.16
9	292.02	mbgs	6.43	6.53	6.77	6.85	7.01	7.06	6.78	6.51	6.15	6.24	6.69	6.65	6.41	6.04	6.02	5.91	5.65	5.96	6.10	6.19	6.36	6.56	6.71	7.07	7.04
		masl	285.59	285.49	285.25	285.17	285.01	284.96	285.24	285.51	285.87	285.78	285.33	285.37	285.61	285.98	286.00	286.11	286.37	286.06	285.92	285.83	285.66	285.46	285.31	284.95	284.98
11	293.16	mbgs	6.52	6.61	6.84	6.91	7.07	7.13	6.94	6.76	6.44	6.14	6.67	6.63	6.44	6.05	6.02	5.92	5.74	6.04	6.08	6.22	6.41	6.62	6.76	7.00	7.10
		masl	286.64	286.55	286.32	286.25	286.09	286.03	286.22	286.40	286.72	287.02	286.49	286.53	286.72	287.11	287.14	287.24	287.42	287.12	287.08	286.94	286.75	286.54	286.40	286.16	286.06
15	291.40	mbgs	4.55	4.76	4.98	5.07	5.17	5.21	4.98	4.79	4.54	NA	4.74	4.42	4.36	3.98	3.93	3.95	3.79	3.95	4.08	4.22	4.39	4.65	4.78	4.56	4.22
		masl	286.85	286.64	286.42	286.33	286.23	286.19	286.42	286.61	286.86	NA	286.66	286.98	287.04	287.42	287.47	287.45	287.61	287.45	287.32	287.18	287.01	286.75	286.62	286.84	287.18
16	291.30	mbgs	3.74	3.91	4.19	4.27	4.45	4.52	4.32	4.18	3.74	3.44	5.03	3.89	3.51	3.19	2.98	3.09	2.97	3.25	3.25	3.25	3.72	3.93	3.93	3.80	4.59
		masl	287.56	287.39	287.11	287.03	286.85	286.78	286.98	287.12	287.56	287.86	286.27	287.41	287.79	288.11	288.32	288.21	288.33	288.05	288.05	288.05	287.58	287.37	287.37	287.50	286.71

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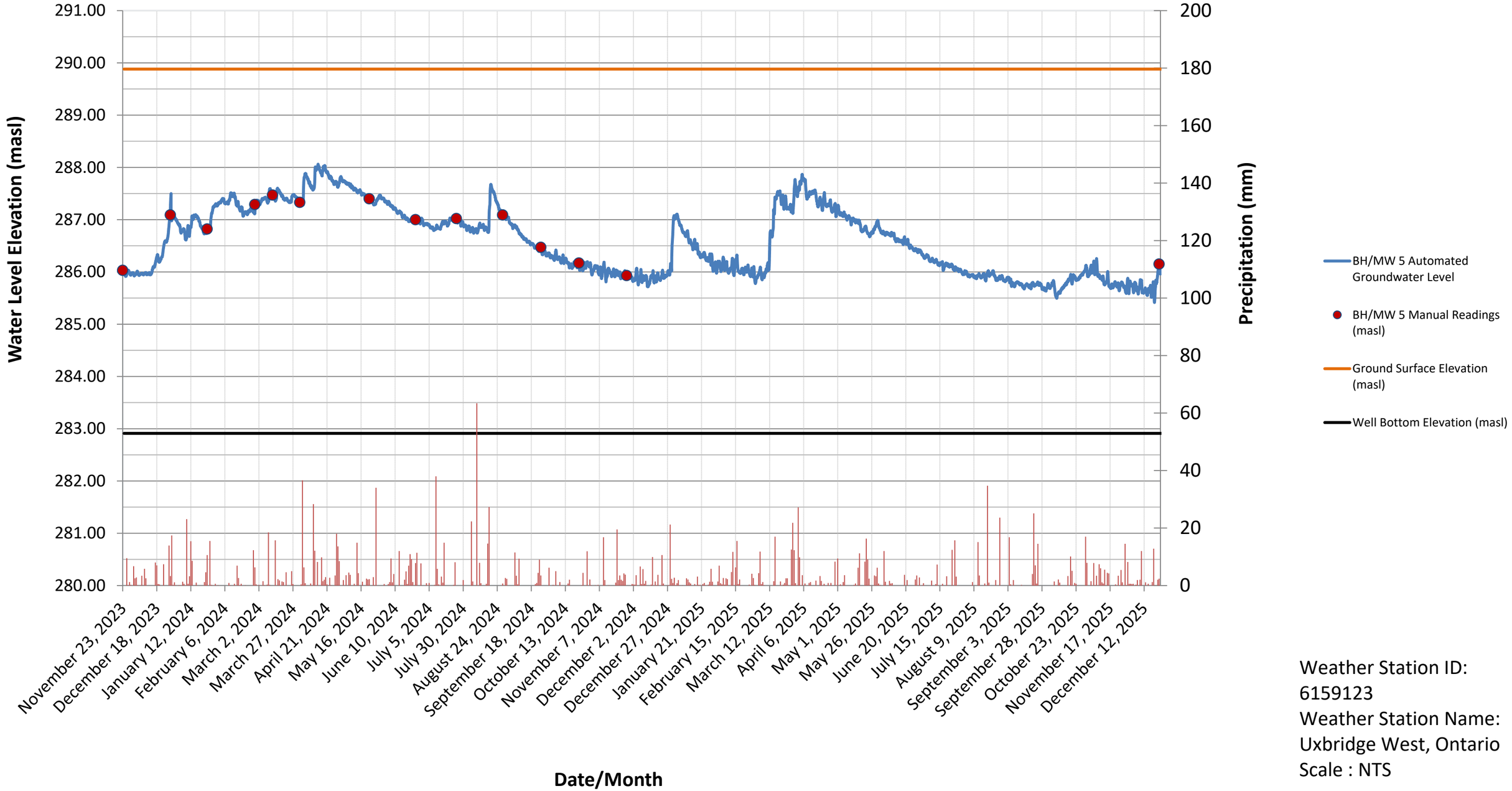
Appendix C-2

Hydrographs

REFERENCE NO. 2103-W118

Hydrograph : BH/MW 5



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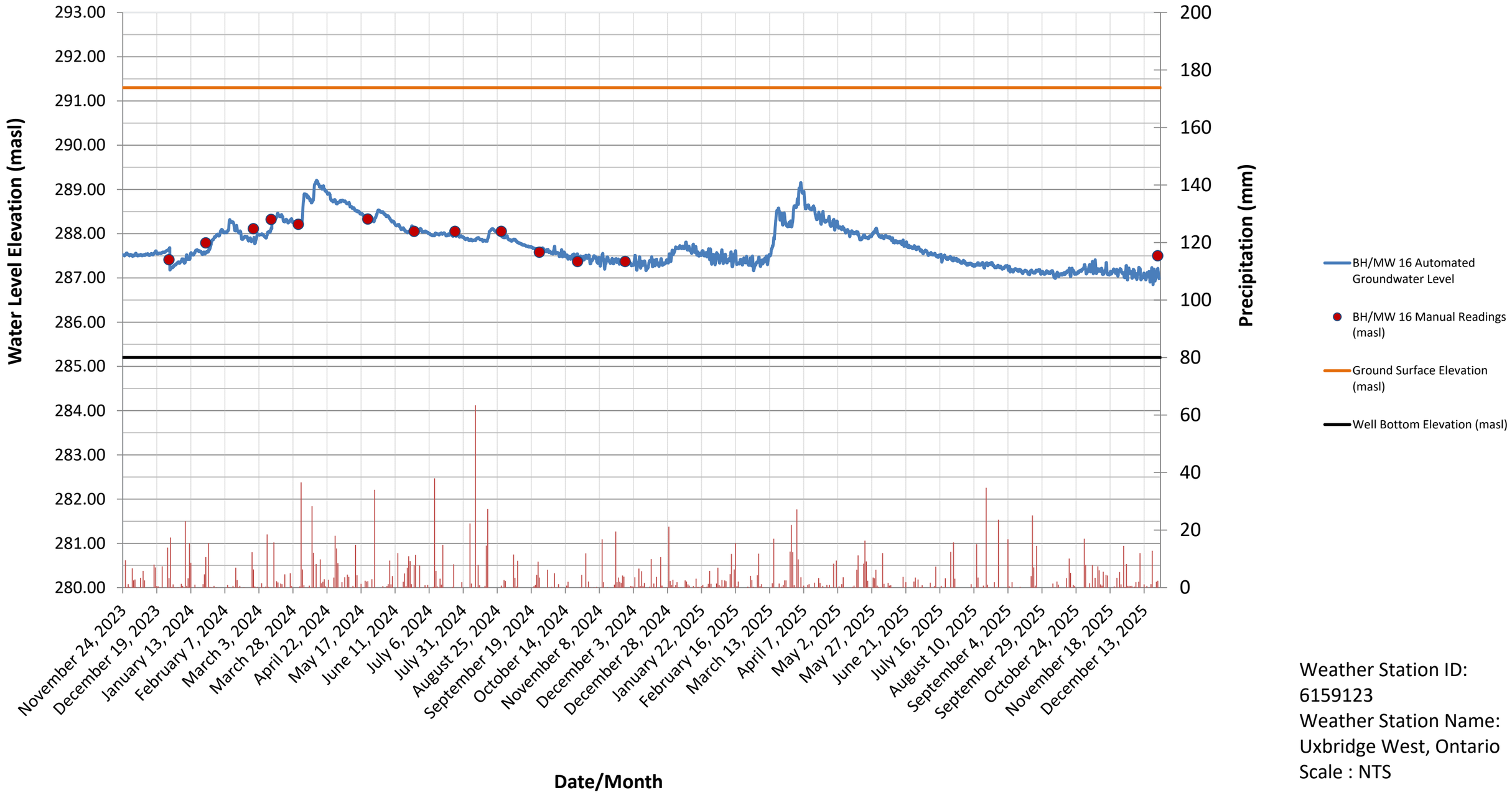
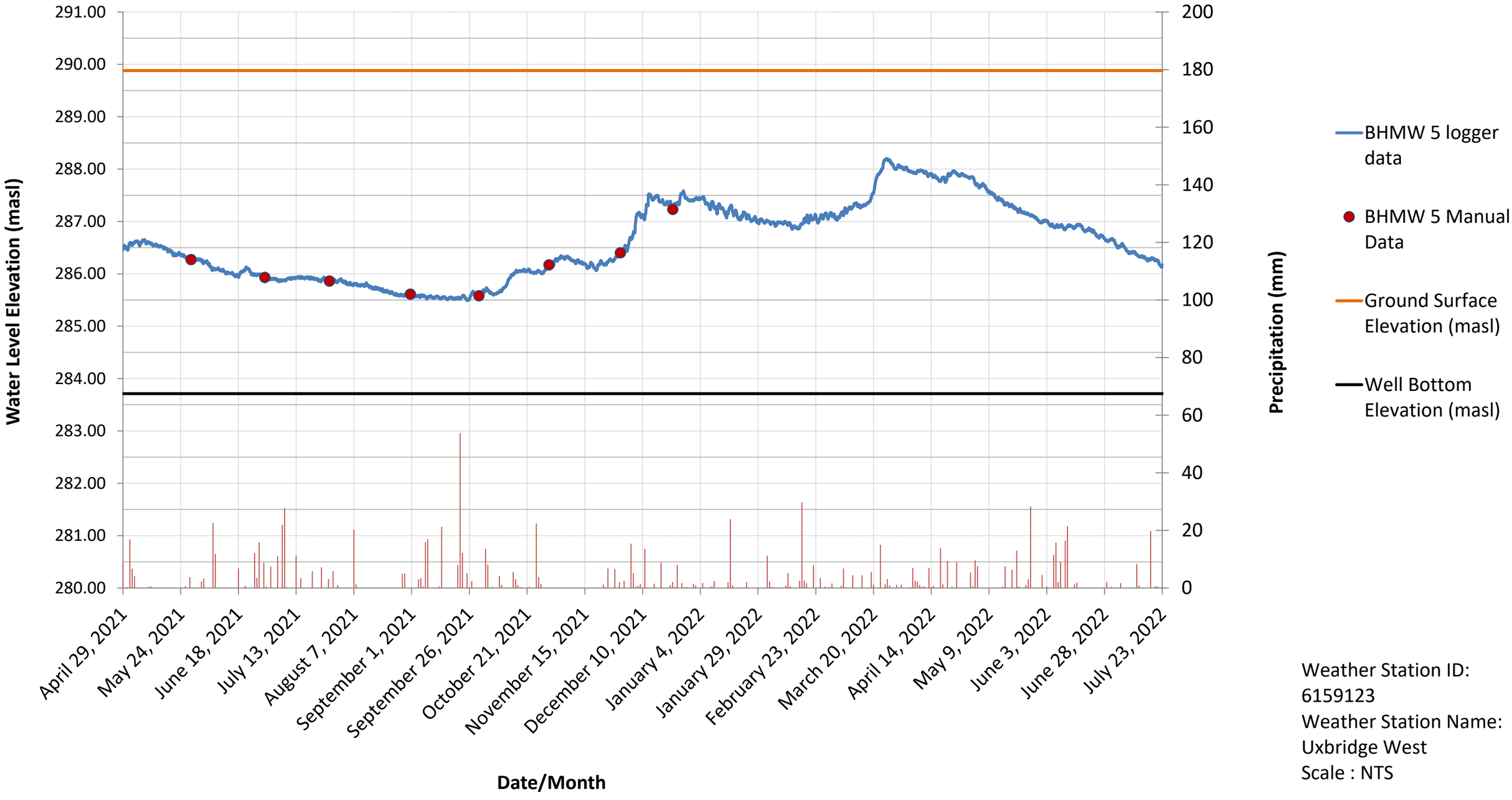
Weather Station Name: Uxbridge West, Ontario
Scale : NTS

Hydrograph : BH/MW 16



Weather Station ID: 6159123
Weather Station Name: Uxbridge West, Ontario
Scale : NTS

Hydrograph : BH/MW 5



Weather Station ID: 6159123
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Appendix D

IN-SITU HYDRAULIC CONDUCTIVITY TESTING DETAILS

REFERENCE NO. 2103-W118

Falling Head Test (Slug Test)

Test Date:		30-Sep-21	
Piezometer/Well No.:		BH/MW 1	
Ground level:		290.56	m
Screen top level:		287.36	m
Screen bottom level:		284.36	m
Test El. (at midpoint of screen):		285.86	m
Test depth (at midpoint of screen):		4.7	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.9502	m
Initial water depth		1.83	m
Aquifer material:		**SILTY CLAY TILL**	

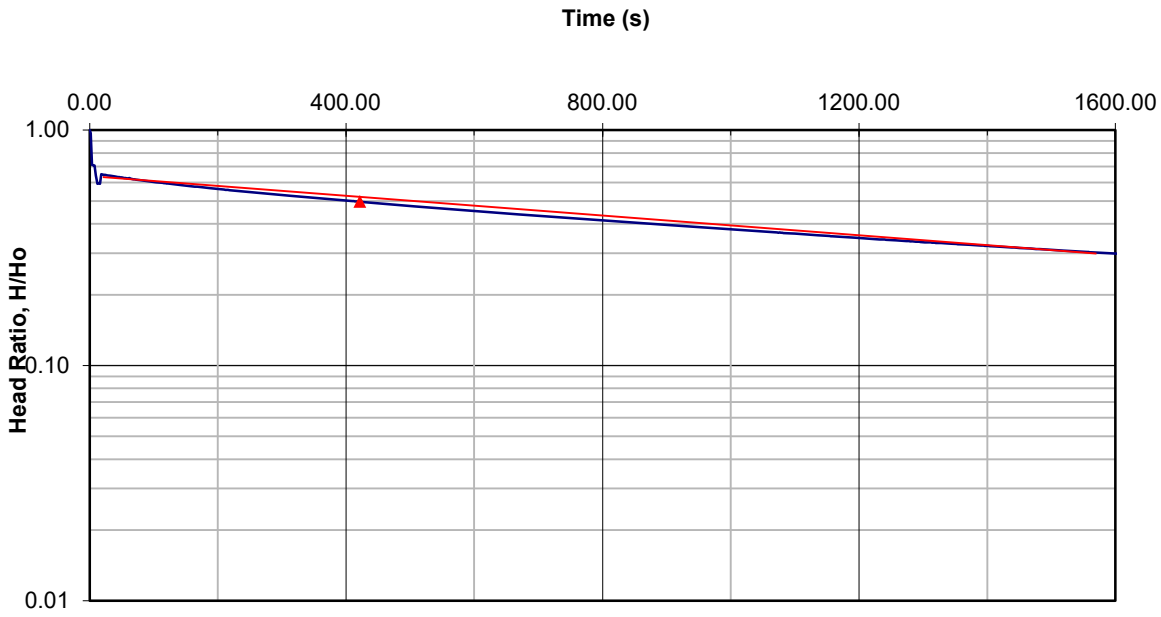
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.00164795$

K= **5.7E-05** cm/s

5.7E-07 m/s



Falling Head Test (Slug Test)

Test Date:		30-Sep-21	
Piezometer/Well No.:		BH/MW 5	
Ground level:		289.88	m
Screen top level:		286.68	m
Screen bottom level:		283.68	m
Test El. (at midpoint of screen):		285.18	m
Test depth (at midpoint of screen):		4.7	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.3734	m
Initial water depth		4.3	m
Aquifer material:		**SILTY CLAY TILL**	

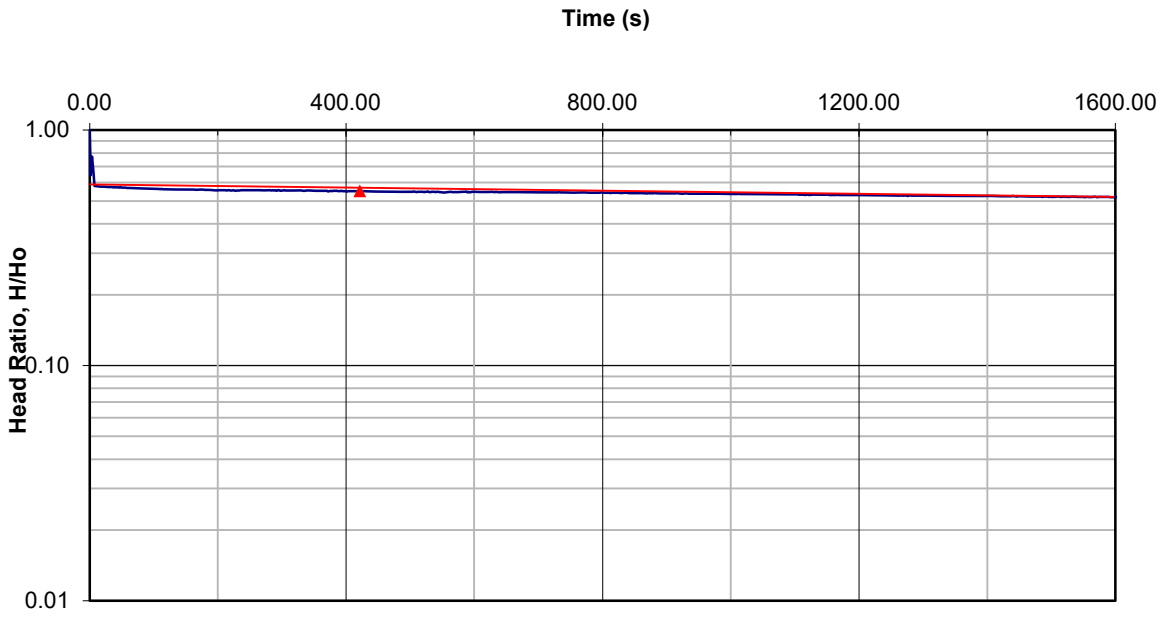
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.00041384$

K= **1.4E-05** cm/s

1.4E-07 m/s



Falling Head Test (Slug Test)

Test Date:		30-Sep-21	
Piezometer/Well No.:		BH/MW 9	
Ground level:		292.02	m
Screen top level:		284.62	m
Screen bottom level:		281.62	m
Test El. (at midpoint of screen):		283.12	m
Test depth (at midpoint of screen):		8.9	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.3784	m
Initial water depth		7.06	m
Aquifer material:		**SILTY SAND**	

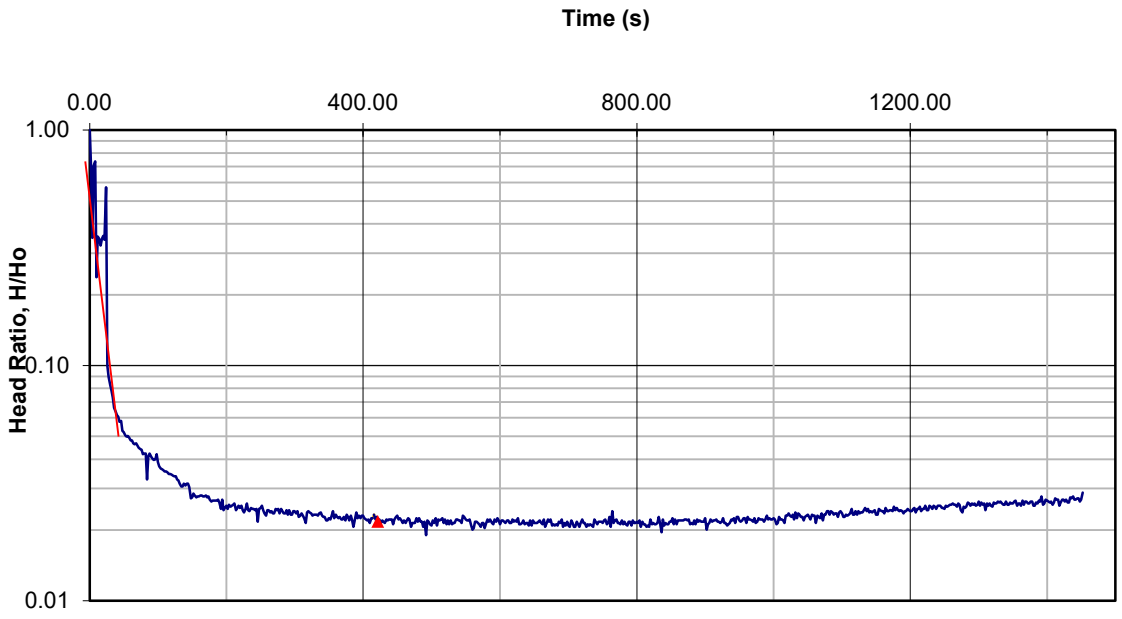
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.03954204$

K= **1.4E-03** cm/s

1.4E-05 m/s



Falling Head Test (Slug Test)

Test Date:		30-Sep-21	
Piezometer/Well No.:		BH/MW 11	
Ground level:		293.16	m
Screen top level:		285.36	m
Screen bottom level:		282.36	m
Test El. (at midpoint of screen):		283.86	m
Test depth (at midpoint of screen):		9.3	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.5496	m
Initial water depth		7.13	m
Aquifer material:		**SILTY SAND**	

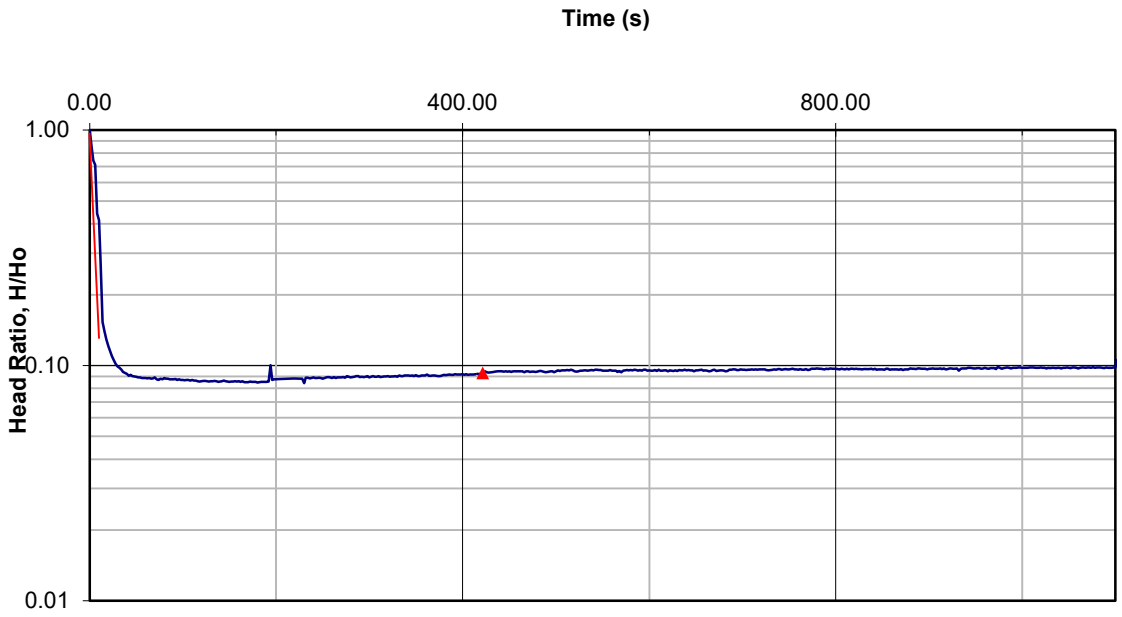
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.07268055$

K= **2.5E-03** cm/s

2.5E-05 m/s



Falling Head Test (Slug Test)

Test Date:		31-Aug-21	
Piezometer/Well No.:		BH/MW 15	
Ground level:		291.40	m
Screen top level:		287.90	m
Screen bottom level:		284.90	m
Test El. (at midpoint of screen):		286.40	m
Test depth (at midpoint of screen):		5	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.193	m
Initial water depth		5.17	m
Aquifer material:		**SILTY CLAY TILL**	

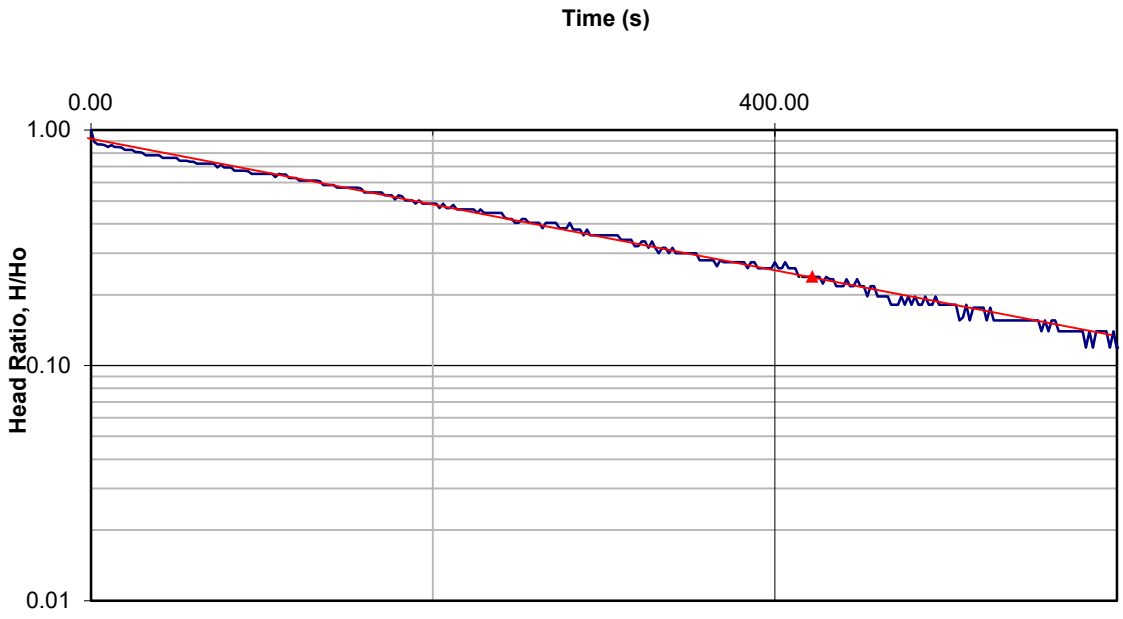
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.00309234$

K= **1.1E-04** cm/s

1.1E-06 m/s



Falling Head Test (Slug Test)

Test Date:		31-Aug-21	
Piezometer/Well No.:		BH/MW 16	
Ground level:		291.30	m
Screen top level:		288.40	m
Screen bottom level:		285.40	m
Test El. (at midpoint of screen):		286.90	m
Test depth (at midpoint of screen):		4.4	m
Screen length	L=	3.0	m
Diameter of undisturbed portion	2R=	0.22	m
Standpipe diameter	2r=	0.05	m
Initial unbalanced head	Ho=	-0.278	m
Initial water depth		4.45	m
Aquifer material:		**SILTY CLAY TILL**	

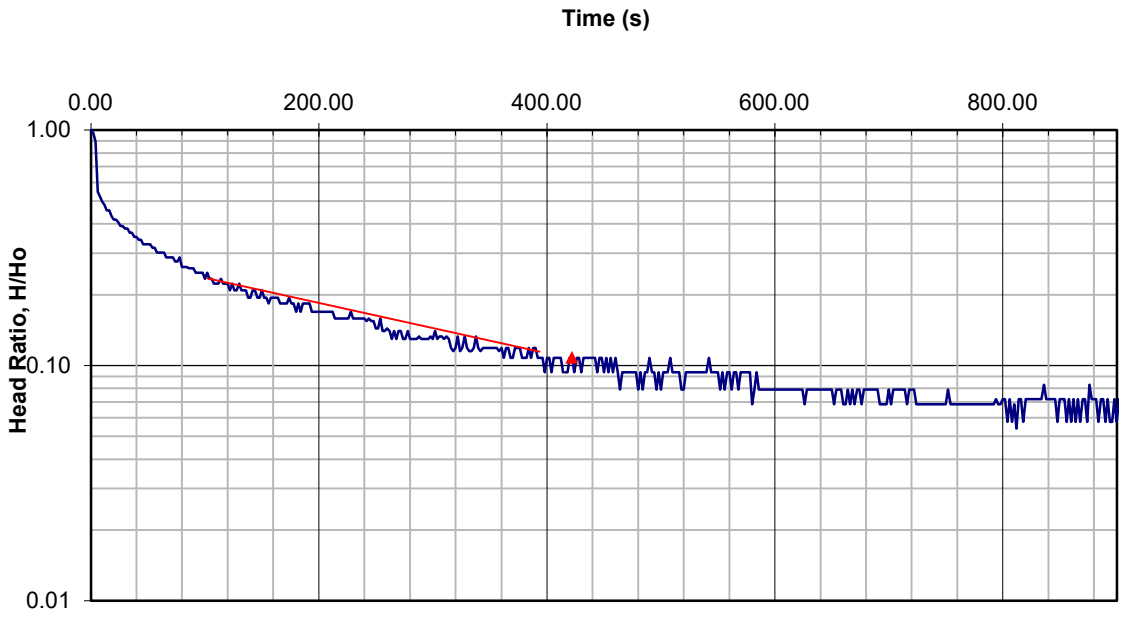
Shape factor $F = \frac{2 \times 3.14 \times L}{\ln(L/R)} = 5.701815$ m

Permeability $K = \frac{3.14 \times r2}{F \times (t2 - t1)} \times \ln(H1/H2)$ (Bouwer and Rice Method)

$\frac{\ln(H1/H2)}{(t2 - t1)} = 0.00217056$

K= **7.5E-05** cm/s

7.5E-07 m/s



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Appendix E

GROUNDWATER QUALITY TEST RESULTS

REFERENCE NO. 2103-W118

FINAL REPORT

CA40015-JAN26 R1

2103-W118, 12749 Tenth Line Stuffville

Prepared for

Soil Engineers Ltd.

FINAL REPORT

CA40015-JAN26 R1

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Soil Engineers Ltd.	Project Specialist	Brad Moore Hon. B.Sc
Address	90 West Beaver Creek Rd Richmond Hill, ON M1S 3A7. Canada	Laboratory Address	SGS Canada Inc. 185 Concession St., Lakefield ON, K0L 2H0
Contact	Yogiraj Rana		
Telephone	705-341-1987	Telephone	705-652-2143
Facsimile	416-754-8516	Facsimile	705-652-6365
Email	yogiraj.rana@soilengineersltd.com	Email	brad.moore@sgs.com
Works #		SGS Reference	CA40015-JAN26
Project Reference	2103-W118, 12749 Tenth Line Stuffville	Received	2026-01-07
		Approved	01/14/2026
Batch		Report Number	CA40015-JAN26 R1
Samples	WATER (1)	Date Reported	01/14/2026

COMMENTS

RL - SGS Reporting Limit

Nonylphenol Ethoxylates is the sum of nonylphenol monoethoxylate and nonylphenol diethoxylate.

Temperature of Sample upon Receipt: 9 degrees C
Cooling Agent Present:Yes
Custody Seal Present:Yes

Chain of Custody Number:046407

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: Soil Engineers Ltd.
Project: 2103-W118, 12749 Tenth Line Stuffville
Project Manager: Yogiraj Rana
Samplers: S Atena Mousari

MATRIX: WATER

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

General Chemistry

Parameter	Units	RL	L1	L2	Result
Alkalinity	mg/L as CaCO3	2			324
Bicarbonate	mg/L as CaCO3	2			324
Carbonate	mg/L as CaCO3	2			< 2
OH	mg/L as CaCO3	2			< 2
Colour	TCU	3			3
Conductivity	uS/cm	2			695
Turbidity	NTU	0.10			6.3
Ammonia+Ammonium (N)	as N mg/L	0.1			< 0.1
Total Reactive Phosphorous (o-phosphate as P)	mg/L	0.03			< 0.03
Total Organic Carbon	mg/L	1			< 1
Biochemical Oxygen Demand (BOD5)	mg/L	2	300	15	< 4 ↑
Total Suspended Solids	mg/L	2	350	15	64
Total Kjeldahl Nitrogen	as N mg/L	0.5	100	1	< 0.5

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MATRIX: WATER

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Metals and Inorganics

Parameter	Units	RL	L1	L2	Result
Bromide	mg/L	0.3			< 0.3
Nitrite (as N)	as N mg/L	0.03			< 0.03
Nitrate (as N)	as N mg/L	0.06			1.22
Sulphate	mg/L	2	1500		7
Cyanide (total)	mg/L	0.01	2	0.02	< 0.01
Fluoride	mg/L	0.06	10		< 0.06
Aluminum (0.2µm)	mg/L	0.001			0.004
Aluminum (total)	mg/L	0.001	50		0.090
Antimony (total)	mg/L	0.0009	5		< 0.0009
Arsenic (total)	mg/L	0.0002	1	0.02	< 0.0002
Boron (total)	mg/L	0.002			0.007
Barium (total)	mg/L	0.00008			0.0586
Beryllium (total)	mg/L	0.000007			< 0.000007
Cadmium (total)	mg/L	0.000003	0.7	0.008	0.000022
Chromium (total)	mg/L	0.00008	2	0.08	0.00087
Calcium (total)	mg/L	0.01			84.0
Cobalt (total)	mg/L	0.000004	5		0.000114
Copper (total)	mg/L	0.001	3	0.05	< 0.001
Lead (total)	mg/L	0.00009	1	0.12	0.00011
Iron (total)	mg/L	0.007			0.111
Potassium (total)	mg/L	0.009			0.845
Magnesium (total)	mg/L	0.001			11.9

Client: Soil Engineers Ltd.
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MATRIX: WATER

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Metals and Inorganics (continued)

Parameter	Units	RL	L1	L2	Result
Manganese (total)	mg/L	0.00001	5	0.15	0.00568
Molybdenum (total)	mg/L	0.0004	5		< 0.0004
Nickel (total)	mg/L	0.0001	2	0.08	0.0007
Sodium (total)	mg/L	0.01			56.8
Silicon (total)	mg/L	0.02			7.35
Phosphorus (total)	mg/L	0.003	10	0.4	0.007
Selenium (total)	mg/L	0.00004	1	0.02	0.00013
Silver (total)	mg/L	0.00005	5	0.12	< 0.00005
Strontium (total)	mg/L	0.00008			0.203
Thallium (total)	mg/L	0.000005			< 0.000005
Tin (total)	mg/L	0.00006	5		0.00039
Titanium (total)	mg/L	0.0001	5		0.0037
Uranium (total)	mg/L	0.000002			0.000316
Vanadium (total)	mg/L	0.00001			0.00042
Zinc (total)	mg/L	0.002	2	0.04	0.008
Hardness	mg/L as CaCO3	0.05			259
Cation sum	meq/L	-9999			7.69
Anion Sum	meq/L	-9999			7.74
Anion-Cation Balance	% difference	-9999			-0.36
Ion Ratio	none	-9999			0.99
Total Dissolved Solids (calculated)	mg/L	-9999			395
Conductivity (calculated)	uS/cm	-9999			772

Client: Soil Engineers Ltd.
Project: 2103-W118, 12749 Tenth Line Stuffville
Project Manager: Yogiraj Rana
Samplers: S Atena Mousari

MATRIX: WATER

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics (continued)					
Langeliers Index 4° C	@ 4° C	-9999			0.16
Saturation pH 4°C	pHs @ 4°C	-9999			7.53
Nonylphenol and Ethoxylates					
Nonylphenol	mg/L	0.001	0.02		< 0.001
Nonylphenol Ethoxylates	mg/L	0.01	0.2		< 0.01
Nonylphenol diethoxylate	mg/L	0.01			< 0.01
Nonylphenol monoethoxylate	mg/L	0.01			< 0.01
Oil and Grease					
Oil & Grease (total)	mg/L	2			< 2
Oil & Grease (animal/vegetable)	mg/L	4	150		< 4
Oil & Grease (mineral/synthetic)	mg/L	4	15		< 4
Other (ORP)					
pH	No unit	0.05	10.5	9	7.69
Chloride	mg/L	1			40
Mercury (total)	mg/L	0.00001	0.01	0.0004	0.00001
Mercury (dissolved)	mg/L	0.00001			0.00001

Client: Soil Engineers Ltd.
Project: 2103-W118, 12749 Tenth Line Stuffville
Project Manager: Yogiraj Rana
Samplers: S Atena Mousari

MATRIX: WATER

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Parameter	Units	RL	L1	L2	Result
PCBs					
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.001	0.0004	< 0.0001
Phenols					
4AAP-Phenolics	mg/L	0.001	1	0.008	0.001
SVOCs					
di-n-Butyl Phthalate	mg/L	0.002	0.08	0.015	< 0.002
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.012	0.0088	< 0.002
VOCs					
Chloroform	mg/L	0.0005	0.04	0.002	< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005	0.05	0.0056	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.08	0.0068	< 0.0005
cis-1,2-Dichloroethylene	mg/L	0.0005	4	0.0056	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005	0.14	0.0056	< 0.0005
Methylene Chloride	mg/L	0.0005	2	0.0052	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	1.4	0.017	< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	1	0.0044	< 0.0005
Trichloroethylene	mg/L	0.0005	0.4	0.008	< 0.0005
Methyl ethyl ketone	mg/L	0.02			< 0.02
Styrene	mg/L	0.0005	0.2		< 0.0005

Client: Soil Engineers Ltd.
Project: 2103-W118, 12749 Tenth Line Stuffville
Project Manager: Yogiraj Rana
Samplers: S Atena Mousari

MATRIX: WATER

Sample Number 9
Sample Name BHMW1
Sample Matrix Ground Water
Sample Date 2026-01-07 00:00

L1 = SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102

L2 = SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102

Parameter	Units	RL	L1	L2	Result
VOCs - BTEX					
Benzene	mg/L	0.0005	0.01	0.002	< 0.0005
Ethylbenzene	mg/L	0.0005	0.16	0.002	< 0.0005
Toluene	mg/L	0.0005	0.27	0.002	< 0.0005
Xylene (total)	mg/L	0.0005	1.4	0.0044	< 0.0005
m-p-xylene	mg/L	0.0005			< 0.0005
o-xylene	mg/L	0.0005			< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - York Sewer Use ByLaw - Sanitary Sewer Discharge - BL_2021_102 L1	SANSEW / WATER / - - York Sewer Use ByLaw - Storm Sewer Discharge - BL_2021_102 L2
BHMW1					
Total Suspended Solids	SM 2540D	mg/L	64		15

QC SUMMARY

Alkalinity

Method: SM 2320 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
Alkalinity	EWL0109-JAN26	mg/L as CaCO3	2	< 2	4	20	100	80	120	NA		

Ammonia by SFA

Method: SM 4500 I 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)	SKA0052-JAN26	as N mg/L	0.1	<0.1	ND	10	97	90	110	99	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-026

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
Chloride	DIO8005-JAN26	mg/L	1	<1	2	20	94	70	130	94	70	130
Nitrite (as N)	DIO8005-JAN26	mg/L	0.03	< 0.03	1	20	100	80	120	102	75	125
Sulphate	DIO8005-JAN26	mg/L	2	<2	2	20	106	80	120	101	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENVIIC-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
Bromide	DIO0245-JAN26	mg/L	0.3	<0.3	ND	20	103	90	110	100	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-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
Biochemical Oxygen Demand (BOD5)	BOD0016-JAN26	mg/L	2	< 2	5	30	102	70	130	103	70	130

Carbon by SFA

Method: SM 5310 I Internal ref.: ME-CA-IENVISFA-LAK-AN-009

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
Total Organic Carbon	SKA0055-JAN26	mg/L	1	<1	1	20	100	90	110	96	75	125

QC SUMMARY

Carbonate/Bicarbonate

Method: SM 2320 | 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
Carbonate	EWL0109-JAN26	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0109-JAN26	mg/L as CaCO3	2	< 2	4	10	NA	90	110	NA		
OH	EWL0109-JAN26	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		

Colour

Method: SM 2120 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

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
Colour	EWL0151-JAN26	TCU	3	< 3	ND	10	110	80	120	NA		

QC SUMMARY

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-IENVIEWL-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
Conductivity	EWL0109-JAN26	uS/cm	2	3	1	10	99	90	110	NA		

Cyanide by SFA

Method: SM 4500 I Internal ref.: ME-CA-IENVISFA-LAK-AN-005

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
Cyanide (total)	SKA0056-JAN26	mg/L	0.01	<0.01	ND	10	95	90	110	91	75	125

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-014

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
Fluoride	EWL0123-JAN26	mg/L	0.06	<0.06	ND	10	95	90	110	104	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

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
Mercury (total)	EHG0016-JAN26	mg/L	0.00001	< 0.00001	ND	20	118	80	120	111	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-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
Silver (total)	EMS0093-JAN26	mg/L	0.00005	<0.00005	ND	20	104	90	110	NV	70	130
Aluminum (total)	EMS0093-JAN26	mg/L	0.001	<0.001	7	20	100	90	110	130	70	130
Aluminum (0.2µm)	EMS0093-JAN26	mg/L	0.001	<0.001	7	20	100	90	110	130	70	130
Arsenic (total)	EMS0093-JAN26	mg/L	0.0002	<0.0002	ND	20	106	90	110	102	70	130
Barium (total)	EMS0093-JAN26	mg/L	0.00008	<0.00008	3	20	102	90	110	99	70	130
Beryllium (total)	EMS0093-JAN26	mg/L	0.000007	<0.000007	ND	20	103	90	110	99	70	130
Boron (total)	EMS0093-JAN26	mg/L	0.002	<0.002	9	20	100	90	110	89	70	130
Calcium (total)	EMS0093-JAN26	mg/L	0.01	<0.01	5	20	101	90	110	98	70	130
Cadmium (total)	EMS0093-JAN26	mg/L	0.000003	<0.000003	0	20	103	90	110	99	70	130
Cobalt (total)	EMS0093-JAN26	mg/L	0.000004	<0.000004	ND	20	103	90	110	99	70	130
Chromium (total)	EMS0093-JAN26	mg/L	0.00008	<0.00008	10	20	104	90	110	103	70	130
Copper (total)	EMS0093-JAN26	mg/L	0.001	<0.001	5	20	105	90	110	102	70	130
Iron (total)	EMS0093-JAN26	mg/L	0.007	<0.007	ND	20	99	90	110	100	70	130
Potassium (total)	EMS0093-JAN26	mg/L	0.009	<0.009	4	20	97	90	110	102	70	130
Magnesium (total)	EMS0093-JAN26	mg/L	0.001	<0.001	6	20	100	90	110	98	70	130
Manganese (total)	EMS0093-JAN26	mg/L	0.00001	<0.00001	8	20	102	90	110	100	70	130
Molybdenum (total)	EMS0093-JAN26	mg/L	0.0004	<0.0004	10	20	103	90	110	102	70	130
Sodium (total)	EMS0093-JAN26	mg/L	0.01	<0.01	5	20	101	90	110	99	70	130
Nickel (total)	EMS0093-JAN26	mg/L	0.0001	<0.0001	6	20	102	90	110	98	70	130
Lead (total)	EMS0093-JAN26	mg/L	0.00009	<0.00009	4	20	102	90	110	101	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-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
Phosphorus (total)	EMS0093-JAN26	mg/L	0.003	<0.003	ND	20	98	90	110	NV	70	130
Antimony (total)	EMS0093-JAN26	mg/L	0.0009	<0.0005	ND	20	99	90	110	109	70	130
Selenium (total)	EMS0093-JAN26	mg/L	0.00004	<0.00004	11	20	101	90	110	98	70	130
Silicon (total)	EMS0093-JAN26	mg/L	0.02	<0.02	11	20	98	90	110	NV	70	130
Tin (total)	EMS0093-JAN26	mg/L	0.00006	<0.00006	ND	20	98	90	110	NV	70	130
Strontium (total)	EMS0093-JAN26	mg/L	0.00008	<0.00008	0	20	104	90	110	99	70	130
Titanium (total)	EMS0093-JAN26	mg/L	0.0001	<0.0001	ND	20	94	90	110	NV	70	130
Thallium (total)	EMS0093-JAN26	mg/L	0.000005	<0.000005	1	20	101	90	110	98	70	130
Uranium (total)	EMS0093-JAN26	mg/L	0.000002	<0.000002	ND	20	103	90	110	100	70	130
Vanadium (total)	EMS0093-JAN26	mg/L	0.00001	<0.00001	14	20	102	90	110	100	70	130
Zinc (total)	EMS0093-JAN26	mg/L	0.002	<0.002	3	20	101	90	110	105	70	130

QC SUMMARY

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-IENVIGC-LAK-AN-015

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
Nonylphenol diethoxylate	GCM0077-JAN26	mg/L	0.01	<0.01			90	55	120			
Nonylphenol monoethoxylate	GCM0077-JAN26	mg/L	0.01	<0.01			87	55	120			
Nonylphenol	GCM0077-JAN26	mg/L	0.001	<0.001			83	55	120			

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-IENVIGC-LAK-AN-019

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
Oil & Grease (total)	GCM0081-JAN26	mg/L	2	<2	NSS	20	103	75	125			

QC SUMMARY

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

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
Oil & Grease (animal/vegetable)	GCM0081-JAN26	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0081-JAN26	mg/L	4	< 4	NSS	20	NA	70	130			

pH

Method: SM 4500 | 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	EWL0109-JAN26	No unit	0.05	NA	0		100			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-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
4AAP-Phenolics	SKA0053-JAN26	mg/L	0.001	<0.001	ND	10	99	80	120	109	75	125

QC SUMMARY

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-IENVIGC-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
Polychlorinated Biphenyls (PCBs) - Total	GCM0080-JAN26	mg/L	0.0001	<0.0001	NSS	30	106	60	140	NSS	60	140

Reactive Phosphorus by SFA

Method: SM 4500-P F | Internal ref.: ME-CA-IENVISFA-LAK-AN-004

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
Total Reactive Phosphorous (o-phosphate as P)	SKA0059-JAN26	mg/L	0.03	<0.03	ND	10	97	90	110	105	75	125

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

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
Bis(2-ethylhexyl)phthalate	GCM0078-JAN26	mg/L	0.002	< 0.002	NSS	30	107	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0078-JAN26	mg/L	0.002	< 0.002	NSS	30	103	50	140	NSS	50	140

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

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
Total Suspended Solids	EWL0150-JAN26	mg/L	2	< 2	3	10	100	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

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
Total Kjeldahl Nitrogen	SKA0054-JAN26	as N mg/L	0.5	<0.5	3	10	102	90	110	100	75	125

QC SUMMARY

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-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
Turbidity	EWL0114-JAN26	NTU	0.10	< 0.10	0	10	103	90	110	NA		

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

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
1,1,2,2-Tetrachloroethane	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	102	60	130	104	50	140
1,2-Dichlorobenzene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	103	60	130	104	50	140
1,4-Dichlorobenzene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	105	60	130	102	50	140
Benzene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	105	60	130	102	50	140
Chloroform	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	102	60	130	103	50	140
cis-1,2-Dichloroethylene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	102	60	130	102	50	140
Ethylbenzene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	106	60	130	104	50	140
m-p-xylene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	107	60	130	105	50	140
Methyl ethyl ketone	GCM0089-JAN26	mg/L	0.02	<0.02	ND	30	103	50	140	111	50	140
Methylene Chloride	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	90	60	130	91	50	140
o-xylene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	106	60	130	104	50	140
Styrene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	106	60	130	109	50	140
Tetrachloroethylene (perchloroethylene)	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	105	60	130	103	50	140
Toluene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	104	60	130	103	50	140
trans-1,3-Dichloropropene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	104	60	130	97	50	140
Trichloroethylene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	99	60	130	102	50	140

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.

Test method information available upon request.

"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

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

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

No: 046407

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

Page _____ of _____

Laboratory Information Section - Lab use only

Received By: Katie Larocque
Received Date: 01/07/26 (mm/dd/yy)
Received Time: 14 : 00 (hr : min)
Received By (signature):
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐
Cooling Agent Present: Yes ☑ No ☐ Type: ICE
Temperature Upon Receipt (°C) 9.9.9
CA 40015-Jan 26.
LAB LIMS #:

REPORT INFORMATION

Company: Soil Engineers Ltd
Contact: Yogirajsinh rana
Address: 40 West Beaver Creek Richmond Hill / L4B1E7
Phone:
Fax: 416-754-8515
Email: Yogirajsinh.rana@soilengineersLtd.com

INVOICE INFORMATION

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

Quotation #:
P.O. #:
Project #: 2103-W118
Site Location/ID: 12749 Tenthline Stouffville.

TURNAROUND TIME (TAT) REQUIRED

☐ Client Regular TAT ☑ 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: ☐ Coarse
☐ Table 2 ☐ Ind/Com ☐ Medium/Fine
☐ Table 3 ☐ Agri/Other
☐ 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: Region of York

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	M&I: Metals & Inorganics (incl CrVI, CN, Hg pH,(BI(HWS),EC,SAR-soil) (Cl, Nawater)	M&I: Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI	M&I: ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	SVOC: PAHs only	SVOC: SVOCs all incl PAHs, ABNs, CPs	PCB: PCBs Total ☐ Aroclor ☐	PHC: F1-F4 + BTEX	PHC: F1-F4 only no BTEX	VOC: VOCs all incl BTEX	VOC: BTEX only	Pest: Pesticides Organochlorine or specify other	Other (please specify)	Other	Other: Sewer Use: Specify pkg: Region of York Storm	Other: Water Characterization Pkg General ☐ Extended ☐	SPLP: Specify tests	TCLP: Specify tests	COMMENTS:
1	BHMW 1	01/07/2026	12:00	25	GW	N												√ Gen chem Package compared to PWQO		√	√	☐Metals ☐VOC ☐1,4-Dioxane ☐OCP ☐ABN	☐M&I ☐VOC ☐PCB ☐B(a)P ☐ABN ☐Ignit.	
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11																								
12																								

Observations/Comments/Special Instructions

Sampled By (NAME): S. Atena Monsavi	Signature: S.A.M	Date: 01/07/2026 (mm/dd/yy)	Pink Copy - Client
Relinquished by (NAME): Atena Monsavi	Signature: S.A.M	Date: 01/07/2026 (mm/dd/yy)	Yellow & White Copy - SGS

Revision #: 1.8
Date of Issue: 06 SEP 2024

FINAL REPORT

CA40015-JAN26 R1

2103-W118, 12749 Tenth Line Stuffville

Prepared for

Soil Engineers Ltd.

FINAL REPORT

CA40015-JAN26 R1

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Soil Engineers Ltd.	Project Specialist	Brad Moore Hon. B.Sc
Address	90 West Beaver Creek Rd Richmond Hill, ON M1S 3A7. Canada	Laboratory Address	SGS Canada Inc. 185 Concession St., Lakefield ON, K0L 2H0
Contact	Yogiraj Rana		
Telephone	705-341-1987	Telephone	705-652-2143
Facsimile	416-754-8516	Facsimile	705-652-6365
Email	yogiraj.rana@soilengineersltd.com	Email	brad.moore@sgs.com
Works #		SGS Reference	CA40015-JAN26
Project Reference	2103-W118, 12749 Tenth Line Stuffville	Received	2026-01-07
		Approved	01/14/2026
Batch		Report Number	CA40015-JAN26 R1
Samples	WATER (1)	Date Reported	01/14/2026

COMMENTS

RL - SGS Reporting Limit

Nonylphenol Ethoxylates is the sum of nonylphenol monoethoxylate and nonylphenol diethoxylate.

Temperature of Sample upon Receipt: 9 degrees C
Cooling Agent Present:Yes
Custody Seal Present:Yes

Chain of Custody Number:046407

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: Soil Engineers Ltd.
Project: 2103-W118, 12749 Tenth Line Stuffville
Project Manager: Yogiraj Rana
Samplers: S Atena Mousari

MATRIX: WATER

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

General Chemistry

Parameter	Units	RL	L1	Result
Alkalinity	mg/L as CaCO3	2		324
Bicarbonate	mg/L as CaCO3	2		324
Carbonate	mg/L as CaCO3	2		< 2
OH	mg/L as CaCO3	2		< 2
Colour	TCU	3		3
Conductivity	uS/cm	2		695
Turbidity	NTU	0.10		6.3
Ammonia+Ammonium (N)	as N mg/L	0.1		< 0.1
Total Reactive Phosphorous (o-phosphate as P)	mg/L	0.03		< 0.03
Total Organic Carbon	mg/L	1		< 1
Biochemical Oxygen Demand (BOD5)	mg/L	2		< 4 ↑
Total Suspended Solids	mg/L	2		64
Total Kjeldahl Nitrogen	as N mg/L	0.5		< 0.5

Client: Soil Engineers Ltd.
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MATRIX: WATER

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

Metals and Inorganics

Parameter	Units	RL	L1	Result
Bromide	mg/L	0.3		< 0.3
Nitrite (as N)	as N mg/L	0.03		< 0.03
Nitrate (as N)	as N mg/L	0.06		1.22
Sulphate	mg/L	2		7
Cyanide (total)	mg/L	0.01		< 0.01
Fluoride	mg/L	0.06		< 0.06
Aluminum (0.2µm)	mg/L	0.001	0.015	0.004
Aluminum (total)	mg/L	0.001		0.090
Antimony (total)	mg/L	0.0009	0.02	< 0.0009
Arsenic (total)	mg/L	0.0002	0.1	< 0.0002
Boron (total)	mg/L	0.002	0.2	0.007
Barium (total)	mg/L	0.00008		0.0586
Beryllium (total)	mg/L	0.000007	0.011	< 0.000007
Cadmium (total)	mg/L	0.000003	0.0002	0.000022
Chromium (total)	mg/L	0.00008		0.00087
Calcium (total)	mg/L	0.01		84.0
Cobalt (total)	mg/L	0.000004	0.0009	0.000114
Copper (total)	mg/L	0.001	0.005	< 0.001
Lead (total)	mg/L	0.00009	0.001	0.00011
Iron (total)	mg/L	0.007	0.3	0.111
Potassium (total)	mg/L	0.009		0.845
Magnesium (total)	mg/L	0.001		11.9

Client: Soil Engineers Ltd.
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Samplers: S Atena Mousari

MATRIX: WATER

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

Metals and Inorganics (continued)

Parameter	Units	RL	L1	Result
Manganese (total)	mg/L	0.00001		0.00568
Molybdenum (total)	mg/L	0.0004	0.04	< 0.0004
Nickel (total)	mg/L	0.0001	0.025	0.0007
Sodium (total)	mg/L	0.01		56.8
Silicon (total)	mg/L	0.02		7.35
Phosphorus (total)	mg/L	0.003	0.01	0.007
Selenium (total)	mg/L	0.00004	0.1	0.00013
Silver (total)	mg/L	0.00005	0.0001	< 0.00005
Strontium (total)	mg/L	0.00008		0.203
Thallium (total)	mg/L	0.000005	0.0003	< 0.000005
Tin (total)	mg/L	0.00006		0.00039
Titanium (total)	mg/L	0.0001		0.0037
Uranium (total)	mg/L	0.000002	0.005	0.000316
Vanadium (total)	mg/L	0.00001	0.006	0.00042
Zinc (total)	mg/L	0.002	0.02	0.008
Hardness	mg/L as CaCO3	0.05		259
Cation sum	meq/L	-9999		7.69
Anion Sum	meq/L	-9999		7.74
Anion-Cation Balance	% difference	-9999		-0.36
Ion Ratio	none	-9999		0.99
Total Dissolved Solids (calculated)	mg/L	-9999		395
Conductivity (calculated)	uS/cm	-9999		772

Client: Soil Engineers Ltd.
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Samplers: S Atena Mousari

MATRIX: WATER

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

Parameter	Units	RL	L1	Result
Metals and Inorganics (continued)				
Langeliers Index 4° C	@ 4° C	-9999		0.16
Saturation pH 4°C	pHs @ 4°C	-9999		7.53
Nonylphenol and Ethoxylates				
Nonylphenol	mg/L	0.001	0.00004	< 0.001
Nonylphenol Ethoxylates	mg/L	0.01		< 0.01
Nonylphenol diethoxylate	mg/L	0.01		< 0.01
Nonylphenol monoethoxylate	mg/L	0.01		< 0.01
Oil and Grease				
Oil & Grease (total)	mg/L	2		< 2
Oil & Grease (animal/vegetable)	mg/L	4		< 4
Oil & Grease (mineral/synthetic)	mg/L	4		< 4
Other (ORP)				
pH	No unit	0.05	8.5	7.69
Chloride	mg/L	1		40
Mercury (total)	mg/L	0.00001	0.0002	0.00001
Mercury (dissolved)	mg/L	0.00001	0.0002	0.00001

Client: Soil Engineers Ltd.
Project: 2103-W118, 12749 Tenth Line Stuffville
Project Manager: Yogiraj Rana
Samplers: S Atena Mousari

MATRIX: WATER

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

Sample Number	9
Sample Name	BHMW1
Sample Matrix	Ground Water
Sample Date	2026-01-07 00:00

Parameter	Units	RL	L1	Result
PCBs				
Polychlorinated Biphenyls (PCBs) - Total	mg/L	0.0001	0.000001	< 0.0001
Phenols				
4AAP-Phenolics	mg/L	0.001	0.001	0.001
SVOCs				
di-n-Butyl Phthalate	mg/L	0.002	0.004	< 0.002
Bis(2-ethylhexyl)phthalate	mg/L	0.002	0.0006	< 0.002
VOCs				
Chloroform	mg/L	0.0005		< 0.0005
1,2-Dichlorobenzene	mg/L	0.0005	0.0025	< 0.0005
1,4-Dichlorobenzene	mg/L	0.0005	0.004	< 0.0005
cis-1,2-Dichloroethylene	mg/L	0.0005	0.2	< 0.0005
trans-1,3-Dichloropropene	mg/L	0.0005		< 0.0005
Methylene Chloride	mg/L	0.0005	0.1	< 0.0005
1,1,2,2-Tetrachloroethane	mg/L	0.0005	0.07	< 0.0005
Tetrachloroethylene (perchloroethylene)	mg/L	0.0005	0.05	< 0.0005
Trichloroethylene	mg/L	0.0005	0.02	< 0.0005
Methyl ethyl ketone	mg/L	0.02		< 0.02
Styrene	mg/L	0.0005	0.004	< 0.0005

Client: Soil Engineers Ltd.
Project: 2103-W118, 12749 Tenth Line Stuffville
Project Manager: Yogiraj Rana
Samplers: S Atena Mousari

MATRIX: WATER

Sample Number 9
Sample Name BHMW1
Sample Matrix Ground Water
Sample Date 2026-01-07 00:00

L1 = PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E

VOCs - BTEX

Parameter	Units	RL	L1	Result
Benzene	mg/L	0.0005	0.1	< 0.0005
Ethylbenzene	mg/L	0.0005	0.008	< 0.0005
Toluene	mg/L	0.0005	0.0008	< 0.0005
Xylene (total)	mg/L	0.0005		< 0.0005
m-p-xylene	mg/L	0.0005	0.002	< 0.0005
o-xylene	mg/L	0.0005	0.04	< 0.0005

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E L1
BHMW1				
Nonylphenol	ASTM D7065-06	mg/L	< 0.001	0.00004
Bis(2-ethylhexyl)phthalate	EPA 3510C/8270D	mg/L	< 0.002	0.0006
Polychlorinated Biphenyls	MOE E3400/EPA 8082A	mg/L	< 0.0001	0.000001

QC SUMMARY

Alkalinity

Method: SM 2320 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
Alkalinity	EWL0109-JAN26	mg/L as CaCO3	2	< 2	4	20	100	80	120	NA		

Ammonia by SFA

Method: SM 4500 I 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)	SKA0052-JAN26	as N mg/L	0.1	<0.1	ND	10	97	90	110	99	75	125

QC SUMMARY

Anions by discrete analyzer

Method: US EPA 325.2 | Internal ref.: ME-CA-[ENVIEWL-LAK-AN-026

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
Chloride	DIO8005-JAN26	mg/L	1	<1	2	20	94	70	130	94	70	130
Nitrite (as N)	DIO8005-JAN26	mg/L	0.03	< 0.03	1	20	100	80	120	102	75	125
Sulphate	DIO8005-JAN26	mg/L	2	<2	2	20	106	80	120	101	75	125

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENVIIC-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
Bromide	DIO0245-JAN26	mg/L	0.3	<0.3	ND	20	103	90	110	100	75	125

QC SUMMARY

Biochemical Oxygen Demand

Method: SM 5210 I Internal ref.: ME-CA-IENVIEWL-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
Biochemical Oxygen Demand (BOD5)	BOD0016-JAN26	mg/L	2	< 2	5	30	102	70	130	103	70	130

Carbon by SFA

Method: SM 5310 I Internal ref.: ME-CA-IENVISFA-LAK-AN-009

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
Total Organic Carbon	SKA0055-JAN26	mg/L	1	<1	1	20	100	90	110	96	75	125

QC SUMMARY

Carbonate/Bicarbonate

Method: SM 2320 | 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
Carbonate	EWL0109-JAN26	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0109-JAN26	mg/L as CaCO3	2	< 2	4	10	NA	90	110	NA		
OH	EWL0109-JAN26	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		

Colour

Method: SM 2120 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-002

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
Colour	EWL0151-JAN26	TCU	3	< 3	ND	10	110	80	120	NA		

QC SUMMARY

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-IENVIEWL-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
Conductivity	EWL0109-JAN26	uS/cm	2	3	1	10	99	90	110	NA		

Cyanide by SFA

Method: SM 4500 I Internal ref.: ME-CA-IENVISFA-LAK-AN-005

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
Cyanide (total)	SKA0056-JAN26	mg/L	0.01	<0.01	ND	10	95	90	110	91	75	125

Fluoride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-IENVIEWL-LAK-AN-014

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
Fluoride	EWL0123-JAN26	mg/L	0.06	<0.06	ND	10	95	90	110	104	75	125

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-[ENVISPE-LAK-AN-004

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
Mercury (total)	EHG0016-JAN26	mg/L	0.00001	< 0.00001	ND	20	118	80	120	111	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-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
Silver (total)	EMS0093-JAN26	mg/L	0.00005	<0.00005	ND	20	104	90	110	NV	70	130
Aluminum (total)	EMS0093-JAN26	mg/L	0.001	<0.001	7	20	100	90	110	130	70	130
Aluminum (0.2µm)	EMS0093-JAN26	mg/L	0.001	<0.001	7	20	100	90	110	130	70	130
Arsenic (total)	EMS0093-JAN26	mg/L	0.0002	<0.0002	ND	20	106	90	110	102	70	130
Barium (total)	EMS0093-JAN26	mg/L	0.00008	<0.00008	3	20	102	90	110	99	70	130
Beryllium (total)	EMS0093-JAN26	mg/L	0.000007	<0.000007	ND	20	103	90	110	99	70	130
Boron (total)	EMS0093-JAN26	mg/L	0.002	<0.002	9	20	100	90	110	89	70	130
Calcium (total)	EMS0093-JAN26	mg/L	0.01	<0.01	5	20	101	90	110	98	70	130
Cadmium (total)	EMS0093-JAN26	mg/L	0.000003	<0.000003	0	20	103	90	110	99	70	130
Cobalt (total)	EMS0093-JAN26	mg/L	0.000004	<0.000004	ND	20	103	90	110	99	70	130
Chromium (total)	EMS0093-JAN26	mg/L	0.00008	<0.00008	10	20	104	90	110	103	70	130
Copper (total)	EMS0093-JAN26	mg/L	0.001	<0.001	5	20	105	90	110	102	70	130
Iron (total)	EMS0093-JAN26	mg/L	0.007	<0.007	ND	20	99	90	110	100	70	130
Potassium (total)	EMS0093-JAN26	mg/L	0.009	<0.009	4	20	97	90	110	102	70	130
Magnesium (total)	EMS0093-JAN26	mg/L	0.001	<0.001	6	20	100	90	110	98	70	130
Manganese (total)	EMS0093-JAN26	mg/L	0.00001	<0.00001	8	20	102	90	110	100	70	130
Molybdenum (total)	EMS0093-JAN26	mg/L	0.0004	<0.0004	10	20	103	90	110	102	70	130
Sodium (total)	EMS0093-JAN26	mg/L	0.01	<0.01	5	20	101	90	110	99	70	130
Nickel (total)	EMS0093-JAN26	mg/L	0.0001	<0.0001	6	20	102	90	110	98	70	130
Lead (total)	EMS0093-JAN26	mg/L	0.00009	<0.00009	4	20	102	90	110	101	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-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
Phosphorus (total)	EMS0093-JAN26	mg/L	0.003	<0.003	ND	20	98	90	110	NV	70	130
Antimony (total)	EMS0093-JAN26	mg/L	0.0009	<0.0005	ND	20	99	90	110	109	70	130
Selenium (total)	EMS0093-JAN26	mg/L	0.00004	<0.00004	11	20	101	90	110	98	70	130
Silicon (total)	EMS0093-JAN26	mg/L	0.02	<0.02	11	20	98	90	110	NV	70	130
Tin (total)	EMS0093-JAN26	mg/L	0.00006	<0.00006	ND	20	98	90	110	NV	70	130
Strontium (total)	EMS0093-JAN26	mg/L	0.00008	<0.00008	0	20	104	90	110	99	70	130
Titanium (total)	EMS0093-JAN26	mg/L	0.0001	<0.0001	ND	20	94	90	110	NV	70	130
Thallium (total)	EMS0093-JAN26	mg/L	0.000005	<0.000005	1	20	101	90	110	98	70	130
Uranium (total)	EMS0093-JAN26	mg/L	0.000002	<0.000002	ND	20	103	90	110	100	70	130
Vanadium (total)	EMS0093-JAN26	mg/L	0.00001	<0.00001	14	20	102	90	110	100	70	130
Zinc (total)	EMS0093-JAN26	mg/L	0.002	<0.002	3	20	101	90	110	105	70	130

QC SUMMARY

Nonylphenol and Ethoxylates

Method: ASTM D7065-06 | Internal ref.: ME-CA-IENVIGC-LAK-AN-015

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
Nonylphenol diethoxylate	GCM0077-JAN26	mg/L	0.01	<0.01			90	55	120			
Nonylphenol monoethoxylate	GCM0077-JAN26	mg/L	0.01	<0.01			87	55	120			
Nonylphenol	GCM0077-JAN26	mg/L	0.001	<0.001			83	55	120			

Oil & Grease

Method: MOE E3401 | Internal ref.: ME-CA-IENVIGC-LAK-AN-019

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
Oil & Grease (total)	GCM0081-JAN26	mg/L	2	<2	NSS	20	103	75	125			

QC SUMMARY

Oil & Grease-AV/MS

Method: MOE E3401/SM 5520F | Internal ref.: ME-CA-[ENV]GC-LAK-AN-019

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
Oil & Grease (animal/vegetable)	GCM0081-JAN26	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0081-JAN26	mg/L	4	< 4	NSS	20	NA	70	130			

pH

Method: SM 4500 | 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	EWL0109-JAN26	No unit	0.05	NA	0		100			NA		

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENV]SFA-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
4AAP-Phenolics	SKA0053-JAN26	mg/L	0.001	<0.001	ND	10	99	80	120	109	75	125

QC SUMMARY

Polychlorinated Biphenyls

Method: MOE E3400/EPA 8082A | Internal ref.: ME-CA-IENVIGC-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
Polychlorinated Biphenyls (PCBs) - Total	GCM0080-JAN26	mg/L	0.0001	<0.0001	NSS	30	106	60	140	NSS	60	140

Reactive Phosphorus by SFA

Method: SM 4500-P F | Internal ref.: ME-CA-IENVISFA-LAK-AN-004

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
Total Reactive Phosphorous (o-phosphate as P)	SKA0059-JAN26	mg/L	0.03	<0.03	ND	10	97	90	110	105	75	125

QC SUMMARY

Semi-Volatile Organics

Method: EPA 3510C/8270D | Internal ref.: ME-CA-[ENV]GC-LAK-AN-005

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
Bis(2-ethylhexyl)phthalate	GCM0078-JAN26	mg/L	0.002	< 0.002	NSS	30	107	50	140	NSS	50	140
di-n-Butyl Phthalate	GCM0078-JAN26	mg/L	0.002	< 0.002	NSS	30	103	50	140	NSS	50	140

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-004

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
Total Suspended Solids	EWL0150-JAN26	mg/L	2	< 2	3	10	100	90	110	NA		

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-002

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
Total Kjeldahl Nitrogen	SKA0054-JAN26	as N mg/L	0.5	<0.5	3	10	102	90	110	100	75	125

QC SUMMARY

Turbidity

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-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
Turbidity	EWL0114-JAN26	NTU	0.10	< 0.10	0	10	103	90	110	NA		

QC SUMMARY

Volatile Organics

Method: EPA 5030B/8260C | Internal ref.: ME-CA-[ENV]GC-LAK-AN-004

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
1,1,2,2-Tetrachloroethane	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	102	60	130	104	50	140
1,2-Dichlorobenzene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	103	60	130	104	50	140
1,4-Dichlorobenzene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	105	60	130	102	50	140
Benzene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	105	60	130	102	50	140
Chloroform	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	102	60	130	103	50	140
cis-1,2-Dichloroethylene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	102	60	130	102	50	140
Ethylbenzene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	106	60	130	104	50	140
m-p-xylene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	107	60	130	105	50	140
Methyl ethyl ketone	GCM0089-JAN26	mg/L	0.02	<0.02	ND	30	103	50	140	111	50	140
Methylene Chloride	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	90	60	130	91	50	140
o-xylene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	106	60	130	104	50	140
Styrene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	106	60	130	109	50	140
Tetrachloroethylene (perchloroethylene)	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	105	60	130	103	50	140
Toluene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	104	60	130	103	50	140
trans-1,3-Dichloropropene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	104	60	130	97	50	140
Trichloroethylene	GCM0089-JAN26	mg/L	0.0005	<0.0005	ND	30	99	60	130	102	50	140

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.

Test method information available upon request.

"Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

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

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

No: 046407

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

Page _____ of _____

Laboratory Information Section - Lab use only

Received By: Katie Larocque
Received Date: 01/07/26 (mm/dd/yy)
Received Time: 14 : 00 (hr : min)
Received By (signature):
Custody Seal Present: Yes ☑ No ☐
Custody Seal Intact: Yes ☑ No ☐
Cooling Agent Present: Yes ☑ No ☐ Type: ICE
Temperature Upon Receipt (°C) 9.9.9
CA 40015-Jan 26.
LAB LIMS #:

REPORT INFORMATION

Company: Soil Engineers Ltd
Contact: Yogirajsinh rana
Address: 40 West Beaver Creek Richmond Hill / L4B1E7
Phone:
Fax: 416-754-8515
Email: Yogirajsinh.rana@soilengineersLtd.com

INVOICE INFORMATION

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

Quotation #:
P.O. #:
Project #: 2103-W118
Site Location/ID: 12749 Tenthline Stouffville.

TURNAROUND TIME (TAT) REQUIRED

☐ Client Regular TAT ☑ 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: ☐ Coarse
☐ Table 2 ☐ Ind/Com ☐ Medium/Fine
☐ Table 3 ☐ Agri/Other
☐ 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: Region of York

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	M&I: Metals & Inorganics (incl CrVI, CN, Hg pH,(BI(HWS),EC,SAR-soil) (Cl, Nawater)	M&I: Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI	M&I: ICP Metals only Sb,As,Ba,Be,B,Cd, Cr,Co,Cu,Pb,Mo,Ni,Se,Ag,Tl,U,V,Zn	SVOC: PAHs only	SVOC: SVOCs all incl PAHs, ABNs, CPs	PCB: PCBs Total ☐ Aroclor ☐	PHC: F1-F4 + BTEX	PHC: F1-F4 only no BTEX	VOC: VOCs all incl BTEX	VOC: BTEX only	Pest: Pesticides Organochlorine or specify other	Other (please specify)	Other	Other: Sewer Use: Specify pkg: Region of York Storm	Other: Water Characterization Pkg General ☐ Extended ☐	SPLP: Specify tests	TCLP: Specify tests	COMMENTS:
1	BHMW 1	01/07/2026	12:00	25	GW	N												√ Gen chem Package compared to PWQO		√	√	☐Metals ☐VOC ☐1,4-Dioxane ☐OCP ☐ABN	☐M&I ☐VOC ☐PCB ☐B(a)P ☐ABN ☐Ignit.	
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11																								
12																								

Observations/Comments/Special Instructions

Sampled By (NAME): S. Atena Monsavi	Signature: S.A.M	Date: 01/07/2026 (mm/dd/yy)	Pink Copy - Client
Relinquished by (NAME): Atena Monsavi	Signature: S.A.M	Date: 01/07/2026 (mm/dd/yy)	Yellow & White Copy - SGS

Revision #: 1.8
Date of Issue: 06 SEP 2024

Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 684-4242	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 684-8522	FAX: (905) 542-2769

Appendix F

SHORT-TERM DEWATERING FLOW RATE ESTIMATES AND REVIEWED PLANS

REFERENCE NO. 2103-W118

Key Plan Subject Property

ACORN SOUTH - Conceptual Demonstration Plan

ESTIMATED UNIT COUNT	18360 - 128cp	February 12, 2026
4.5m On-Street Towns	8%	12
4.5m Rear Lane Towns	21%	33
6.4m Back-to-Back Towns	48%	76
5.6m Stacked Towns	23%	36
Total	**100%**	**157 units**

- Back-to-Back Townhouses
- Rear Lane Townhouses
- On-Street Townhouses
- Stacked Townhouses
- School
- Environmental Lands
- Open Space
- Stormwater Management Pond
- Future Development
- PMTSA Boundary (2.19 ha within PMTSA Boundary)

BOUSFIELDS INC.

3 Church Street, Suite 200, Toronto, Ontario M5E 1M2
P (416) 947-9744 | F (416) 947-0781 | E bousfields@bousfields.ca

DEWATERING CALCULATION FOR UNDERGROUND SERVICES INSTALLATION

Dewatering Rate Formula for an Unconfined Aquifer (Powers et al., 2007):

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

Where:

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
H = Initial Hight of static groundwater level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
r_s = Distance to the wellpoints from the centre of the trench (m), assumed to be half of the trench width
x = Trench Length (m)
L = Distance from a line source to the trench, R_o (m)/2

Radius of Influence Formula (Sichardt Equation):

$$R_0 = 3000 * D * K^{0.5}$$

Where:

R_0 = Radius of Influence (m), beyond which there is negligible drawdown
D = Distance from the initial static water level to the dewatering target
K = Hydraulic conductivity (m/s)

Parameter	Units	BH/MW 1
Total Anticipated Short-Term Dewatering Flow including Storm Event and Groundwater Seepage with Safety Factor:	L/day	**29,650.0**
Anticipated Storm Flow:		
Anticipated Storm Flow (2Year-3Hr event)	L/day	3,100.0
Storm Event (2Year-3Hr event)	m	0.03098
Groundwater Seepage Estimate:		
Q s.f. 1.5	L/day	26,550.0
Q	L/day	17,700.0
Q	m^3/day	17.6
K	m/day	0.0492
H	m	5.3
h	m	2.0
R_0	m	7.4
Trench width (b)	m	2.0
r_s	m	1.0
x (a)	m	50.0
L	m	3.7
	a/b	25.0
Conceptual Zone of Influence:		
R_0	m	7.4
D	m	3.3
K	m/s	5.70E-07
Empirical constant (conservative)		3000
Assumptions:		
Assumed Grading Elevation	masl	291.8
Highest Interpreted Groundwater Elevation	masl	290.1
Proposed Invert Elevation for the Excavation	masl	287.8
Trench Width	m	2.0
Trench Length	m	50.0
Area	m^2	100.0
Perimeter	m	104.0

CONSTRUCTION DEWATERING CALCULATION FOR TOWNHOUSE BLOCKS

Dewatering Rate Formula for an Unconfined Aquifer (Powers et al., 2007):

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

Where:

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
H = Initial Hight of static groundwater level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
r_s = Distance to the wellpoints from the centre of the trench (m), assumed to be half of the trench width
x = Trench Length (m)
L = Distance from a line source to the trench, R_o (m)/2

Radius of Influence Formula (Sichardt Equation):

$$R_0 = 3000 * D * K^{0.5}$$

Where:

R_0 = Radius of Influence (m), beyond which there is negligible drawdown
D = Distance from the initial static water level to the dewatering target
K = Hydraulic conductivity (m/s)

Parameter	Units	BH/MW 1 Stacked TH	BH/MW 1 B2B TH	BH/MW 1 RLTH
Total Anticipated Short-Term Dewatering Flow including Storm Event and Groundwater Seepage with Safety Factor:	L/day	**33,200.0**	**29,650.0**	**16,200.0**
Anticipated Storm Flow:				
Anticipated Storm Flow (2Year-3Hr event)	L/day	24,200.0	21,400.0	13,200.0
Storm Event (2Year-3Hr event)	m	0.03098	0.03098	0.03098
Groundwater Seepage Estimate:				
Q s.f. 1.5	L/day	9,000.0	8,250.0	3,000.0
Q	L/day	6,000.0	5,500.0	2,000.0
Q	m^3/day	5.9	5.4	2.0
K	m/day	0.0492	0.0492	0.0492
H	m	3.8	3.8	3.8
h	m	1.5	1.5	1.5
R_0	m	5.1	5.1	5.1
Trench width (b)	m	20.9	18.2	16.5
r_s	m	10.4	9.1	8.3
x (a)	m	37.3	37.8	25.7
L	m	2.6	2.6	2.6
	a/b	1.8	2.1	1.6
Conceptual Zone of Influence:				
R_0	m	5.1	5.1	5.1
D	m	2.3	2.3	2.3
K	m/s	5.70E-07	5.70E-07	5.70E-07
Empirical constant (conservative)		3000	3000	3000
Assumptions:				
Proposed Grading Elevation	masl	291.8	291.8	291.8
Highest Interpreted Groundwater Elevation	masl	290.1	290.1	290.1
Proposed Invert Elevation for the Excavation	masl	288.8	288.8	288.8
Trench Width	m	20.9	18.2	16.5
Trench Length	m	37.3	37.8	25.7
Area	m^2	778.0	689.2	424.4
Perimeter	m	116.3	112.1	84.4

LONG-TERM FOUNDATION DRAINAGE CALCULATION FOR TOWNHOUSE BLOCK

Dewatering Rate Formula for an Unconfined Aquifer (Powers et al., 2007):

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

Where:

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
H = Initial Hight of static groundwater level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
r_s = Distance to the wellpoints from the centre of the trench (m), assumed to be half of the trench width
x = Trench Length (m)
L = Distance from a line source to the trench, R_o (m)/2

Radius of Influence Formula (Sichardt Equation):

$$R_0 = 3000 * D * K^{0.5}$$

Where:

R_0 = Radius of Influence (m), beyond which there is negligible drawdown
D = Distance from the initial static water level to the dewatering target
K = Hydraulic conductivity (m/s)

Parameter	Units	BH/MW 1 Stacked TH	BH/MW 1 B2B TH	BH/MW 1 RLTH
Total Anticipated Long- Term Foundation Drainage Flow including Infiltration and Groundwater Seepage with Safety Factor:	L/day	4,200.0	4,200.0	3,050.0
Anticipated Infiltration:				
Anticipated Storm Flow (2Year-3Hr event)	L/day	1,800.0	1,800.0	1,400.0
Storm Event (2Year-3Hr event)	m	0.0309	0.0309	0.0309
Groundwater Seepage Estimate:				
Q s.f. 1.5	L/day	2,400.0	2,400.0	1,650.0
Q	L/day	1,600.0	1,600.0	1,100.0
Q	m^3/day	1.5	1.6	1.1
K	m/day	0.0025	0.0025	0.0025
H	m	2.8	2.8	2.8
h	m	1.5	1.5	1.5
R_0	m	0.6	0.6	0.6
Trench width (b)	m	20.9	18.2	16.5
r_s	m	10.4	9.1	8.3
x (a)	m	37.3	37.8	25.7
L	m	0.3	0.3	0.3
	a/b	1.8	2.1	1.6
Conceptual Zone of Influence:				
R_0	m	0.6	0.6	0.6
D	m	1.3	1.3	1.3
K	m/s	2.85E-08	2.85E-08	2.85E-08
Empirical constant (conservative)		3000	3000	3000
Assumptions:				
Proposed Grading Elevation	masl	291.8	291.8	291.8
Highest Interpreted Groundwater Elevation	masl	290.1	290.1	290.1
Proposed Invert Elevation for the Excavation	masl	288.8	288.8	288.8
Trench Width	m	20.9	18.2	16.5
Trench Length	m	37.3	37.8	25.7
Area	m^2	778.0	689.2	424.4
Perimeter	m	116.3	112.1	84.4

DEWATERING CALCULATION FOR STORM WATER MANAGEMENT POND

Dewatering Rate Formula for an Unconfined Aquifer (Powers et al., 2007):

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

Where:

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
H = Initial Hight of static groundwater level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
r_s = Distance to the wellpoints from the centre of the trench (m), assumed to be half of the trench width
x = Trench Length (m)
L = Distance from a line source to the trench, R_o (m)/2

Radius of Influence Formula (Sichardt Equation):

$$R_0 = 3000 * D * K^{0.5}$$

Where:

R_0 = Radius of Influence (m), beyond which there is negligible drawdown
D = Distance from the initial static water level to the dewatering target
K = Hydraulic conductivity (m/s)

Parameter	Units	SWMP BH/MW 11
Total Anticipated Short-Term Dewatering Flow including Storm Event and Groundwater Seepage with Safety Factor:	L/day	**258,700.0**
Anticipated Storm Flow:		
Anticipated Storm Flow (2Year-3Hr event)	L/day	183,100.0
Storm Event (2Year-3Hr event)	m	0.03098
Groundwater Seepage Estimate:		
Q s.f. 2	L/day	75,600.0
Q	L/day	37,800.0
Q	m^3/day	37.7
K	m/day	0.2160
H	m	5.4
h	m	2.0
R_0	m	16.2
Trench width (b)	m	62.2
r_s	m	31.1
x (a)	m	95.0
L	m	8.1
	a/b	1.5
Conceptual Zone of Influence:		
R_0	m	16.2
D	m	3.4
K	m/s	2.50E-06
Empirical constant (conservative)		3000
Assumptions:		
Assumed Grading Elevation	masl	289.8
Highest Interpreted Groundwater Elevation	masl	287.4
Proposed Invert Elevation for the Excavation	masl	285.0
Trench Width	m	62.2
Trench Length	m	95.0
Area	m^2	5,909.0
Perimeter	m	314.4

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Appendix G

Pre- and Post-Development Water Balance Assessment

REFERENCE NO. 2103-W118

Pre- and Post-Development Water Balance

12749 Tenth Line, Whitchurch-Stouffville

Water Balance Components (Using TRSPA Tool)

Component	Initial Value mm/yr	Modified Value mm/yr	m/yr
Precipitation	867	867	0.867
Runoff	164	131	0.131
Recharge	317	254	0.254
Evapotranspiration	602	482	0.482

Subject Site Subsurface Conditions

Surface Soil — Topsoil, Earth fill and Glacial Till

Subject Site Breakdown Area (m^2)

A: Pre-Development	
Existing Impervious Area	0.00
Existing Pervious Area (Green Area)	102,800.00
Total	102,800.00
B: Post-Development	
Proposed Impervious Area (Stacked Townhouse-SKTH)	3,861.00
Proposed Impervious Area (Onstreet Townouse - OSTH)	1,305.00
Proposed Impervious Area (Rear Lot Townhouse-RLTH)	4,185.00
Proposed Impervious Area (Back to Back Townhouse-B2)	8,082.00
Proposed Impervious Area (8.5 m Lane Way)	6,710.00
Proposed Impervious Area (School Block)	17,352.00
Proposed Impervious Area (20 m ROW)	5,557.30
Proposed Impervious Area (SWM Block)	5,905.00
Proposed Pervious Area (Stacked Townhouse-SKTH)	429.00
Proposed Pervious Area (Onstreet Townouse - OSTH)	435.00
Proposed Pervious Area (Rear Lot Townhouse-RLTH)	465.00
Proposed Pervious Area (Back to Back Townhouse-B2)	898.00
Proposed Pervious Area (School Block)	4,338.00
Proposed Pervious Area (20 m ROW)	3,782.70
Proposed Pervious Area (SWM Block)	5,905.00
Proposed Pervious Area (Open Space / Environmental Area/ Future Development)	33,590.00
Total	102,800.00

Source: https://trca.ca/conservation/drinking-water-source-protection/trspa-water-balance-tool/

Impervious Factors

ET-Impervious (10%)	0.1
Runoff-Impervious (90%)	0.9

Subject Site Pre- and Post-Development Water Balance Estimates

Pre-Development Water Balance

Breakdown	Area (m^2)	Precipitation (m^3/yr)	Evapotranspiration (m^3/yr)	Infiltration (m^3/yr)	Runoff (m^3/yr)
Existing Impervious Area	0.00	0.00	0.00	0.00	0.00
Existing Pervious Area (Green Area)	102,800.00	89,127.600	49,549.60	26,111.20	13,466.80
Total	**102,800.00**	**89,127.60**	**49,549.60**	**26,111.20**	**13,466.80**

Post-Development Water Balance

Breakdown	Area (m^2)	Precipitation (m^3/yr)	Evapotranspiration (m^3/yr)	Infiltration (m^3/yr)	Runoff (m^3/yr)
Proposed Impervious Area (Stacked Townhouse-SKTH)	3,861.00	3,347.49	334.75	0.00	3,012.74
Proposed Impervious Area (Onstreet Townouse - OSTH)	1,305.00	1,131.44	113.15	0.00	1,018.29
Proposed Impervious Area (Rear Lot Townhouse-RLTH)	4,185.00	3,628.40	362.84	0.00	3,265.56
Proposed Impervious Area (Back to Back Townhouse-B2)	8,082.00	7,007.09	700.71	0.00	6,306.38
Proposed Impervious Area (8.5 m Lane Way)	6,710.00	5,817.57	581.76	0.00	5,235.81
Proposed Impervious Area (School Block)	17,352.00	15,044.18	1,504.41	0.00	13,539.77
Proposed Impervious Area (20 m ROW)	5,557.30	4,818.18	481.82	0.00	4,336.36
Proposed Impervious Area (SWM Block)	5,905.00	5,119.63	511.96	0.00	4,607.67
Proposed Pervious Area (Stacked Townhouse-SKTH)	429.00	371.94	206.77	108.97	56.20
Proposed Pervious Area (Onstreet Townouse - OSTH)	435.00	377.15	209.67	110.49	56.99
Proposed Pervious Area (Rear Lot Townhouse-RLTH)	465.00	403.16	224.13	118.11	60.92
Proposed Pervious Area (Back to Back Townhouse-B2)	898.00	778.57	432.84	228.09	117.64
Proposed Pervious Area (School Block)	4,338.00	3,761.04	2,090.92	1,101.85	568.27
Proposed Pervious Area (20 m ROW)	3,782.70	3,279.60	1,823.26	960.81	495.53
Proposed Pervious Area (SWM Block)	5,905.00	5,119.63	2,846.21	1,499.87	773.55
Proposed Pervious Area (Open Space / Environmental Area/ Future Development)	33,590.00	29,122.53	16,190.38	8,531.86	4,400.29
Total	**102,800.00**	**89,127.60**	**28,615.58**	**12,660.05**	**47,851.97**

Subject Site Pre- and Post-Development Water Balance Gain/Loss

Gain/Loss (m^3/yr)	Precipitation (m^3/yr)	Evapotranspiration (m^3/yr)	Infiltration (m^3/yr)	Runoff (m^3/yr)
Pre-Development	89,127.60	49,549.60	26,111.20	13,466.80
Post-Development	89,127.60	28,615.58	12,660.05	47,851.97
Gain/Loss (-)		-20,934.02	-13,451.15	34,385.17
Gain/Loss (%)	-	42 ↓	52 ↓	255 ↑

Subject Site Pre- and Post-Development Water Balance Components Gain/Loss

Gain/Loss (mm/yr)	Precipitation (mm/yr)	Evapotranspiration (mm/yr)	Infiltration (mm/yr)	Runoff (mm/yr)
Pre-Development	867.00	482.00	254.00	131.00
Post-Development	867.00	278.36	123.15	465.49
Gain/Loss (-)	-	-203.64	-130.85	334.49
Gain/Loss (%)	-	42 ↓	52 ↓	255 ↑