Interim Hydrogeological Assessment

Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario

Infrastructure Ontario

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1. Introduction

GHD has been retained by Infrastructure Ontario (IO) to complete a hydrogeological assessment in support of a Site Plan Approval for the proposed MECP-MLITSD Science Facility Complex. The development is proposed to be a four-storey, slab-on-grade building on a 3.04-hectare (7.5 acres) parcel of land located north of William Halton Parkway, west of ErinoakKids Centre for Treatment and Development in Oakville, Ontario. The Site location is presented on **Figure 1.1**. The development is to be constructed on the eastern portion (Eastern Lot, 3.04 hectare (ha)) of the provincially owned Oakville Land Assembly (OLA) (7.07 ha) located north of William Halton Parkway in Oakville, Ontario (Site). GHD has previously completed investigations in 2018 on the Site and on the adjacent properties to the west and north of the Site. A Site plan is presented on **Figure 1.2.**

The hydrogeological investigation was carried out in accordance with the approved GHD work plan dated May 16, 2025. The purpose of the hydrogeological investigation was to characterize the current geological and hydrogeological conditions throughout the Sites and surrounding areas, including:

1. Characterize the geological and hydrogeological conditions.
2. Estimate the requirement for groundwater control during construction.
3. Determine if dewatering during construction is needed, if required, will dewatering require registration on the Environmental Activity and Sector Registry (EASR).
4. Determine the requirement for mitigation measures during dewatering activities.
5. Determine the requirement for long term management of foundation drainage and if a Permit to Take Water (PTTW) will be required for drainage.
6. Evaluate management options for the discharge of groundwater to the municipal sewer system (sanitary or storm).
7. Assess potential impacts to infrastructure, natural environment and land stability resulting from the proposed development.
8. Characterize the impact of the proposed development on groundwater recharge in comparison to existing conditions.

This interim report presents updated data collected during the long-term groundwater monitoring program at the Site.

1.1 Limitations

This report: has been prepared by GHD for Infrastructure Ontario and may only be used and relied on by Infrastructure Ontario for the purpose agreed between GHD and Infrastructure Ontario as set out in section 1.0 of this report.

GHD otherwise disclaims responsibility to any person other than Infrastructure Ontario arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report

2. Background

2.1 Site Description

The Site is currently vacant undeveloped land which has been used for agricultural purposes since at least 1934. GHD understands that the proposed development will consist of a new four-storey building on slab-on-grade. The proposed development comprises of the main MECP-MLITSD Science Facility Complex which includes a laboratory, office support building, shipping/receiving and science garage, expansion area, truck service entrance and approximately 250 parking spaces. It is GHD's understanding that a road easement is also being proposed around the property. **Figure 1.2** shows the outline of the proposed development area.

The Site is bounded by William Halton Parkway to the southwest and the Erinoak Kids Centre for Treatment and development to the northeast. The northwest and southeast portions of the Site are bounded by agricultural land as shown on **Figure 2.1**.

The Site is also located within the jurisdiction of Conservation Halton (CH). Based on CH mapping, the northeast portion of the Site is currently located within the Sixteen Mile Creek sub-watershed, while the remainder of the Site drains southwest to the McCraney Creek sub-watershed. A minor unregulated drainage feature currently bisects the Site. The Site is located approximately 600 m south of Sixteen Mile Creek and 600 m northeast of McCraney Creek. The Site does not sit within any sensitive or vulnerable areas (i.e., Highly Vulnerable Aquifers, Significant Groundwater Recharge Areas, Well Head Protection Areas, etc.) per the Halton-Hamilton Source Protection Region Source Protection Plan[1].

The Site is currently unserviced, but the nearby residential and commercial areas, and adjacent hospital and treatment centre have full municipal services supplied by the Regional Municipality of Halton, which obtains water from Lake Ontario.

2.2 Regional Setting

The Site is located on the South Slope physiographic region (Chapman and Putnam 1984), which is characterized by a thin silty clay till overlying a shale plain. The principal physiographic landform in the area of the Site is characterized as a till plain (**Figure 2.2**). The topography is generally flat on the shale plain, with a gradual slope to the eastwards toward Lake Ontario, and locally to the east towards Sixteen Mile Creek (**Figure 2.3**) which flows to Lake Ontario. The Site is slightly sloped to the east with a high at BH25-21 (162.29 mAMSL) to a low at MW25-18 (158.93 mAMSL). The average elevation at the Site is approximately 160.5 metres above mean sea level (mAMSL).

Regional surficial geology mapping of the area indicates that the Site and surrounding lands are underlain by clay to silt textured till derived from glaciolacustrine deposits or shale (**Figure 2.4**).

The surficial geology and general stratigraphic framework for the Site and surrounding area consists of the following deposits:

– Surficial Soil – Topsoil and Fill
– Halton Till – Silty to clayey till
– Queenston Formation (bedrock) – weathered shale

The location of water wells recorded by the MECP[2] within 500 m of the Site is shown on **Figure 2.5**, and a summary of the records is presented in **Appendix H**. Based on review of the well records[3], all recent records are for monitoring wells, or test holes.

1 Halton-Hamilton Source Protection Region, 2022. Halton-Hamilton Region Source Protection Plan, version 4.1.
2 Ministry of Environment, Conservation & Parks.
3 Water Well Information System, Ontario Ministry of the Environment, Conservation & Parks.

3. Methodology

This hydrogeological assessment was completed subsequent to a geotechnical investigation undertaken by GHD in 2025[4]. Borehole logs generated during the geotechnical investigation were used to support the hydrogeological assessment.

The hydrogeological assessment activities are described in the sections below.

The investigative locations are shown on **Figure 3.1**. The details of the investigations completed by GHD are summarized in the following sections, and a detailed description of the field investigation methodology and protocols are provided in **Appendix A**.

3.1 Borehole Advancement and Monitoring Well Installations

As indicated previously, boreholes were advanced, and monitoring wells were installed during a geotechnical investigation undertaken by GHD. The drilling program for this hydrogeological/geotechnical investigation was completed between June 18 and June 27, 2025. The geotechnical investigation consisted of advancing a total of twenty-three (23) boreholes to depths ranging between 2.4 m and 6.4 m. For long term ground water monitoring, monitoring wells were installed in five selected borehole locations (MW25-07, MW25-08, MW25-11, MW25-14, MW25-18). Stratigraphic and Instrumentation Logs for these are presented in **Appendix B**.

The boreholes were drilled using a CME055 track mounted drill rig supplied and operated by drilling subcontractor 3D Drillers Inc of Stouffville, Ontario. The boreholes and monitoring well installations were completed under the full-time supervision of a GHD technical representative.

The boreholes were advanced through overburden using hollow stem augers (108 mm inside diameter). Representative, disturbed soil samples were obtained at 0.75 m intervals of depth using a 50 mm outer-diameter (O.D.) split-spoon sampler advanced by a 63.5 kg automatic hammer dropping approximately 760 mm in accordance with Standard Penetration Test (SPT) procedures described in ASTM D D1586[5].

The GHD technical representative logged the material encountered in the boreholes and examined the samples as they were obtained. The recovered soil samples were sealed in clean, airtight containers, and transferred to GHD's laboratories in Mississauga, and Waterloo.

Rock coring was performed on three (3) boreholes (MW25-07, MW25-11, and MW25-18), rock core samples were collected from each borehole until the desired RQD value was obtained. The rock cores were placed in core boxes, visually examined and logged after coring and transported to GHD laboratory in Waterloo where they were reviewed by GHD staff members

The monitoring wells consisted of a 50 mm diameter PVC pipe with a slotted screen sealed at select depths within the borehole. The borehole annulus surrounding the piezometer screen was backfilled with sand and the remainder of the borehole was then backfilled with bentonite to or to near the ground surface. Excess soil cuttings were collected in drums, temporarily stored on-site, and subsequently disposed of off-site.

The monitoring well locations are presented on **Figure 3.1,** and the well completion details for the monitoring wells are provided in **Table 3.1**. Copies of the Stratigraphic and Instrumentation logs for the monitoring wells are provided in **Appendix B.**

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[4] Geotechnical Investigation Report, Willian Halton Parkway, Oakville, Ontario MECP-MLITSD Science Facility Complex. Prepared by GHD for Infrastructure Ontario. August 11, 2025.

[5] ASTM D1586-18 - Standard Test Method for Standard Penetration Test and Split-Barrel Samplings of the soil, ASTM International, West Conshohocken, PA 2015

Grain size analyses, consisting of sieve and hydrometer testing, were carried out on selected samples collected from the drilled boreholes. The results of these tests are summarized in **Table 3.2**, and the grain size distribution test results are presented in **Appendix C**.

The monitoring wells were developed after installation to repair the formation damage as a result of the drilling action and to restore the natural hydraulic properties of the formation. A Waterra® check valve and new dedicated polyethylene tubing were used to develop the wells. The well development results in the surging and agitation of the water column to remove fine materials in the well pack and surrounding geologic formation to achieve a relatively silt free condition prior to sampling. Development activities involved the removal of approximately five to ten well volumes using an inertial pump, depending on the groundwater availability and the recharge characteristics of each groundwater monitoring well. Well volumes were determined by measuring the depth of water between the static groundwater level and the bottom of the well. The development method is described in further detail in **Appendix A**.

3.2 Single Well Response Testing

In-situ hydraulic response testing, referred to as single-well response tests (SWRT), were completed at all monitoring wells with sufficient volume (MW25-07, MW25-11, MW25-18), to estimate the horizontal hydraulic conductivity of the water bearing deposits.

Single-well response tests involve the near-instantaneous displacement of the water column by inserting or removing a known volume ("slug"). The slug may consist of a section of weighted solid pipe or the rapid injection or removal of a known volume of water into/out of the monitoring well. The water level response in the well is measured until the water level returns to static conditions. Two test types are recognized, falling head where the water column is displaced upwards and falls to the original static level, and rising head where the water level is displaced downwards, and rises to the original static level. Details of the SWRT methodology are presented in **Appendix A.**

The results of the hydraulic testing were reviewed and analyzed while considered representative of the screened formation using the Bouwer and Rice (1976)[6] aquifer test solution for unconfined conditions using the software AQTESOLV™. These solutions were used to determine the horizontal hydraulic conductivity of the geologic deposits within the immediate vicinity of the screened interval of each monitoring well. The AQTESOLV™ analysis reports are presented in **Appendix D** and are summarized in **Table 3.3.**

3.3 Infiltration Testing

To facilitate infiltration testing, three test holes were manually augured from June 26 to June 27, 2025, (GP-1 to GP-3). GHD completed infiltration testing following test hole advancement. A constant-head test was completed in the test hole using a Guelph Permeameter.

The Guelph Permeameter (GP) method provides information on soil infiltration capacity that is useful in assessing stormwater management options. It is a well-known constant-head borehole permeameter technique (ASTM, 2010) and is one of the infiltration testing methods recommended by conservation authorities (CVC, 2010).

GP tests are carried out in the vadose zone above the water table, where the soil is unsaturated. The method measures the steady-state flow rate (Q) necessary to maintain a constant depth of water (H) in an uncased test hole. Steady flow produces a small inner saturated zone adjacent to the test hole, encased within a larger outer wetted, but unsaturated volume. Consequently, combined saturated-unsaturated flow occurs. The hydraulic conductivity measured in the vadose zone is referred to as the “field-saturated” hydraulic conductivity (Kfs) and is calculated from Q and H using the analytical solutions provided by the GP manufacturer (Elrick, D.E and Reynolds W.D, 1992b and Soil Moisture Equipment Corp). The analytical solution input parameters include the following:

– Reservoir cross sectional area
– Water height

[6] Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol 12, no. 3, pp. 423-428.

– Borehole radius
– Soil texture
– Steady state rate of water level change

The field data from the GP tests was analyzed using calculation spreadsheets provided by the manufacturer. Reports from these analyses are presented in **Appendix E - Figures 1 through 3**. A summary of the GP tests and the results are presented in Section 4.2, below.

3.4 Groundwater Level Monitoring

Groundwater levels were measured during June 2025, July 2025, October 2025 and January 2026. Groundwater levels were measured with reference to the surveyed top of riser pipe. The depth to water below top of riser pipe was converted to depth below ground surface (mBGS) and these groundwater levels are presented in **Table 3.4**. The groundwater elevations expressed in geodetic elevation (mAMSL) are presented in **Table 3.5.** The manual groundwater elevation data are shown on the hydrograph in **Appendix F**.

3.5 Groundwater Quality

A groundwater sample was collected from monitoring well MW25-11 on July 10, 2025, for laboratory analysis of the parameters listed in the Halton Region and City of Oakville Wastewater By-Law (Sewers), and Provincial Water Quality Objectives (PWQOs).

Prior to sampling, the well was purged using low-flow methods to ensure that the sample collected was representative of groundwater quality. Purging of the well was considered complete when three consistent field measurement readings of pH, conductivity, and temperature had been obtained.

The samples were submitted under chain of custody procedures to ALS, an analytical laboratory in Waterloo, Ontario for chemical analysis. The laboratory certificates of analysis are presented in **Appendix G**. The groundwater analytical results for PWQOs are shown in **Table 3.6** and the Halton and Oakville Sewer By-Law sample is shown in **Table 3.7**. The results from the sampling are discussed in **Section 4.0**.

4. Site Geology and Hydrogeology

The following sections provide a description of the geology and hydrogeology of the Site, based on the results of the investigations completed and on the available background information. Hydrostratigraphic cross-section A-A' oriented in a plan north-south direction, and cross-sections B-B’, C-C’, D-D’ oriented in a plan west to east direction across the Site were prepared based on the data collected. The locations of the profiles are presented on **Figure 3.1,** and the profiles are shown on **Figure 4.1** through **Figure 4.4**, respectively**.**

4.1 Geology

Based on information collected during the installation of the monitoring wells and advancement of boreholes, the following surficial materials and geologic deposits underlie the Site:

– Surficial Materials – Topsoil
– Fill (to a depth of 0.8 to 1.52 mBGS) – Silty Clay, Clay
– Native Clay/Silty Clay (to a depth of 2.1 to 3.8 mBGS) – Clay with Sand, Sandy Clay, Sandy Silty Clay, Clay
– Bedrock – Shale/Weathered Shale.

Surficial Materials – In In all the advanced boreholes with the exception of boreholes BH25-04, MW25-07, MW25-08, MW25-11, and MW25-14 a topsoil layer with a thickness ranging between 152 mm and 254 mm was encountered directly from ground surface.

Fill – Fill material was encountered underlying the topsoil layer or directly from the ground surface. The fill material generally consisted of a clay and/or silty clay (including clay with sand and silty clay with sand) deposit which extended to depths ranging between 0.8 m and 1.52 mBGS (Elevation 161.9 m and 157.4 m). Rootlets and rock fragments were also encountered within the fill materials.

Clay/Silty Clay – In all the advanced boreholes, the fill material was followed by a clay and/or silty clay deposits consisting of clay with sand, sandy clay with gravel, and sandy silty clay with gravel. The clay deposit extended to depths ranging between 2.1 m and 3.8 mBGS (Elevation 158.7 m to 156.5 m).

Bedrock – In all advanced boreholes with the exception of Borehole BH25-12, BH25-19, BH25-20, and BH25-22, bedrock (weathered shale bedrock) was encountered at depths ranging between 2.1 and 3.8 mBGS (Elevation 158.5 m and 156.5 m). The shale bedrock was cored in boreholes (MW25-07, MW25-11, MW25-18) to verify the presence of bedrock and assess the bedrock quality. The boreholes within the completed weathered zones were advanced by auguring and SPT sampling for variable thicknesses, but generally less than 1 m before reaching refusal [3 consecutive spoon refusals (over 50 blows per 0.3 m of penetration)]. It should be noted that elevation and condition of the bedrock were assessed through a limited number of boreholes during the investigation. As such, the top of the bedrock profile cannot be accurately determined.

4.2 Hydrogeology

The hydrogeological field investigations completed for the Site included hydraulic testing and assessment of the hydraulic properties and conditions for the water bearing deposits. SWRTs were completed at all groundwater monitoring wells. A summary of the aquifer hydraulic conductivity results is presented in **Table 3.3**.

The hydrostratigraphic units underlying the Site include:

– Highly weathered bedrock – Based on the results from the SWRTs (**Table 3.3**), the geometric mean of the hydraulic conductivity (K_h) of this deposit is 9.2×10^{-3} cm/s.

Based on the results of the SWRTs completed at the Site, the weathered shale has fracture units that significantly range in conductivity. K values at monitoring wells MW25-11 and MW25-18 range from 1.1×10^{-2} cm/s to 7.8×10^{-2} cm/s, while the K values at MW25-07 range from 8.7×10^{-4} cm/s to 9.2×10^{-4} cm/s. Previous investigations completed by GHD at the Site and just adjacent to the Site estimated the hydraulic conductivity of the bedrock to be 8.5×10^{-5} cm/s[7]. It is likely that the high K unit does not extend across the entire Site.

For the purposes of a preliminary assessment of the hydrogeological conditions at the Site, the geometric mean of the SWRTs completed during the 2025 investigation were used for dewatering calculations. Additional tests can be completed at the Site (pumping tests, packer tests) to estimate the specific yield of the unit if required.

4.2.1 Groundwater Levels Flow

The depth to groundwater measurements are presented in **Table 3.4** and the groundwater elevations are presented in **Table 3.5** and **Appendix F**. Groundwater levels (mBGS) collected on July 10, 2025, are shown on **Figure 4.5**. Groundwater elevations (mAMSL) and groundwater contours for monitoring wells are shown on **Figure 4.6**.

Based on review of groundwater level data collected to date, the shallowest depth to water observed was 0.40 mBGS measured at MW25-07 on June 27, 2025, and the deepest was 3.63 mBGS measured at MW25-11 on October 21, 2025.

[7] GHD, 2019. Updated Hydrogeological Assessment, Halton Region, Consolidated Courthouse Development, William Halton Parkway, Oakville, Ontario

Based on review of the groundwater level data collected to date, The highest groundwater elevation observed was 159.16 mAMSL measured at MW25-07 on June 27, 2025, and the lowest groundwater level observed was 155.51 mAMSL measured at MW25-18 on October 21, 2025.

Based on the groundwater contours presented on **Figure 4.6**, groundwater is interpreted to flow in a predominantly eastward direction.

4.2.2 Shallow Soil Infiltration

As described previously, GHD completed three infiltration tests in the shallow soils at the Site. It should be noted that the test results represent the soils in place at the time of testing. Infiltration rates are likely to vary if fill is brought to grade the Site. IO may need to complete additional testing following final design of the Site.

Results from the GP testing at GP-1, GP-2 and GP-3, indicated that no infiltration was measured at any of the three locations. The minimum hydraulic conductivity detectable using this the Guelph Permeameter is approximately 10^{-6} cm/s. Results from the infiltration tests completed on Site can be qualified to estimate that the tested soil had a hydraulic conductivity less than 10^{-6} cm/s. These results are not unexpected given the clay soil matrix generally encountered overlying bedrock.

5. Water Taking Evaluation

It is GHD's understanding that the proposed environmental science building will consist of a slab on grade supported on spread and/or strip footings. At the time of writing this report, the foundation schedule including sizes and elevations were not provided to GHD. For the purpose of providing a dewatering estimate, GHD has assumed the depth of excavation based on similar projects completed. It is anticipated that the following estimates will need to be re-evaluated once spring high groundwater levels are determined.

5.1 Construction Site Dewatering (Short-Term)

It is expected that building footings and below grade services such as water and wastewater will require construction excavations to depths of 3 mBGS or less. The construction of footings and utility trenches are anticipated to intersect low permeability deposits and could intersect the water table particularly during seasonal high fluctuations.

5.1.1 Groundwater

Groundwater yields/seepage from the till deposits are expected to be slow and the seepage from the weathered shale deposits are expected to vary by fracture frequency and therefore groundwater control requirements may vary but are anticipated for construction excavations. Groundwater seepage into the excavation can be controlled by conventional construction dewatering techniques such as gravity drainage and pumping from open sumps with filtration.

Some dewatering would be needed to lower the groundwater levels below the base of the trench excavation for utility installation and slab on grade construction to provide safe dry working conditions.

A summary of the relevant depths and corresponding elevations is provided as follows:

Summary of Relevant Construction Dewatering Depths

Utility Excavation	Depth (mBGS)	Elevation (mAMSL)
a) Ground	0.0	160.5
b) Water Table	1.3	159.2
d) Bottom Excavation	3.0	157.5

Utility Excavation	Depth (mBGS)	Elevation (mAMSL)
e) Bottom Dewatering	4.0	156.5
Slab on Grade Excavation	**Depth (mBGS)**	**Elevation (mAMSL)**
a) Ground	0.0	160.5
b) Water Table	1.3	159.2
d) Bottom Excavation	1.5	159.0
e) Bottom Dewatering	2.5	158.0

Note: mBGS - metres below ground surface
mAMSL - metres above mean sea level.

The required water table drawdown is anticipated to be generally about 2.7 m (159.2 mAMSL – 156.5 mAMSL = 2.7 m) and 1.2 m (159.2 mAMSL – 158.0 mAMSL = 1.2 m) within the utility excavations area and the slab on grade excavation area respectively.

The temporary water takings and area of influence during an open cut excavation were estimated using the field test results and the analytical solution for groundwater seepage (unconfined flow) to a trench (CGS, 2013), as presented below.

Equation and Parameters

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

2) $$r_w = \frac{a+b}{\pi}$$

3) $$L = R_O = 3000(\Delta H)\sqrt{K}$$

where:
Q = constant pumping rate (m^3/day)
K = hydraulic conductivity (m/day)
H = height of groundwater pressure (m)
h_w = dewatering height (m)
R_o = radius of influence (m)
r_w = radius of footprint (m)
a = length of excavation (m)
b = width of excavation (m)

The analytical model input parameters are provided in **Appendix I**, and are summarized as follows:

Utility Trench

Q = calculated groundwater seepage rate for an excavation with dimensions 3 m x 15 m
K = 7.95 m/day (9.2 x10^{-3} cm/s)
H = 2.7 m height of water table
h_w = 0 m dewatering height
R_o = 83.4 m
r_w = 5.73 m
a = 15 m (assumed length)
b = 3 m (assumed width)

Note: Height measurements are relative to base of the active groundwater flow system, which is assumed to be 1m below the base of excavation.

The steady state groundwater takings are estimated to be approximately 78,400 L/day (**Appendix I.1**). Water taking at this rate was predicted to result in an area of influence of approximately 83.4 m from the excavation. A safety factor of 3X was then applied to account for the removal of the initial groundwater storage during the early stages of the water taking. Based on this, the maximum water takings are estimated to be up to 235,200 L/day.

Slab on Grade Excavation

$K = 7.95$ m/day (9.2×10^{-3} cm/s)
$H = 1.2$ m height of water table
$h_w = 0$ m dewatering height
$R_o = 103.0$ m
$r_w = 28.3$ m
$a = 145$ m
$b = 70$ m

The steady state groundwater takings were estimated to be approximately 104,180 L/day (**Appendix I.2**). Water taking at this rate was predicted to result in an area of influence of approximately 103.0 m from the excavation. A safety factor of 3X was then applied to account for the removal of the initial groundwater storage during the early stages of the water taking. Based on this, the maximum water takings are estimated to be up to 312,540 L/day.

5.1.2 Precipitation

In addition to groundwater, surface runoff and precipitation may also accumulate in the excavation resulting in additional water takings. The amount of water required to be removed will depend on the size of the excavation, the intensity of the precipitation event, excavation methodology and methods to reduce runoff into the excavation.

The effect of a 'significant' precipitation event is represented by an estimated 25 millimetre (mm) of precipitation (i.e., rain, snow) in a day falling directly into the open excavation. This would account for approximately 1,125 L per day (15 m x 3 m x 0.025 m x 1000 L/m^3 = 1,125 L) for the utility trench and approximately 253,750 L per day (145 m x 70 m x 0.025 m x 1000 l/m^3 = 253,750 L) for the slab on grade excavation. It is anticipated that typical precipitation accumulations will be less than this estimate as storm events of this magnitude (25 mm) are rare. Surface water runoff during storm events is anticipated to be reduced with the use of site grading away from the construction excavations. If the excavation is not properly managed, surface water runoff would also accumulate in the excavation, and would need to be controlled.

5.1.3 Environmental Activity and Sector Registry (EASR)

Construction site dewatering (groundwater) of volumes greater than 50,000 L/day require self-registration on the Ontario Environmental Activity and Sector Registry (EASR). As the maximum estimated construction dewatering rate and the water taking rate at the start of construction would be greater than 50,000 L/d, self-registration will be required.

5.1.4 Summary

The estimated daily construction site dewatering volumes are summarized in the table below.

Summary of Construction Site Dewatering

Scenario – Utility Excavation	Estimated Groundwater Takings (L/d)
Maximum – Dewatering at start of construction with storm event	236,325(1)
Dewatering at start of construction with no storm event	78,400 to 235,200 (1)
Dewatering under steady state conditions due to groundwater seepage only	78,400
Scenario – Slab on Grade Excavation	**Estimated Groundwater Takings (L/d)**
Maximum – Dewatering at start of construction with storm event	566,290(1)
Dewatering at start of construction with no storm event	104,180 to 312,540(1)
Dewatering under steady state conditions due to groundwater seepage only	104,180

Note: (1) assumes 3x safety factor to remove water storage in the immediate vicinity of the excavation at the start of construction. Once this water is removed, groundwater will seepage into the excavation under steady state conditions.

5.2 Foundation Drainage (Long-Term)

5.2.1 Groundwater

The highest groundwater level measured for this assessment was 159.2 mAMSL. Based on the highest groundwater level measurement if the base of the slab on grade is above this elevation, long term dewatering will not be required. Evaluation for long-term dewatering should be re-evaluated once design drawings have been provided.

6. Groundwater Quality

Review of the analytical results for a sample collected from monitoring well MW25-11 (**Table 3.6** and **Table 3.7**) indicates that the groundwater discharge from this Site will meet the criteria for discharge to the Halton sewers and the Oakville combined sewer. Groundwater discharge is not anticipated to meet the PWQOs with multiple parameters exceeding the respective criteria. The following parameters had concentrations above the by-law/PWQO criteria.

	MW25-11
Halton Storm Sewer	None
Halton Sanitary Sewer	None
Oakville Combined Sewer	None
Provincial Water Quality Objectives	Boron, Boron (dissolved), Uranium, Uranium (dissolved)

Total suspended solids can be reduced on-site with settling and filtration methods. Reducing total suspended solids can often reduce the concentration of other chemical parameters (metals in particular) prior to discharge to surface water bodies.

As the water that accumulates in the excavation will primarily be a combination of groundwater and precipitation, the groundwater sample analytical results alone are not representative of the actual excavation discharge water quality. Additional sample collection will be required from the construction water takings prior to discharge to the regional sewer.

7. Water Balance Calculation

In support of the development of the proposed MECP-MLITSD Science Facility Complex, a Site-specific water balance assessment was conducted utilizing a non-continuous hydrological model (Thornthwaite and Mather) approach at a monthly resolution. The assessment was completed for existing and proposed (uncontrolled and controlled) conditions.

The objective of this assessment is to conduct a Site-specific water balance analysis to characterize the impact of the proposed development on groundwater recharge in comparison to existing conditions. The approach used to complete the assessment is summarized below:

– Review available topographic data, climate data, hydrogeological data, and plans and drawings for the proposed development at the Site.
– Complete monthly water balance calculations using the Thornthwaite and Mather approach for the Site under existing and proposed (uncontrolled and controlled) conditions.
– Provide recommendations to meet existing conditions for infiltration through Low Impact Development (LID) measures, if applicable.

7.1 Existing and Proposed Conditions

Under existing conditions, the Site is situated in the OLA Eastern Lot with an approximate area of 3.04 ha and is currently a vacant, undeveloped lot that was historically used for agricultural purposes. A map of the land use within the Site is provided on **Figure 2.1**.

Under proposed conditions, the Site will consist of a four-storey slab-on-grade institutional building and approximately 250 parking stalls. These areas are based on the Site Test Fit Plan prepared by IO[8]. As the Site Plan is currently in development, GHD understands that any changes to the Site Plan would require the revision of the proposed (uncontrolled) condition scenario of the water balance assessment. A map of the proposed development, per the Site Plan to-date, for the Site is provided on **Figure 1.2**.

A land use breakdown of the existing and proposed (uncontrolled and controlled) conditions for the Site-specific water balance is provided in the table below.

Land Use Breakdown of the Existing and Proposed Condition Areas

Land Use	Area (ha)	Total Percent Area (%)
Existing Condition		
Agricultural Cropland	3.04	100
Total Site Area:	**3.04**	**100**
Proposed Condition		
Hedgerow	0.15	4.9
Landscaping Area	0.72	23.7
Proposed Industrial Buildings	0.99	32.6
Walkways / Parking Lot / Asphalt	1.18	38.8
Total Site Area:	**3.04**	**100**

[8] Infrastructure Ontario, 2024. MECP – Environmental Sciences Complex, Option 7 Site Test Fit Plan.

7.2 Site-Specific Water Balance

7.2.1 Methodology

The Site-specific water balance assessment was conducted based on the standard methodology developed by the Conservation Authorities Geoscience Group, as described in Cuddy et al.[9]. The standardized water balance approach is to utilize the monthly water balance summaries for different soil-water holding capacities provided by the Meteorological Service Data Analysis and Archive Division of Environment Canada (EC).

Water Holding Capacity (WHC)

The maximum soil storage is quantified as the water holding capacity (WHC), which is defined based on a combination of land use and soil type, as presented in Table 3.1 of the MOE SWM Manual[10]. The WHC represents the total amount of water that can be stored in the soil capillaries and is defined as the water content between the field capacity and wilting point (the practical maximum and minimum soil water content, respectively). WHC values typically range from approximately 10 millimetres (mm) for bedrock and impervious areas to 400 mm for mature forest over silt loam.

Climate Data

The water balance assessment presented herein is based on composite meteorological data from the Environment and Climate Change Canada (ECCC) Thornthwaite and Mather water budget. Historical records spanning 62 years between 1963 to 2024 were compiled from three (3) nearby climate stations, with missing observations substituted with records from nearby stations including the Milton South (Climate ID: 615EAQG) and Oakville Southeast WPCP (Climate ID: 615N745) ECCC meteorological stations. The stations are summarized in the table below with the ECCC data presented in **Table J1** in **Appendix J**.

ECCC Climate Stations near the Site

Climate ID	Station Name	Record Period(s)	Distance from Site (km)
6155PD4	Oakville Gerard	1991/01 – 2006/10	6.29 SE
6153301	Hamilton RBG CS	2006/11 – 2006/12 2023/10 – 2024/12	21.21 SW
6155750	Oakville TWN	2007/01 – 2023/09	9.13 NE

Model Approach

The results from the ECCC water balance model presents the following monthly output: temperature (mean), precipitation, rainfall, snowmelt, potential evapotranspiration (PET), actual evapotranspiration (AET), and water surplus (WS) for each of the years in the historic record, as well as average monthly values over the entire record. The model is used to estimate the soil storage (water) surplus based on a provided soil water holding capacities.

The Thornthwaite and Mather[11] method is used to calculate the potential and actual amounts of evapotranspiration and water surplus. The calculations are performed daily and consists of daily precipitation (rainfall and snowmelt) and temperature data to estimate evapotranspiration (ET), soil-water storage, and water surplus. The EC water balance model utilizes a daily timestep developed by the Meteorological Service of Canada (MSC), as daily data allows for

[9] Cuddy, S., Chan, G.S., and Post. R., 2013. Hydrogeological Assessment Submissions – Conservation Authority Guidelines for Development Applications.
[10] Ministry of the Environment (MOE) 2003b, Stormwater Management Planning and Design Manual, March 2003.
[11] Thornthwaite, C.W., Mather, J.R., 1957. Instructions and tables for computing potential evapotranspiration and water balance, Johns Hopkins Univ., Laboratory in Climatology, Publ. in Climat., 10, No.3

more accurate modelling of snowmelt and snow storage, which are of particular importance in a cold weather/winter climate[12].

The water balance calculations are based on the following equation:

$$P = S + ET + WS$$

Where:

P = precipitation

S = change in soil water storage

ET = evapotranspiration

WS = water surplus (surface runoff and infiltration)

Precipitation (P) is either rain or snow depending on the mean daily temperature. Evapotranspiration (ET) refers to the water that is lost to the atmosphere due to evaporation from soil or water and due to transpiration from plants and trees. The Thornthwaite & Mather[13] methodology estimates AET based on the following condition: 1) AET equals PET when there is enough water available within the soil storage (water holding capacity) to meet the evapotranspiration demand, otherwise, 2) AET equals the amount of water that is available for evapotranspiration.

The water surplus (WS) is the difference between P and AET and is calculated when the water holding capacity of the soil storage is exceeded. The WS represents the total water available in each month to runoff as surface overland flow or infiltrate to the ground and recharge the groundwater table. The average annual water surplus is separated into infiltration and runoff based on an infiltration factor. The infiltration factor is presented in Table 3.1 of the MOE SWM Manual[14]. Site-specific infiltration factors are estimated based on aggregating the infiltration factors for topography, surficial soil type, and vegetative cover factors (land use).

7.2.2 Water Balance Parameters

The surficial soils are primarily silty clay and clayey silt deposits (i.e., silt loam) within the Site based on the borehole drilling logs completed by GHD (detailed in **Appendix B**). Available topography for the Site can be classified as flat to rolling land with an average slope between 0.6 to 2.8 m/km. The maximum soil storage was quantified using a WHC based on guidelines provided in Table 3.1 of the MOE SWM Manual[14]. The infiltration factors and WHCs for the existing and proposed land uses, Site-specific topography, surficial soil type, and vegetative cover factors are presented for the Site-specific water balance assessment in **Table J2** in **Appendix J**.

The water balance analysis was developed under the following assumptions:

– WHCs were chosen based on Table 3.1 in the MOE SWM Manual[14] corresponding to the silt loam soil type, existing and proposed (uncontrolled and controlled) condition land uses for the Site-specific water balance.
– For the impervious areas, WHCs of 2 mm and 10 mm were chosen to represent the roofed and paved areas, respectively. A WHC of 2 mm was chosen for roofed areas as minimal depression storage is available on sloped roofs. A WHC of 10 mm was chosen for paved areas due to the presence of depressions throughout the surface which could hold runoff.
– Net surplus was estimated by multiplying the estimated monthly surplus for the assumed WHC by the associated drainage area. AET and surplus values were obtained from the meteorological data from the composite data from the ECCC meteorological stations based on the WHC assigned to each land use area.
– Runoff was calculated as the difference between surplus and infiltration.

[12] Johnstone, K, and PYT Louie, 1983. Water balance tabulations for Canadian climate stations, Hydrometeorology Division, Canadian Climate Centre, Atmospheric Environment Service, Environment Canada, DS#8-83.
[13] Thornthwaite, C.W., Mather, J.R., 1957. Instructions and tables for computing potential evapotranspiration and water balance, Johns Hopkins Univ., Laboratory in Climatology, Publ. in Climat., 10, No.3
[14] Ministry of the Environment (MOE) 2003b, Stormwater Management Planning and Design Manual, March 2003.

7.2.3 Water Balance Results

An average annual water balance was carried out on a Site-specific basis. The results for the existing and proposed (uncontrolled and controlled) conditions are presented in this section.

7.2.3.1 Existing Conditions

Based on the results of the assessment, the average annual existing water balance was estimated on a Site-specific basis as summarized in the table below, with detailed monthly values provided in **Table J3** in **Appendix J**.

Existing Average Annual Water Balance Results – Site-Specific

Land Use	Area (ha)	Average Annual Volume m^3/yr [1]				
		Precipitation (P)	Evapotranspiration (ET)	Surplus (S)	Infiltration (I)	Runoff (R)
Agricultural Cropland	3.04	25,070	16,925	8,110	4,460	3,650
Total	**3.04**	**25,070**	**16,925**	**8,110**	**4,460**	**3,650**

Note:
1. Volumes are rounded for reporting purposes.

7.2.3.2 Proposed (Uncontrolled) Conditions

Based on the results of the assessment, the average annual proposed (uncontrolled) water balance was estimated on a Site-specific basis as summarized in table below, with detailed monthly values provided in **Table J4** in **Appendix J**.

Proposed (Uncontrolled) Average Annual Water Balance Results – Site-Specific

Land Use	Area (ha)	Average Annual Volume m^3/yr [1]				
		Precipitation (P)	Evapotranspiration (ET)	Surplus (S)	Infiltration (I)	Runoff (R)
Hedgerow	0.15	1,240	970	270	175	95
Landscaping Area	0.72	5,950	4,020	1,925	1,060	865
Proposed Industrial Buildings	0.99	8,130	4,305	3,845	-	3,845
Walkways / Parking Lot / Asphalt	1.18	9,750	5,280	4,505	-	4,505
Total	**3.04**	**25,070**	**14,575**	**10,545**	**1,235**	**9,310**

Note:
1. Volumes are rounded for reporting purposes.

7.2.3.3 Proposed (Controlled) Conditions

Upon review of the water balance results with the Client, recommendations for the potential incorporation of LIDs, SWM facilities, or changes in grading to meet existing conditions will be determined, if necessary. If any SWM or LID control measures are proposed, the proposed (controlled) conditions scenario will be evaluated.

7.2.4 Summary of Water Balance Results

A summary of the annual water balance assessment considering surplus, infiltration, and runoff for the existing and proposed (uncontrolled) conditions is provided in the table below, with detailed annual values provided in **Table J5** in **Appendix J**.

Summary of Average Annual Water Balance Results - Site-Specific

Scenario	Area (ha)	Average Annual Volume [1]					
		Surplus (S)		Infiltration (I)		Runoff (R)	
		m^3/yr	mm/yr	m^3/yr	mm/yr	m^3/yr	mm/yr
Existing	3.04	8,110	267	4,460	147	3,650	120
Proposed (Uncontrolled)	3.04	10,545	347	1,235	41	9,310	306
Existing to Proposed Difference							
Absolute Difference	-	2,435	80	(3,225)	(106)	5,660	186
Percent Difference	0%	30%		-72%		155%	

Note:
1. Volumes are rounded for reporting purposes.

Under proposed (uncontrolled) conditions, Site-specific surplus is anticipated to increase by approximately 2,435 m^3/year (80 mm/yr), representing a corresponding decrease in evapotranspiration due to changes in land use. Direct infiltration is anticipated to decrease by approximately 3,225 m^3/yr (106 mm/yr) due to an increase in impervious area. This will increase the runoff generated within the Site by 5,660 m^3/yr (186 mm/yr).

7.3 Recommendations

7.3.1 Potential LID Measures

Based on a Site-specific infiltration deficit of 3,225 m^3/yr (106 mm/yr), GHD recommends the use of LID features with particular interest in capturing and infiltrating a percentage of runoff generated from the proposed buildings (3,845 m^3/yr) to meet existing conditions. Generally, maintaining a separation of one (1) m between the base of potential LID controls and the seasonally high groundwater table or top of bedrock is recommended. Five monitoring wells were installed on the Site in June 2025 to monitor biweekly groundwater levels over a period of three (3) months. The monitoring data indicates a minimum groundwater level of 0.4 mBGS and maximum groundwater level of 2.87 mBGS. Depending on the final grades of the Site, a minimum 1 m separation between the high groundwater table and the bottom of proposed subsurface LIDs may not be feasible, however surface LIDs may be feasible. A summary of the recorded groundwater levels measured to date is provided in **Table 3.4**.

As spring groundwater measurements are not yet available for all of the monitoring wells installed in June 2025, the reported groundwater levels are not reflective of the annual high groundwater table observed during the spring months of the year. Feasibility of LID controls will be confirmed as additional measurements of the groundwater table are recorded in the future. Overall, GHD recommends the use of roof downspout disconnection to bioswales or infiltration galleries to increase the infiltration of surplus.

8. Evaluation of Impact

Based on the assessment above, significant construction site dewatering is anticipated. The anticipated construction dewatering zone of influence extends a maximum 103 m from the excavation. A review of the Ontario Wetlands Database shows no wetlands within the zone of influence of dewatering.

Based on **Figure 2.5**, no MECP water supply wells are within a 500 m radius of the Site. Impacts to local water supply are not anticipated. Resulting geotechnical impacts are not anticipated.

9. Summary and Conclusions

Based on the results of the hydrogeological and Site-specific water balance assessment, the following summary and conclusions are provided:

1. The development is primarily underlain by a thin layer of topsoil underlain by an unsaturated fill overlying a continuous partially saturated till deposit comprised primarily of clay with sand, sandy clay, sandy silty clay, and clay. The till deposit overlies a saturated heavily weathered shale bedrock.
2. The highest observed groundwater table elevation is 159.16 mAMSL, which is approximately 1.3 mBGS from the average elevation of the Site.
3. Utility trench construction dewatering daily volumes are estimated to be approximately 78,400 to 235,200 L/day at the start of construction (up to 236,325 L/day during storm events) and approximately 78,400 L/day under steady state conditions.
4. Slab on grade construction dewatering daily volumes are estimated to be approximately 104,180 to 312,540 L/day at the start of construction (up to 566,290 L/day during storm events) and approximately 104,180 L/day under steady state conditions.
5. The maximum estimated construction dewatering rate and the water taking rate at the start of construction would be greater than 50,000 L/d, EASR self-registration will be required.
6. Groundwater collected during construction will require pre-treatment to reduce the metal concentrations prior to discharge to surface water bodies. Discharge to the storm sewers may be possible without pretreatment.
7. Compared to existing conditions (8,110 m^3/yr), average annual surplus over the Site area will increase by 2,435 m^3/yr (80 mm/yr) under proposed (uncontrolled) conditions.
8. Compared to existing conditions (4,460 m^3/yr), average annual infiltration over the Site area will decrease by 3,225 m^3/yr (106 mm/yr) under proposed (uncontrolled) conditions.
9. Compared to existing conditions (3,650 m^3/yr), average annual runoff over the Site area will increase by 5,660 m^3/yr (186 mm/yr) under proposed (uncontrolled) conditions.
10. GHD recommends the incorporation of LID features to infiltrate surplus within the Site boundary, however seasonal high groundwater levels are required to determine LID feasibility.
11. Once the SWM strategy has been confirmed (by others), GHD recommends updating the water balance to include the proposed (controlled) conditions to determine if the infiltration deficit has been addressed.

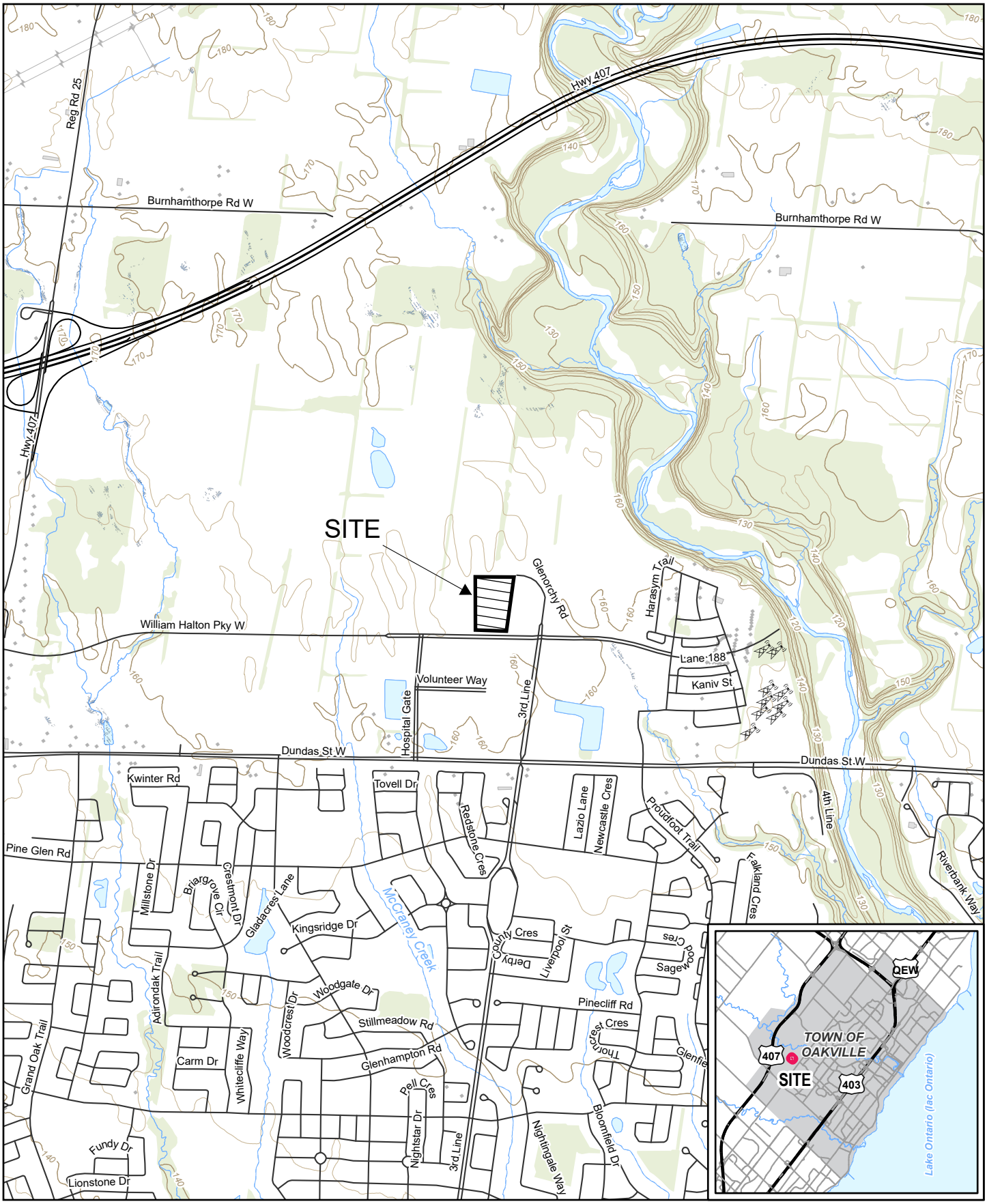
All of Which is Respectfully Submitted,

GHD

Loden Ozaki, B.Sc.

Ben Kempel, P.Geo.

Figures



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Map Projection: Transverse Mercator
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Grid: NAD 1983 UTM Zone 17N

Plan North

GHD

INFRASTRUCTURE ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX, OAKVILLE LAND ASSEMBLY – WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
HYDROGEOLOGICAL ASSESSMENT

Project No. **12669624**
Revision No. **-**
Date **Mar 26, 2026**

SITE LOCATION MAP

FIGURE 1.1

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Print date: 26 Mar 2026 - 12:28

LEGEND

- SITE BOUNDARY
- PROPOSED BUILDING FOOTPRINT
- PROPOSED ROAD RIGHT OF WAY

0 12.5 25 37.5m

1:1250

Coordinate System: UTM83-17

GHD

INFRASTRUCTURE ONTARIO
WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX,
OAKVILLE LAND ASSEMBLY
HYDROGEOLOGICAL ASSESSMENT

SITE PLAN

Project No. **12669624**
Date **March 2026**

FIGURE 1.2

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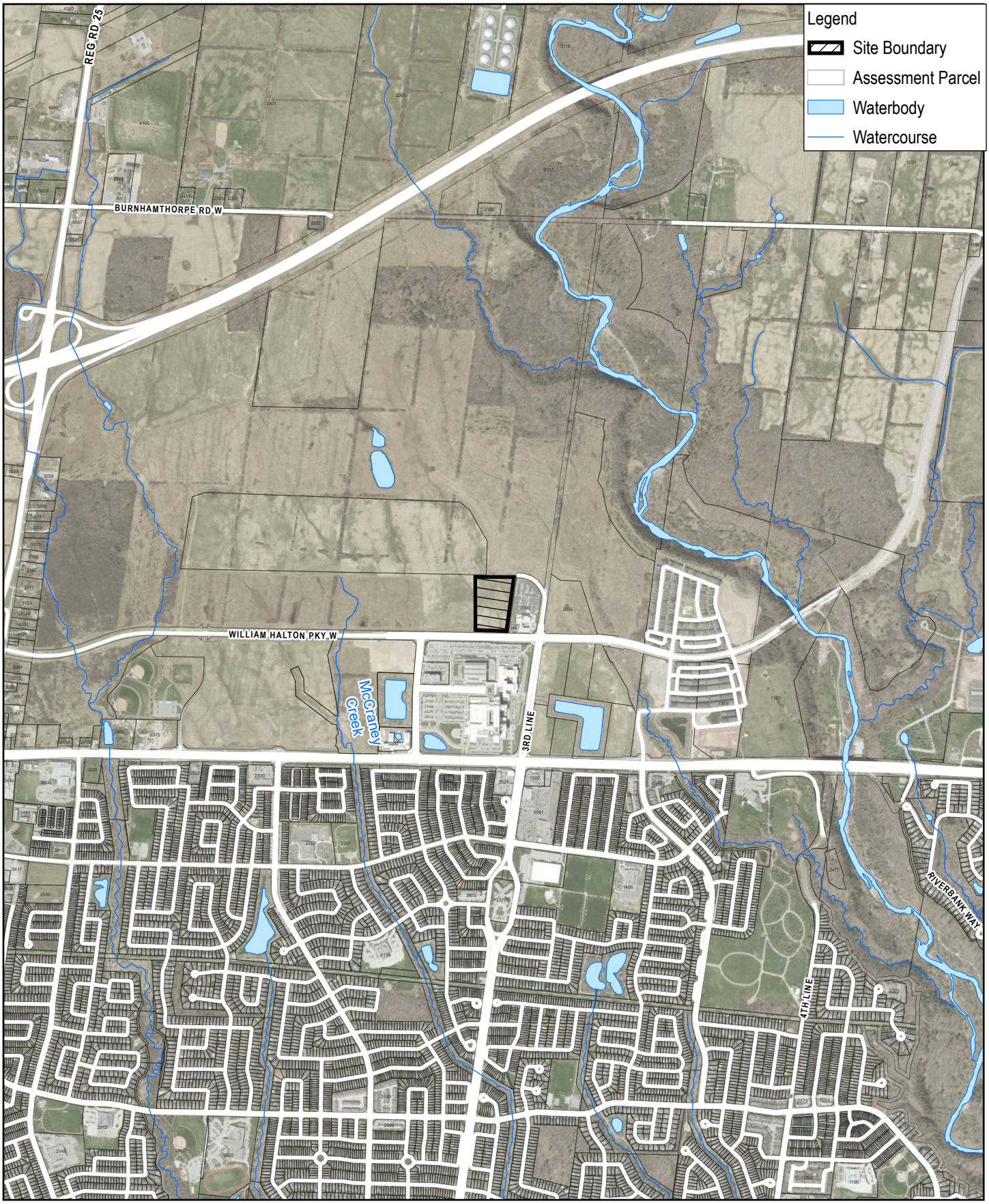

Paper Size ANSI A

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Plan North

INFRASTRUCTURE ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX, OAKVILLE LAND ASSEMBLY – WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
HYDROGEOLOGICAL ASSESSMENT

LAND USE

Project No. **12669624**
Revision No. **-**
Date **Mar 26, 2026**

FIGURE 2.1

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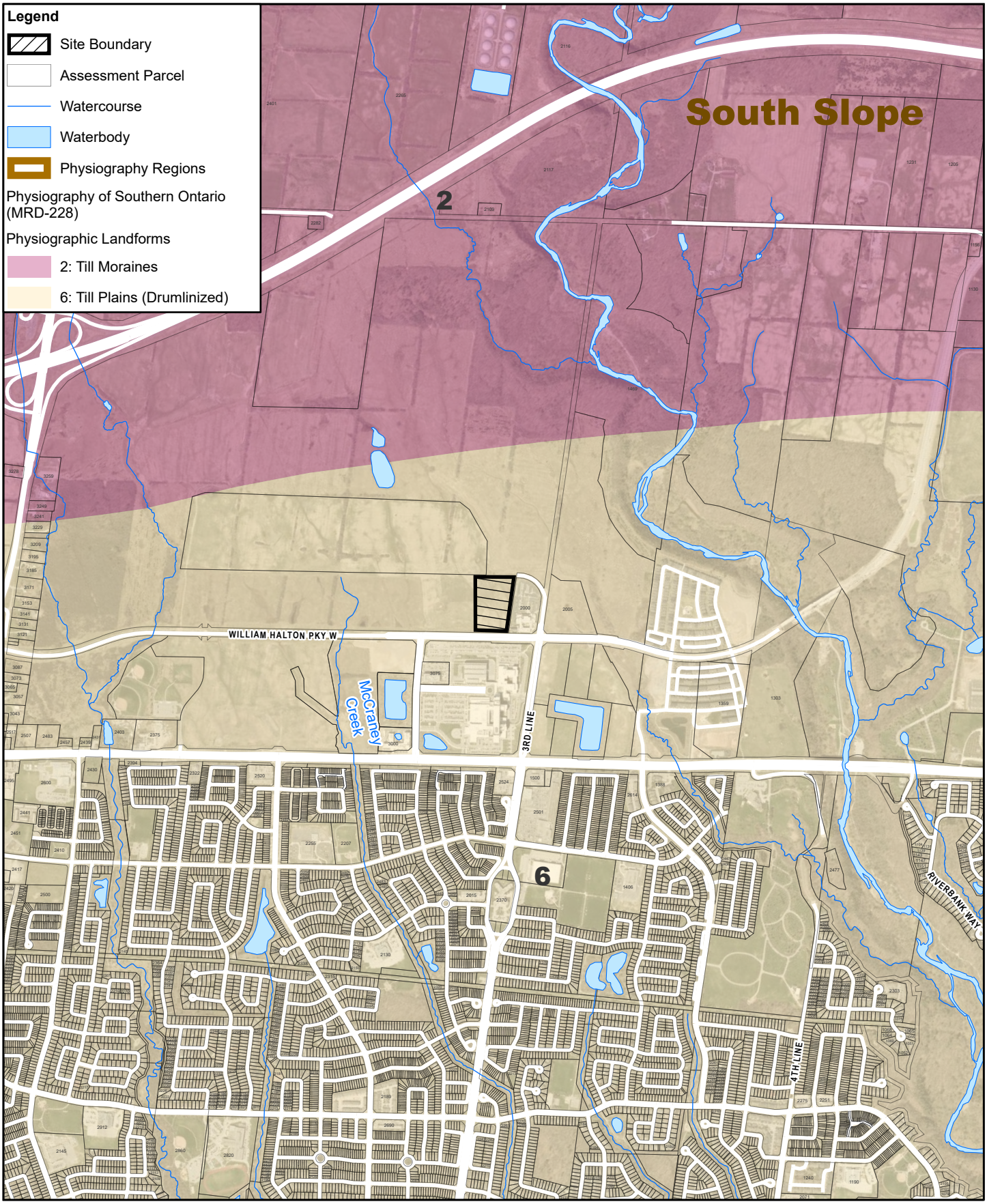

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Plan North

INFRASTRUCTURE ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX, OAKVILLE LAND ASSEMBLY – WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
HYDROGEOLOGICAL ASSESSMENT

PHYSIOGRAPHY

Project No. **12669624**
Revision No.
Date **Mar 26, 2026**

Figure 2.2

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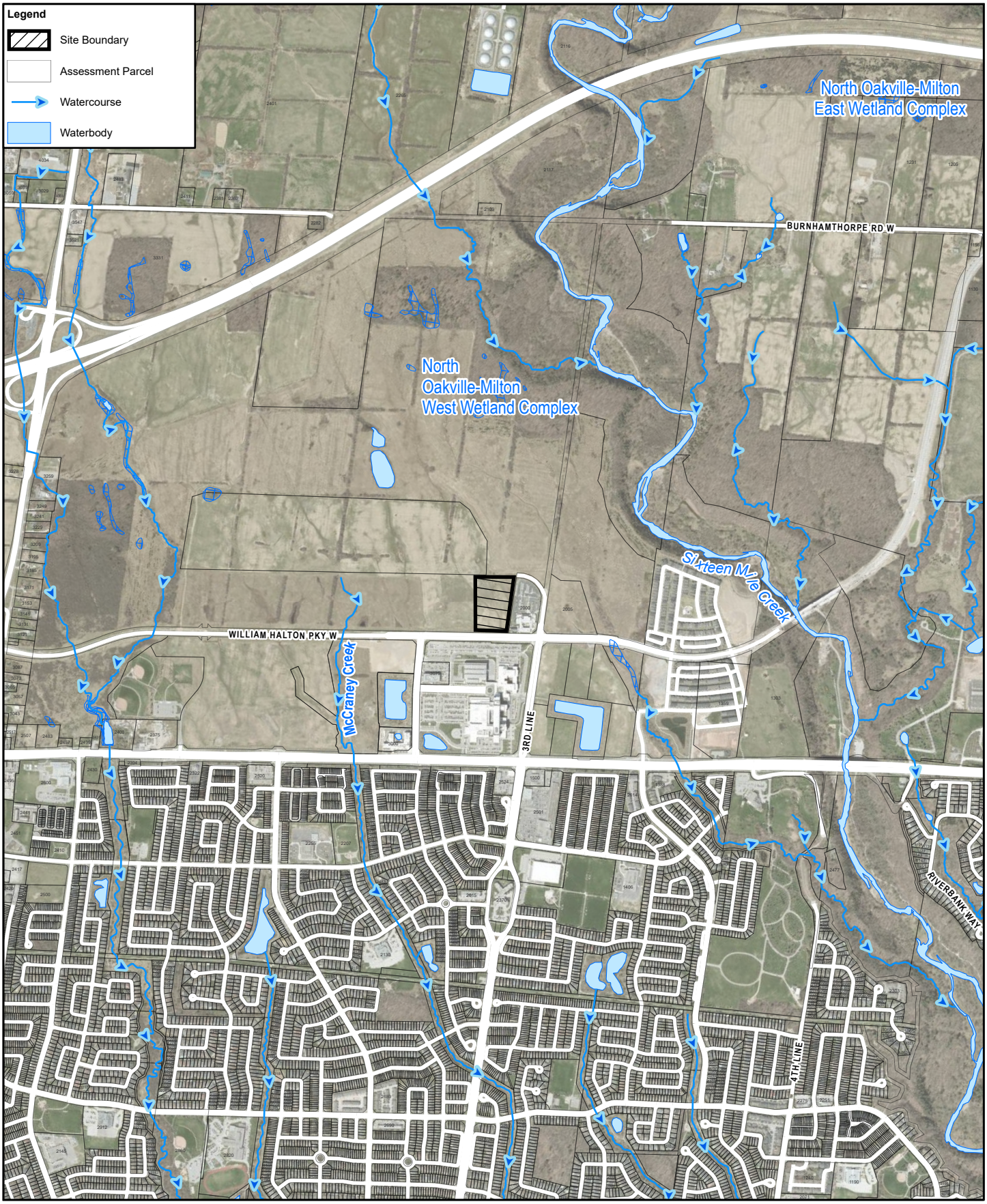

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Plan North

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PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX, OAKVILLE LAND ASSEMBLY – WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
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Project No. **12669624**
Revision No.
Date **Mar 26, 2026**

SURFACE WATER DRAINAGE

Figure 2.3

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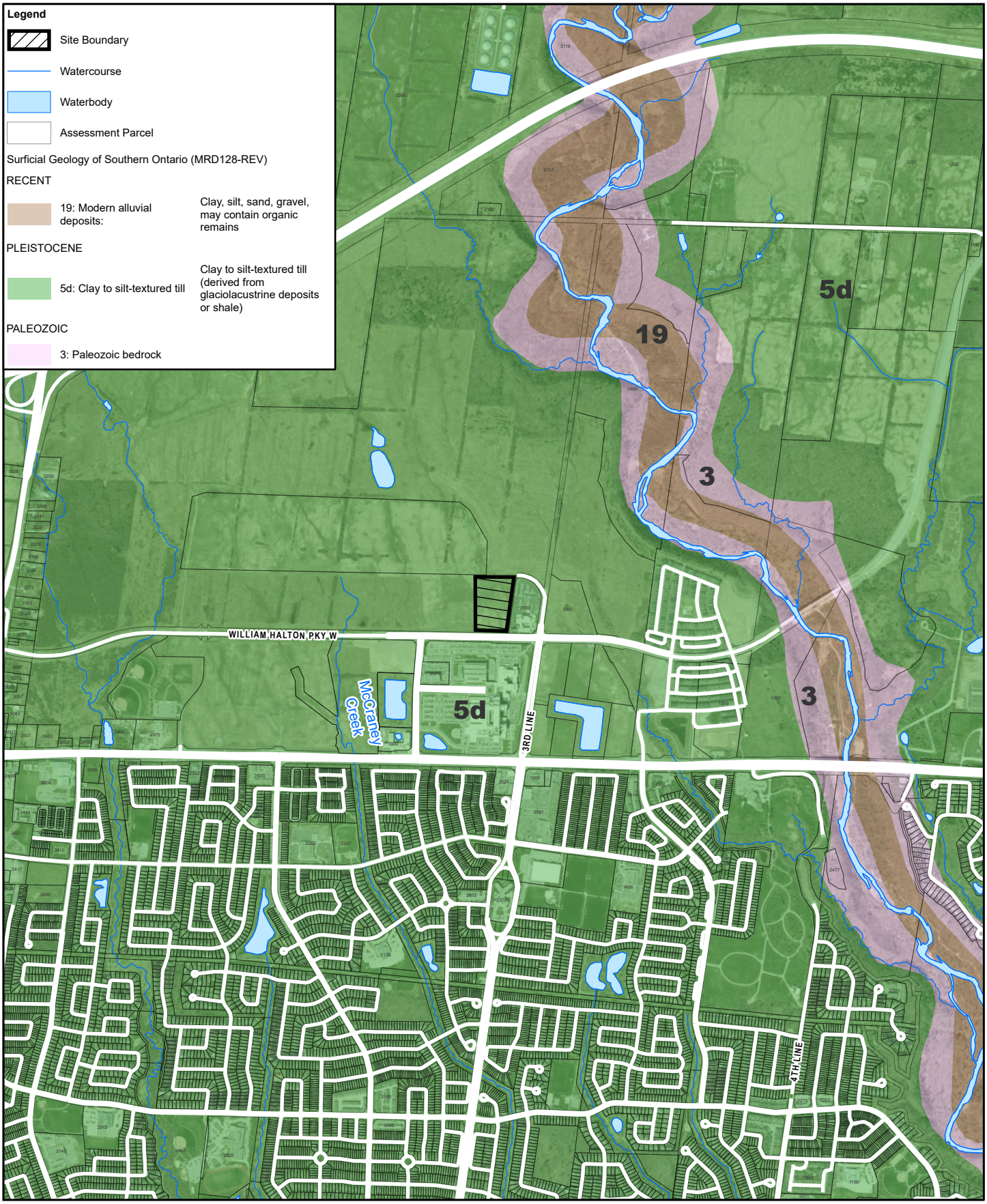

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Plan North

GHD

INFRASTRUCTURE ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX, OAKVILLE LAND ASSEMBLY –
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HYDROGEOLOGICAL ASSESSMENT

Project No. **12669624**
Revision No.
Date **Mar 26, 2026**

SURFICIAL GEOLOGY

FIGURE 2.4

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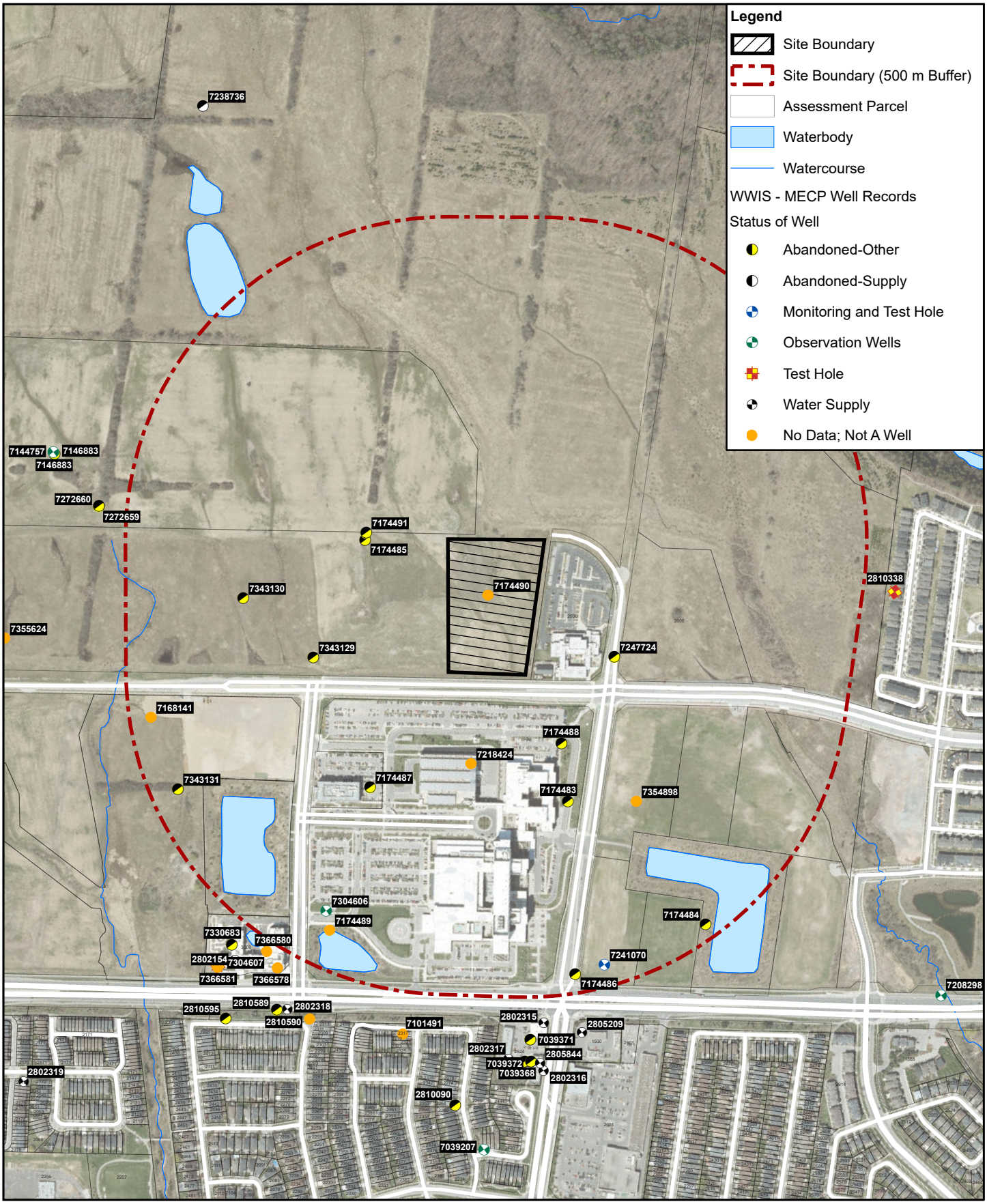

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Metres

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Grid: NAD 1983 UTM Zone 17N

Plan North

INFRASTRUCTURE ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX, OAKVILLE LAND ASSEMBLY – WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
HYDROGEOLOGICAL ASSESSMENT

MECP Well Location Plan

Project No. **12669624**
Revision No.
Date **Mar 26, 2026**

Figure 2.5

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Print date: 26 Mar 2026 - 12:37

LEGEND

- SITE BOUNDARY
- PROPOSED BUILDING FOOTPRINT
- PROPOSED ROAD RIGHT OF WAY
- A — A' CROSS SECTION LOCATION
- BOREHOLE LOCATION (GHD, 2025)
- MONITORING WELL LOCATION (GHD, 2025)
- GAS PROBE LOCATION (GHD, 2025)

0 12.5 25 37.5m

1:1250

Coordinate System: UTM83-17

INFRASTRUCTURE ONTARIO
WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX, OAKVILLE LAND ASSEMBLY
HYDROGEOLOGICAL ASSESSMENT

INVESTIGATIVE AND CROSS-SECTION LOCATION MAP

Project No. **12669624**
Date **March 2026**

FIGURE 3.1

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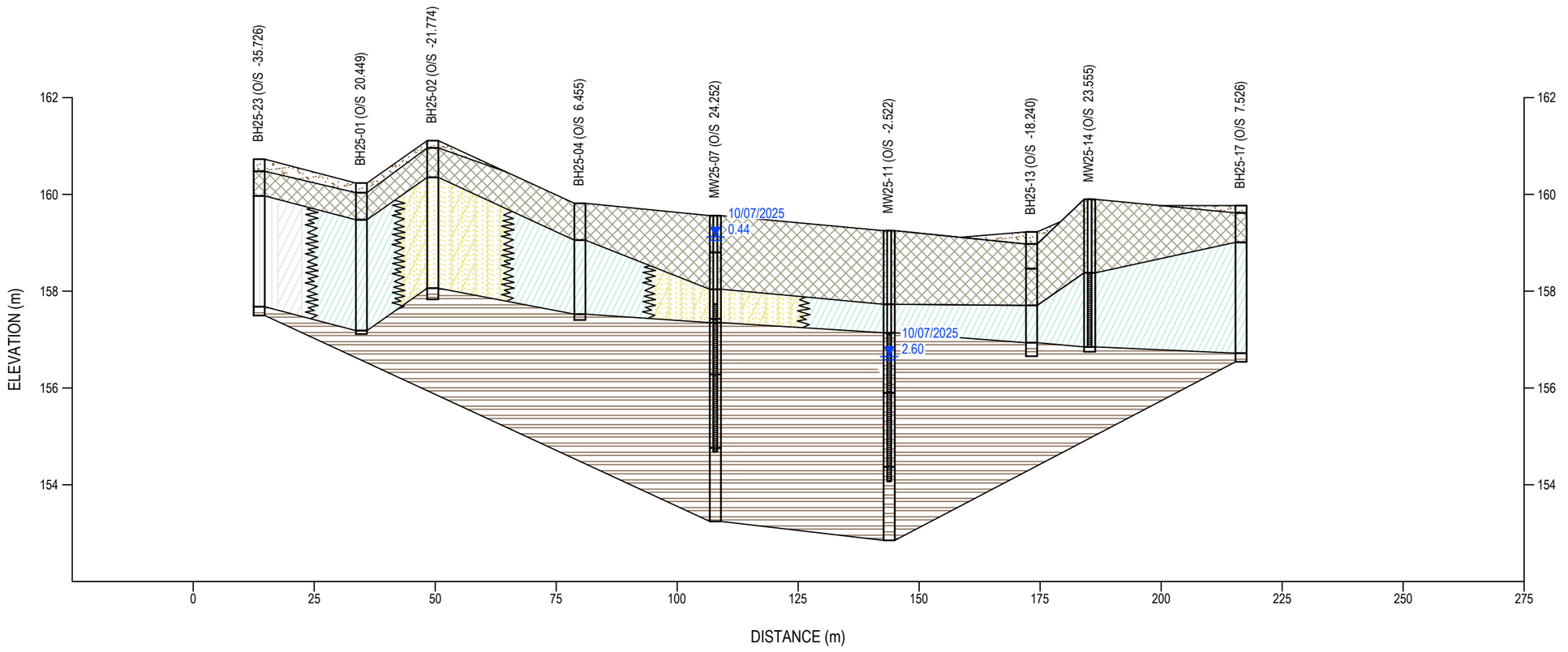

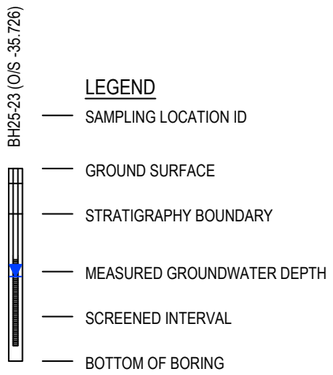

LEGEND

- SAMPLING LOCATION ID
- GROUND SURFACE
- STRATIGRAPHY BOUNDARY
- MEASURED GROUNDWATER DEPTH
- SCREENED INTERVAL
- BOTTOM OF BORING

- TOPSOIL
- FILL
- SHALE
- SC-SM
- CL-ML
- CL

HORIZONTAL
1:1000
0 10 20 30

VERTICAL
1:100
0 1 2 3

INFRASTRUCTURE ONTARIO
WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX,
OAKVILLE LAND ASSEMBLY
HYDROGEOLOGICAL ASSESSMENT

CROSS-SECTION A-A'

Project No. **12669624**
Date **March 2026**

FIGURE 4.1

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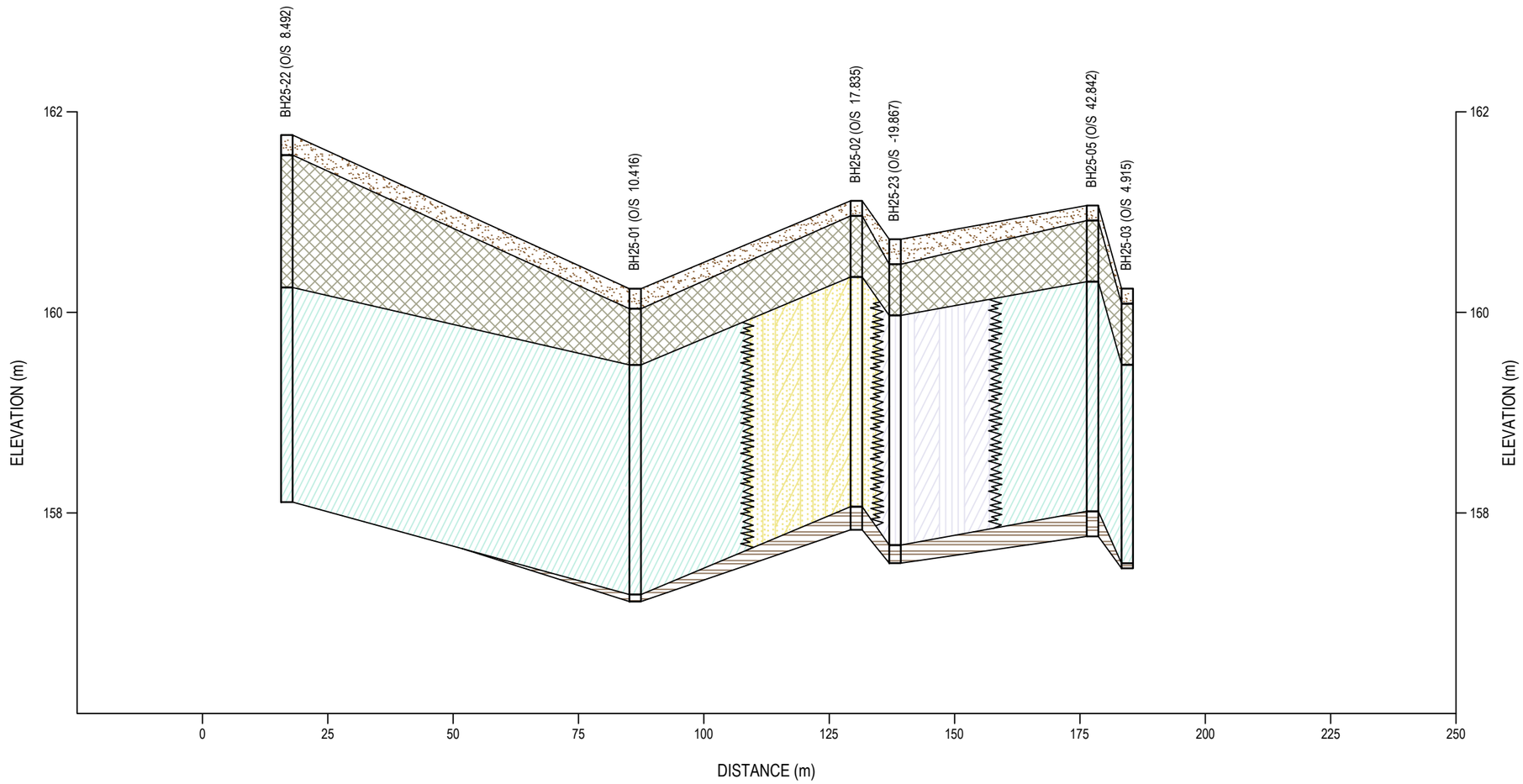

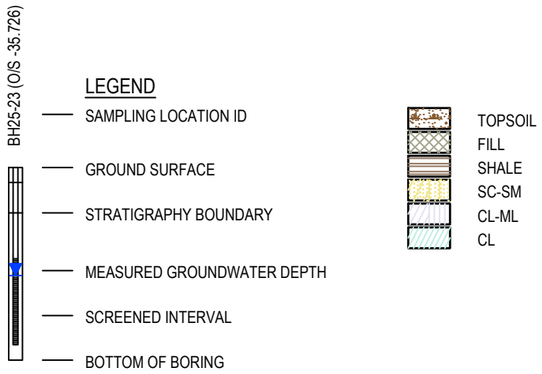

HORIZONTAL
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0 0.5 1 1.5
VERTICAL
1:50

INFRASTRUCTURE ONTARIO
WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX,
OAKVILLE LAND ASSEMBLY
HYDROGEOLOGICAL ASSESSMENT

CROSS-SECTION B-B'

Project No. **12669624**
Date **March 2026**

FIGURE 4.2

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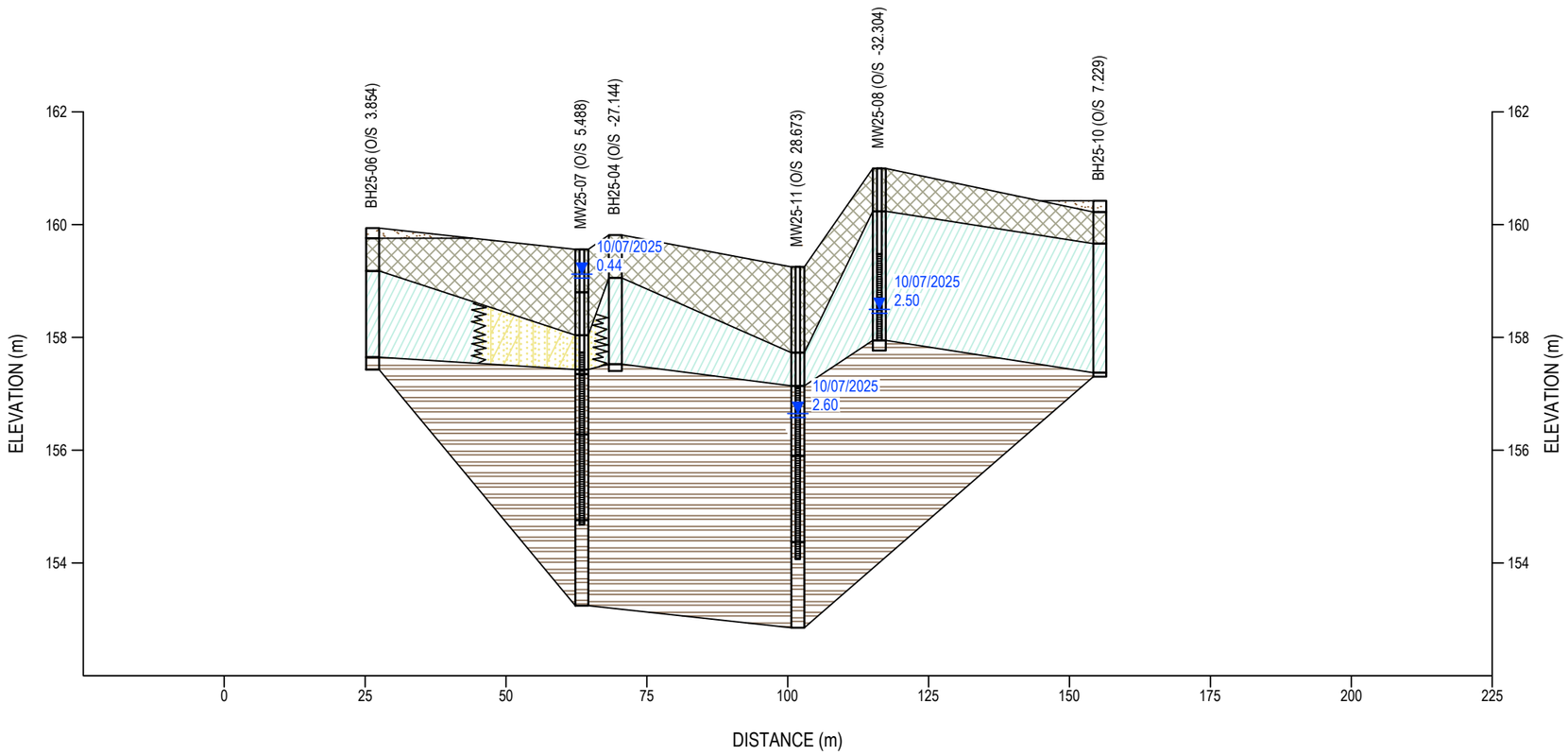

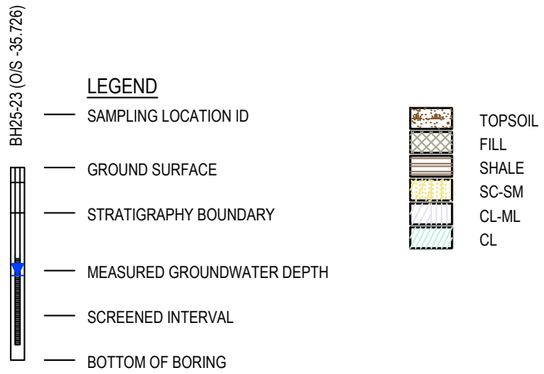

HORIZONTAL
1:1000
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0 1 2 3
VERTICAL
1:100

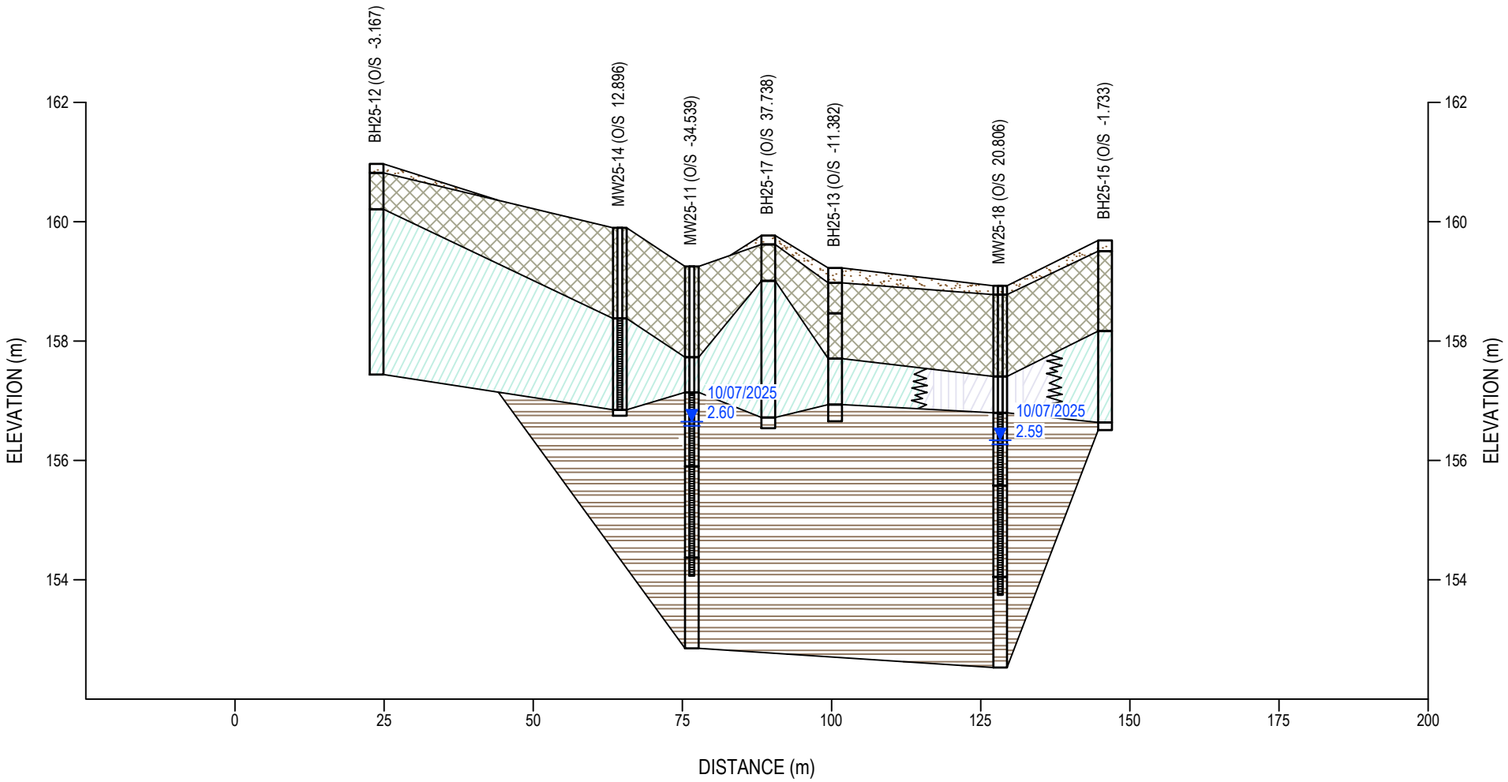
INFRASTRUCTURE ONTARIO
WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX,
OAKVILLE LAND ASSEMBLY
HYDROGEOLOGICAL ASSESSMENT

CROSS-SECTION C-C'

Project No. **12669624**
Date **March 2026**

FIGURE 4.3

Filename: C:\ADSK\ACCDocs\GHD Services Pty Ltd\11230862-Enviro Projs\Project Files\12669624\01 WIP\Env\Figures\RPT004\12669624-GHD-00-00-RPT-EN-D103_WA-004.dwg
Plot Date: 25 March 2026 3:29 PM



BH25-23 (O/S -35.726)

LEGEND

- SAMPLING LOCATION ID
- GROUND SURFACE
- STRATIGRAPHY BOUNDARY
- MEASURED GROUNDWATER DEPTH
- SCREENED INTERVAL
- BOTTOM OF BORING

- TOPSOIL
- FILL
- SHALE
- SC-SM
- CL-ML
- CL

HORIZONTAL
1:1000
0 10 20 30
0 1 2 3
VERTICAL
1:100

INFRASTRUCTURE ONTARIO
WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX,
OAKVILLE LAND ASSEMBLY
HYDROGEOLOGICAL ASSESSMENT

CROSS-SECTION D-D'

Project No. **12669624**
Date **March 2026**

FIGURE 4.4

Filename: C:\ADSK\ACCDocs\GHD Services Pty Ltd\11230862-Enviro Projs\Project Files\12669624\01 WIP\Env\Figures\RPT004\12669624-GHD-00-00-RPT-EN-D103_WA-004.dwg
Plot Date: 25 March 2026 3:31 PM

LEGEND

- SITE BOUNDARY
- PROPOSED BUILDING FOOTPRINT
- PROPOSED ROAD RIGHT OF WAY
- BOREHOLE LOCATION (GHD, 2025)
- MONITORING WELL LOCATION (GHD, 2025)
- GAS PROBE LOCATION (GHD, 2025)
- (2.50) DEPTH TO GROUNDWATER

0 12.5 25 37.5m

1:1250

Coordinate System: UTM83-17

GHD

INFRASTRUCTURE ONTARIO
WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX, OAKVILLE LAND ASSEMBLY
HYDROGEOLOGICAL ASSESSMENT

DEPTH TO GROUNDWATER (JULY 10, 2025)

Project No. **12669624**
Date **March 2026**

FIGURE 4.5

Filename: C:\ADSK\ACCDocs\GHD Services Pty Ltd\11230862-Enviro Projs\Project Files\1266962 4\01 WIP\Env\Figures\RPT004\12669624-GHD-00-00-RPT-EN-D104_WA-004.dwg
Plot Date: 25 March 2026 3:36 PM

Data Source: OPTION 7 - SITE TEST FIT PLAN, Produced by WZMH ARCHITECTS, SEPTEMBER 3, 2024

LEGEND

- SITE BOUNDARY
- PROPOSED BUILDING FOOTPRINT
- PROPOSED ROAD RIGHT OF WAY
- 156.50 GROUNDWATER ELEVATION CONTOUR
- BOREHOLE LOCATION (GHD, 2025)
- MONITORING WELL LOCATION (GHD, 2025)
- GAS PROBE LOCATION (GHD, 2025)
- (156.34) GROUNDWATER ELEVATION (mAMSL)

0 12.5 25 37.5m

1:1250

Coordinate System: UTM83-17

INFRASTRUCTURE ONTARIO
WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX, OAKVILLE LAND ASSEMBLY
HYDROGEOLOGICAL ASSESSMENT

GROUNDWATER ELEVATION CONTOUR MAP (JULY 10, 2025)

Project No. **12669624**
Date **March 2026**

FIGURE 4.6

Filename: C:\ADSK\ACCDocs\GHD Services Pty Ltd\11230862-Enviro Projs\Project Files\1266962 4\01 WIP\Env\Figures\RPT004\12669624-GHD-00-00-RPT-EN-D105_WA-004.dwg
Plot Date: 25 March 2026 3:40 PM

Data Source: OPTION 7 - SITE TEST FIT PLAN, Produced by WZMH ARCHITECTS, SEPTEMBER 3, 2024

Tables

Table 3.1

Monitoring Well Completion Details
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastructure Ontario

Well ID	Date Installed	Easting	Northing	Ground Elevation (m AMSL)	Top of Riser Elevation (m AMSL)	Total Depth Drilled (m BGS)	Stick Up (m BGS)	Screened Interval (m BGS) Top	Screened Interval (m BGS) Bottom	Screened Interval (m AMSL) Top	Screened Interval (m AMSL) Bottom	Sandpack Interval (m BGS) Top	Sandpack Interval (m BGS) Bottom	Sandpack Interval (m AMSL) Top	Sandpack Interval (m AMSL) Bottom	Screened Material
Monitoring Wells																
MW/BH25-07	20-Jun-25	599672	4811829	159.56	160.54	6.32	0.98	1.83	4.88	157.73	154.68	1.22	6.32	158.34	153.24	Sandy Silty Clay to Shale
MW/BH25-08	19-Jun-25	599699	4811889	161.00	161.92	3.23	0.92	1.52	3.05	159.48	157.95	0.91	3.05	160.09	157.95	Sandy Lean Clay
MW/BH25-11	20-Jun-25	599717	4811829	159.25	160.10	6.40	0.85	2.14	5.18	157.11	154.07	1.52	6.40	157.73	152.85	Shale
MW/BH25-14	18-Jun-25	599734	4811783	159.90	160.78	3.15	0.88	1.52	3.05	158.38	156.85	0.91	3.05	158.99	156.85	Sandy Lean Clay
MW/BH25-18	23-Jun-25	599791	4811813	158.93	159.84	6.40	0.91	2.13	5.18	156.80	153.75	1.52	6.40	157.41	152.53	Shale

Table 3.1

Monitoring Well Completion Details
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastructure Ontario

Well ID	Date Installed	Easting	Northing	Ground Elevation (m AMSL)	Top of Riser Elevation (m AMSL)	Total Depth Drilled (m BGS)	Stick Up (m BGS)	Screened Interval (m BGS) Top	Screened Interval (m BGS) Bottom	Screened Interval (m AMSL) Top	Screened Interval (m AMSL) Bottom	Sandpack Interval (m BGS) Top	Sandpack Interval (m BGS) Bottom	Sandpack Interval (m AMSL) Top	Sandpack Interval (m AMSL) Bottom	Screened Material
Boreholes																
BH25-01	26-Jun-25	599616	4811877	160.24	-	3.12	-	-	-	-	-	-	-	-	-	-
BH25-02	27-Jun-25	599654	4811901	161.11	-	3.28	-	-	-	-	-	-	-	-	-	-
BH25-03	19-Jun-25	599684	4811948	160.24	-	2.79	-	-	-	-	-	-	-	-	-	-
BH25-04	26-Jun-25	599661	4811860	159.82	-	2.41	-	-	-	-	-	-	-	-	-	-
BH25-05	19-Jun-25	599705	4811915	161.07	-	3.30	-	-	-	-	-	-	-	-	-	-
BH25-06	26-Jun-25	599640	4811812	159.94	-	2.51	-	-	-	-	-	-	-	-	-	-
BH25-09	26-Jun-25	599697	4811863	159.64	-	2.49	-	-	-	-	-	-	-	-	-	-
BH25-10	25-Jun-25	599752	4811875	160.42	-	3.12	-	-	-	-	-	-	-	-	-	-
BH25-12	25-Jun-25	599692	4811773	160.97	-	3.53	-	-	-	-	-	-	-	-	-	-
BH25-13	25-Jun-25	599750	4811824	159.23	-	2.57	-	-	-	-	-	-	-	-	-	-
BH25-15	24-Jun-25	599793	4811842	159.69	-	3.18	-	-	-	-	-	-	-	-	-	-
BH25-16	25-Jun-25	599744	4811743	160.27	-	3.94	-	-	-	-	-	-	-	-	-	-
BH25-17	24-Jun-25	599769	4811777	159.77	-	3.23	-	-	-	-	-	-	-	-	-	-
BH25-19	27-Jun-25	599580	4811578	162.23	-	3.66	-	-	-	-	-	-	-	-	-	-
BH25-20	27-Jun-25	599498	4811649	162.18	-	3.48	-	-	-	-	-	-	-	-	-	-
BH25-21	27-Jun-25	599486	4811735	162.29	-	3.94	-	-	-	-	-	-	-	-	-	-
BH25-22	27-Jun-25	599564	4811831	161.77	-	3.66	-	-	-	-	-	-	-	-	-	-
BH25-23	27-Jun-25	599634	4811934	160.73	-	3.23	-	-	-	-	-	-	-	-	-	-

Notes:
- Elevations were established using a geodetic benchmark (BM) and NAD83 UTM 18 (1997).

Table 3.2

Summary of Grain Size Analyses
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastuture Ontario

Borehole Identification	Sample Number	Depth (mBGS)	Percent				Description
			Gravel	Sand	Silt	Clay	
BH25-01	SS3	1.5 - 2.1	3	25	61	11	Lean Clay with Sand (CL)
BH25-02	SS4	2.3 - 2.9	7	35	45	13	Sandy Silty Clay (CL-ML)
BH25-03	SS3	1.5 - 2.1	6	15	60	19	Lean Clay with Sand (CL)
BH25-04	SS2	0.8 - 1.4	3	23	56	18	Lean Clay with Sand (CL)
BH25-05	SS4	2.3 - 2.9	3	34	48	15	Sandy Lean Clay (CL)
BH25-06	SS3	1.5 - 2.1	3	22	61	14	Lean Clay with Sand (CL)
MW25-07	SS3	1.5 - 2.1	17	21	51	11	Sandy Silty Clay with Gravel (CL-ML)
MW25-08	SS4	2.3 - 2.9	4	31	49	16	Sandy Lean Clay (CL)
BH25-09	SS3	1.5 - 2.1	12	37	41	10	Sandy Silty Clay (CL-ML)
BH25-10	SS2	0.8 - 1.4	5	24	52	19	Lean Clay with Sand (CL)
MW25-11	SS2	0.8 - 1.4	9	14	49	28	Lean Clay (CL)
BH25-12	SS4	2.3 - 2.9	7	23	54	16	Sandy Lean Clay (CL)
BH25-13	SS3	1.5 - 2.1	7	17	57	19	Lean Clay with Sand (CL)
MW25-14	SS3	1.5 - 2.1	7	23	51	19	Sandy Lean Clay (CL)
BH25-15	SS2	0.8 - 1.4	2	17	59	22	Lean Clay with Sand (CL)
BH25-16	SS3	1.5 - 2.1	4	24	53	19	Lean Clay with Sand (CL)
BH25-17	SS4	2.3 - 2.9	12	29	42	17	Sandy Lean Clay (CL)
MW25-18	SS3	1.5 - 2.1	23	29	40	8	Silty, Clayey Sand with Gravel (SC-SM)
BH25-19	SS4	2.3 - 2.9	5	26	51	18	Sandy Lean Clay (CL)
BH25-20	SS3	1.5 - 2.1	6	22	52	20	Lean Clay with Sand (CL)
BH25-21	SS2	0.8 - 1.4	19	33	36	12	Clayey Sand with Gravel (SC)
BH25-22	SS3	1.5 - 2.1	17	28	41	14	Sandy Lean Clay with Gravel (CL)
BH25-23	SS3	1.5 - 2.1	16	28	42	14	Sandy Silty Clay with Gravel (CL-ML)

Table 3.3

Summary of Single Well Response Tests
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastructure Ontario

	Hydraulic Conductivity (cm/s)	Hydraulic Conductivity (cm/s)
Borehole ID	**Falling**	**Rising**
MW25-07	8.69E-04	9.23E-04
MW25-11	-	1.10E-02
	-	1.58E-02
MW25-18	-	7.83E-02
	-	6.00E-02
	Geometric Mean	9.32E-03

Table 3.4

Summary of Groundwater Levels (mBGS)
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

	MW25-07	MW25-08	MW25-11	MW25-14	MW25-18
Top of Riser (mAMSL):	160.54	161.92	160.10	160.78	159.84
Ground Surface (mAMSL):	159.56	161.00	159.25	159.90	158.93
20-Jun-25	0.50	-	2.73	-	-
23-Jun-25	-	-	-	-	1.98
27-Jun-25	0.40	2.87	2.68	DRY	2.66
10-Jul-25	0.44	2.50	2.60	DRY	2.59
11-Jul-25	1.06	*	2.70	DRY	2.62
21-Oct-25	2.31	2.96	3.63	DRY	3.42
18-Dec-25	2.23	DRY	3.57	DRY	3.37
23-Jan-26	0.90	1.63	2.63	DRY	2.52

Notes:

- \- No data available (inaccessible, not found, damaged, destroyed, not measured)
- * Well still recovering from development
- mBGS metres below ground surface
- mAMSL metres above mean sea level

Table 3.5

Summary of Groundwater Elevation (mAMSL)
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

	MW25-07	MW25-08	MW25-11	MW25-14	MW25-18
Top of Riser (mAMSL):	160.54	161.92	160.10	160.78	159.84
Ground Surface (mAMSL):	159.56	161.00	159.25	159.90	158.93
20-Jun-25	159.06	-	156.52	-	-
23-Jun-25	-	-	-	-	156.95
27-Jun-25	159.16	158.13	156.57	DRY	156.27
10-Jul-25	159.12	158.50	156.65	DRY	156.34
11-Jul-25	158.50	*	156.55	DRY	156.31
21-Oct-25	157.25	158.04	155.62	DRY	155.51
18-Dec-25	157.33	DRY	155.68	DRY	155.56
23-Jan-26	158.66	159.37	156.62	DRY	156.41

Notes:

- \- No data available (inaccessible, not found, damaged, destroyed, not measured)
- * Well still recovering from development
- mBGS metres below ground surface
- mAMSL metres above mean sea level

Table 3.6

Groundwater Analytical Results - PWQO
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastructure Ontario

Sample Location:			**MW25-11**
Sample ID:			**GW-12669624-071025-DB-001**
Sample Date:			**7/10/2025**
Field SDG:			**WT2518423**
		PWQO	
Parameters	**Units**		
Metals			
Aluminum	mg/L	0.075	0.0365 DLHC
Antimony	mg/L	0.02	ND(0.00100) DLHC
Arsenic	mg/L	0.005	ND(0.00100) DLHC
Barium	mg/L	-	0.0671 DLHC
Beryllium	mg/L	0.011	ND(0.000200) DLHC
Boron	mg/L	0.2	**0.710 DLHC**
Cadmium	mg/L	0.0002	ND(0.0000500) DLHC
Calcium	mg/L	-	128 DLHC
Chromium	mg/L	0.001	ND(0.00500) DLHC
Cobalt	mg/L	0.0009	ND(0.00100) DLHC
Copper	mg/L	0.005	ND(0.00500) DLHC
Iron	mg/L	0.3	ND(0.100) DLHC
Lead	mg/L	0.005	ND(0.000500) DLHC
Manganese	mg/L	-	0.00805 DLHC
Molybdenum	mg/L	0.04	0.00242 DLHC
Nickel	mg/L	0.025	ND(0.00500) DLHC
Phosphorus	mg/L	0.01	ND(0.500) DLHC
Selenium	mg/L	0.1	ND(0.000500) DLHC
Silver	mg/L	0.0001	ND(0.000100) DLHC
Sodium	mg/L	-	75.1 DLHC
Thallium	mg/L	0.0003	ND(0.000100) DLHC
Tungsten	mg/L	0.03	ND(0.00100) DLHC
Uranium	mg/L	0.005	**0.00640 DLHC**
Vanadium	mg/L	0.006	ND(0.00500) DLHC
Zinc	mg/L	0.03	ND(0.0300) DLHC
Zirconium	mg/L	0.004	ND(0.00200) DLHC
Dissolved Metals			
Aluminum (dissolved)	mg/L	0.075	ND(0.0100) DLHC
Antimony (dissolved)	mg/L	0.02	ND(0.00100) DLHC
Arsenic (dissolved)	mg/L	0.005	ND(0.00100) DLHC
Barium (dissolved)	mg/L	-	0.0685 DLHC
Beryllium (dissolved)	mg/L	0.011	ND(0.000200) DLHC
Bismuth (dissolved)	mg/L	-	ND(0.000500) DLHC
Boron (dissolved)	mg/L	0.2	**0.645 DLHC**

Table 3.6

Groundwater Analytical Results - PWQO
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastructure Ontario

Sample Location:			**MW25-11**
Sample ID:			**GW-12669624-071025-DB-001**
Sample Date:			**7/10/2025**
Field SDG:			**WT2518423**
		PWQO	
Parameters	**Units**		
Cadmium (dissolved)	mg/L	0.0002	ND(0.0000500) DLHC
Caesium (dissolved)	mg/L	-	ND(0.000100) DLHC
Calcium (dissolved)	mg/L	-	127 DLHC
Chromium (dissolved)	mg/L	0.001	ND(0.00500) DLHC
Cobalt (dissolved)	mg/L	0.0009	ND(0.00100) DLHC
Copper (dissolved)	mg/L	0.005	ND(0.00200) DLHC
Iron (dissolved)	mg/L	0.3	ND(0.100) DLHC
Lead (dissolved)	mg/L	0.005	ND(0.000500) DLHC
Lithium (dissolved)	mg/L	-	0.0597 DLHC
Magnesium (dissolved)	mg/L	-	52.7 DLHC
Manganese (dissolved)	mg/L	-	0.00530 DLHC
Molybdenum (dissolved)	mg/L	0.04	0.00237 DLHC
Nickel (dissolved)	mg/L	0.025	ND(0.00500) DLHC
Phosphorus (dissolved)	mg/L	0.01	ND(0.500) DLHC
Potassium (dissolved)	mg/L	-	6.28 DLHC
Rubidium (dissolved)	mg/L	-	0.00312 DLHC
Selenium (dissolved)	mg/L	0.1	ND(0.000500) DLHC
Silicon (dissolved)	mg/L	-	4.21 DLHC
Silver (dissolved)	mg/L	0.0001	ND(0.000100) DLHC
Sodium (dissolved)	mg/L	-	69.8 DLHC
Strontium (dissolved)	mg/L	-	6.41 DLHC
Sulfur (dissolved)	mg/L	-	72.4 DLHC
Tellurium (dissolved)	mg/L	-	ND(0.00200) DLHC
Thallium (dissolved)	mg/L	0.0003	ND(0.000100) DLHC
Thorium (dissolved)	mg/L	-	ND(0.00100) DLHC
Tin (dissolved)	mg/L	-	ND(0.00100) DLHC
Titanium (dissolved)	mg/L	-	ND(0.00300) DLHC
Tungsten (dissolved)	mg/L	0.03	ND(0.00100) DLHC
Uranium (dissolved)	mg/L	0.005	**0.00633 DLHC**
Vanadium (dissolved)	mg/L	0.006	ND(0.00500) DLHC
Zinc (dissolved)	mg/L	0.03	ND(0.0100) DLHC
Zirconium (dissolved)	mg/L	0.004	ND(0.00300) DLHC
General Chemistry			
Alkalinity, bicarbonate	mg/L	-	275
Alkalinity, carbonate	mg/L	-	ND(2.0)
Alkalinity, hydroxide	mg/L	-	ND(2.0)

Table 3.6

Groundwater Analytical Results - PWQO
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastructure Ontario

Sample Location:			**MW25-11**
Sample ID:			**GW-12669624-071025-DB-001**
Sample Date:			**7/10/2025**
Field SDG:			**WT2518423**
		PWQO	
Parameters	**Units**		
Alkalinity, phenolphthalein	mg/L	-	ND(2.0)
Alkalinity, total (as CaCO3)	mg/L	25% of natural	275
Ammonia-N	mg/L	-	0.162
Anion sum	meq/L(me/L)	-	14.3
Anion/Cation ratio	%	-	-1.42
Biochemical oxygen demand (BOD)	mg/L	-	ND(3.0) BODL
Cation sum	meq/L(me/L)	-	13.9
Chloride	mg/L	-	140 DLDS
Color (true)	TCU	-	ND(2.0)
Conductivity	uS/cm	-	1290
Cyanide (total)	mg/L	0.005	ND(0.0020)
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	1.62
Fluoride	mg/L	-	0.258 DLDS
Hardness	mg/L	-	534
Hydrogen sulfide (calculated)	mg/L	-	ND(0.0016)
Nitrate (as N)	mg/L	-	2.93 DLDS
Nitrite (as N)	mg/L	-	ND(0.050) DLDS
Nitrite/Nitrate	mg/L	-	2.93
Orthophosphate (dissolved)	mg/L	-	ND(0.0010)
pH, field	s.u.	6.5-8.5	7.12
pH, lab	s.u.	6.5-8.5	7.80
Phosphorus	mg/L	0.01	0.0025
Sulfate	mg/L	-	223 DLDS
Sulfide	mg/L	-	ND(0.0015)
Temperature, field	Deg C	-	21.0
Total dissolved solids (TDS)	mg/L	-	669
Total kjeldahl nitrogen (TKN)	mg/L	-	0.476
Total organic nitrogen (dissolved)	mg/L	-	0.314
Total suspended solids (TSS)	mg/L	-	ND(3.0)
Turbidity	NTU	10% of natural	0.92
Un-ionized ammonia (as NH3) (calculated)	mg/L	-	0.0011

Footnotes:
ND - Not detected at the associated reporting limit.
BODL - Limit of Reporting for BOD was increased to account for the largest volume of sample tested.
DLDS - Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC - Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Table 3.7

Summary of Groundwater Analytical Results - Halton and Oakville Sewer By-Law
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastructure Ontario

Sample Location:					**MW25-11**
Sample ID:					**GW-12669624-071025-DB-001**
Sample Date:					**7/10/2025**
Field SDG:					**WT2518420**
		Oakville	**HALTON**		
Parameters	**Units**	**Combined a**	**Storm a**	**Sanitary b**	
Volatile Organic Compounds					
1,1,2,2-Tetrachloroethane	mg/L	0.017	0.017	-	ND(0.0005)
1,2-Dichlorobenzene	mg/L	0.0056	0.0056	-	ND(0.0005)
1,4-Dichlorobenzene	mg/L	0.0068	0.0068	0.08	ND(0.0005)
Benzene	mg/L	0.002	0.002	0.01	ND(0.0005)
Chloroform (Trichloromethane)	mg/L	0.002	0.002	0.04	ND(0.0005)
cis-1,2-Dichloroethene	mg/L	0.0056	0.0056	-	ND(0.0005)
Ethylbenzene	mg/L	0.002	0.002	0.16	ND(0.0005)
m&p-Xylenes	mg/L	-	-	-	ND(0.0004)
Methylene chloride	mg/L	0.0052	0.0052	2.0	ND(0.001)
o-Xylene	mg/L	-	-	-	ND(0.0003)
Tetrachloroethene	mg/L	0.0044	0.0044	1.0	ND(0.0005)
Toluene	mg/L	0.002	0.002	0.016	ND(0.0005)
trans-1,3-Dichloropropene	mg/L	0.0056	0.0056	-	ND(0.0003)
Trichloroethene	mg/L	0.0076	0.0076	0.4	ND(0.0005)
Xylenes (total)	mg/L	0.0044	0.0044	-	ND(0.0005)
PAHs					
1-Methylnaphthalene	mg/L	-	0.0008	-	ND(0.00001)
2-Methylnaphthalene	mg/L	-	0.0088	-	ND(0.00001)
Acenaphthene	mg/L	-	0.015	-	ND(0.00001)
Acenaphthylene	mg/L	-	0.001	-	ND(0.00001)
Anthracene	mg/L	-	-	-	ND(0.00001)
Benzo(a)anthracene	mg/L	-	-	-	ND(0.00001)
Benzo(a)pyrene	mg/L	-	-	-	ND(0.000005)
Benzo(b)fluoranthene/Benzo(j)fluoranthene	mg/L	-	0.002	-	ND(0.00001)
Benzo(g,h,i)perylene	mg/L	-			ND(0.00001)
Benzo(k)fluoranthene	mg/L	-			ND(0.00001)
Chrysene	mg/L	-	-	-	ND(0.00001)
Dibenz(a,h)anthracene	mg/L	-	-	-	ND(0.000005)
Fluoranthene	mg/L	-	-	-	ND(0.00001)
Fluorene	mg/L	-	-	-	ND(0.00001)
Indeno(1,2,3-cd)pyrene	mg/L	-	-	-	ND(0.00001)
Naphthalene	mg/L	-	-	-	ND(0.00005)
Phenanthrene	mg/L	-	-	-	ND(0.00002)
Pyrene	mg/L	-	-	-	ND(0.00001)
Total PAH	mg/L	0.002	-	-	ND(0.00007)
			-	-	
Semi-Volatile Organic Compounds			-	-	
3,3'-Dichlorobenzidine	mg/L	0.0008	-	-	ND(0.0004)
bis(2-Ethylhexyl)phthalate (DEHP)	mg/L	0.0088	-	-	ND(0.0006)
Di-n-butylphthalate (DBP)	mg/L	0.015	-	-	ND(0.001)
Nonyl phenol	mg/L	0.001	-	-	ND(0.0004)
Nonyl phenol diethoxylates	mg/L	-	-	0.14	ND(0.0001)
Nonyl phenol ethoxylate (total)	mg/L	0.01	-	-	ND(0.002)
Nonyl phenol monoethoxylates	mg/L	-	-	-	ND(0.0004)
Pentachlorophenol	mg/L	0.002	0.002	-	ND(0.0005)

Table 3.7

Summary of Groundwater Analytical Results - Halton and Oakville Sewer By-Law
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastructure Ontario

Sample Location:					**MW25-11**
Sample ID:					**GW-12669624-071025-DB-001**
Sample Date:					**7/10/2025**
Field SDG:					**WT2518420**
			HALTON		
Parameters	**Units**	**Oakville Combined a**	**Storm a**	**Sanitary b**	
Metals					
Aluminum	mg/L	-	-	50	0.0356 DLHC
Antimony	mg/L	-	-	5	ND(0.00100) DLHC
Arsenic	mg/L	0.02	0.02	1.0	ND(0.00100) DLHC
Beryllium	mg/L	-	-	5	ND(0.000200) DLHC
Cadmium	mg/L	0.008	0.008	1.0	ND(0.0000500) DLHC
Chromium	mg/L	0.08	0.08	3	ND(0.00500) DLHC
Chromium VI (hexavalent)	mg/L	0.04	0.04	-	ND(0.00050)
Cobalt	mg/L	-	-	5	ND(0.00100) DLHC
Copper	mg/L	0.04	0.04	3	ND(0.00500) DLHC
Iron	mg/L	-	-	50	ND(0.100) DLHC
Lead	mg/L	0.12	0.12	3	ND(0.000500) DLHC
Manganese	mg/L	0.05	0.05	5	0.00626 DLHC
Mercury	mg/L	0.0004	0.0004	0.05	ND(0.0000050)
Molybdenum	mg/L	-	-	5	0.00232 DLHC
Nickel	mg/L	0.08	0.08	3	ND(0.00500) DLHC
Selenium	mg/L	0.02	0.02	5	ND(0.000500) DLHC
Silver	mg/L	0.12	0.12	5	ND(0.000100) DLHC
Tin	mg/L	-	-	5	ND(0.00100) DLHC
Titanium	mg/L	-	-	5	ND(0.00300) DLHC
Zinc	mg/L	0.04	0.04	3	ND(0.0300) DLHC
PCBs					
Aroclor-1016 (PCB-1016)	mg/L	-	0.0004	-	ND(0.00002)
Aroclor-1221 (PCB-1221)	mg/L	-	0.0004	-	ND(0.00002)
Aroclor-1232 (PCB-1232)	mg/L	-	0.0004	-	ND(0.00002)
Aroclor-1242 (PCB-1242)	mg/L	-	0.0004	-	ND(0.00002)
Aroclor-1248 (PCB-1248)	mg/L	-	0.0004	-	ND(0.00002)
Aroclor-1254 (PCB-1254)	mg/L	-	0.0004	-	ND(0.00002)
Aroclor-1260 (PCB-1260)	mg/L	-	0.0004	-	ND(0.00002)
Aroclor-1262 (PCB-1262)	mg/L	-	0.0004	-	ND(0.00002)
Aroclor-1268 (PCB-1268)	mg/L	-	0.0004	-	ND(0.00002)
Total PCBs	mg/L	0.0004	0.0004	-	ND(0.00006)
Pesticides					
2,4'-DDD	mg/L	-	-	-	ND(0.000004)
2,4'-DDE	mg/L	-	-	-	ND(0.000004)
2,4'-DDT	mg/L	-	-	-	ND(0.000004)
4,4'-DDD	mg/L	-	-	-	ND(0.000004)
4,4'-DDE	mg/L	-	-	-	ND(0.000004)
4,4'-DDT	mg/L	-	0.00004	-	ND(0.000004)
Aldrin	mg/L	-	-	-	ND(0.000008)
Aldrin & Dieldrin	mg/L	0.00008	0.00008	-	ND(0.000011)
alpha-Chlordane	mg/L	-	-	-	ND(0.000008)
Chlordane	mg/L	0.04	0.04	-	ND(0.000011)
Chlordane, technical	mg/L	-	-	-	ND(0.000008)
DDT and metabolites	mg/L	0.00004	-	-	ND(0.00001)
Dieldrin	mg/L	-	-	-	ND(0.000008)
gamma-BHC (lindane)	mg/L	-	-	-	ND(0.000008)
Mirex	mg/L	0.04	0.04	-	ND(0.000008)

Table 3.7

Summary of Groundwater Analytical Results - Halton and Oakville Sewer By-Law
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, ON
Infrastructure Ontario

Sample Location:					**MW25-11**
Sample ID:					**GW-12669624-071025-DB-001**
Sample Date:					**7/10/2025**
Field SDG:					**WT2518420**
			HALTON		
Parameters	**Units**	**Oakville Combined a**	**Storm a**	**Sanitary b**	
General Chemistry					
Biochemical oxygen demand (BOD)	mg/L	15	15	300	ND(3.0) BODL
Cyanide (total)	mg/L	0.02	0.02	2	ND(0.0020)
Escherichia coli	MPN/100mL	200	-	200	1
Fluoride	mg/L	-	-	10	0.223 DLDS
Mineral oil and grease	mg/L	-	-	15	ND(5.0)
Oil and grease	mg/L	-	-	-	ND(5.0)
Oil and grease, animal and vegetable	mg/L	-	-	150	ND(5)
pH, lab	s.u.	6.5-8.5	-	6.5-8.5	8.04
Phenolics (total)	mg/L	0.008	0.008	1.0	0.0045
Phosphorus	mg/L	0.4	0.4	10	0.0028
Sulfate	mg/L	-	-	1500	212 DLDS
Total kjeldahl nitrogen (TKN)	mg/L	-	-	100	0.432
Total suspended solids (TSS)	mg/L	15	15	350	4.5

Footnotes:
ND - Not detected at the associated reporting limit.
BODL - Limit of Reporting for BOD was increased to account for the largest volume of sample tested.
DLDS - Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC - Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Appendices

Appendix A

Field Methods

Appendix A Field Investigation Methodology and Protocols

Utility Locates

Prior to initiating the subsurface investigation activities, all applicable utility companies (gas, telephone, network cables, pipelines and sewers) were contacted through Ontario One-Call. Also, a private utility locator was utilized to demarcate the location of the respective underground utilities to ensure the lines were not damaged during the investigation work.

Health and Safety

A Site-specific Health and Safety Plan (HASP) outlining specific job tasks and their related hazards was prepared and implemented by GHD prior to initiating field activities. The HASP presents the visually observed Site conditions and identifies potential physical hazards to field personnel. All GHD field and project staff working on and/or visiting the site were required to sign the HASP to document their knowledge of the potential hazards while on-site.

All drilling activities were conducted under Level D Personal Protective Equipment (PPE), which consisted of protective gloves, hard hats, safety glasses, safety boots and reflective vests at all times.

Soil Classification

The soil was logged using the Unified Soil Classification System (USGS), making special note of any visual or olfactory evidence of potential impacts.

Monitoring Well Installation

Monitoring wells were installed in selected boreholes by the licensed water well drillers consistent with Regulation 903 – Wells. GHD technical staff supervised the monitoring well construction and well development to ensure conformance with GHD's Standard Operating Procedures.

The monitoring wells were constructed with 2-inch (~50 mm) Schedule 40 PVC screen and casing. The screen length used for the monitoring wells was 1.5 or 3.0 metres on average and pre-slotted (No. 10 slot). The annular space between the monitoring well screen and surrounding geological formation were backfilled with No. 3 grade silica sand to an average height of 0.6 metres above the top of the screen. The remaining annular space was backfilled with bentonite. Some monitoring wells were installed with minor alteration to the above installation details, due to the specific conditions encountered.

To complete the instrumentation, an expandable J-plug was installed on the riser style casing to cover the top of the riser pipe to protect against debris falling into the well and surface runoff infiltration. All wells were installed in a flushmount or monument configuration with concrete collar around the protective casing. Each groundwater monitoring well was instrumented with dedicated sampling equipment consisting of polyethylene tubing and Waterra foot valves for monitoring well development and installation.

Monitoring Well Development

Subsequent to the monitoring well installation, each well was developed to ensure hydraulic connection with the screened hydrostratigraphic unit. A hydraulic connection ensures that groundwater levels and samples are representative of the subsurface condition. Development also aids in achieving low-turbidity samples.

The wells were developed using dedicated 5/8” (~16 mm) diameter polyethylene tubing with a Waterra foot valve. Well development activities were undertaken until purged water was clear. In cases where a well was purged dry before sufficient development, the well water level was allowed to recover before continuing.

Surveying

Subsequent to installation, all wells and boreholes were surveyed for vertical and lateral control, and for water table elevation reference, using a geodetic benchmark to tie in vertical elevations relative to metres above mean sea level (mAMSL) at the Site. The ground surface and top of riser pipe elevation of each of well were surveyed with respect to this benchmark.

Water Level Measurements

The measurement of groundwater levels in monitoring wells was required during the hydrogeological investigation in order to determine the presence and depth of groundwater. Water level measurements were used to determine: hydraulic head, hydraulic gradients and the direction of groundwater flow.

Since many decisions concerning the vertical and horizontal flow of groundwater through various types of geologic conditions depend on groundwater/fluid measurements, the accuracy of the measurements made at an appropriate level of precision is very important. Typically, the precision required is 1 mm, and the equipment employed had measurement resolution at this level.

Manual groundwater level measurements were measured using a Solinst water level meter. Measurements were obtained by lowering the electrode, attached to a graduated polyethylene tape, slowly into the well until the indicator sounded. To ensure accuracy, all fluid level readings were double-checked in the field when recorded.

In order to provide reliable data, each round of water level measurements was collected over as short a period of time as possible. Barometric pressure can affect groundwater levels and, therefore, observation of significant weather changes during the period of water level measurements was noted. Rainfall events and groundwater pumping can also affect groundwater level measurements. Personnel collecting water level data noted if any of these controls are in effect during the groundwater level collection period.

Groundwater Sampling

Prior to initiating groundwater sample collection, the wells were purged of the standing stagnant groundwater volume using a dedicated Waterra foot valve and polyethylene tubing. Purging was performed until the water in the well was representative of the actual conditions in the hydrostratigraphic unit. Stabilization was achieved by the removal of at least three times the volume of standing water in the well. Purging was considered complete once purged groundwater field parameters including conductivity, temperature and pH were stable. Stabilization was achieved when field measurements for conductivity and temperature were within a range of plus or minus 10 percent of the average for the last three readings and field measurements for pH were within a range of plus or minus 0.1 pH unit of the average for the last three readings.

The wells were purged using dedicated inertial pumps. In the event of a slowly recharging well, the well was pumped dry to ensure all standing water was removed from the sand pack and then allowed to recover prior to sample collection.

In the event of a well with groundwater that contains a high amount of silt or sediment after well development, a 0.75"x36" PVC water bailer was used to collect the water.

Water samples were collected directly from the dedicated tubing or bailer to laboratory supplied sample containers. Samples were relinquished to an accredited analytical laboratory under Chain of Custody protocols.

Single Well Response Tests

Single well response tests (SWRT) were completed in selected monitoring well installations to determine the hydraulic conductivity of the screened geologic formation. The SWRT consisted of falling head tests (slug tests), and rising head tests (recovery rests) as described in the sections below.

1.1 Falling Head Test (Slug Test)

The slug test involves causing a sudden change in water level in a well and measuring the water level response within that well. Water level change may be induced by suddenly injecting or emplacing a known quantity or "slug" into the well. The slug can water or solid (stainless steel, polyvinyl chloride). A detailed description of the procedure is provided, as follows:

i) The static water level was determined prior to any testing of the well.

ii) A datalogger, programmed to measure water pressure at an appropriate interval (eg. 5 seconds), was installed in the well at a known depth.

iii) A slug of known dimensions was set in place just above the static water level.

iv) The slug was then released instantaneously until it was completely submerged in the water column.

v) After the initial positive displacement of the water column, water levels were monitored manually.

vi) When the water level reached approximately 90 percent of the original observed (static) water level, the slug was then rapidly removed from the water column to initiate a "rising-head" test.

1.2 Rising Head Test (Recovery Test)

The recovery test also involves causing a sudden change in water level in a well and measuring the water level response within that well. Water level change may be induced by suddenly removing a known quantity or "slug" out of the well. The slug is usually a stainless steel or polyvinyl chloride rod.

Recovery tests were carried out after the slug tests described above. Water level monitoring continued until the water level was within 10 percent of the original static level.

Guelph Permeameter Tests

Guelph Permeameter tests provide information on soil infiltration capacity that is used in the assessment of stormwater management options. The Guelph Permeameter is a well-known constant-head borehole permeameter technique[1].

Guelph Permeameter tests are carried out in the vadose zone above the water table, where the soil is unsaturated. The method measures the steady-state flow rate (Q) necessary to maintain a constant depth of water (H) in an uncased borehole. The hydraulic conductivity measured in the vadose zone is referred to as the “field-saturated” hydraulic conductivity (K_{fs}) and is calculated from Q and H using the analytical

[1] ASTM D5126.D5126M-90. Standard Guide for Comparison of Field Methods for Determining Hydraulic Conductivity in Vadose Zone. ASTM International, 2010.

solutions[2] provided by the Guelph Permeameter manufacturer[3]. The analytical solution input parameters include the following:

- Reservoir cross sectional area
- Water height
- Borehole radius
- Soil texture
- Steady state rate of water level change.

The GP method measures the steady -state rate necessary to maintain a constant depth of water in an uncased cylindrical borehole above the water table. A summary of field procedures is presented below:

- Excavate a cylindrical borehole to the desired depth in the material to be tested;
- Fill the permeameter with liquid and insert it in the well;
- Start the permeameter by raising the air-inlet tube out of the outlet port;
- Set the desired H level by adjusting the height of the air-inlet tube;
- Monitor the rate of fall of the liquid surface in the reservoir until a steady rate, r, is attained;

The field saturated hydraulic conductivity is calculated using an approximate analytical solution.

[2] Elrick, D.E. and W.D. Reynolds. Methods Of Analyzing Constant Head Well Permeameter Data. Soil Sci. Soc. Am. J. 56: 320-323. 1992b.

[3] Soil Moisture Equipment Corp. Goleta, California.

Appendix B

Stratigraphic and Instrumentation Logs

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-01

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 26/06/2025 **Northing:** 4811876.60 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599616.43 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 160.24 m **Final Depth:** 3.12 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.00 / 160.24																		
	0.20 / 160.04		TOPSOIL (203 mm)																
	0.76 / 159.48		FILL: Lean CLAY with Sand, contains rootlets, brown, moist, stiff	SS1	87	2-4-4-4	8	0							21				
1			NATIVE: Lean CLAY with Sand (CL), trace gravel, contains shale fragments, reddish brown, moist to wet, very stiff to hard	SS2	96	4-10-11-15	21	0							18				
2				SS3	96	6-17-18-50	35	0	3	25	61	11			9	18-26	8		
				SS4	100	16-29-50 /25 mm	79	0							19				
3	3.05 / 157.19		WEATHERED SHALE, red	SS5	100	50/76 mm	R	0							4				
	3.12 / 157.12		End of Hole at 3.12 m BGS																
4																			
5																			
6																			
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

▽ **At Time of Drilling:**

▼ **Upon Completion of Drilling:** 1.92 m **on** 26/06/2025

▽ **Last Water Level Taken:**

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH25-02
Project Number: 12669624

Client: Infrastructure Ontario
Project: Proposed MECP-MLITSD Science Facility Complex
Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario
Date (dd/mm/yyyy): 27/06/2025
Drilling Company: 3D Drilling
Equipment Used: Track Mounted CME 55
Drilling Method(s): Hollow Stem Auger
Hole Diameter(s): 197 mm

Northing: 4811901.32 m
Easting: 599653.71 m
Horizontal Datum: NAD83 / UTM zone 17N
Elevation: 161.11 m
Elevation Datum:
Coordinates and Elevation Values are Surveyed

Logged By: Reza Bay
Reviewed By: Brice Zanne
Final Depth: 3.28 m

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.15 / 160.96		TOPSOIL (152 mm)																
	0.76 / 160.35		FILL: Silty CLAY with Sand, trace gravel, contains rootlets, brown, moist, stiff	SS1	96	2-6-6-8	12	0							21				
1			NATIVE: Sandy Silty CLAY (CL-ML), trace sand, trace gravel, brown to reddish brown, signs of oxidation, moist, very stiff to hard	SS2	100	6-11-15-18	26	0						21.5	12				
2				SS3	100	7-15-19-22	34	0							13				
				SS4	100	7-16-22-47	38	0	7	35	45	13			11	16-23	7		
3	3.05 / 158.06		WEATHERED SHALE/BEDROCK, red	SS5	100	38-50 /77 mm	R	0							4				
	3.28 / 157.83		End of Hole at 3.28 m BGS																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
At Time of Drilling:
Upon Completion of Drilling: Dry
Last Water Level Taken:
N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-03

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 19/06/2025 **Northing:** 4811947.67 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599684.32 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 160.24 m **Final Depth:** 2.79 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
0.15 / 160.09		TOPSOIL (152 mm)																
		FILL: Silty CLAY with Sand, contains rootlets, brown, moist, stiff	SS1	58	2-4-4-5	8	90.1							14				
0.76 / 159.48		NATIVE: Lean CLAY with Sand (CL), trace gravel, brown to reddish brown, moist, very stiff to hard	SS2	71	3-7-12-18	19	8.5							15				
			SS3	71	9-19-20-31	39	8.9	6	15	60	19			11	17-25	8		
			SS4	100	19-45-50 /101 mm	95	8.2							8				
2.74 / 157.50		WEATHERED SHALE, red	SS5	100	50/51 mm	R	2.3							5				
2.79 / 157.45		End of Hole at 2.79 m BGS																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

▽ **At Time of Drilling:**

▼ **Upon Completion of Drilling:** 2.69 m **on** 19/06/2025

▽ **Last Water Level Taken:**

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-04

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 26/06/2025 **Northing:** 4811860.46 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599660.86 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 159.82 m **Final Depth:** 2.41 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
0	0.00 / 159.82																		
			FILL: Silty CLAY with Sand, organics, contains rootlets, dark brown, moist, firm	SS1	79	1-2-3-5	5	0							20				
	0.76 / 159.06		NATIVE: Lean CLAY with Sand (CL), trace gravel, reddish brown to red, signs of oxidation, moist, stiff to hard	SS2	75	2-4-9-15	13	0	3	23	56	18		21.5	12	17-25	8		
1			- contains weathered shale at 1.52 m BGS	SS3	82	6-20-50 /127 mm	70	0							10				
2	2.29 / 157.53		WEATHERED SHALE, red	SS4	100	50/127 mm	R	0							5				
	2.41 / 157.41		End of Hole at 2.41 m BGS																
3																			
4																			
5																			
6																			
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-05

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 19/06/2025 **Northing:** 4811915.24 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599705.18 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 161.07 m **Final Depth:** 3.30 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
0	0.00 / 161.07																		
	0.15 / 160.92		TOPSOIL (152 mm)																
			FILL: Silty CLAY with Sand, contains rootlets, brown, moist, stiff	SS1	54	3-6-6-5	12	0.1							16				
	0.76 / 160.31		NATIVE: Sandy Lean CLAY (CL), trace gravel, brown to reddish brown, moist, very stiff to hard	SS2	96	6-14-18-16	32	2.3							14				
1				SS3	100	5-12-16-21	28	1.5							13				
2				SS4	96	4-15-38-48	53	0.9	3	34	48	15			12	16-24	8		
3	3.05 / 158.02		WEATHERED SHALE, reddish brown	SS5	100	13-50 /102 mm	R	2.9							10				
	3.30 / 157.77		End of Hole at 3.30 m BGS																
4																			
5																			
6																			
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-06

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 26/06/2025 **Northing:** 4811811.82 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599639.63 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 159.94 m **Final Depth:** 2.51 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.00 / 159.94																		
	0.18 / 159.76		TOPSOIL (178 mm)																
	0.76 / 159.18		FILL: Lean CLAY with Sand, contains rootlets, dark brown, moist, firm	SS1	87	2-2-5-5	7	0							21				
1			NATIVE: Lean CLAY with Sand (CL), trace gravel, reddish brown, moist, very stiff to hard	SS2	100	5-8-10-16	18	0							14				
			- contains weathered shale at 1.52 m BGS	SS3	100	26-24-50 /127 mm	74	0	3	22	61	14			8	18-27	9		
2	2.29 / 157.65		WEATHERED SHALE, red	SS4	33	13-50 /77 mm	R	0							7				
	2.51 / 157.43		End of Hole at 2.51 m BGS																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

▽ **At Time of Drilling:**

▼ **Upon Completion of Drilling:** Dry

▽ **Last Water Level Taken:**

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

MW25-07

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 20/06/2025 **Northing:** 4811829.36 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599672.39 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger/HQ Coringe **Elevation:** 159.56 m **Final Depth:** 6.32 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Monitoring Well
0	0.00 / 159.56		FILL: Silty CLAY, trace sand, contains rootlets, dark brown, signs of oxidation, moist, firm	SS1	79	2-3-4-5	7	0.9							28				
	0.76 / 158.80		Lean CLAY, trace sand, contains rootlets, brown, signs of oxidation, moist, firm	SS2	71	2-3-4-6	7	0.9							20				
1	1.52 / 158.04		NATIVE: Sandy Silty CLAY with Gravel (CL-ML), reddish grey, moist, hard	SS3	100	24-33-50 /51 mm	83	0.4	17	21	51	11			8	18-25	7		
	2.13 / 157.43		WEATHERED SHALE, reddish brown	SS4	100	50/76 mm	R								6				
2	2.21 / 157.35		***End of Overburden. Refer to next page for Bedrock.***																
3																			
4																			
5																			
6			End of Hole at 6.32 m BGS																
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Bentonite
1.22
158.34
T.O.S.
1.83
157.73

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: 0.50 m **on** 20/06/2025

Last Water Level Taken: 10/07/2025

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)
MW25-07	160.54

T.O.S.: Top of Screen
B.O.S.: Bottom of Screen
Screen Diameter: mm
Screen Slot Size: 51 mm
Material: PVC
mBGS: Meters below ground surface
mBTOC: Meters below top of casing

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit
20/06/2025	0.50	mBGS
27/06/2025	0.40	mBGS
10/07/2025	0.44	mBGS

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Bedrock)

MW25-07

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 20/06/2025 **Northing:** 4811829.36 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599672.39 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger/HQ Coringe **Elevation:** 159.56 m **Final Depth:** 6.32 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Run Number	Core Recovery % Total	Core Recovery % Solid	'N'/RQD Value	Fracture Index (#/Interval)	Strength Data: Strength Index	Strength Data: Weathering Index	Water Level(s)	Defect Description	Monitoring Well
			Start of Bedrock Log. ***Refer to previous page for Overburden Details.***										
	2.21 / 157.35		SHALE, thinly bedded red shale, Run 1: slightly weathered (W2), weak (R2) Joints: 2.72, 2.82, 2.92, 3.23 m (0°); 2.51 m (0° - 1-5 mm open) Fragments: (2.21-2.46m)	Run 1	100	71	71	1.00 2.00 1.00 1.00	R2	W2			
	3.28 / 156.28		Limestone: (2.67-2.72m); (3.23-3.28m) Run 2: slightly weathered (W2), weak to medium strong (R2-R3) Joints: 3.76, 4.02, 4.09, 4.12, 4.40 m (0°); 4.22 m (0° - 1-5 mm open) Fragments: (3.28-3.41m); Limestone: (3.76-3.84m); (4.17-4.22m)	Run 2	100	87	83	0.00 1.00 3.00 2.00 0.00	R2-R3	W2			Sand
	4.80 / 154.76		Run 3: fresh (W1), weak to medium strong (R2-R3) Joints: 5.28 m (45°); 5.0-5.03 m (0° - Clay fill); 5.38 m (0° >10 mm open) Limestone: (5.03-5.18m); (5.41-5.59m)	Run 3	100	92	92	2.00 2.00 0.00 0.00 0.00	R2-R3	W1			B.O.S. 4.88 154.68
	6.32 / 153.24		End of Hole at 6.32 m BGS										

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: 0.50 m **on** 20/06/2025

Last Water Level Taken: 10/07/2025

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)
MW25-07	160.54

T.O.S.: Top of Screen
B.O.S.: Bottom of Screen
Screen Diameter: mm
Screen Slot Size: 51 mm
Material: PVC

mBGS: Meters below ground surface
mBTOC: Meters below top of casing

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit
20/06/2025	0.50	mBGS
27/06/2025	0.40	mBGS
10/07/2025	0.44	mBGS

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

MW25-08

Project Number: 12669624

Client: Infrastructure Ontario
Project: Proposed MECP-MLITSD Science Facility Complex
Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario
Date Range (dd/mm/yyyy): 18/06/2025 - 19/06/2025
Drilling Company: 3D Drilling
Equipment Used: Track Mounted CME 55
Drilling Method(s): Hollow Stem Auger
Hole Diameter(s): 197 mm

Northing: 4811888.79 m
Easting: 599698.52 m
Horizontal Datum: NAD83 / UTM zone 17N
Elevation: 161.00 m
Elevation Datum:
Coordinates and Elevation Values are Surveyed

Logged By: Reza Bay
Reviewed By: Brice Zanne
Final Depth: 3.23 m

Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Monitoring Well
0.00 / 161.00		FILL: Lean CLAY, trace sand, contains rootlets, brown, moist, stiff	SS1	71	3-4-4-5 /152 mm	8	59.3						20.1	19				
0.76 / 160.24		NATIVE: Sandy Lean CLAY (CL), trace gravel, brown, signs of oxidation, moist, very stiff to hard	SS2	96	6-13-16-21 /152 mm	29	44.3							14				
			SS3	96	7-15-21-24 /152 mm	36	48.2							13				
			SS4	100	5-14-22-39 /152 mm	36	29.8	4	31	49	16			12	16-24	8		
3.05 / 157.95		WEATHERED SHALE, reddish brown	SS5	86	36-50 /25 mm	R	6.8							5				
3.23 / 157.77		End of Hole at 3.23 m BGS Termination Note: Auger and spoon refusal.																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Monitoring Well: Bentonite 0.91 / 160.09; T.O.S. 1.52 / 159.48; Sand; 3.05 / 157.95; B.O.S. 3.05 / 157.95

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
▽ **At Time of Drilling:**
▼ **Upon Completion of Drilling:** Dry
▼ **Last Water Level Taken:** 10/07/2025
N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)
MW25-08	161.92

T.O.S.: Top of Screen
B.O.S.: Bottom of Screen
Screen Diameter: mm
Screen Slot Size: 51 mm
Material: PVC
mBGS: Meters below ground surface
mBTOC: Meters below top of casing

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit
27/06/2025	2.87	mBGS
10/07/2025	2.50	mBGS

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-09

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 26/06/2025 **Northing:** 4811862.61 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599697.37 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 159.64 m **Final Depth:** 2.49 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.00 / 159.64																		
	0.15 / 159.49		TOPSOIL (152 mm)																
			FILL: Lean CLAY with Sand, contains rootlets, brown, moist, firm	SS1	87	2-3-4-6	7	0							14				
	0.76 / 158.88		NATIVE: Sandy Silty CLAY (CL-ML), trace gravel, reddish brown, moist, very stiff to hard	SS2	100	4-12-14-17	26	0							12				
			- contains piece of broken rocks and red shale fragments at 1.52 m BGS	SS3	100	7-24-50 /127 mm	74	0	12	37	41	10			8	17-23	6		
	2.29 / 157.35		WEATHERED SHALE, red	SS4	75	30-50 /51 mm	R	0							8				
	2.49 / 157.15		End of Hole at 2.49 m BGS																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

▽ **At Time of Drilling:**

▼ **Upon Completion of Drilling:** Dry

▼ **Last Water Level Taken:**

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-10

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 25/06/2025 **Northing:** 4811874.75 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599752.33 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 160.42 m **Final Depth:** 3.12 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.00 / 160.42																		
	0.20 / 160.22		TOPSOIL (203 mm)																
			FILL: Lean CLAY, trace sand, contains rootlets, brown, moist, firm	SS1	62	2-3-3-3	6	1.6							17				
	0.76 / 159.66		NATIVE: Lean CLAY with Sand (CL), trace gravel, brown, signs of oxidation, moist, very stiff to hard	SS2	83	3-9-13-17	22	0.9	5	24	52	19			12	17-27	10		
1				SS3	87	6-13-21-30	34	0.1							13				
2			- contains red shale lenses at 2.29 m BGS	SS4	100	10-26-50 /127 mm	76	0							9				
3	3.05 / 157.37		WEATHERED SHALE, red	SS5	100	50/76 mm	R	0							5				
	3.12 / 157.30		End of Hole at 3.12 m BGS																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

MW25-11

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date Range (dd/mm/yyyy): 20/06/2025 - 23/06/2025

Drilling Company: 3D Drilling

Equipment Used: Track Mounted CME 55

Drilling Method(s): Hollow Stem Auger

Hole Diameter(s): 197 mm

Northing: 4811828.97 m

Easting: 599717.19 m

Horizontal Datum: NAD83 / UTM zone 17N

Elevation: 159.25 m

Elevation Datum:

Coordinates and Elevation Values are Surveyed

Logged By: Reza Bay

Reviewed By: Brice Zanne

Final Depth: 6.40 m

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Monitoring Well
	0.00 / 159.25		FILL: Lean CLAY with Sand, trace gravel, contains rootlets, dark brown, moist, firm to very stiff	SS1	71	3-3-4-4	7	0.4							26				
1			- contains pieces of rock /cobbles/ boulder at 0.76 m BGS	SS2	25	45-11-17-23	28	0.4	9	14	49	28			21	21-40	19		
	1.52 / 157.73		NATIVE: Sandy Lean CLAY (CL), contains pieces of shale, red, moist, hard	SS3	100	24-50 /127 mm	R	123.4						20.1	9				
2	2.11 / 157.14		***End of Overburden.*** ***Refer to next page for Bedrock.***																
3																			
4																			
5																			
6																			
			End of Hole at 6.40 m BGS																
7																			
8																			
9																			

Grain Size Analysis: Gravel %, Sand %, Silt %, Clay %, Fines %

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Water Level(s)

Monitoring Well: Bentonite; 1.52 / 157.73

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

▽ **At Time of Drilling:**

▼ **Upon Completion of Drilling:** 2.73 m **on** 23/06/2025

▼ **Last Water Level Taken:** 10/07/2025

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)
MW25-11	160.10

T.O.S.: Top of Screen
B.O.S.: Bottom of Screen
Screen Diameter: mm
Screen Slot Size: 51 mm
Material: PVC
mBGS: Meters below ground surface
mBTOC: Meters below top of casing

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit
20/06/2025	2.73	mBGS
27/06/2025	2.68	mBGS
10/07/2025	2.60	mBGS

Created with OpenGround Template: GHD-CA-GEO-Overburden-Rev02 / Strip Set: GHD-CA-GEO-Overburden-Log-V5 25/3/26

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Bedrock)

MW25-11

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date Range (dd/mm/yyyy): 20/06/2025 - 23/06/2025 | **Northing:** 4811828.97 m | **Logged By:** Reza Bay

Drilling Company: 3D Drilling | **Easting:** 599717.19 m | **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 | **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger | **Elevation:** 159.25 m | **Final Depth:** 6.40 m

Hole Diameter(s): 197 mm | **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Run Number	Core Recovery % Total	Core Recovery % Solid	'N'/RQD Value	Fracture Index (#/Interval)	Strength Data: Strength Index	Strength Data: Weathering Index	Water Level(s)	Defect Description	Monitoring Well
1			***Start of Bedrock Log.*** ***Refer to previous page for Overburden Details.***										
2	2.11 / 157.14		SHALE, thinly bedded red/gray limy shale Run 1: slightly weathered (W2), weak to medium strong (R2-R3) Joints: 3.33 m (0°); 3.23 m (20°); 2.52 m (0° - 1-5 mm open) Disintegrated to soil (2.11-2.47m, W4)	SS4 Run 1	100	67	R 67	0.00 1.00 0.00 1.00 1.00	R2-R3	W2	▼	2.41-3.35	T.O.S. 2.13 157.12
3	3.35 / 155.90		Limestone: (2.47-2.52 m); (2.77-2.85 m)										
4	4.88 / 154.37		Run 2: slightly weathered (W2), weak to medium strong (R2-R3) Joints: 3.60 m (0°); 4.72 m (20°); 3.35, 3.38 m (0° - 1-5 mm open); 3.99 m (0° -10 mm open); Limestone: (3.53-3.60 m); (4.16-4.21 m); (4.70-4.77 m)	Run 2	93	85	85	2.00 1.00 1.00 0.00 1.00	R2-R3	W2		3.35-4.88	Sand
5			Run 3: fresh (W1), medium strong (R3) Joints: 6.10 m (0° - 1-5mm open, Clay fill) Limestone: (5.26-5.39 m); (5.97-6.10 m)	Run 3	100	100	98	0.00 0.00 0.00 1.00 0.00	R3	W1		4.88-6.40	B.O.S. 5.18 154.07
6	6.40 / 152.85		End of Hole at 6.40 m BGS										
7													
8													
9													

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

▽ **At Time of Drilling:**

▼ **Upon Completion of Drilling:** 2.73 m **on** 23/06/2025

▽ **Last Water Level Taken:** 10/07/2025

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)
MW25-11	160.10

T.O.S.: Top of Screen
B.O.S.: Bottom of Screen
Screen Diameter: mm
Screen Slot Size: 51 mm
Material: PVC

mBGS: Meters below ground surface
mBTOC: Meters below top of casing

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit
20/06/2025	2.73	mBGS
27/06/2025	2.68	mBGS
10/07/2025	2.60	mBGS

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-12

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 25/06/2025 **Northing:** 4811773.01 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599691.78 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 160.97 m **Final Depth:** 3.53 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
0	0.00 / 160.97																		
	0.15 / 160.82		TOPSOIL (152 mm)																
			FILL: Lean CLAY with Sand, trace gravel, contains rootlets, brown, moist, stiff	SS1	79	3-6-7-8	13	0.3							9				
	0.76 / 160.21		NATIVE: Sandy Lean CLAY (CL), trace gravel, brown to reddish brown, moist, stiff to hard	SS2	71	4-3-5-7	8	0.2							18				
1			- signs of oxidation at 1.52 m BGS	SS3	100	3-9-12-17	21	0							15				
2				SS4	100	6-13-15-25	28	0	7	23	54	16			12	17-25	8		
3	3.53 / 157.44		- contains piece of red shale at 3.05 m BGS	SS5	100	13-35-49-50 /26 mm	84	0							9				
			End of Hole at 3.53 m BGS																
4																			
5																			
6																			
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-13

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 25/06/2025 **Northing:** 4811823.71 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599750.12 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 159.23 m **Final Depth:** 2.57 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.00 / 159.23																		
	0.25 / 158.98		TOPSOIL (254 mm)																
	0.76 / 158.47		FILL: Silty CLAY with Sand, contains rootlets, dark brown, moist, stiff	SS1	100	3-4-6-5	10	0							20				
1	1.52 / 157.71		Lean CLAY, trace sand, trace gravel, contains rootlets, brown, signs of oxidation, moist, stiff	SS2	71	2-3-8-15	11	0							16				
2	2.29 / 156.94		NATIVE: Lean CLAY with Sand (CL), trace gravel, red, moist, very stiff	SS3	100	3-8-11-30	19	0	7	17	57	19			13	17-25	8		
	2.57 / 156.66		WEATHERED SHALE, red	SS4	100	48-50 /127 mm	R	0							5				
			End of Hole at 2.57 m BGS																
3																			
4																			
5																			
6																			
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

MW25-14

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 18/06/2025 **Northing:** 4811783.16 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599734.42 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 159.90 m **Final Depth:** 3.15 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Monitoring Well
	0.00 / 159.90		FILL: Lean CLAY, trace sand, contains rootlets, brown, moist, firm to very stiff	SS1	75	2-4-2-5	6	0							22				Hole Plug 0.30 / 159.60
1				SS2	54	4-9-13-23	22	38.4							15				Bentonite 0.91 / 158.99
	1.52 / 158.38		NATIVE: Sandy Lean CLAY (CL), trace gravel, reddish brown, moist, hard	SS3	83	10-19-23-38	42	39.2	7	23	51	19		12	18-28	10		T.O.S. 1.52 / 158.38 Sand
2				SS4	100	10-46-49-50 /26 mm	95	40.8						9					
	3.05 / 156.85		WEATHERED SHALE, red	SS5	50	50/102 mm	R	4.9						3					3.05 / 156.85 B.O.S. 3.05 / 156.85
3	3.15 / 156.75		End of Hole at 3.15 m BGS																
4																			
5																			
6																			
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken: 10/07/2025

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)
MW25-14	160.78

T.O.S.: Top of Screen
B.O.S.: Bottom of Screen
Screen Diameter: mm
Screen Slot Size: 51 mm
Material: PVC
mBGS: Meters below ground surface
mBTOC: Meters below top of casing

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit
20/06/2025	N/A	mBGS
23/06/2025	N/A	mBGS
27/06/2025	N/A	mBGS
10/07/2025	N/A	mBGS

Created with OpenGround Template: GHD-CA-GEO-Overburden-Rev02 / Strip Set: GHD-CA-GEO-Overburden-Log-V5 25/3/26

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH25-15
Project Number: 12669624

Client: Infrastructure Ontario
Project: Proposed MECP-MLITSD Science Facility Complex
Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario
Date (dd/mm/yyyy): 24/06/2025
Drilling Company: 3D Drilling
Equipment Used: Track Mounted CME 55
Drilling Method(s): Hollow Stem Auger
Hole Diameter(s): 197 mm

Northing: 4811841.67 m
Easting: 599792.77 m
Horizontal Datum: NAD83 / UTM zone 17N
Elevation: 159.69 m
Elevation Datum:
Coordinates and Elevation Values are Surveyed

Logged By: Reza Bay
Reviewed By: Brice Zanne
Final Depth: 3.18 m

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	● SPT N-Value ▼ DCPT Value (blows 100mm) Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak □ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual ○ Moisture Content (%) PL w LL (20 40 60 80)	Water Level(s)	Backfill Details
	0.00 / 159.69																			
	0.18 / 159.51		TOPSOIL (178 mm)																	
1			FILL: Lean CLAY with Sand, contains rootlets, brown to grey, moist, brown, stiff to very stiff	SS1	58	2-4-6-9	10	0							14					
			- contains signs of oxidation at 0.76 m BGS	SS2	100	6-9-12-17	21	0	2	17	59	22			13	18-28	10			
	1.52 / 158.17		NATIVE: Sandy Lean CLAY (CL), contains shale fragments, brown to grey, moist, hard	SS3	29	29-19-38-33	57	0							11					
2			- contains piece of weathered shale, reddish brown at 2.29 m BGS	SS4	100	13-50-50 /76 mm	100	0							7					
3	3.05 / 156.64		WEATHERED SHALE, red	SS5	100 0			0							4					
	3.18 / 156.51		End of Hole at 3.18 m BGS																	

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
At Time of Drilling:
Upon Completion of Drilling: Dry
Last Water Level Taken:

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-16

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 25/06/2025 **Northing:** 4811743.46 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599743.66 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 160.27 m **Final Depth:** 3.94 m

Hole Diameter(s): 197 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.00 / 160.27																		
	0.15 / 160.12		TOPSOIL (154 mm)																
			FILL: Silty CLAY with Sand, contains rootlets, brown, moist, brown, stiff	SS1	79	2-5-5-4	10	0							15				
	0.76 / 159.51		Lean CLAY, trace sand, trace gravel, brown, moist, very stiff	SS2	71	3-8-9-15	17	0							13				
1	1.52 / 158.75		NATIVE: Lean CLAY with Sand (CL), trace gravel, brown to reddish brown, moist, hard	SS3	100	6-13-18-23	31	0	4	24	53	19			12	17-26	9		
2				SS4	100	9-19-20-29	39	0							11				
3			- contains piece of rock (red shale) at 3.05 m BGS	SS5	85	7-45-50 /25 mm	95	0							11				
	3.81 / 156.46		WEATHERED SHALE, red	SS6	60	50/127 mm	R	0							4				
4	3.94 / 156.33		End of Hole at 3.94 m BGS																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD
(Overburden)

BH25-17
Project Number: 12669624

Client: Infrastructure Ontario
Project: Proposed MECP-MLITSD Science Facility Complex
Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario
Date (dd/mm/yyyy): 24/06/2025
Drilling Company: 3D Drilling
Equipment Used: Track Mounted CME 55
Drilling Method(s): Hollow Stem Auger
Hole Diameter(s): 197 mm

Northing: 4811777.01 m
Easting: 599769.03 m
Horizontal Datum: NAD83 / UTM zone 17N
Elevation: 159.77 m
Elevation Datum:
Coordinates and Elevation Values are Surveyed

Logged By: Reza Bay
Reviewed By: Brice Zanne
Final Depth: 3.23 m

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.15 / 159.62		TOPSOIL (154 mm)																
	0.76 / 159.01		FILL: Lean CLAY, trace sand, contains rootlets, brown, moist, firm	SS1	71	2-3-4-5	7	0.1							17				
1			NATIVE: Sandy Lean CLAY (CL), trace gravel, brown, moist, very stiff to hard	SS2	100	4-7-9-11	16	0							14				
2				SS3	79	7-15-20-26	35	0							11				
				SS4	100	7-22-30-50 /127 mm	52	0	12	29	42	17			10	16-25	9		
3	3.05 / 156.72		WEATHERED SHALE, red	SS5	71	50-50 /26 mm	R								4				
	3.23 / 156.54		End of Hole at 3.23 m BGS																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:
Measuring Point Elevation may change; Refer to Current Elevation Table
At Time of Drilling:
Upon Completion of Drilling: Dry
Last Water Level Taken:
N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

MW25-18

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date Range (dd/mm/yyyy): 23/06/2025 - 24/06/2025 | **Northing:** 4811813.13 m | **Logged By:** Reza Bay

Drilling Company: 3D Drilling | **Easting:** 599791.24 m | **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 | **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger/HQ Coringe | **Elevation:** 158.93 m | **Final Depth:** 6.40 m

Hole Diameter(s): 197 mm | **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Monitoring Well
	0.00 / 158.93																		
1	0.15 / 158.78		TOPSOIL (154 mm)																
			FILL: Lean CLAY, trace sand, contains rootlets, dark brown to reddish brown, moist, firm to very stiff	SS1	71	1-3-3-4	6	0							21				
				SS2	96	2-7-10-12	17	0						20.8	16				
2	1.52 / 157.41		NATIVE: Sandy Silty CLAY with Gravel (CL-ML), contains red shale fragments, reddish brown, moist, hard	SS3	92	10-27-43-49	70	0	23	29	40	8			8	16-23	7		
	2.13 / 156.80		***End of Overburden. Refer to next page for Bedrock.***																
3																			
4																			
5																			
6																			
			End of Hole at 6.40 m BGS																
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Bentonite
1.52
157.41
T.O.S.
2.13
156.80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

▽ **At Time of Drilling:**

▼ **Upon Completion of Drilling:** 1.98 m **on** 24/06/2025

▼ **Last Water Level Taken:** 10/07/2025

Well - Reference Elevation(s)	
Location	Elevation (m)
MW25-18	159.84

T.O.S.: Top of Screen
B.O.S.: Bottom of Screen
Screen Diameter: mm
Screen Slot Size: 51 mm
Material: PVC
mBGS: Meters below ground surface
mBTOC: Meters below top of casing

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit
23/06/2025	1.98	mBGS
27/06/2025	2.66	mBGS
10/07/2025	2.59	mBGS

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Bedrock)

MW25-18

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date Range (dd/mm/yyyy): 23/06/2025 - 24/06/2025 | **Northing:** 4811813.13 m | **Logged By:** Reza Bay

Drilling Company: 3D Drilling | **Easting:** 599791.24 m | **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 | **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger/HQ Coringe | **Elevation:** 158.93 m | **Final Depth:** 6.40 m

Hole Diameter(s): 197 mm | **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Run Number	Core Recovery % Total	Core Recovery % Solid	'N'/RQD Value	Fracture Index (#/Interval)	Strength Data: Strength Index	Strength Data: Weathering Index	Water Level(s)	Defect Description	Monitoring Well
1			***Start of Bedrock Log.*** ***Refer to previous page for Overburden Details.***										
2	2.13 / 156.80		SHALE, thinly bedded red/gray limy shale Run 1: slightly weathered (W2), weak to medium strong (R2-R3) Disintegrated to soil and rock fragments: (2.13-2.92 m, W4); Fragments: (3.12-3.22 m) Limestone: (3.27-3.35 m)	Run 1	100	27	23	0.00 0.00 0.00 1.00	R2-R3	W2			
3	3.35 / 155.58		Run 2: slightly weathered (W2), weak to medium strong (R2-R3) Joints: 3.40, 3.55 m (0° - 1-5 mm open); 3.91, 4.26, 4.70 m (0° - 10 mm Clay fill) Fragments-Clay fill (3.78-3.91 m) Limestone (4.04-4.11 m); (4.16-4.19 m); (4.59-4.80 m)	Run 2	100	88	88	2.00 1.00 1.00 0.00 1.00	R2-R3	W2			Sand
4	4.88 / 154.05		Run 3: thinly bedded red limy shale fresh (W1), medium strong (R3) Joints: 4.96 m (0°)	Run 3	100	97	95	1.00 0.00 0.00 0.00 0.00	R3	W1			B.O.S. 5.18 / 153.75
5													
6	6.40 / 152.53		End of Hole at 6.40 m BGS										
7													
8													
9													

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: 1.98 m **on** 24/06/2025

Last Water Level Taken: 10/07/2025

Well - Reference Elevation(s)	
Location	Elevation (m)
MW25-18	159.84

T.O.S.: Top of Screen
B.O.S.: Bottom of Screen
Screen Diameter: mm
Screen Slot Size: 51 mm
Material: PVC

mBGS: Meters below ground surface
mBTOC: Meters below top of casing

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit
23/06/2025	1.98	mBGS
27/06/2025	2.66	mBGS
10/07/2025	2.59	mBGS

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-19

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 27/06/2025 **Northing:** 4811578.31 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599579.87 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 162.23 m **Final Depth:** 3.66 m

Hole Diameter(s): 146 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.00 / 162.23																		
	0.25 / 161.98		TOPSOIL (254 mm)																
	0.76 / 161.47		FILL: Lean CLAY with Sand, trace gravel, contains rootlets, brown, moist, stiff	SS1	75	1-6-8-15	14	0							16				
1			NATIVE: Sandy Lean CLAY (CL), trace gravel, brown to reddish brown, signs of oxidation, moist, very stiff to hard	SS2		6-11-13-15	24	0							14				
2				SS3	100	7-13-19-21	32	0							13				
				SS4	100	6-15-21-28	36	0	5	26	51	18			12	16-24	8		
3			- contains shale fragments at 3.05 m BGS	SS5	100	13-22-25-48	47	0							13				
	3.66 / 158.57		End of Hole at 3.66 m BGS																
4																			
5																			
6																			
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-20

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 27/06/2025 **Northing:** 4811649.03 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599497.90 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 162.18 m **Final Depth:** 3.48 m

Hole Diameter(s): 146 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
0	0.00 / 162.18																		
	0.25 / 161.93		TOPSOIL (254 mm)																
	0.76 / 161.42		FILL: Lean CLAY with Sand, trace gravel, contains rootlets, brown, moist, firm	SS1	96	1-3-4-9	7								18				
1			NATIVE: Lean CLAY with Sand (CL), trace gravel, reddish brown, contains signs of oxidation, moist, very stiff to hard	SS2	100	5-12-13-18	25								13				
2				SS3	100	6-11-14-18	25		6	22	52	20			13	17-25	8		
				SS4	100	7-13-24-30	37								12				
3	3.48 / 158.70			SS5	100	11-25-50 /127 mm	75								10				
			End of Hole at 3.48 m BGS																
4																			
5																			
6																			
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-21

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 27/06/2025 **Northing:** 4811735.18 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599486.31 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 162.29 m **Final Depth:** 3.94 m

Hole Diameter(s): 146 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.00 / 162.29																		
	0.20		TOPSOIL (203 mm)																
	162.09 / 0.76		FILL: Lean CLAY with Sand, trace gravel, contains rootlets, brown, moist, stiff	SS1	100	2-4-7-10	11								14				
1	161.53		NATIVE: Sandy Lean CLAY with Gravel (CL), contains piece of broken rocks, reddish brown, oxidized, moist to wet, firm to very stiff	SS2	79	6-12-13-21	25		19	33	36	12			10	16-24	8		
			- red, saturated, stiff at 1.52 m BGS	SS3	33	3-7-3-13	10								16				
2				SS4	38	2-3-8-15	11								14				
3	3.81			SS5	42	2-3-1-50	4								14				
	158.48		WEATHERED SHALE, red	SS6	100	50/127 mm	R								7				
4	3.94 / 158.35		End of Hole at 3.94 m BGS																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

▽ **At Time of Drilling:**

▼ **Upon Completion of Drilling:** 3.31 m **on** 27/06/2025

▽ **Last Water Level Taken:**

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-22

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 27/06/2025 **Northing:** 4811830.55 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599564.40 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 161.77 m **Final Depth:** 3.66 m

Hole Diameter(s): 146 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
0.00 / 161.77																		
0.20 / 161.57		TOPSOIL (203 mm)																
		FILL: Lean CLAY with Gravel, trace sand, contains rootlets, piece of rocks, reddish brown, moist, stiff	SS1	96	1-3-5-7	8								21				
			SS2	62	3-4-5-5	9								13				
1.52 / 160.25		NATIVE: Sandy Lean CLAY with Gravel (CL), contains piece of broken rocks, reddish brown, moist, very stiff to hard	SS3	87	4-11-10-14	21		17	28	41	14			11	17-25	8		
			SS4	25	8-9-11-12	20								12				
			SS5	79	12-24-25-19	49								10				
3.66 / 158.11		End of Hole at 3.66 m BGS																

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

STRATIGRAPHIC AND INSTRUMENTATION RECORD

(Overburden)

BH25-23

Project Number: 12669624

Client: Infrastructure Ontario

Project: Proposed MECP-MLITSD Science Facility Complex

Location: Oakville Land Assembly - William Halton Parkway, Oakville, Ontario

Date (dd/mm/yyyy): 27/06/2025 **Northing:** 4811934.12 m **Logged By:** Reza Bay

Drilling Company: 3D Drilling **Easting:** 599633.58 m **Reviewed By:** Brice Zanne

Equipment Used: Track Mounted CME 55 **Horizontal Datum:** NAD83 / UTM zone 17N

Drilling Method(s): Hollow Stem Auger **Elevation:** 160.73 m **Final Depth:** 3.23 m

Hole Diameter(s): 146 mm **Elevation Datum:**

Coordinates and Elevation Values are Surveyed

Depth Scale (m)	Depth (m) / Elev. (m)	Strata	Description	Sample Number	Recovery %	Blows per 0.15m or Partial Increment	'N'/RQD Value	PID (ppm)	Grain Size Analysis: Gravel %	Sand %	Silt %	Clay %	Fines %	Unit Weight (kN/m3)	Moisture Content %	PL% - LL%	Plasticity Index (%)	Water Level(s)	Backfill Details
	0.00 / 160.73																		
	0.25 / 160.48		TOPSOIL (254 mm)																
	0.76 / 159.97		FILL: Silty CLAY with Sand, contains rootlets, brown, moist, stiff	SS1	67	1-4-4-5	8								24				
1			NATIVE: Sandy Silty CLAY with Gravel (CL-ML), brown, moist, very stiff to hard	SS2		6-11-14-18	25								12				
2			- contains piece of broken rocks at 1.52 m BGS	SS3	100	8-16-46-49	62		16	28	42	14			9	16-23	7		
			- contains weathered shale, red at 2.29 m BGS	SS4	46	10-24-37-50	61								11				
3	3.05 / 157.68		WEATHERED SHALE, red	SS5	85	36-50 /26 mm	R								10				
	3.23 / 157.50		End of Hole at 3.23 m BGS																
4																			
5																			
6																			
7																			
8																			
9																			

● SPT N-Value
▼ DCPT Value (blows 100mm)
Δ Peak Undrained Shear Strength (vane), C_u (kPa)-Peak
□ Remoulded Undrained Shear Strength (Vane), C_u (kPa)-Residual
○ Moisture Content (%)
PL w LL
20 40 60 80

Legend:

Measuring Point Elevation may change; Refer to Current Elevation Table

At Time of Drilling:

Upon Completion of Drilling: Dry

Last Water Level Taken:

N Value: R - Refusal

Well - Reference Elevation(s)	
Location	Elevation (m)

Screen Diameter: mm
Screen Slot Size:
Material:

Water Readings		
Date (dd/mm/yyyy)	Depth	Unit

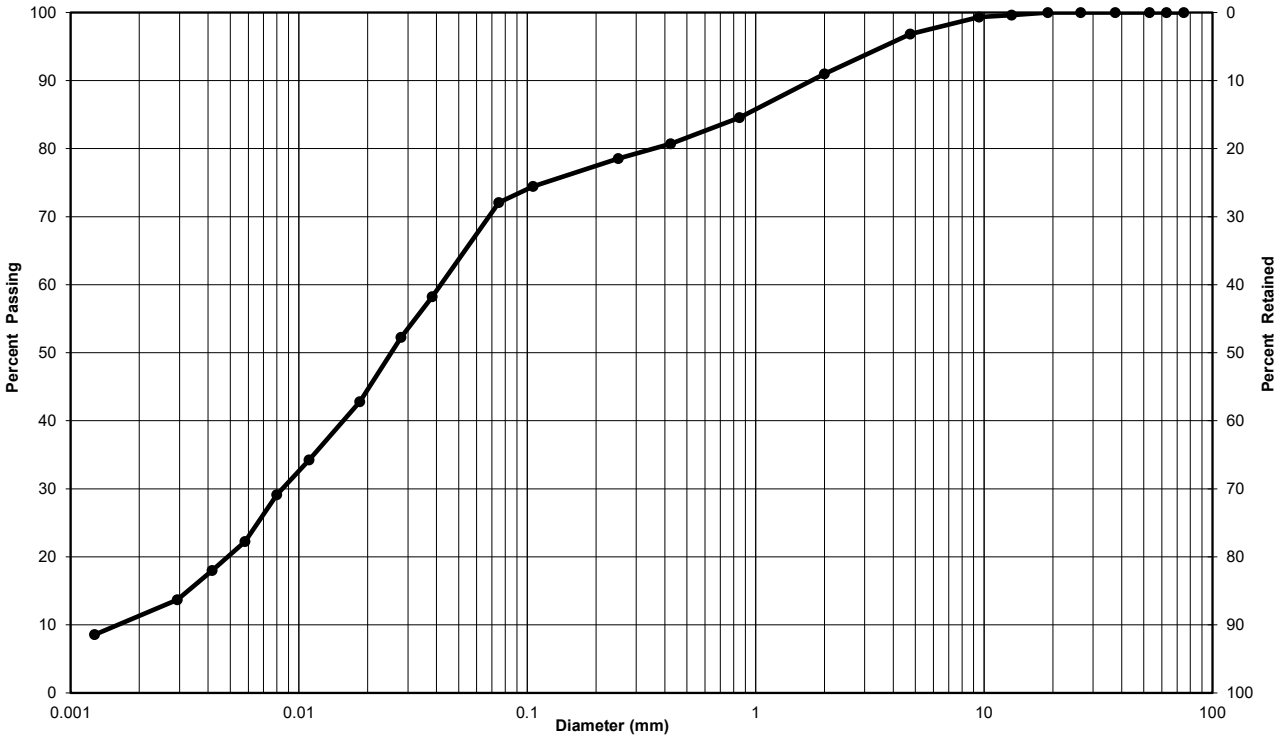
Appendix C

Grain Size Distribution Test Results

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-1
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-01	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay with sand (CL)	3	25	72
Silt-size particles (%) :	61		
Clay-size particles (%) (<0.002 mm):	11		

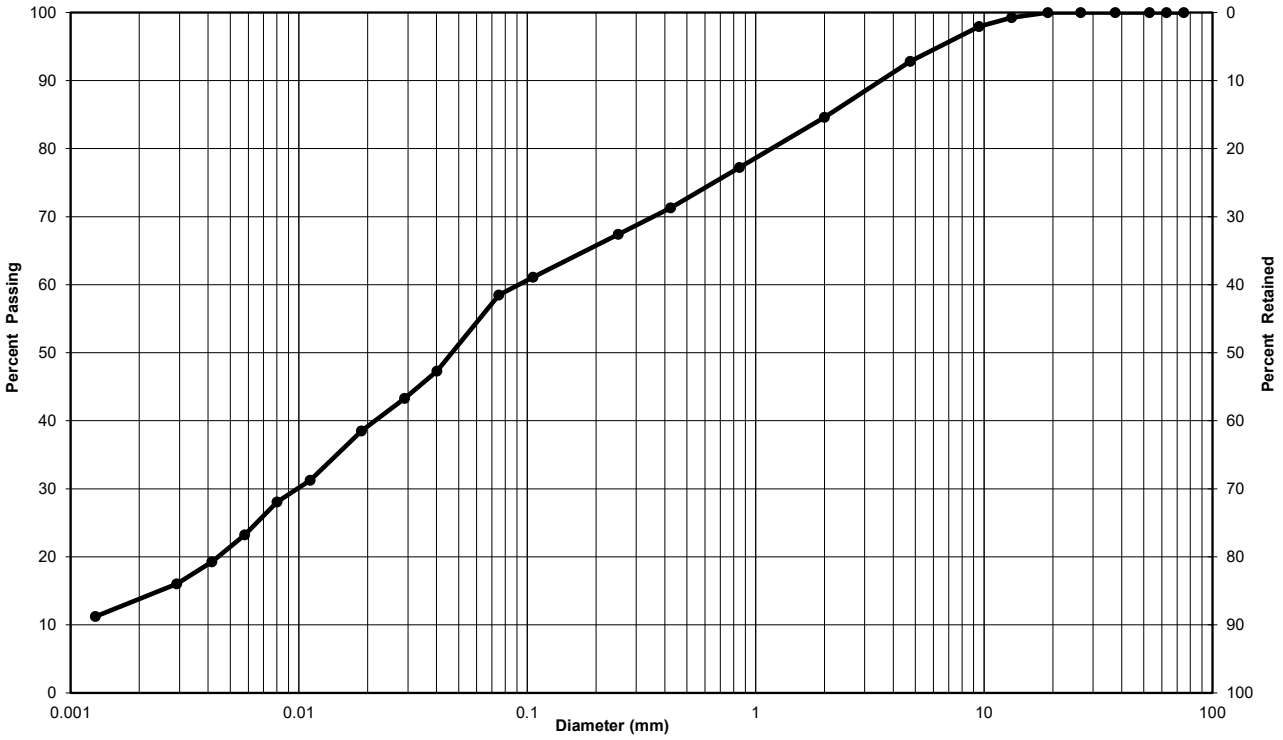
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-2
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-02	Sample No.:	SS4
Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy silty clay (CL-ML)	7	35	58
Silt-size particles (%) :	45		
Clay-size particles (%) (<0.002 mm):	13		

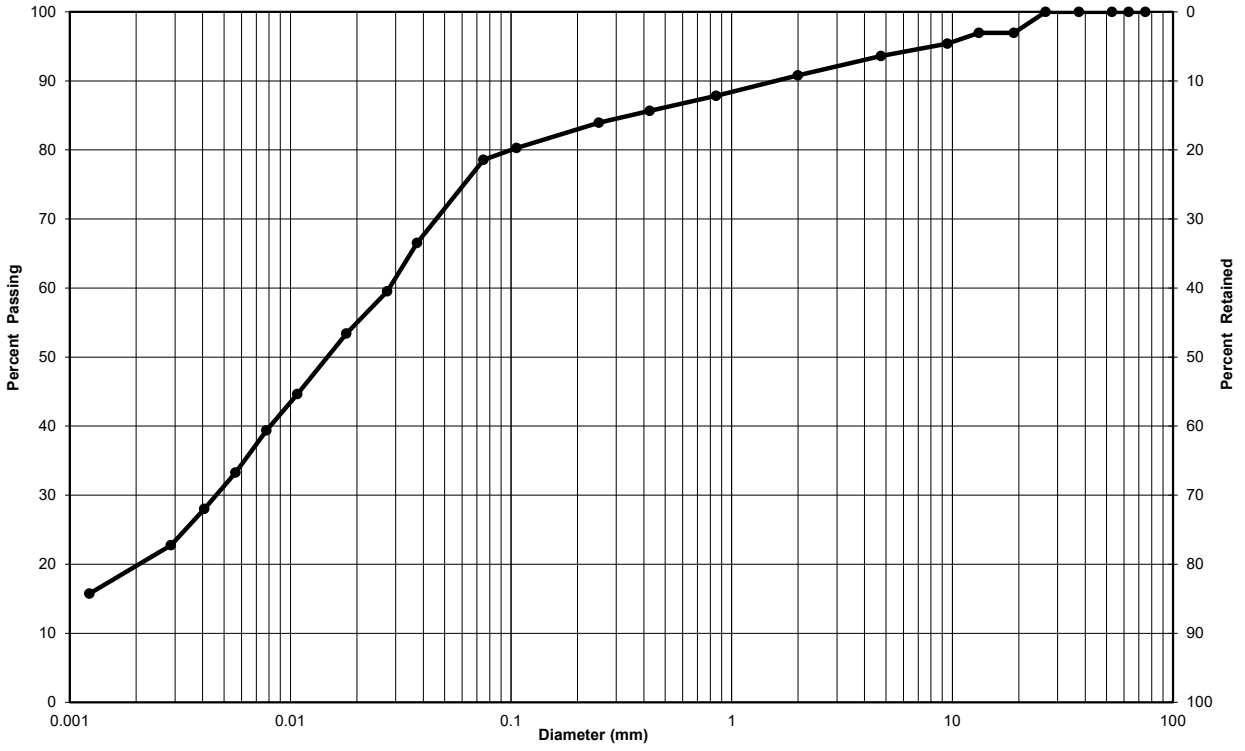
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 11, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1446-1
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-03	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay with sand (CL)	6	15	79
Silt-size particles (%) :	60		
Clay-size particles (%) (<0.002 mm):	19		

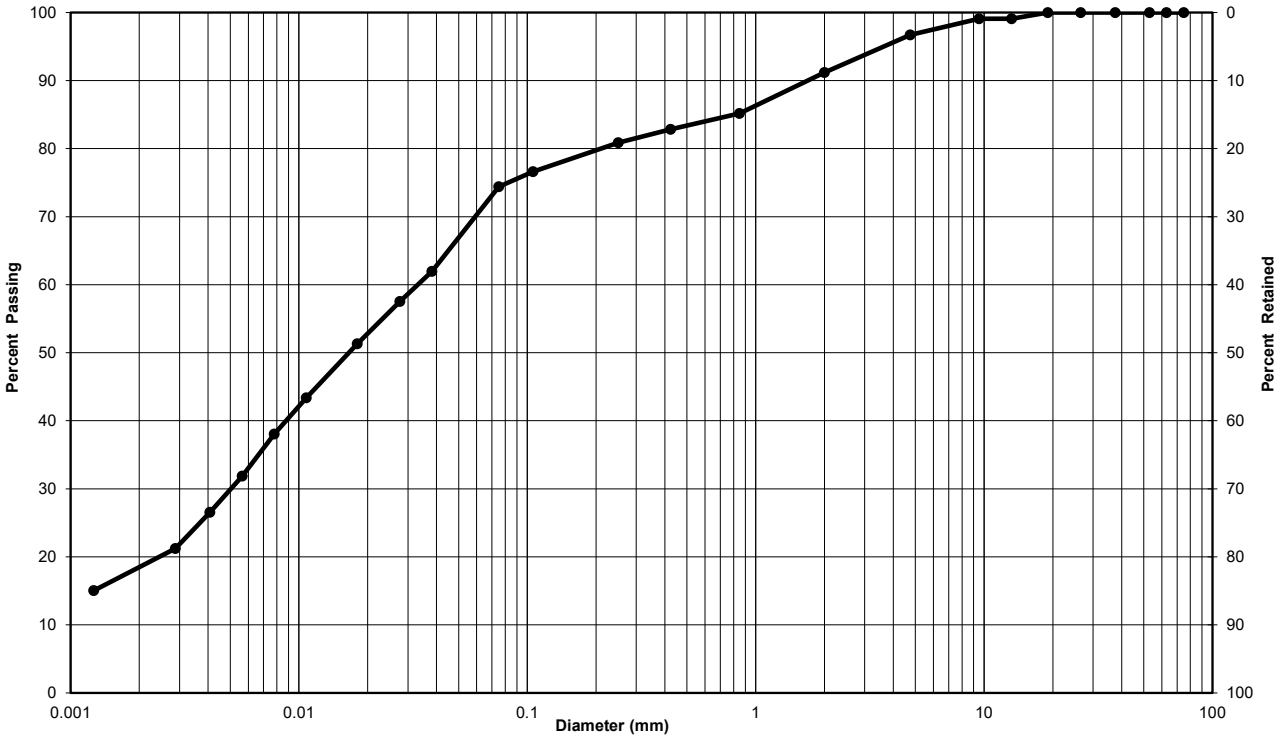
Remarks:

Performed by:	Melanie Mitchell / Riley Cowperthwaite	**Date:**	July 2, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 4, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-4
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-04	Sample No.:	SS2
Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay with sand (CL)	3	23	74
Silt-size particles (%) :	56		
Clay-size particles (%) (<0.002 mm):	18		

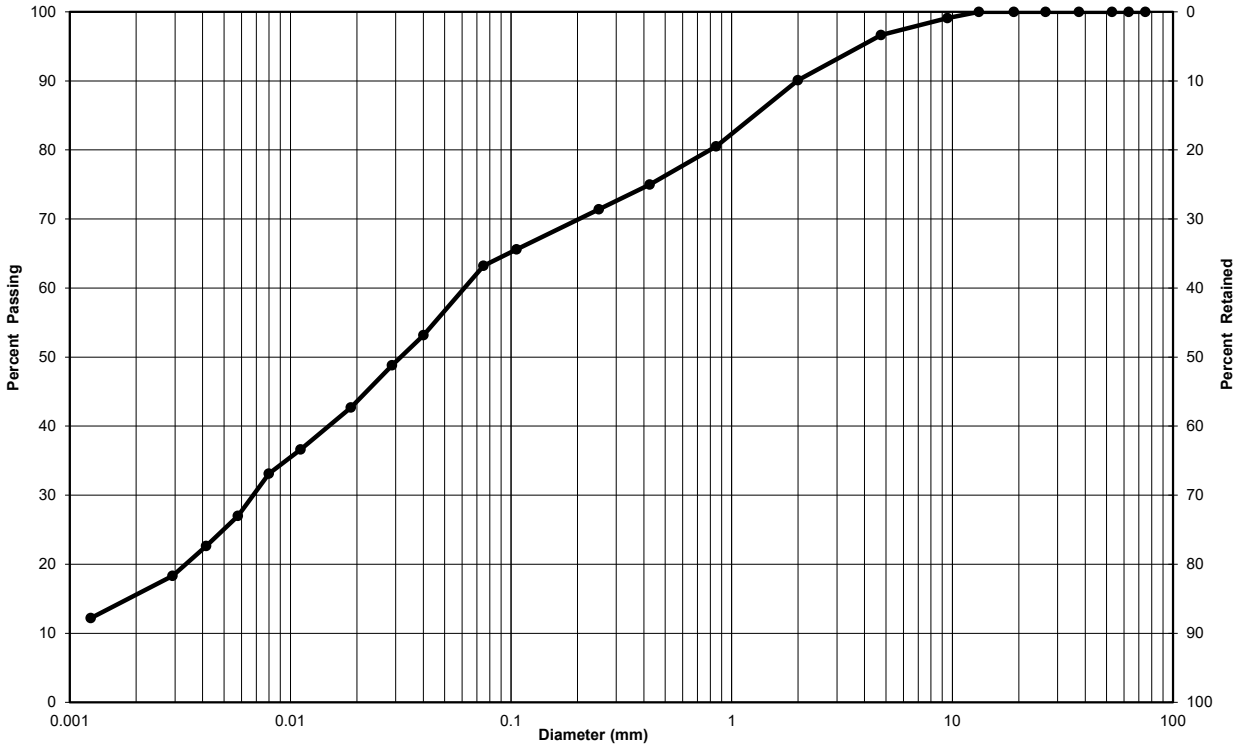
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 11, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1446-2
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-05	Sample No.:	SS4
Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy lean clay (CL)	3	34	63
Silt-size particles (%) :	48		
Clay-size particles (%) (<0.002 mm):	15		

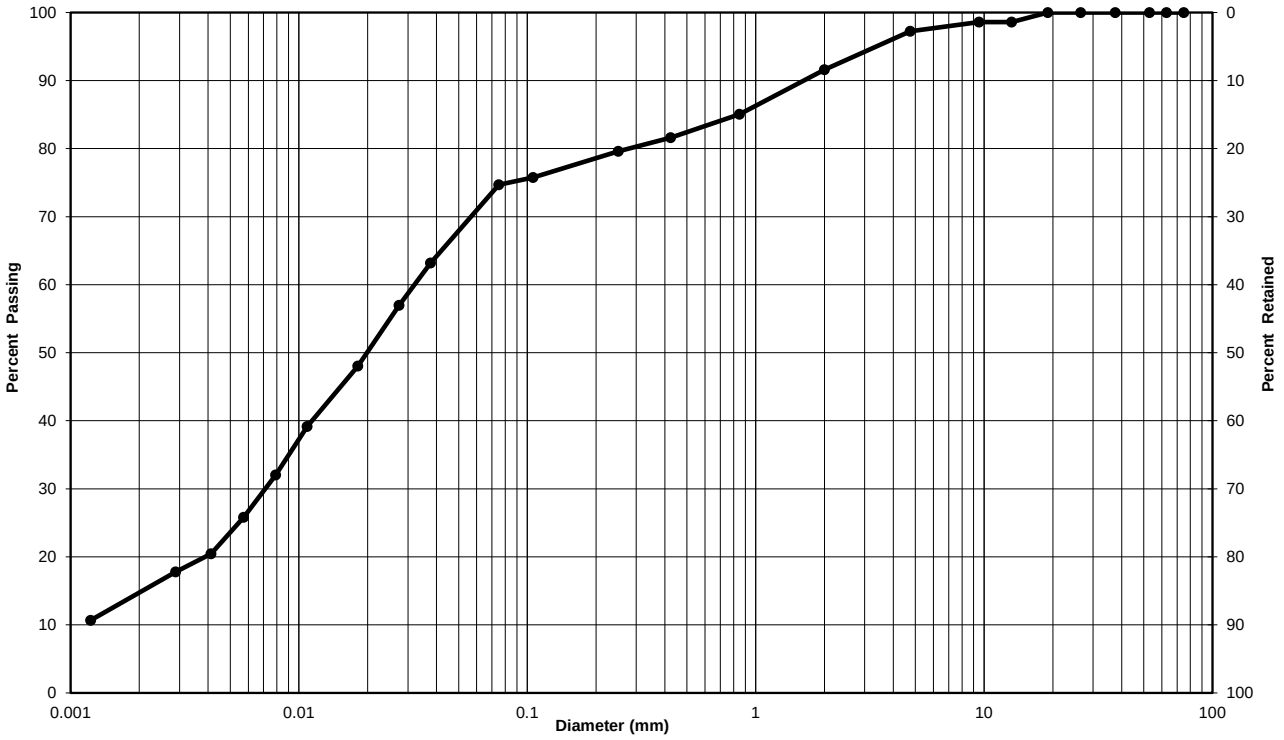
Remarks:

Performed by:	Melanie Mitchell / Riley Cowperthwaite	**Date:**	July 2, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 4, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-5
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-06	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay with sand (CL)	3	22	75
Silt-size particles (%) :	61		
Clay-size particles (%) (<0.002 mm):	14		

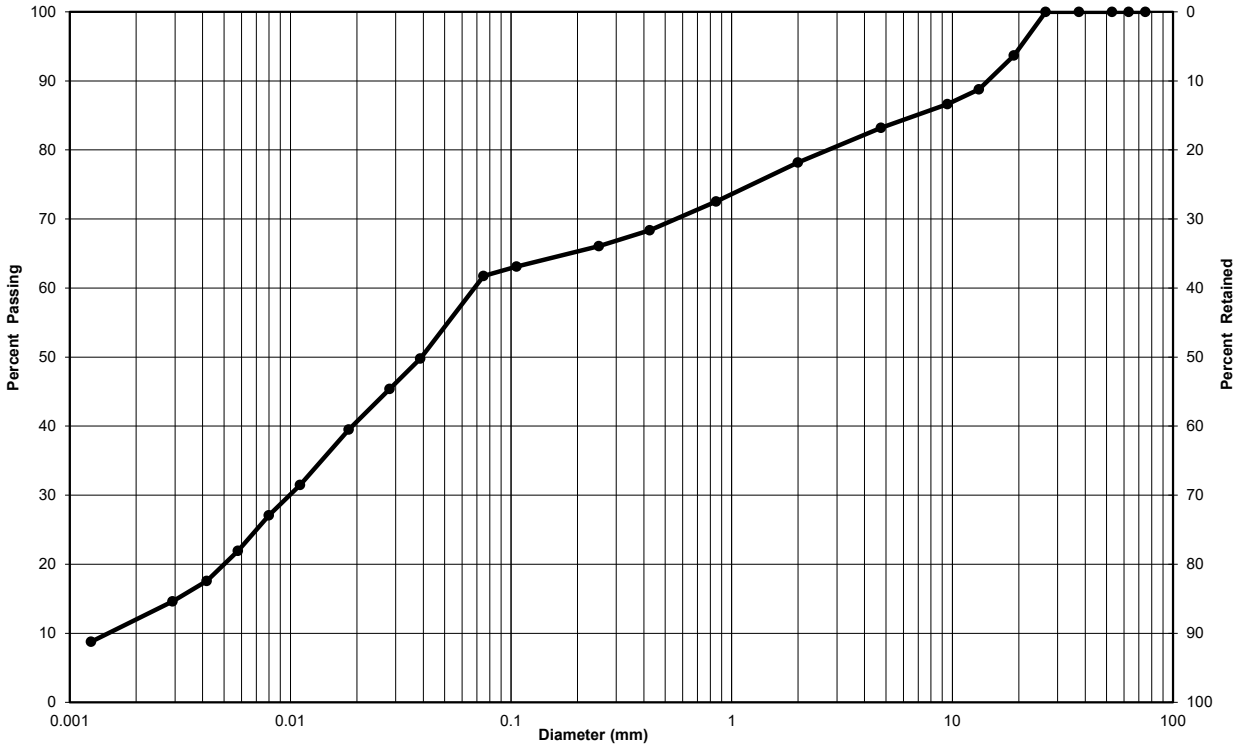
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 17, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 18, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1446-3
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	MW25-07	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy silty clay with gravel (CL-ML)	17	21	62
Silt-size particles (%) :	51		
Clay-size particles (%) (<0.002 mm):	11		

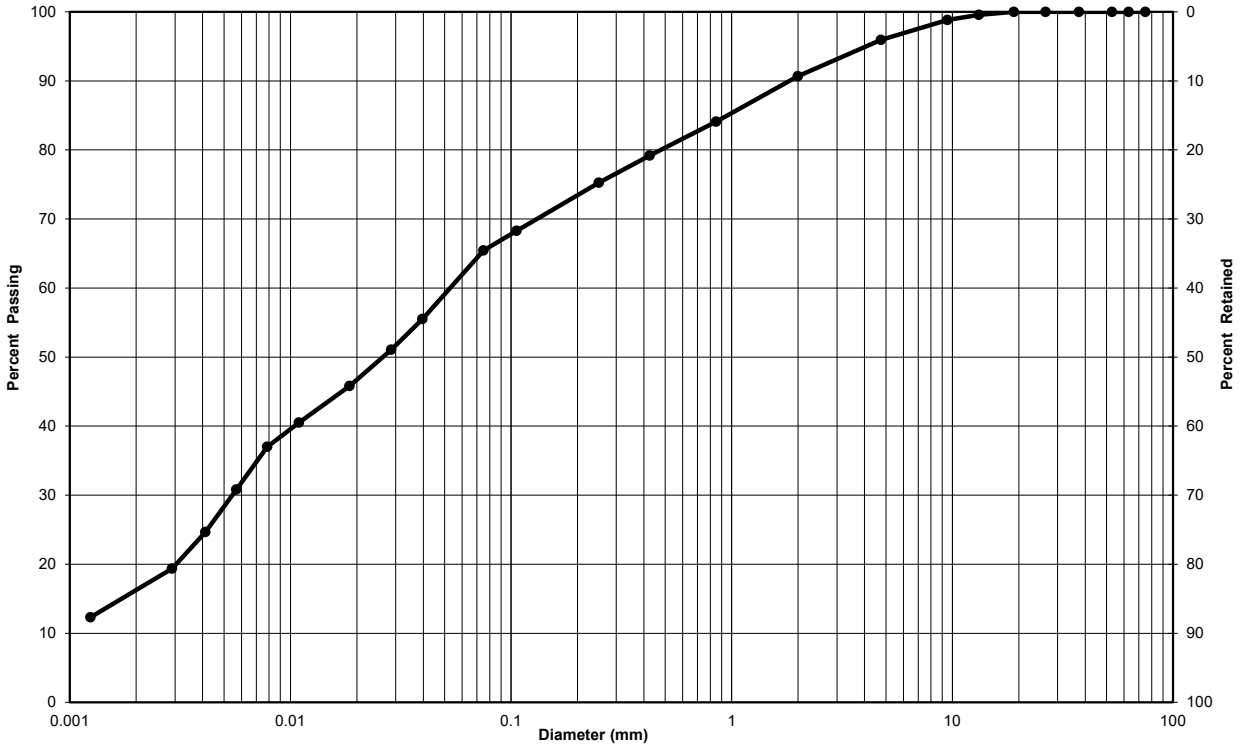
Remarks:

Performed by:	Melanie Mitchell / Riley Cowperthwaite	**Date:**	July 2, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 4, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1446-6
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	MW25-08	Sample No.:	SS4
Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy lean clay (CL)	4	31	65
Silt-size particles (%) :	49		
Clay-size particles (%) (<0.002 mm):	16		

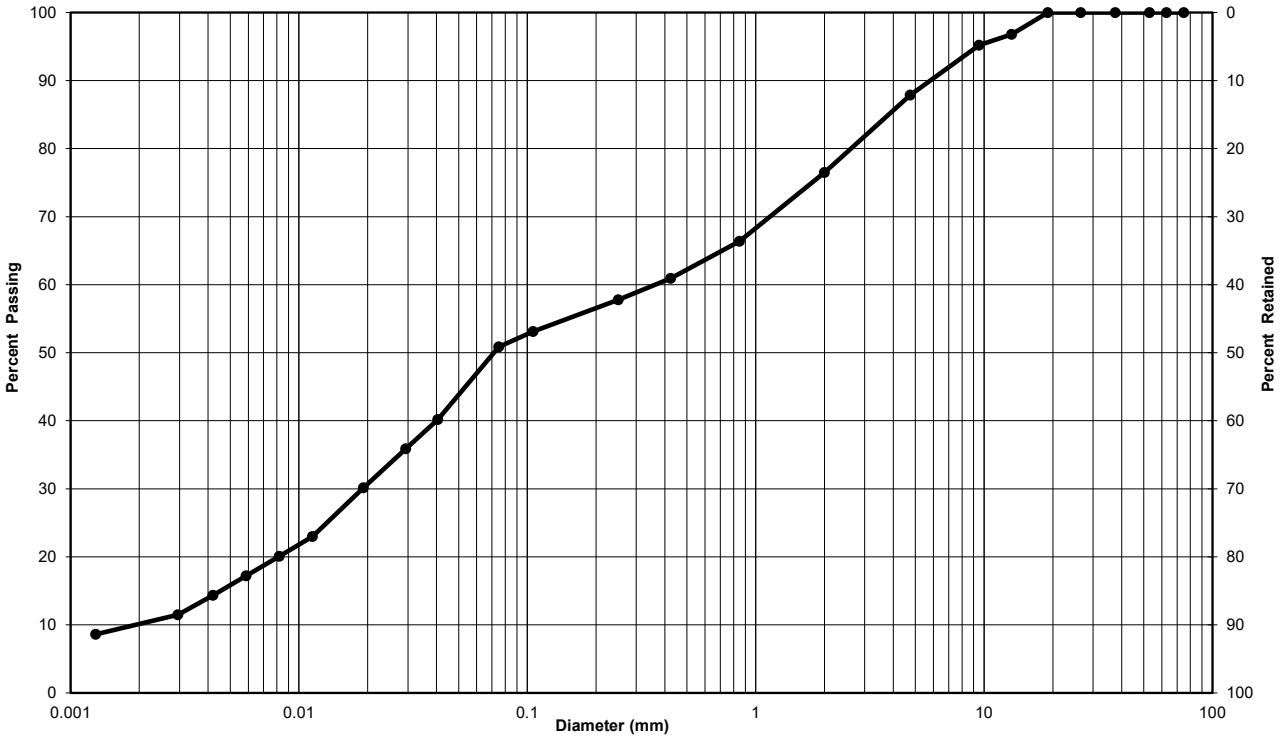
Remarks:

Performed by:	Melanie Mitchell / Riley Cowperthwaite	**Date:**	July 2, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 4, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-6
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-09	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy silty clay (CL-ML)	12	37	51
Silt-size particles (%) :	41		
Clay-size particles (%) (<0.002 mm):	10		

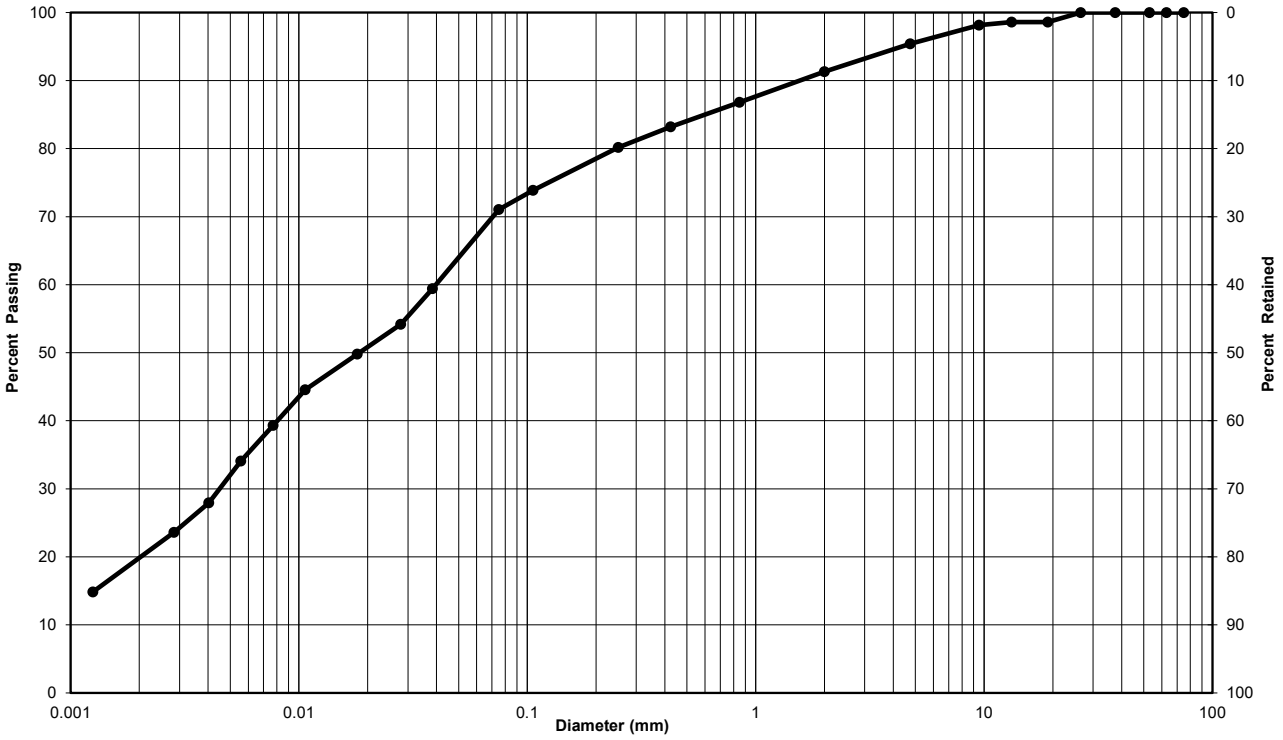
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 11, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-7
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-10	Sample No.:	SS2
Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay with sand (CL)	5	24	71
Silt-size particles (%) :	52		
Clay-size particles (%) (<0.002 mm):	19		

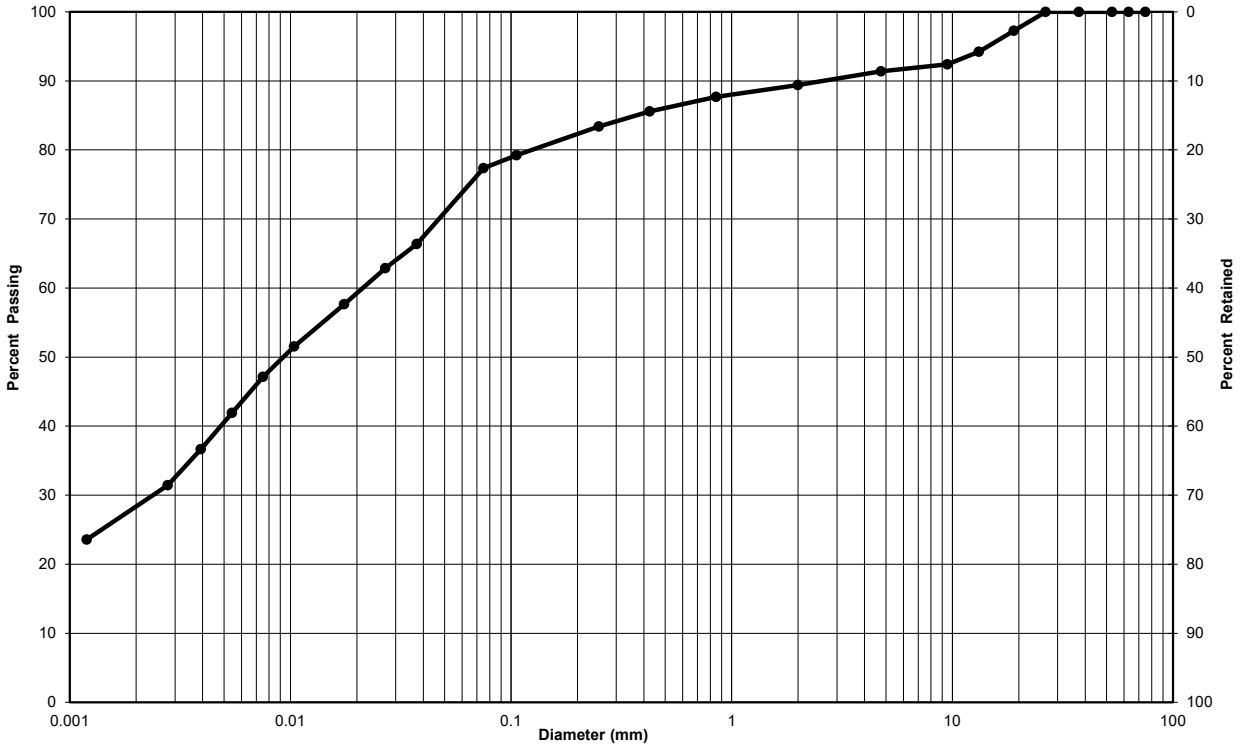
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1446-7
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	MW25-11	Sample No.:	SS2
Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay (CL)	9	14	77
Silt-size particles (%) :	49		
Clay-size particles (%) (<0.002 mm):	28		

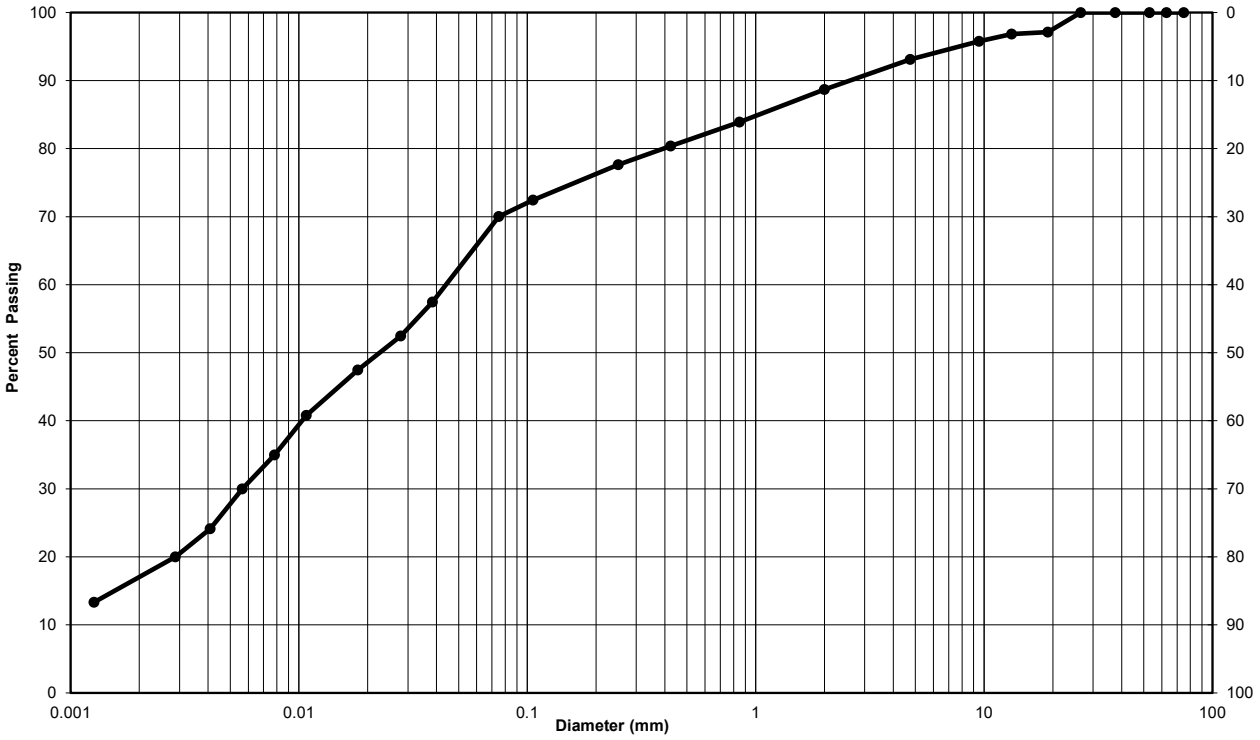
Remarks:

Performed by:	Melanie Mitchell / Riley Cowperthwaite	**Date:**	July 2, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 4, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-9
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-12	Sample No.:	SS4
Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

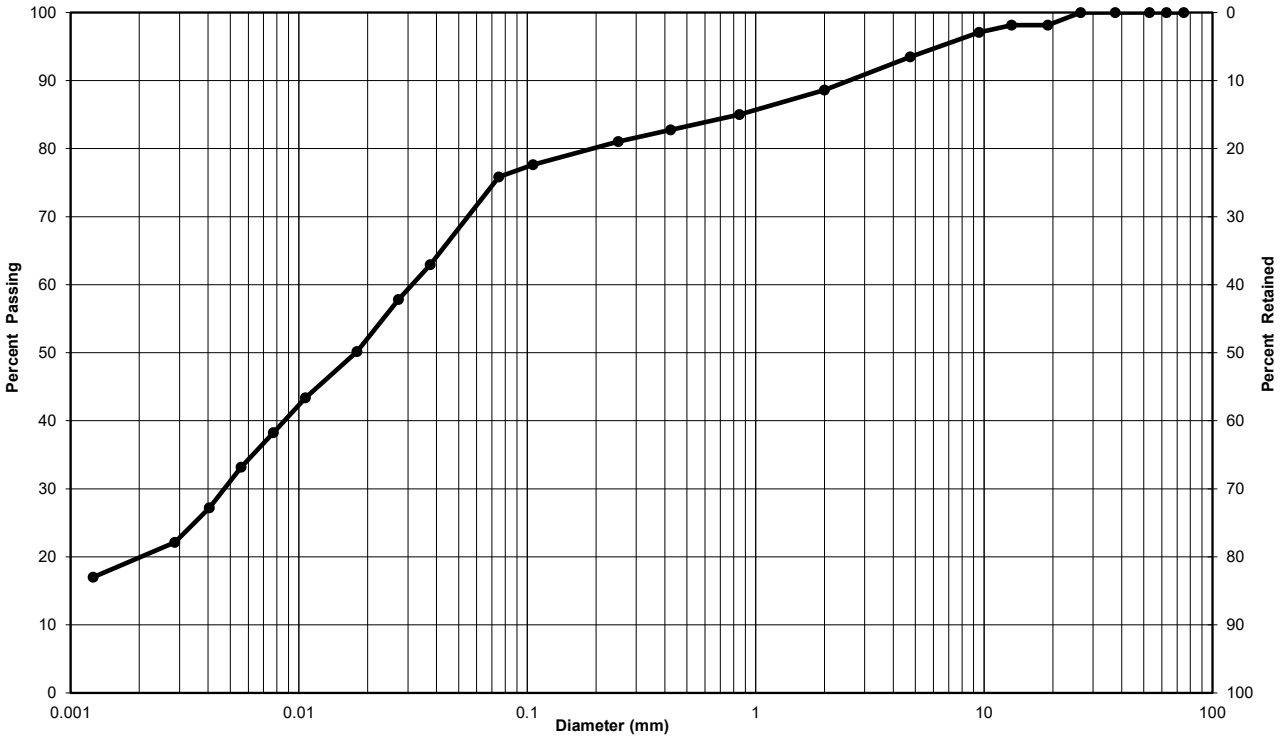
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy lean clay (CL)	7	23	70
Silt-size particles (%) :	54		
Clay-size particles (%) (<0.002 mm):	16		

Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 11, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-10
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624
Borehole No.:	BH25-13	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay with sand (CL)	7	17	76
Silt-size particles (%) :	57		
Clay-size particles (%) (<0.002 mm):	19		

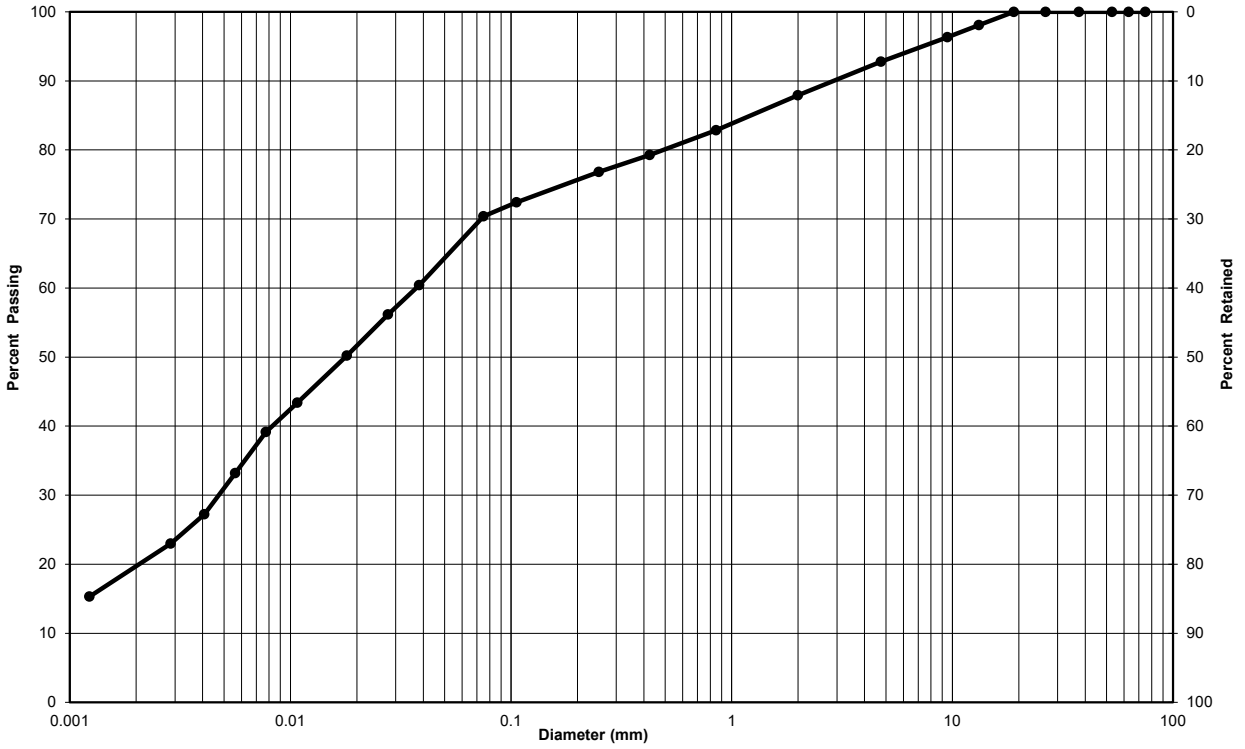
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 11, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1446-9
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	MW25-14	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy lean clay (CL)	7	23	70
Silt-size particles (%) :	51		
Clay-size particles (%) (<0.002 mm):	19		

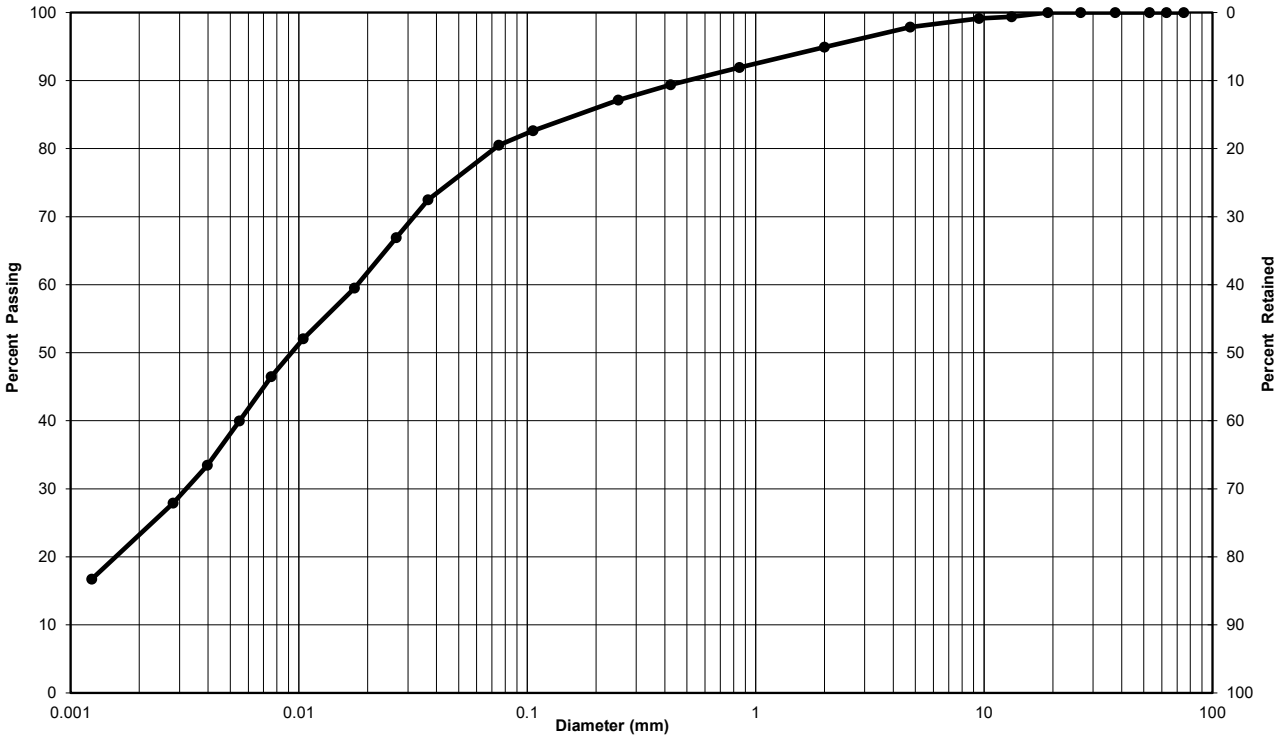
Remarks:

Performed by:	Melanie Mitchell / Riley Cowperthwaite	**Date:**	July 2, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 4, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-11
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-15	Sample No.:	SS2
Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay with sand (CL)	2	17	81
Silt-size particles (%) :	59		
Clay-size particles (%) (<0.002 mm):	22		

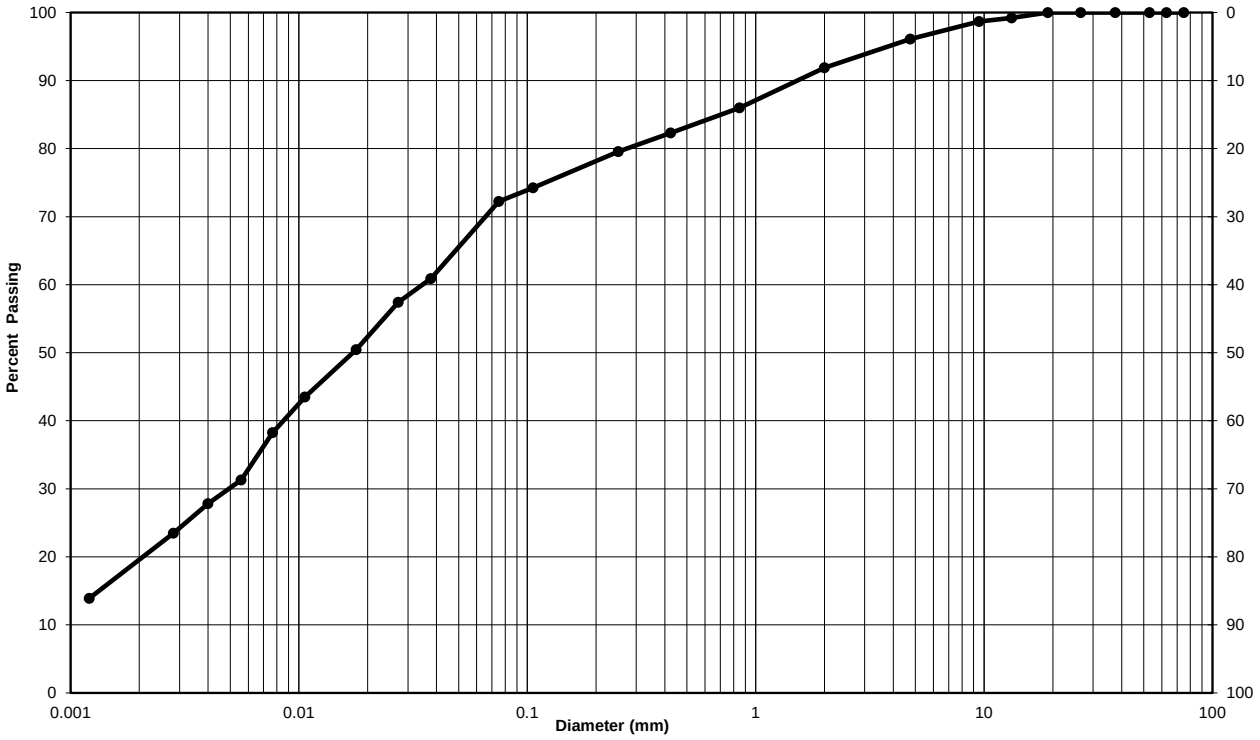
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-12
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-16	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

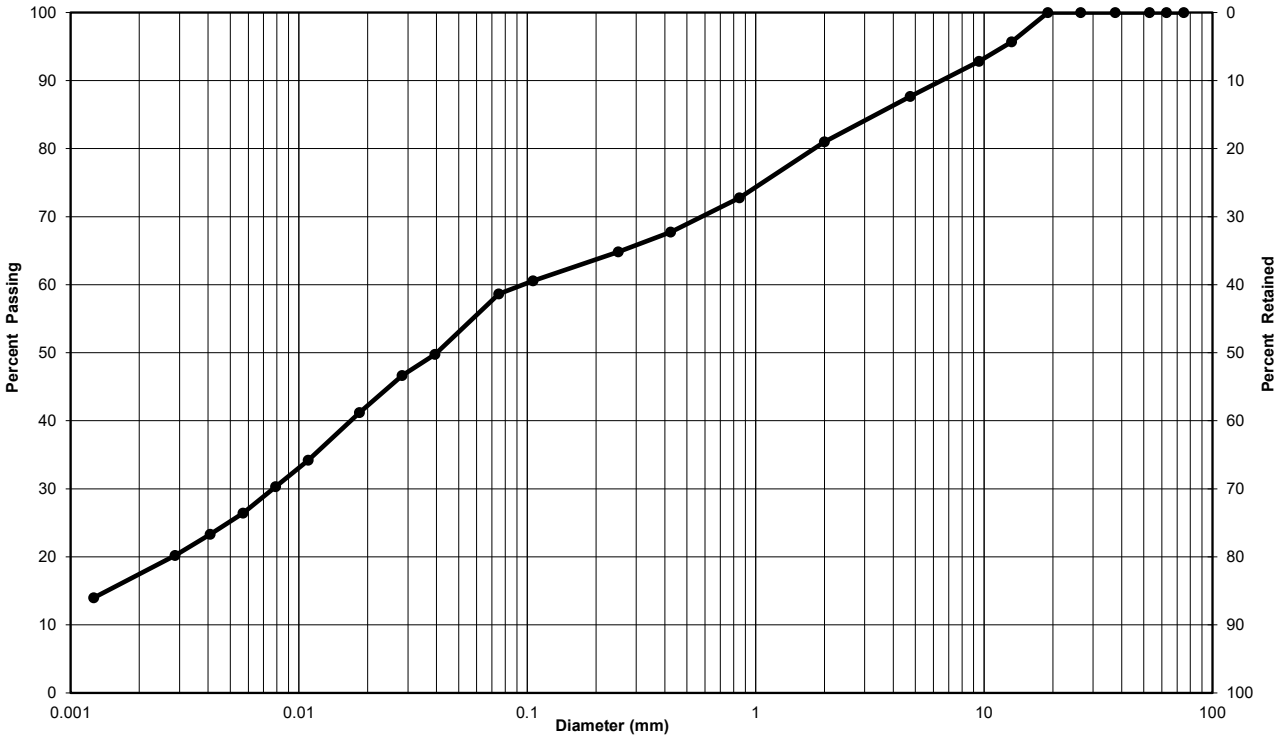
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay with sand (CL)	4	24	72
Silt-size particles (%) :	53		
Clay-size particles (%) (<0.002 mm):	19		

Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 17, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 18, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-13
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624
Borehole No.:	BH25-17	Sample No.:	SS4
Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy lean clay (CL)	12	29	59
Silt-size particles (%) :	42		
Clay-size particles (%) (<0.002 mm):	17		

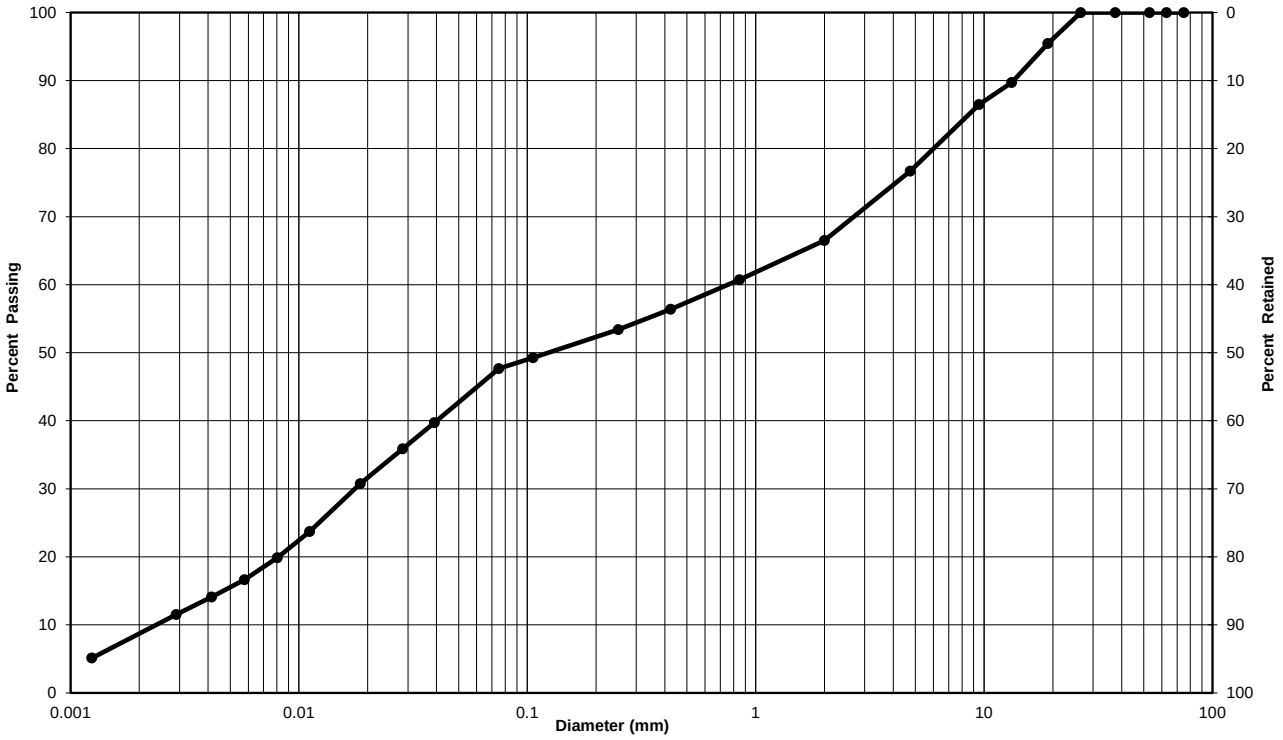
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 11, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-14
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	MW25-18	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty, clayey sand with gravel (SC-SM)	23	29	48
Silt-size particles (%) :	40		
Clay-size particles (%) (<0.002 mm):	8		

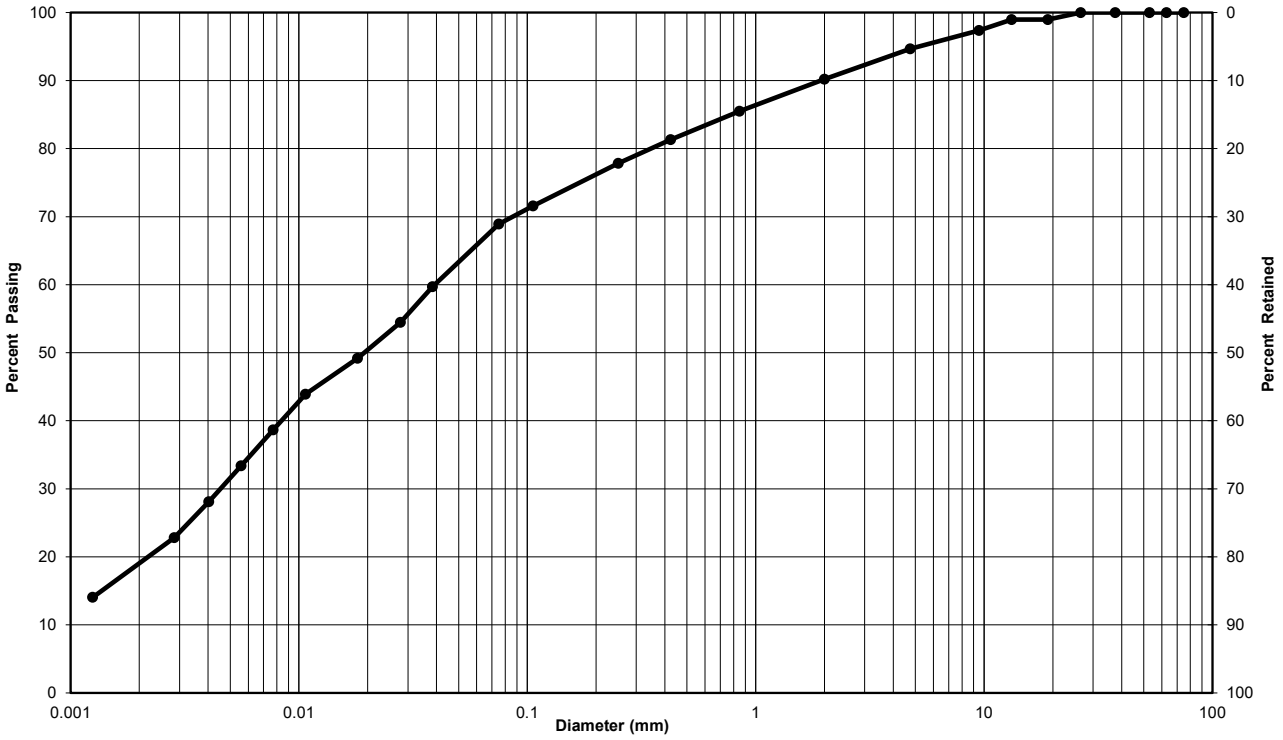
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 17, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 18, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-16
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-19	Sample No.:	SS4
Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy lean clay (CL)	5	26	69
Silt-size particles (%) :	51		
Clay-size particles (%) (<0.002 mm):	18		

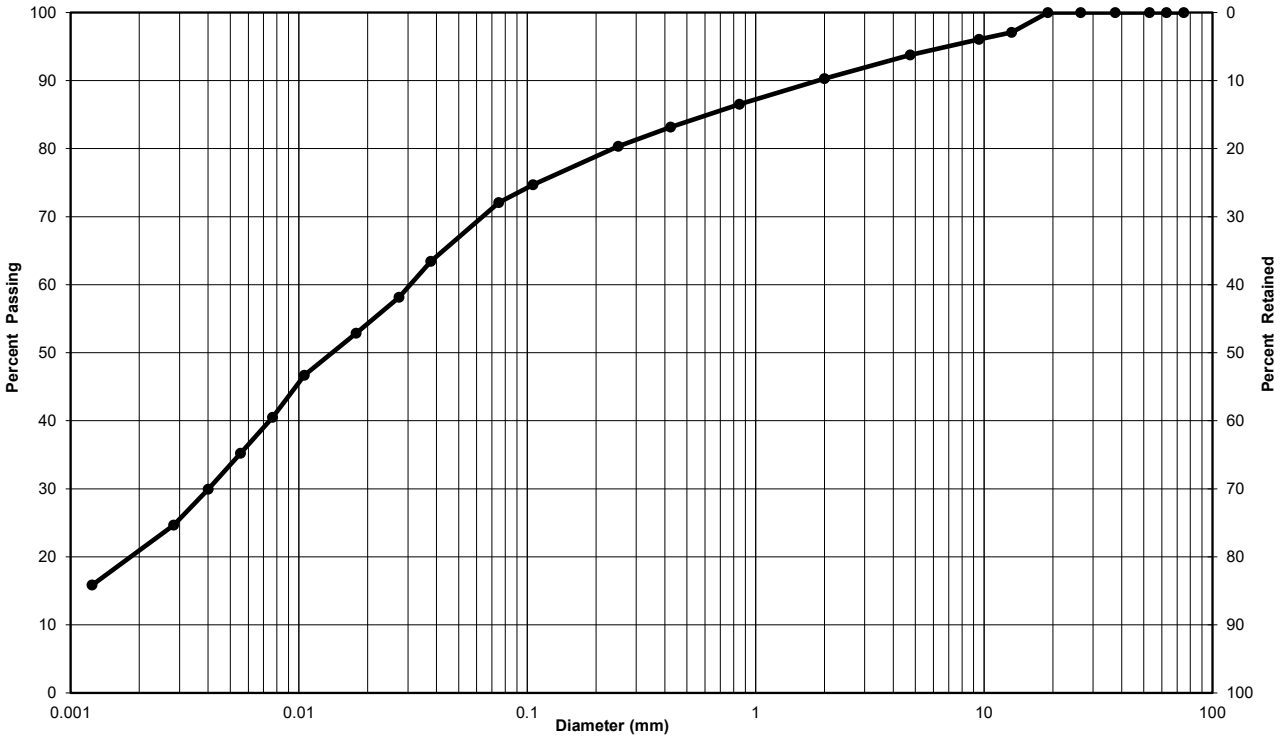
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-17
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-20	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Lean clay with sand (CL)	6	22	72
Silt-size particles (%) :	52		
Clay-size particles (%) (<0.002 mm):	20		

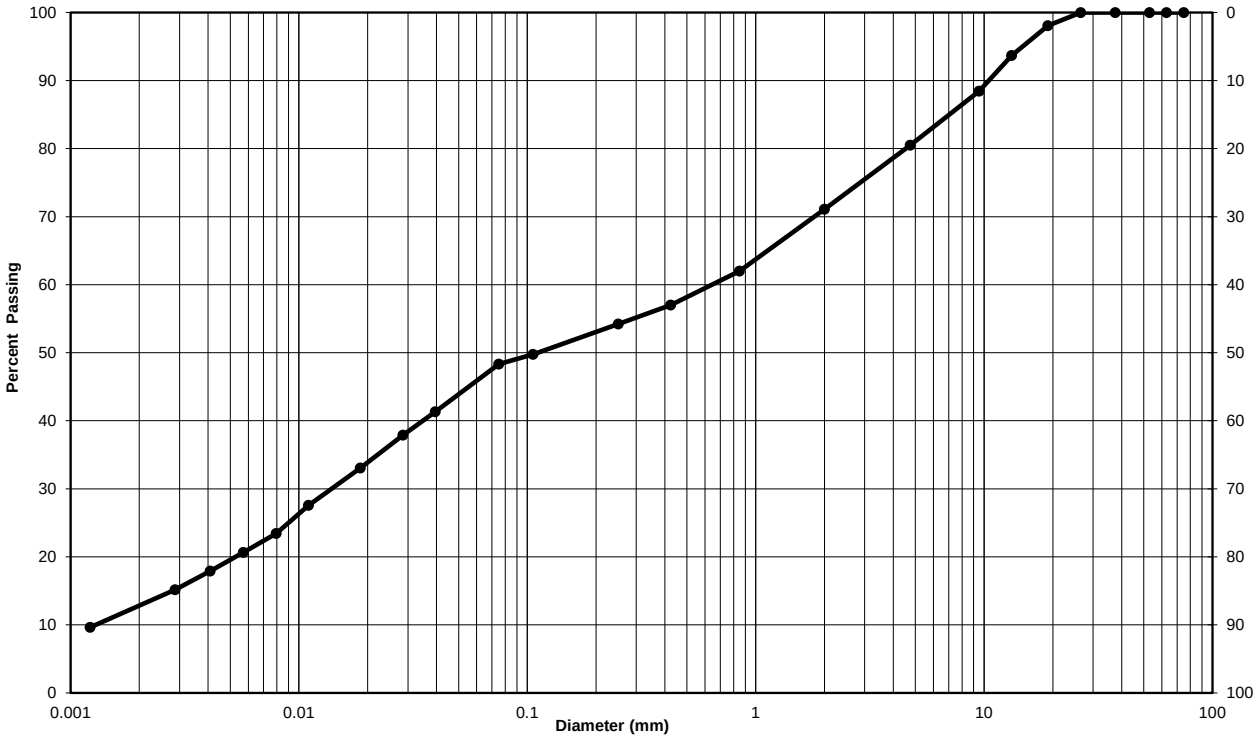
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-18
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-21	Sample No.:	SS2
Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Clayey sand with gravel (SC)	19	33	48
Silt-size particles (%) :	36		
Clay-size particles (%) (<0.002 mm):	12		

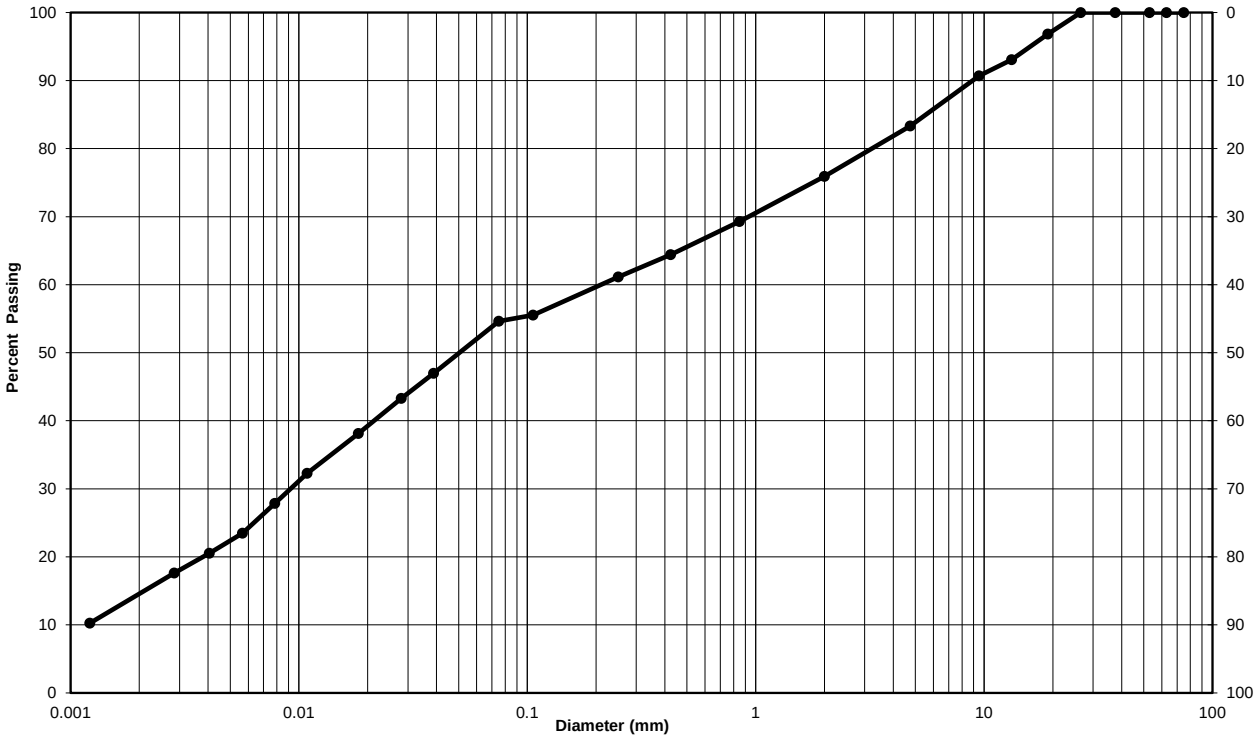
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 17, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 18, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-19
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-22	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy lean clay with gravel (CL)	17	28	55
Silt-size particles (%) :	41		
Clay-size particles (%) (<0.002 mm):	14		

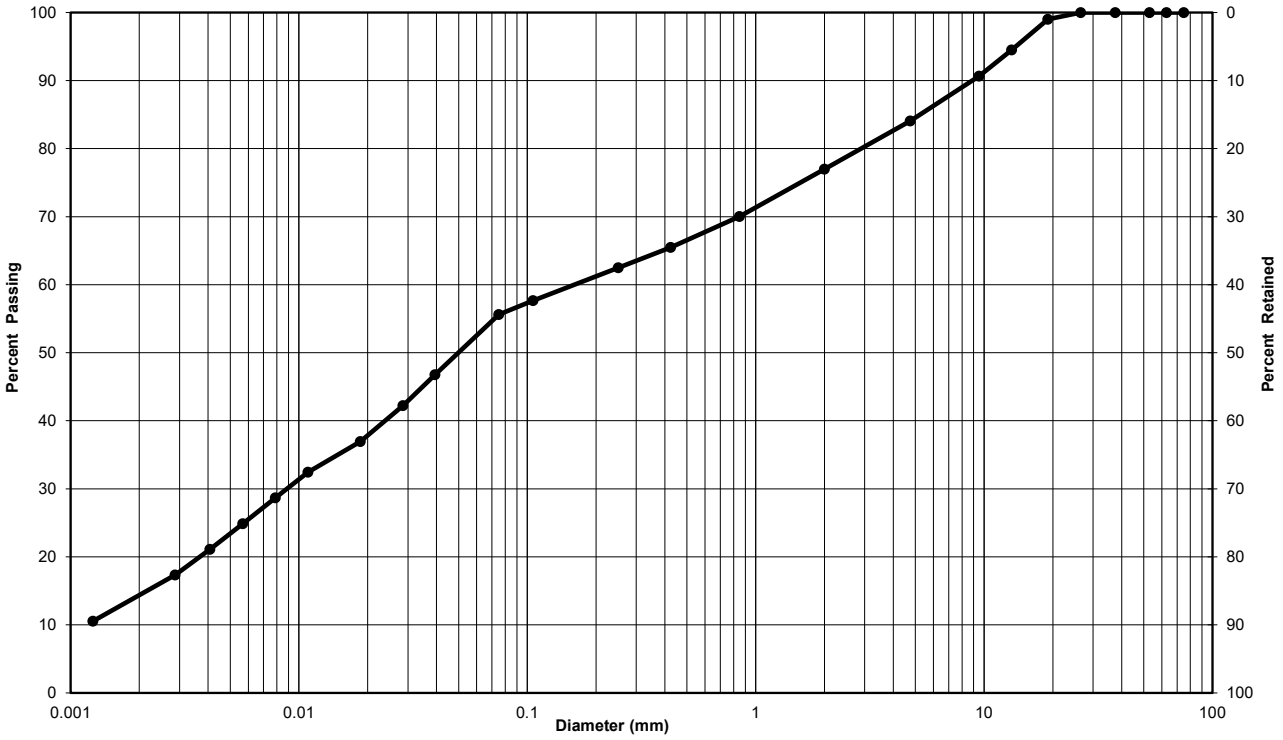
Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 17, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 18, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Particle-Size Analysis of Soils
MTO LS-702 (Geotechnical)

Client:	Infrastructure Ontario	**Lab No.:**	WLA 1448-20
Project, Site:	Oakville Land Assembly, Oakvile/William Halton Pkwy West	**Project No.:**	12669624

Borehole No.:	BH25-23	Sample No.:	SS3
Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)	Enclosure:	-



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy silty clay with gravel (CL-ML)	16	28	56
Silt-size particles (%) :	42		
Clay-size particles (%) (<0.002 mm):	14		

Remarks:

Performed by:	Riley Cowperthwaite/Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.	**Date:**	July 16, 2025
Laboratory Location:	GHD Ltd. - 140 Bathurst Drive, Waterloo, ON		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-1
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-01	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Lean clay with sand (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	4
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	34	28	19
Water Content:			
Tare no.	D94	AB7	AB32
Wet soil+tare, g	17.19	16.31	16.21
Dry soil+tare, g	15.06	14.29	14.17
Mass of water, g	2.13	2.02	2.04
Tare, g	6.34	6.28	6.43
Mass of soil, g	8.72	8.01	7.74
Water content %	24.4%	25.2%	26.4%

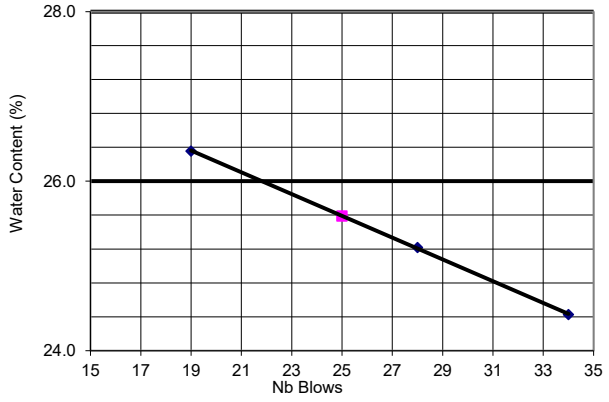
Plastic Limit (PL) - Water Content:		
Tare no.	D84	G23
Wet soil+tare, g	17.62	21.05
Dry soil+tare, g	15.88	18.79
Mass of water, g	1.74	2.26
Tare, g	6.32	6.31
Mass of soil, g	9.56	12.48
Water content %	18.2%	18.1%
Average water content %	18.2%	

Natural Water Content (W^n):		
Tare no.	Q1	
Wet soil+tare, g	1090.60	
Dry soil+tare, g	1017.40	
Mass of water, g	73.20	
Tare, g	223.20	
Mass of soil, g	794.20	
Water content %	9.2%	

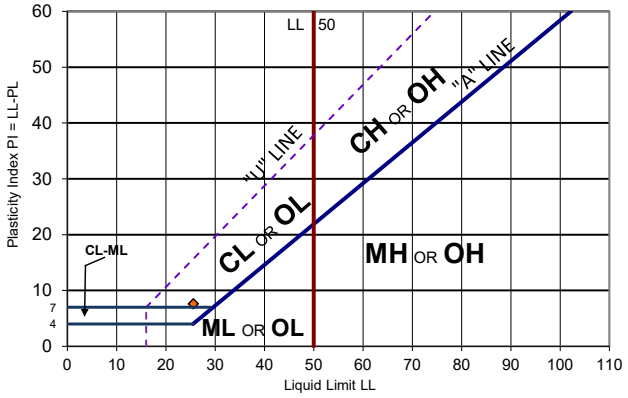
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
26	18	8	9.2

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-2
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-02	Sample no.:	SS4	Sample Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)
Soil Description:	Sandy lean clay (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	dpgs
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	28	24	17
Water Content:			
Tare no.	Z26	Z21	Z23
Wet soil+tare, g	32.50	32.44	32.41
Dry soil+tare, g	30.52	30.43	30.35
Mass of water, g	1.98	2.01	2.06
Tare, g	21.58	21.55	21.59
Mass of soil, g	8.94	8.88	8.76
Water content %	22.1%	22.6%	23.5%

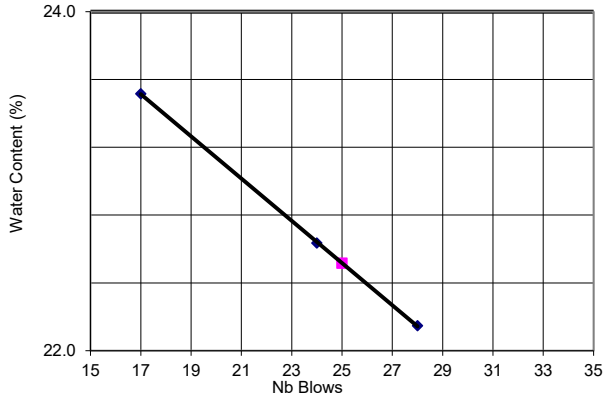
Plastic Limit (PL) - Water Content:		
Tare no.	Z9	Z45
Wet soil+tare, g	33.43	34.19
Dry soil+tare, g	31.84	32.47
Mass of water, g	1.59	1.72
Tare, g	21.63	21.55
Mass of soil, g	10.21	10.92
Water content %	15.6%	15.8%
Average water content %	15.7%	

Natural Water Content (W^n):		
Tare no.	T3	
Wet soil+tare, g	1076.20	
Dry soil+tare, g	982.70	
Mass of water, g	93.50	
Tare, g	98.40	
Mass of soil, g	884.30	
Water content %	10.6%	

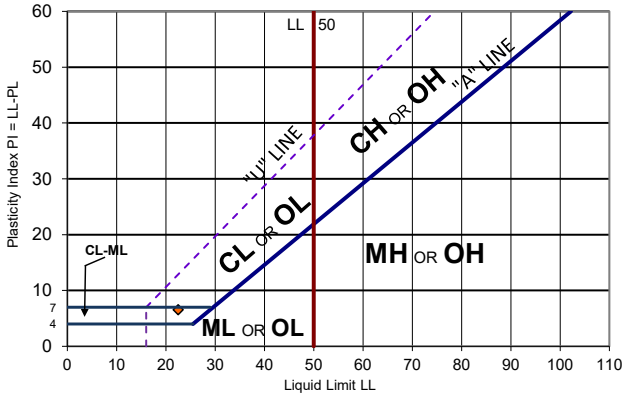
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
23	16	7	10.6

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1446-1
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-03	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Lean clay with sand (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	YZ2
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	35	24	18
Water Content:			
Tare no.	Z12	Z20	Z34
Wet soil+tare, g	32.50	31.69	31.85
Dry soil+tare, g	30.37	29.69	29.79
Mass of water, g	2.13	2.00	2.06
Tare, g	21.47	21.59	21.58
Mass of soil, g	8.90	8.10	8.21
Water content %	23.9%	24.7%	25.1%

Plastic Limit (PL) - Water Content:

Tare no.	Z45	Z4
Wet soil+tare, g	32.02	34.02
Dry soil+tare, g	30.52	32.21
Mass of water, g	1.50	1.81
Tare, g	21.57	21.62
Mass of soil, g	8.95	10.59
Water content %	16.8%	17.1%
Average water content %	16.9%	

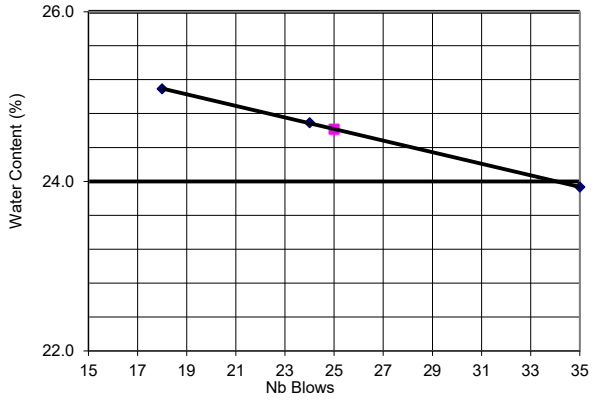
Natural Water Content (W^n):

Tare no.	T5	
Wet soil+tare, g	1009.70	
Dry soil+tare, g	918.90	
Mass of water, g	90.80	
Tare, g	112.20	
Mass of soil, g	806.70	
Water content %	11.3%	

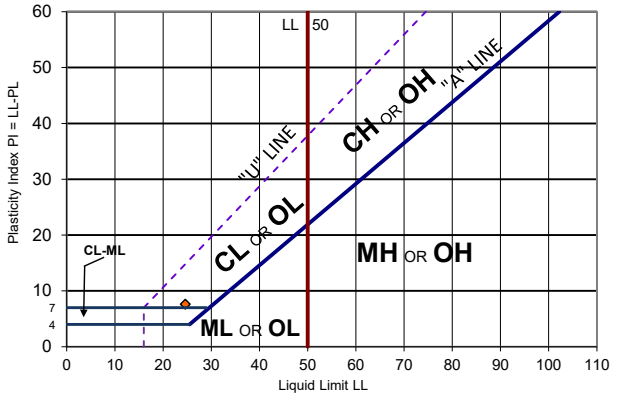
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
25	17	8	11.3

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	June 30, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 3, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-4
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-04	Sample no.:	SS2	Sample Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)
Soil Description:	Lean clay with sand (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	#3
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	33	23	19
Water Content:			
Tare no.	Z24	Z10	Z22
Wet soil+tare, g	31.36	32.49	31.24
Dry soil+tare, g	29.52	30.34	29.28
Mass of water, g	1.84	2.15	1.96
Tare, g	21.76	21.69	21.54
Mass of soil, g	7.76	8.65	7.74
Water content %	23.7%	24.9%	25.3%

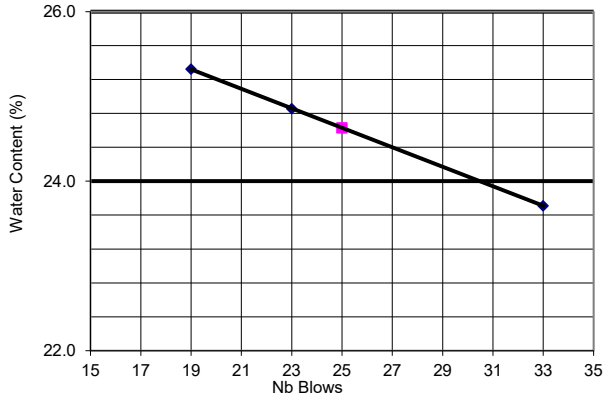
Plastic Limit (PL) - Water Content:		
Tare no.	Z5	Z14
Wet soil+tare, g	32.75	32.55
Dry soil+tare, g	31.12	30.99
Mass of water, g	1.63	1.56
Tare, g	21.51	21.80
Mass of soil, g	9.61	9.19
Water content %	17.0%	17.0%
Average water content %	17.0%	

Natural Water Content (W^n):		
Tare no.	X17	
Wet soil+tare, g	731.80	
Dry soil+tare, g	670.30	
Mass of water, g	61.50	
Tare, g	168.20	
Mass of soil, g	502.10	
Water content %	12.2%	

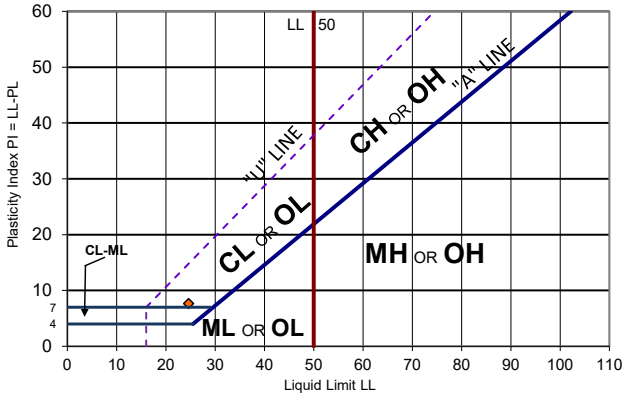
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
25	17	8	12.2

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1446-2
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-05	Sample no.:	SS4	Sample Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)
Soil Description:	Sandy lean clay (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	RC
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	32	26	16
Water Content:			
Tare no.	Z39	Z29	Z27
Wet soil+tare, g	31.32	32.11	31.05
Dry soil+tare, g	29.50	30.08	29.19
Mass of water, g	1.82	2.03	1.86
Tare, g	21.70	21.54	21.56
Mass of soil, g	7.80	8.54	7.63
Water content %	23.3%	23.8%	24.4%

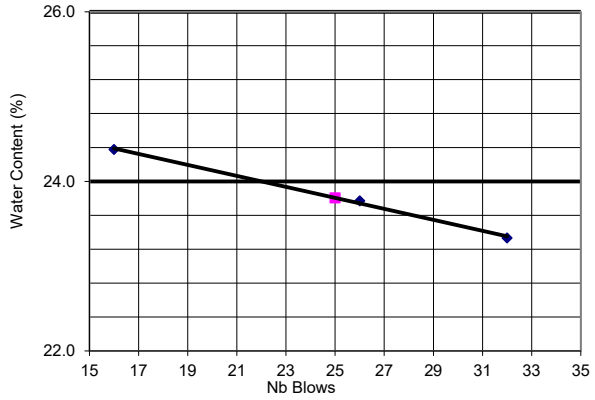
Plastic Limit (PL) - Water Content:		
Tare no.	Z32	Z40
Wet soil+tare, g	32.18	33.03
Dry soil+tare, g	30.69	31.43
Mass of water, g	1.49	1.60
Tare, g	21.65	21.70
Mass of soil, g	9.04	9.73
Water content %	16.5%	16.4%
Average water content %	16.5%	

Natural Water Content (W^n):		
Tare no.	Z05	
Wet soil+tare, g	964.20	
Dry soil+tare, g	874.60	
Mass of water, g	89.60	
Tare, g	95.40	
Mass of soil, g	779.20	
Water content %	11.5%	

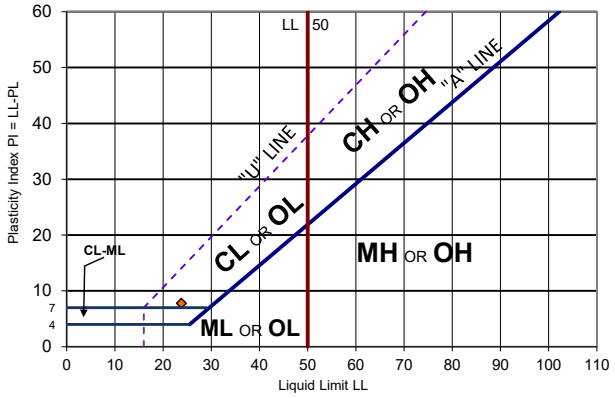
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
24	16	8	11.5

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	June 30, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 3, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-5
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-06	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Lean clay with sand (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	bean
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	35	23	15
Water Content:			
Tare no.	Z8	Z25	Z15
Wet soil+tare, g	32.02	32.23	31.13
Dry soil+tare, g	29.91	30.02	29.05
Mass of water, g	2.11	2.21	2.08
Tare, g	21.64	21.75	21.55
Mass of soil, g	8.27	8.27	7.50
Water content %	25.5%	26.7%	27.7%

Plastic Limit (PL) - Water Content:

Tare no.	Z3	Z19
Wet soil+tare, g	32.55	34.63
Dry soil+tare, g	30.86	32.61
Mass of water, g	1.69	2.02
Tare, g	21.51	21.51
Mass of soil, g	9.35	11.10
Water content %	18.1%	18.2%
Average water content %	18.1%	

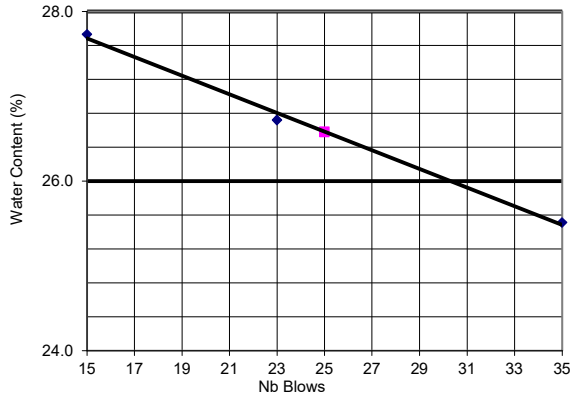
Natural Water Content (W^n):

Tare no.	Q7	
Wet soil+tare, g	753.70	
Dry soil+tare, g	713.30	
Mass of water, g	40.40	
Tare, g	220.00	
Mass of soil, g	493.30	
Water content %	8.2%	

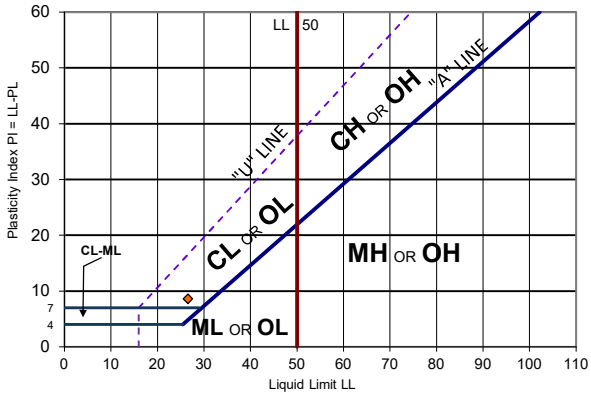
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
27	18	9	8.2

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	June 18, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1446-3
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	MW25-07	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Sandy silty clay with gravel (CL-ML)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	goat
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	30	25	18
Water Content:			
Tare no.	Z33	Z23	18
Wet soil+tare, g	31.78	29.67	36.97
Dry soil+tare, g	29.77	28.05	34.75
Mass of water, g	2.01	1.62	2.22
Tare, g	21.62	21.58	26.08
Mass of soil, g	8.15	6.47	8.67
Water content %	24.7%	25.0%	25.6%

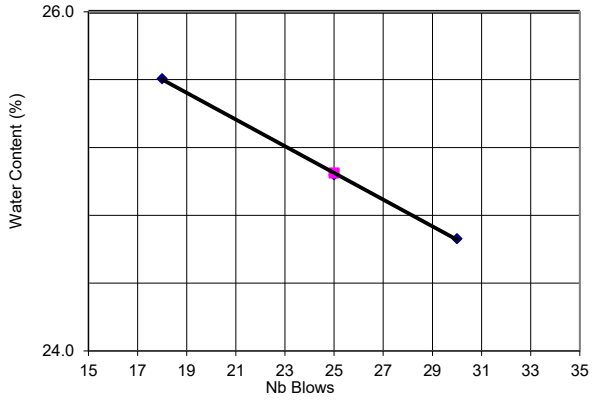
Plastic Limit (PL) - Water Content:		
Tare no.	Z41	Z44
Wet soil+tare, g	31.25	31.83
Dry soil+tare, g	29.80	30.31
Mass of water, g	1.45	1.52
Tare, g	21.67	21.76
Mass of soil, g	8.13	8.55
Water content %	17.8%	17.8%
Average water content %	17.8%	

Natural Water Content (W^n):		
Tare no.	onion	
Wet soil+tare, g	900.80	
Dry soil+tare, g	860.30	
Mass of water, g	40.50	
Tare, g	351.70	
Mass of soil, g	508.60	
Water content %	8.0%	

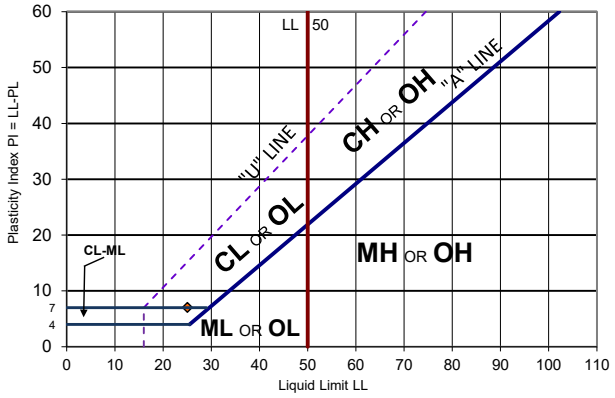
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
25	18	7	8.0

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	June 30, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 3, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1446-6
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	MW25-08	Sample no.:	SS4	Sample Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)
Soil Description:	Sandy lean clay (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	4
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	32	22	17
Water Content:			
Tare no.	26	Z18	Z1
Wet soil+tare, g	34.32	30.75	30.38
Dry soil+tare, g	32.58	28.96	28.62
Mass of water, g	1.74	1.79	1.76
Tare, g	25.20	21.66	21.60
Mass of soil, g	7.38	7.30	7.02
Water content %	23.6%	24.5%	25.1%

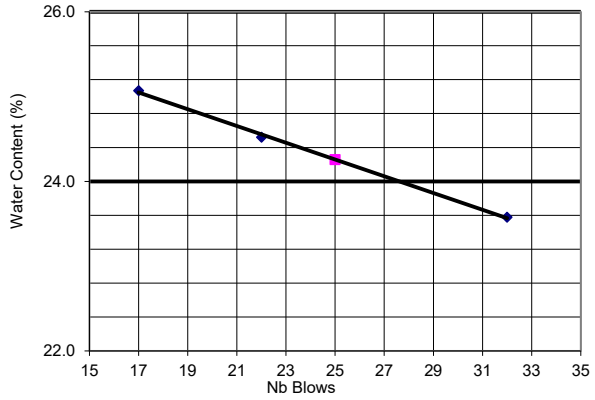
Plastic Limit (PL) - Water Content:		
Tare no.	Z14	Z5
Wet soil+tare, g	32.20	30.51
Dry soil+tare, g	30.75	29.24
Mass of water, g	1.45	1.27
Tare, g	21.81	21.51
Mass of soil, g	8.94	7.73
Water content %	16.2%	16.4%
Average water content %	16.3%	

Natural Water Content (W^n):		
Tare no.	Z04	
Wet soil+tare, g	1198.10	
Dry soil+tare, g	1079.00	
Mass of water, g	119.10	
Tare, g	92.20	
Mass of soil, g	986.80	
Water content %	12.1%	

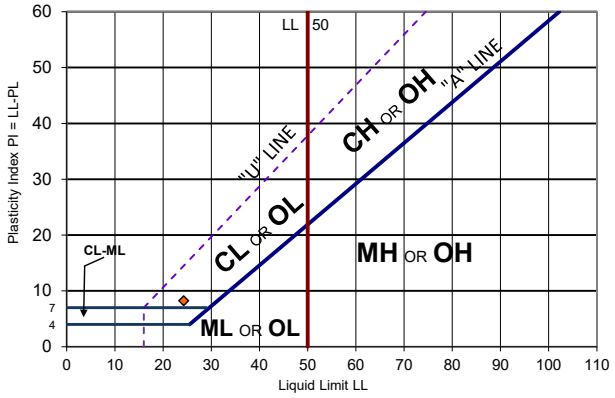
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
24	16	8	12.1

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	June 30, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 3, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-6
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-09	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Sandy silty clay (CL-ML)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	Bam
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	35	29	20
Water Content:			
Tare no.	26	Z18	Z7
Wet soil+tare, g	35.93	32.08	31.46
Dry soil+tare, g	34.03	30.18	29.58
Mass of water, g	1.90	1.90	1.88
Tare, g	25.18	21.68	21.58
Mass of soil, g	8.85	8.50	8.00
Water content %	21.5%	22.4%	23.5%

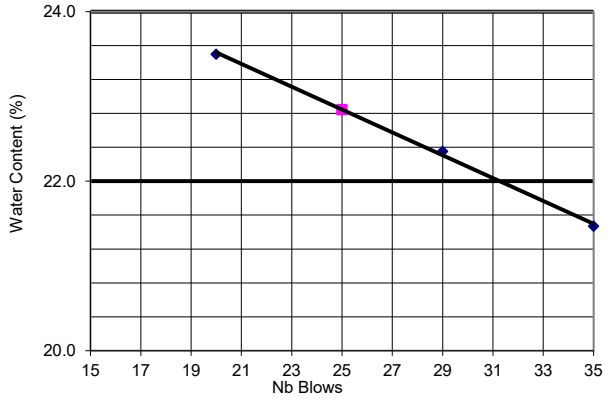
Plastic Limit (PL) - Water Content:		
Tare no.	18	Z12
Wet soil+tare, g	36.22	30.90
Dry soil+tare, g	34.79	29.56
Mass of water, g	1.43	1.34
Tare, g	26.09	21.49
Mass of soil, g	8.70	8.07
Water content %	16.4%	16.6%
Average water content %	16.5%	

Natural Water Content (W^n):		
Tare no.	chocolate	
Wet soil+tare, g	936.50	
Dry soil+tare, g	894.30	
Mass of water, g	42.20	
Tare, g	352.60	
Mass of soil, g	541.70	
Water content %	7.8%	

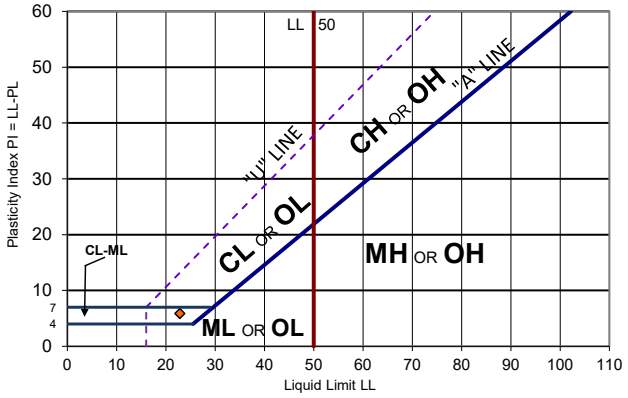
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
23	17	6	7.8

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-7
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-10	Sample no.:	SS2	Sample Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)
Soil Description:	Lean clay with sand (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	blake
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	34	28	17
Water Content:			
Tare no.	Z13	Z16	Z30
Wet soil+tare, g	31.52	31.55	31.32
Dry soil+tare, g	29.51	29.52	29.17
Mass of water, g	2.01	2.03	2.15
Tare, g	21.58	21.76	21.42
Mass of soil, g	7.93	7.76	7.75
Water content %	25.3%	26.2%	27.7%

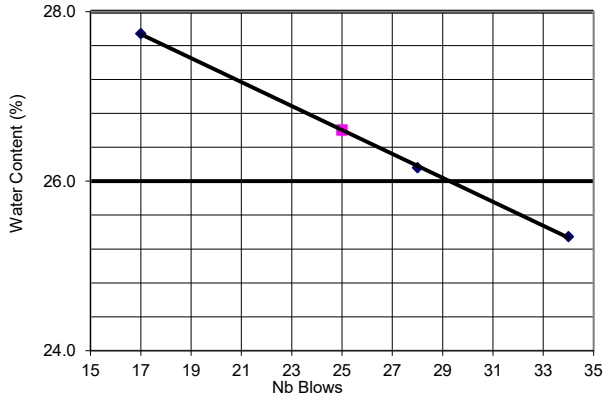
Plastic Limit (PL) - Water Content:		
Tare no.	120	Z42
Wet soil+tare, g	25.41	34.29
Dry soil+tare, g	23.68	32.42
Mass of water, g	1.73	1.87
Tare, g	13.82	21.64
Mass of soil, g	9.86	10.78
Water content %	17.5%	17.3%
Average water content %	17.4%	

Natural Water Content (W^n):		
Tare no.	H4	
Wet soil+tare, g	1153.50	
Dry soil+tare, g	1037.90	
Mass of water, g	115.60	
Tare, g	106.60	
Mass of soil, g	931.30	
Water content %	12.4%	

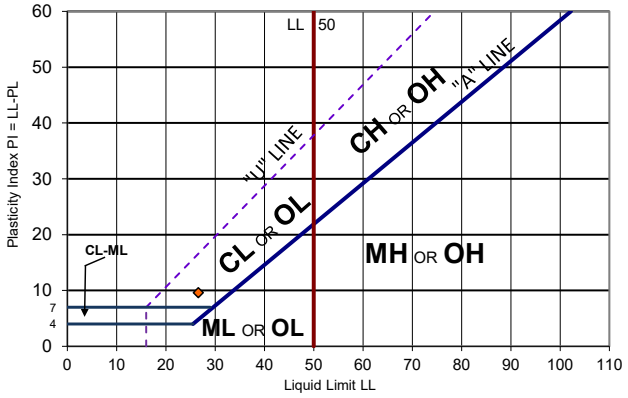
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
27	17	10	12.4

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1446-7
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	MW25-11	Sample no.:	SS2	Sample Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)
Soil Description:	Lean clay (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	blake
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	33	22	18
Water Content:			
Tare no.	Z24	22	Z6
Wet soil+tare, g	29.99	32.08	27.36
Dry soil+tare, g	27.72	30.05	25.68
Mass of water, g	2.27	2.03	1.68
Tare, g	21.76	25.00	21.56
Mass of soil, g	5.96	5.05	4.12
Water content %	38.1%	40.2%	40.8%

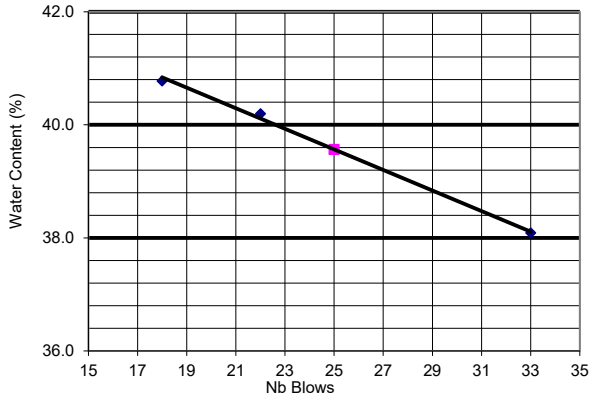
Plastic Limit (PL) - Water Content:		
Tare no.	Z37	1
Wet soil+tare, g	31.88	32.88
Dry soil+tare, g	30.11	31.44
Mass of water, g	1.77	1.44
Tare, g	21.74	24.63
Mass of soil, g	8.37	6.81
Water content %	21.1%	21.1%
Average water content %	21.1%	

Natural Water Content (W^n):		
Tare no.	ken	
Wet soil+tare, g	729.30	
Dry soil+tare, g	663.50	
Mass of water, g	65.80	
Tare, g	349.80	
Mass of soil, g	313.70	
Water content %	21.0%	

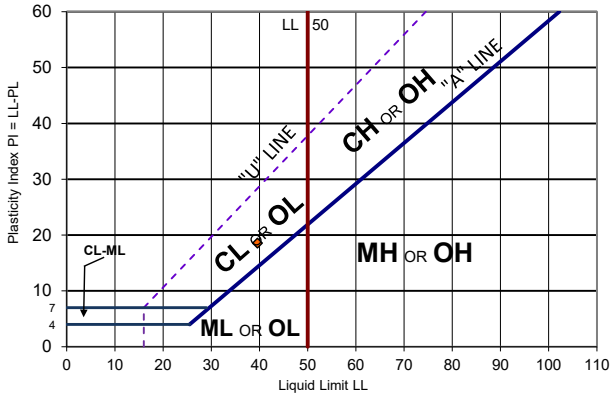
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
40	21	19	21.0

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	June 30, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 3, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-9
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-12	Sample no.:	SS4	Sample Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)
Soil Description:	Sandy lean clay (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	cheese
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	28	22	17
Water Content:			
Tare no.	Q2	Z43	25
Wet soil+tare, g	25.86	31.88	37.84
Dry soil+tare, g	23.66	29.84	35.52
Mass of water, g	2.20	2.04	2.32
Tare, g	14.91	21.84	26.56
Mass of soil, g	8.75	8.00	8.96
Water content %	25.1%	25.5%	25.9%

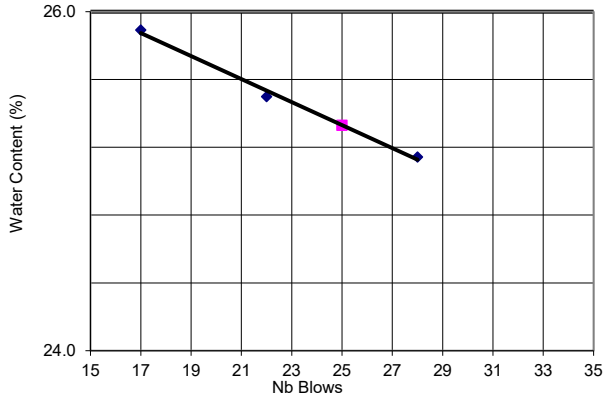
Plastic Limit (PL) - Water Content:		
Tare no.	Z30	Z13
Wet soil+tare, g	34.66	33.71
Dry soil+tare, g	32.73	31.94
Mass of water, g	1.93	1.77
Tare, g	21.44	21.59
Mass of soil, g	11.29	10.35
Water content %	17.1%	17.1%
Average water content %	17.1%	

Natural Water Content (W^n):		
Tare no.	S5	
Wet soil+tare, g	1113.10	
Dry soil+tare, g	1009.60	
Mass of water, g	103.50	
Tare, g	153.20	
Mass of soil, g	856.40	
Water content %	12.1%	

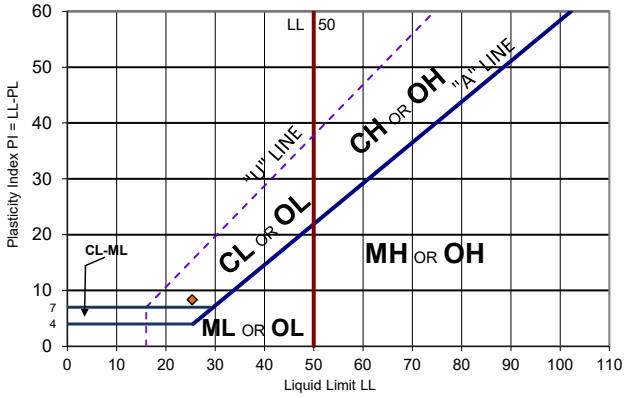
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
25	17	8	12.1

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-10
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-13	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Lean clay with sand (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	glow
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	34	23	17
Water Content:			
Tare no.	Z1	Z6	Z4
Wet soil+tare, g	31.98	32.11	32.36
Dry soil+tare, g	29.94	29.96	30.13
Mass of water, g	2.04	2.15	2.23
Tare, g	21.60	21.57	21.61
Mass of soil, g	8.34	8.39	8.52
Water content %	24.5%	25.6%	26.2%

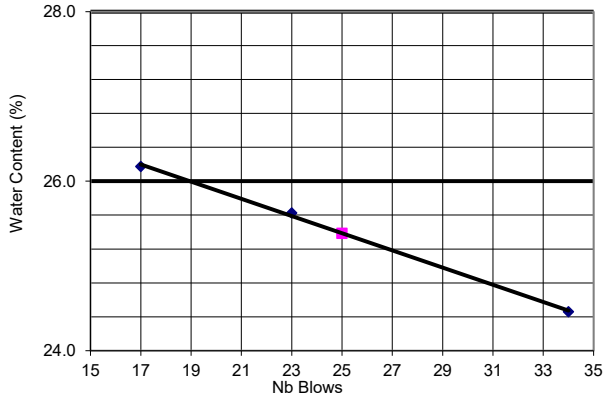
Plastic Limit (PL) - Water Content:		
Tare no.	Z17	Z28
Wet soil+tare, g	32.29	30.80
Dry soil+tare, g	30.73	29.43
Mass of water, g	1.56	1.37
Tare, g	21.66	21.53
Mass of soil, g	9.07	7.90
Water content %	17.2%	17.3%
Average water content %	17.3%	

Natural Water Content (W^n):		
Tare no.	onion	
Wet soil+tare, g	1410.50	
Dry soil+tare, g	1288.30	
Mass of water, g	122.20	
Tare, g	351.80	
Mass of soil, g	936.50	
Water content %	13.0%	

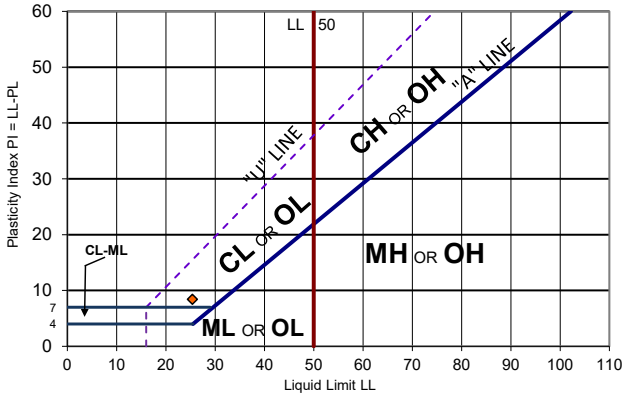
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
25	17	8	13.0

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1446-9
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	MW25-14	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Sandy lean clay (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	foot
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	28	20	15
Water Content:			
Tare no.	Z9	Z22	Z26
Wet soil+tare, g	31.18	29.76	31.66
Dry soil+tare, g	29.13	27.93	29.37
Mass of water, g	2.05	1.83	2.29
Tare, g	21.61	21.50	21.58
Mass of soil, g	7.52	6.43	7.79
Water content %	27.3%	28.5%	29.4%

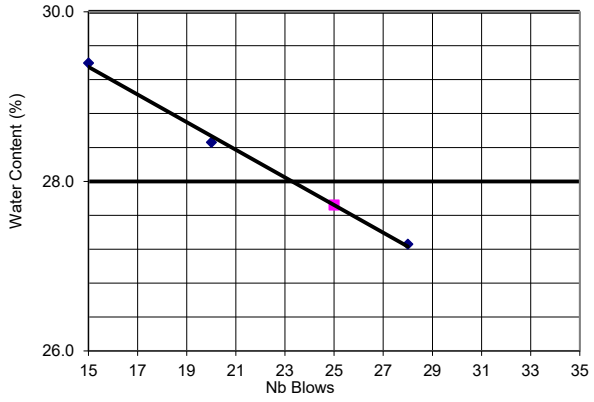
Plastic Limit (PL) - Water Content:		
Tare no.	Z46	120
Wet soil+tare, g	32.61	22.20
Dry soil+tare, g	30.92	20.91
Mass of water, g	1.69	1.29
Tare, g	21.70	13.82
Mass of soil, g	9.22	7.09
Water content %	18.3%	18.2%
Average water content %	18.3%	

Natural Water Content (W^n):		
Tare no.	M12	
Wet soil+tare, g	1155.60	
Dry soil+tare, g	1056.90	
Mass of water, g	98.70	
Tare, g	235.70	
Mass of soil, g	821.20	
Water content %	12.0%	

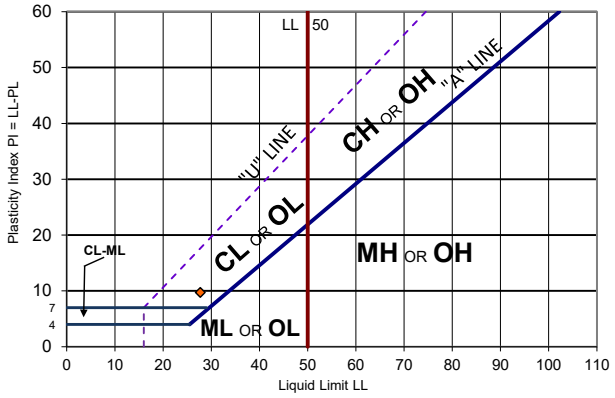
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
28	18	10	12.0

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	June 30, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 3, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-11
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-15	Sample no.:	SS2	Sample Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)
Soil Description:	Lean clay with sand (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	YZ2
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	27	20	16
Water Content:			
Tare no.	120	Z38	Z16
Wet soil+tare, g	23.42	32.13	32.03
Dry soil+tare, g	21.35	29.77	29.69
Mass of water, g	2.07	2.36	2.34
Tare, g	13.81	21.53	21.75
Mass of soil, g	7.54	8.24	7.94
Water content %	27.5%	28.6%	29.5%

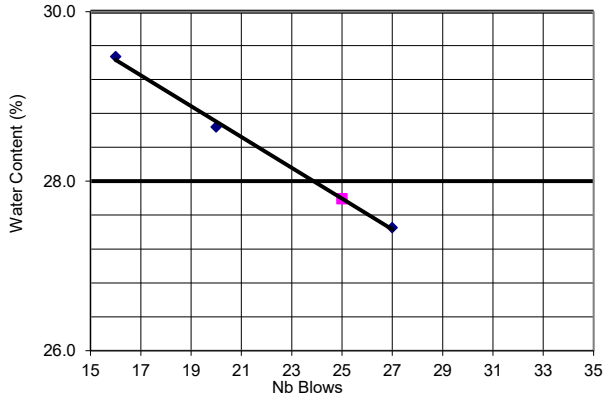
Plastic Limit (PL) - Water Content:		
Tare no.	Z42	Z11
Wet soil+tare, g	32.95	34.73
Dry soil+tare, g	31.21	32.71
Mass of water, g	1.74	2.02
Tare, g	21.64	21.69
Mass of soil, g	9.57	11.02
Water content %	18.2%	18.3%
Average water content %	18.3%	

Natural Water Content (W^n):		
Tare no.	mushroom	
Wet soil+tare, g	896.20	
Dry soil+tare, g	805.10	
Mass of water, g	91.10	
Tare, g	124.10	
Mass of soil, g	681.00	
Water content %	13.4%	

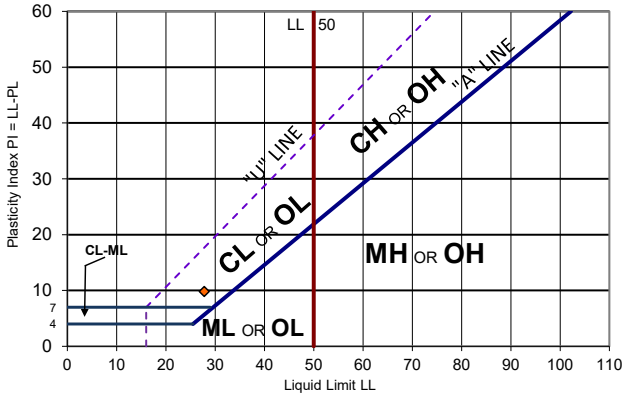
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
28	18	10	13.4

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by: Melanie Mitchell **Date:** July 9, 2025

Reviewed by: Abdul Hafeez Khan, P.Eng.; Laboratory Manager **Date:** July 16, 2025

Laboratory Location: 140 Bathurst Drive, Waterloo

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-12
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-16	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Lean clay with sand (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	RC
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	27	20	15
Water Content:			
Tare no.	AB44	D24	D28
Wet soil+tare, g	16.44	16.22	16.30
Dry soil+tare, g	14.40	14.13	14.13
Mass of water, g	2.04	2.09	2.17
Tare, g	6.42	6.28	6.24
Mass of soil, g	7.98	7.85	7.89
Water content %	25.6%	26.6%	27.5%

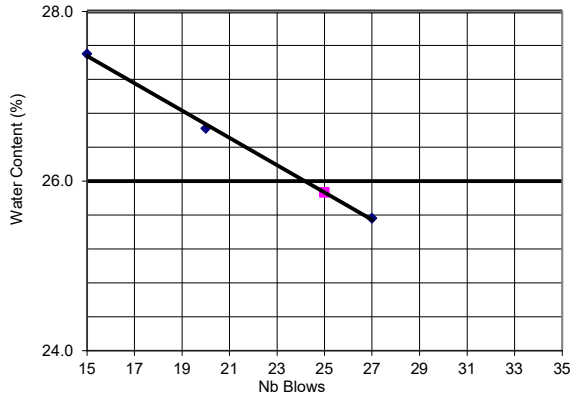
Plastic Limit (PL) - Water Content:		
Tare no.	T1	D61
Wet soil+tare, g	16.90	18.52
Dry soil+tare, g	15.35	16.77
Mass of water, g	1.55	1.75
Tare, g	6.26	6.34
Mass of soil, g	9.09	10.43
Water content %	17.1%	16.8%
Average water content %	16.9%	

Natural Water Content (W^n):		
Tare no.	Z04	
Wet soil+tare, g	1141.40	
Dry soil+tare, g	1032.10	
Mass of water, g	109.30	
Tare, g	92.00	
Mass of soil, g	940.10	
Water content %	11.6%	

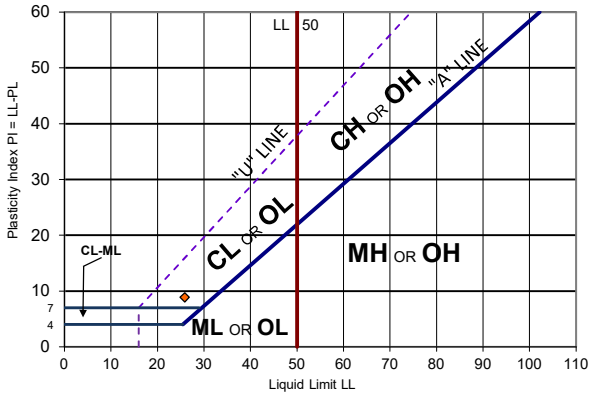
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
26	17	9	11.6

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by: Melanie Mitchell **Date:** July 10, 2025

Reviewed by: Abdul Hafeez Khan, P.Eng.; Laboratory Manager **Date:** July 18, 2025

Laboratory Location: 140 Bathurst Drive, Waterloo

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-13
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-17	Sample no.:	SS4	Sample Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)
Soil Description:	Sandy lean clay (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	colada
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	30	23	17
Water Content:			
Tare no.	Z39	Z27	Z41
Wet soil+tare, g	32.38	31.62	30.52
Dry soil+tare, g	30.31	29.64	28.73
Mass of water, g	2.07	1.98	1.79
Tare, g	21.72	21.62	21.64
Mass of soil, g	8.59	8.02	7.09
Water content %	24.1%	24.7%	25.2%

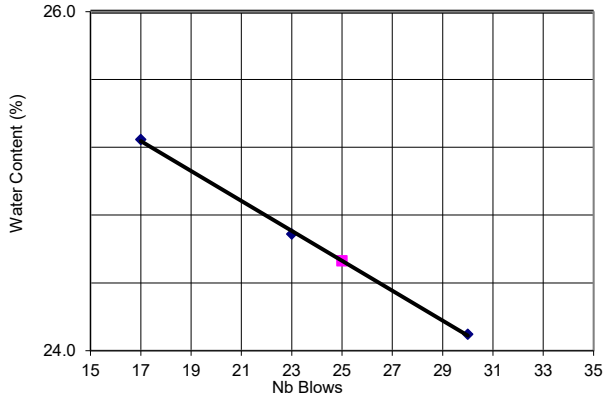
Plastic Limit (PL) - Water Content:		
Tare no.	Z33	22
Wet soil+tare, g	32.40	37.28
Dry soil+tare, g	30.90	35.58
Mass of water, g	1.50	1.70
Tare, g	21.61	25.00
Mass of soil, g	9.29	10.58
Water content %	16.1%	16.1%
Average water content %	16.1%	

Natural Water Content (W^n):		
Tare no.	CA	
Wet soil+tare, g	1109.90	
Dry soil+tare, g	1024.70	
Mass of water, g	85.20	
Tare, g	158.80	
Mass of soil, g	865.90	
Water content %	9.8%	

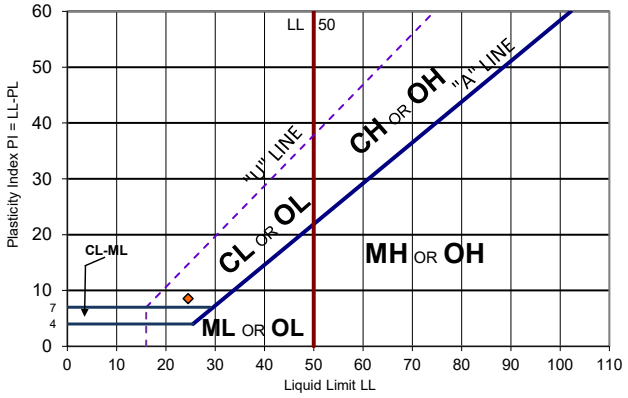
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
25	16	9	9.8

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-14
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	MW25-18	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Silty, clayey sand with gravel (SC-SM)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	foot
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	29	21	16
Water Content:			
Tare no.	D84	AB32	G23
Wet soil+tare, g	15.42	14.32	13.66
Dry soil+tare, g	13.75	12.82	12.23
Mass of water, g	1.67	1.50	1.43
Tare, g	6.27	6.40	6.26
Mass of soil, g	7.48	6.42	5.97
Water content %	22.3%	23.4%	24.0%

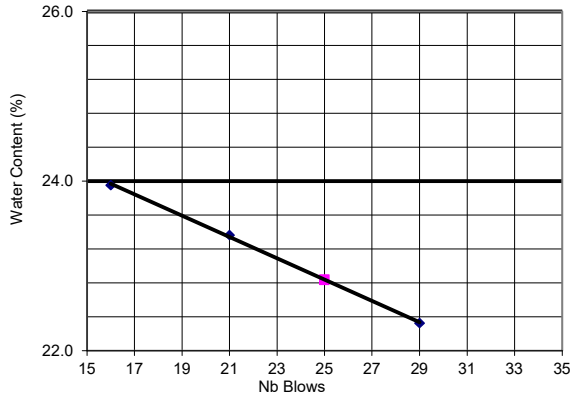
Plastic Limit (PL) - Water Content:		
Tare no.	D94	AB7
Wet soil+tare, g	15.72	16.86
Dry soil+tare, g	14.40	15.37
Mass of water, g	1.32	1.49
Tare, g	6.34	6.27
Mass of soil, g	8.06	9.10
Water content %	16.4%	16.4%
Average water content %	16.4%	

Natural Water Content (W^n):		
Tare no.	C89	
Wet soil+tare, g	950.20	
Dry soil+tare, g	893.60	
Mass of water, g	56.60	
Tare, g	157.80	
Mass of soil, g	735.80	
Water content %	7.7%	

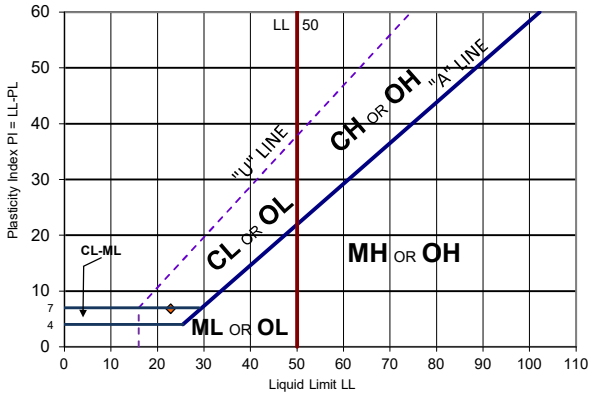
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
23	16	7	7.7

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	June 18, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-16
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-19	Sample no.:	SS4	Sample Depth:	7.5 ft - 9.5 ft (2.29 m - 2.90 m)
Soil Description:	Sandy lean clay (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	gravy
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	31	22	16
Water Content:			
Tare no.	D89	D45	T7
Wet soil+tare, g	16.18	16.14	16.89
Dry soil+tare, g	14.29	14.20	14.75
Mass of water, g	1.89	1.94	2.14
Tare, g	6.30	6.30	6.25
Mass of soil, g	7.99	7.90	8.50
Water content %	23.7%	24.6%	25.2%

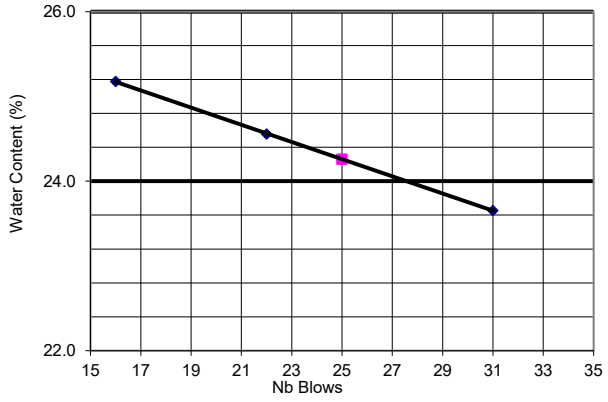
Plastic Limit (PL) - Water Content:		
Tare no.	G19	T4
Wet soil+tare, g	18.29	18.93
Dry soil+tare, g	16.62	17.16
Mass of water, g	1.67	1.77
Tare, g	6.23	6.28
Mass of soil, g	10.39	10.88
Water content %	16.1%	16.3%
Average water content %	16.2%	

Natural Water Content (W^n):		
Tare no.	sleep	
Wet soil+tare, g	1338.90	
Dry soil+tare, g	1213.30	
Mass of water, g	125.60	
Tare, g	177.60	
Mass of soil, g	1035.70	
Water content %	12.1%	

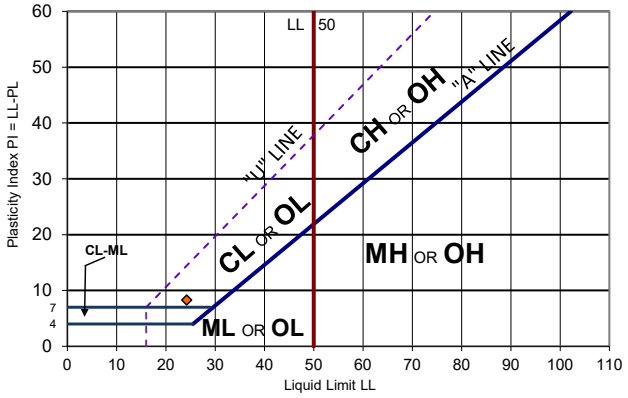
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
24	16	8	12.1

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-17
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-20	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Lean clay with sand (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	truck
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	30	24	19
Water Content:			
Tare no.	D50	civic	D73
Wet soil+tare, g	16.09	15.89	14.93
Dry soil+tare, g	14.15	13.95	13.15
Mass of water, g	1.94	1.94	1.78
Tare, g	6.38	6.32	6.28
Mass of soil, g	7.77	7.63	6.87
Water content %	25.0%	25.4%	25.9%

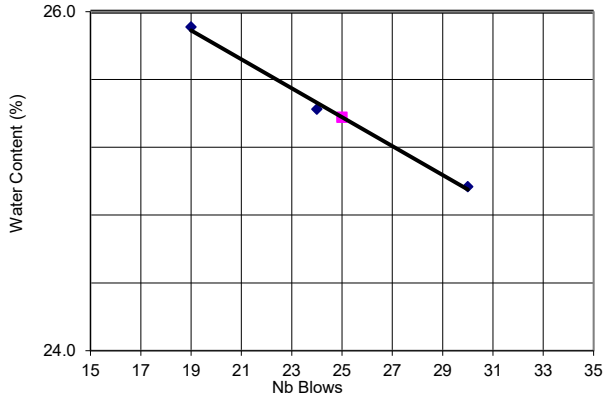
Plastic Limit (PL) - Water Content:		
Tare no.	AB23	D16
Wet soil+tare, g	17.43	18.13
Dry soil+tare, g	15.80	16.43
Mass of water, g	1.63	1.70
Tare, g	6.25	6.35
Mass of soil, g	9.55	10.08
Water content %	17.1%	16.9%
Average water content %	17.0%	

Natural Water Content (W^n):		
Tare no.	S17	
Wet soil+tare, g	1209.40	
Dry soil+tare, g	1092.10	
Mass of water, g	117.30	
Tare, g	167.80	
Mass of soil, g	924.30	
Water content %	12.7%	

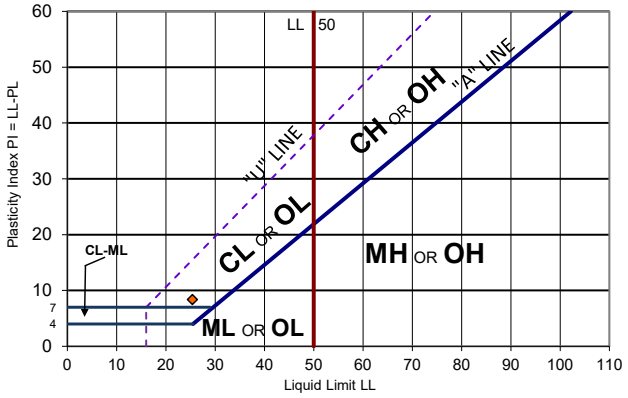
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
25	17	8	12.7

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-18
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-21	Sample no.:	SS2	Sample Depth:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)
Soil Description:	Clayey sand with gravel (SC)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	goat
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	32	24	19
Water Content:			
Tare no.	Z44	Z34	Z2
Wet soil+tare, g	31.40	31.38	29.96
Dry soil+tare, g	29.57	29.46	28.30
Mass of water, g	1.83	1.92	1.66
Tare, g	21.75	21.60	21.72
Mass of soil, g	7.82	7.86	6.58
Water content %	23.4%	24.4%	25.2%

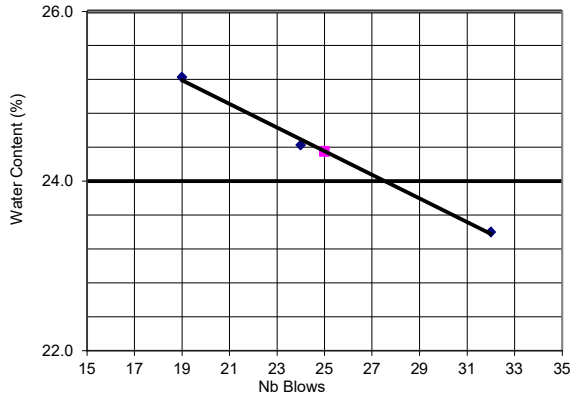
Plastic Limit (PL) - Water Content:		
Tare no.	Z46	Z20
Wet soil+tare, g	32.46	34.26
Dry soil+tare, g	30.96	32.49
Mass of water, g	1.50	1.77
Tare, g	21.71	21.62
Mass of soil, g	9.25	10.87
Water content %	16.2%	16.3%
Average water content %	16.2%	

Natural Water Content (W^n):		
Tare no.	T5	
Wet soil+tare, g	965.40	
Dry soil+tare, g	889.70	
Mass of water, g	75.70	
Tare, g	112.20	
Mass of soil, g	777.50	
Water content %	9.7%	

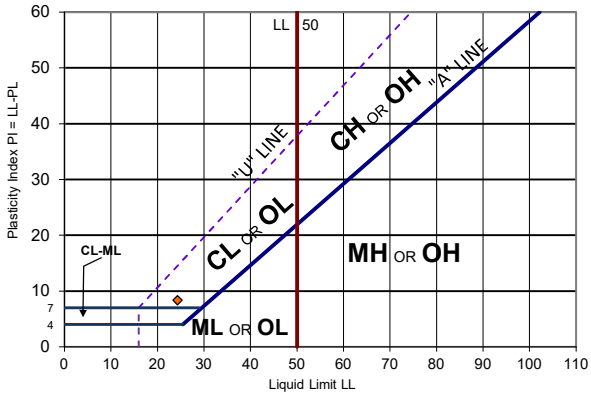
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
24	16	8	9.7

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	June 18, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-19
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-22	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Sandy lean clay with gravel (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	micco
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	32	24	17
Water Content:			
Tare no.	D23	D91	AB28
Wet soil+tare, g	16.10	14.04	16.50
Dry soil+tare, g	14.17	12.47	14.44
Mass of water, g	1.93	1.57	2.06
Tare, g	6.39	6.29	6.45
Mass of soil, g	7.78	6.18	7.99
Water content %	24.8%	25.4%	25.8%

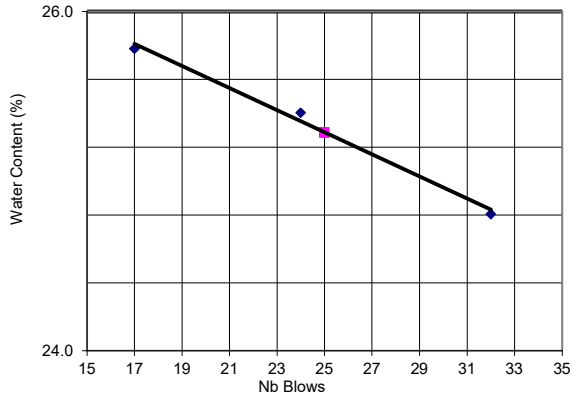
Plastic Limit (PL) - Water Content:		
Tare no.	D19	D10
Wet soil+tare, g	16.30	15.72
Dry soil+tare, g	14.87	14.39
Mass of water, g	1.43	1.33
Tare, g	6.28	6.32
Mass of soil, g	8.59	8.07
Water content %	16.6%	16.5%
Average water content %	16.6%	

Natural Water Content (W^n):		
Tare no.	Z05	
Wet soil+tare, g	840.20	
Dry soil+tare, g	765.30	
Mass of water, g	74.90	
Tare, g	95.30	
Mass of soil, g	670.00	
Water content %	11.2%	

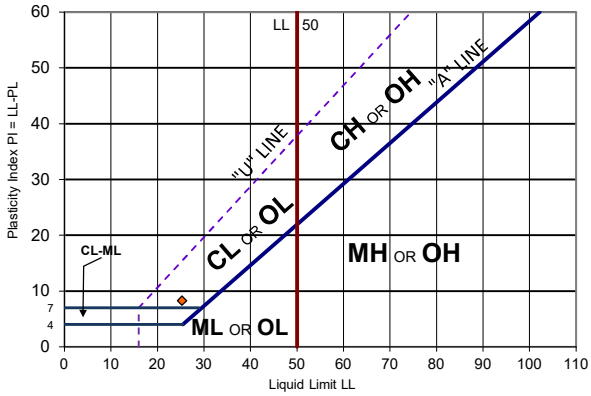
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
25	17	8	11.2

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 10, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 18, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

Liquid Limit, Plastic Limit and Plasticity Index of Soils
(ASTM D4318, MTO LS-703/704)

Client:	Infrastructure Ontario	**Lab no.:**	WLA 1448-20
Project/Site:	Oakville Land Assembly, Oakville/William Halton Pkwy West	**Project no.:**	12669624

Borehole no.:	BH25-23	Sample no.:	SS3	Sample Depth:	5.0 ft - 7.0 ft (1.52 m - 2.13 m)
Soil Description:	Sandy lean clay with gravel (CL)			Date sampled:	

Apparatus:	Automatic	Balance no.:	WLG-15	Porcelain bowl no.:	chicken
Liquid limit device no.:	WLSA-35A	Oven no.:	WLG-2	Spatula no.:	WLSA-3D
Sieve no.:	WLS-110	Glass plate no.:	1		

Liquid Limit (LL):

	Test No. 1	Test No. 2	Test No. 3
Number of blows	32	26	16
Water Content:			
Tare no.	Z40	Z37	Z29
Wet soil+tare, g	31.26	32.24	31.44
Dry soil+tare, g	29.52	30.28	29.52
Mass of water, g	1.74	1.96	1.92
Tare, g	21.72	21.75	21.55
Mass of soil, g	7.80	8.53	7.97
Water content %	22.3%	23.0%	24.1%

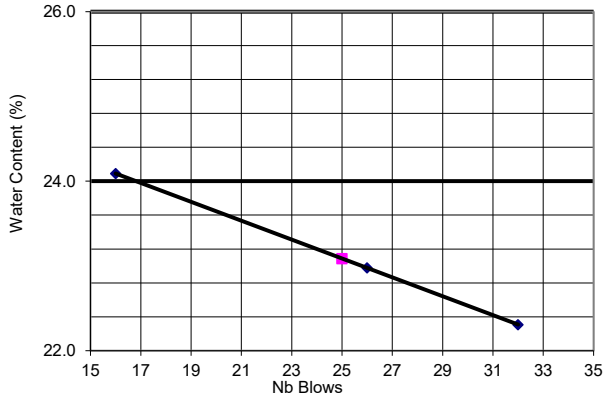
Plastic Limit (PL) - Water Content:		
Tare no.	Z32	1
Wet soil+tare, g	34.28	39.07
Dry soil+tare, g	32.54	37.08
Mass of water, g	1.74	1.99
Tare, g	21.64	24.63
Mass of soil, g	10.90	12.45
Water content %	16.0%	16.0%
Average water content %	16.0%	

Natural Water Content (W^n):		
Tare no.	R2D2	
Wet soil+tare, g	1118.60	
Dry soil+tare, g	1032.00	
Mass of water, g	86.60	
Tare, g	110.50	
Mass of soil, g	921.50	
Water content %	9.4%	

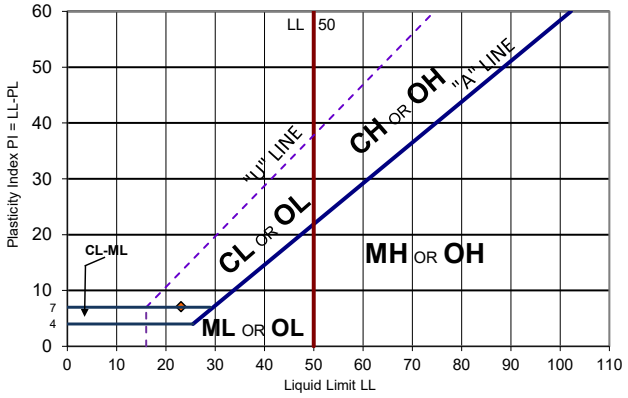
Soil Preparation:

- ☑ Cohesive <425 µm
- ☐ Cohesive >425 µm
- ☐ Non-cohesive
- ☑ Dry preparation (oven dried))
- ☐ Dry preparation (air dried)
- ☐ Wet preparation

Results



Soil Plasticity Chart ASTM D2487



Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Natural Water Content Wn
23	16	7	9.4

Plasticity Chart based on ASTM D2487. Additional laboratory reporting information available upon request.

Remarks:

Performed by:	Melanie Mitchell	**Date:**	July 9, 2025
Reviewed by:	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date:**	July 16, 2025
Laboratory Location:	140 Bathurst Drive, Waterloo		

LABORATORY DETERMINATION OF DENSITY (UNIT WEIGHT) OF SOIL SPECIMENS (ASTM D7263)

CLIENT: Infrastructure Ontario **LAB No.:** WLA 1448

PROJECT/SITE: Oakville Land Assembly, Oakville / William Halton Pkwy West **PROJECT No.:** 12669624

Lab No.	Sample I.D.	Sample Depth	Sample Description	Moisture Content %	Bulk Density (wet) (kg/m^3)	Unit Weight (wet) (kN/m^3)	Bulk Density (dry) (kg/m^3)	Unit Weight (dry) (kN/m^3)
WLA 1448	BH25-04	2.5 ft. - 4.5 ft. (0.76 m - 1.37 m)	Silty Clay	14.9	2197	21.5	1912	18.8
WLA 1448	MW25-18	2.5 ft. - 4.5 ft. (0.76 m - 1.37 m)	Silty Clay	14.3	2119	20.8	1854	18.2
WLA 1448	BH25-02	2.5 ft. - 4.5 ft. (0.76 m - 1.37 m)	Silty Clay	11.7	2187	21.5	1957	19.2

TESTED BY: Melanie Mitchell **TEST DATE:** July 1, 2025

APPROVED BY: Abdul Hafeez Khan, P.Eng. **APPROVED DATE:** July 7, 2025

LABORATOY LOCATION: GHD Limited - 140 Bathurst Drive, Waterloo Ontario

LABORATORY DETERMINATION OF DENSITY (UNIT WEIGHT) OF SOIL SPECIMENS (ASTM D7263)

CLIENT: Infrastructure Ontario **LAB No.:** WLA 1446

PROJECT/SITE: Oakville Land Assembly, Oakville/William Halton Pkwy West **PROJECT No.:** 12669624

Lab No.	Sample I.D.	Sample Depth	Sample Description	Moisture Content %	Bulk Density (wet) (kg/m^3)	Unit Weight (wet) (kN/m^3)	Bulk Density (dry) (kg/m^3)	Unit Weight (dry) (kN/m^3)
WLA 1446-5	MW25-08	SS-1 (0.0 ft.-2.0 ft.) (0.0 m - 0.76 m)	Silty Clay	20.3	2047	20.1	1702	16.7
WLA 1446-8	MW25-11	SS-3 (5.0 ft.-7.0 ft.) (1.52 m - 2.13 m)	Silty Clay	7.5	2053	20.1	1909	18.7

TESTED BY: Melanie Mitchell **TEST DATE:** June 24, 2026

APPROVED BY: Abdul Hafeez Khan, P.Eng. **APPROVED DATE:** July 4, 2025

LABORATOY LOCATION: GHD Limited - 140 Bathurst Drive, Waterloo Ontario

POINT LOAD STRENGTH INDEX OF ROCK
(ASTM D5731)

CLIENT:	Infrastructure Ontario	**LAB No.:**	WLT 1276-1
PROJECT/ SITE:	Oakville Land Assembly , Oakville, William Halton Pkwy West	**PROJECT No.:**	12669624
Borehole No.:	MW 25-07	Sample No.:	Run 1
Depth, m:	2.51 - 3.12 m (8'3" - 10'3")	Date Sampled:	June 20, 2025
Lithologic Description:	Shale		

Specimen No.	Direction of Loading*		Thickness	Diameter	Equivalent Core Diameter D_e	Failure Load P	Point Load Strength Index I_s	Corrected Point Load Strength Index I_{s50}	Estimated Uniaxial Compressive Strength σ_c
			mm	mm	mm	kN	MPa	MPa	MPa
1	a	⊥	37.00	60.48	37.0	1.5	0.5	0.5	12.7
2	a	⊥	39.00	60.48	39.0	1.5	0.5	0.5	12.4
3	a	⊥	48.00	60.48	48.0	1.8	0.5	0.5	11.9
4	a	⊥	33.00	60.48	33.0	1.7	0.7	0.6	16.5
5	a	⊥	43.00	60.48	43.0	2.0	0.6	0.6	14.8
6	a	⊥	51.00	60.48	51.0	2.4	0.6	0.6	14.8
							Mean	**0.5**	**13.9**

*d = diametral ⊥ = perpendicular to plane of weakness
a = axial // = parallel to plane of weakness

REMARKS: Tested at "as received" moisture content

PERFORMED BY:	I.Nasseri-Moghaddam	**DATE:**	July 7, 2025
VERIFIED BY:	M. Braverman	**DATE:**	July 9, 2025

POINT LOAD STRENGTH INDEX OF ROCK
(ASTM D5731)

CLIENT:	Infrastructure Ontario	**LAB No.:**	WLT 1276-3
PROJECT/ SITE:	Oakville Land Assembly , Oakville, William Halton Pkwy West	**PROJECT No.:**	12669624
Borehole No.:	MW 25-11	Sample No.:	Run 1
Depth, m:	2.41 - 3.2 m (7'11" - 9'11")	Date Sampled:	June 23, 2025
Lithologic Description:	Limy Shale		

Specimen No.	Direction of Loading*		Thickness	Diameter	Equivalent Core Diameter D_e	Failure Load P	Point Load Strength Index I_s	Corrected Point Load Strength Index I_{s50}	Estimated Uniaxial Compressive Strength σ_c
			mm	mm	mm	kN	MPa	MPa	MPa
1	a	⊥	37.00	38.38	37.0	1.2	0.7	0.6	16.4
2	a	⊥	42.00	59.55	42.0	2.2	0.7	0.6	16.6
3	a	⊥	49.00	30.00	49.0	2.7	1.4	1.4	35.0
4	a	⊥	36.00	59.55	36.0	6.2	2.3	2.0	55.4
5	a	⊥	26.00	59.55	26.0	5.8	2.9	2.2	72.1
6	a	⊥	30.00	59.55	30.0	7.7	3.4	2.7	82.9
							Mean	**1.6**	**46.2**

*d = diametral ⊥ = perpendicular to plane of weakness

a = axial // = parallel to plane of weakness

REMARKS: Tested at "as received" moisture content

PERFORMED BY:	I.Nasseri-Moghaddam	**DATE:**	July 7, 2025
VERIFIED BY:	M. Braverman	**DATE:**	July 9, 2025

POINT LOAD STRENGTH INDEX OF ROCK
(ASTM D5731)

CLIENT:	Infrastructure Ontario	**LAB No.:**	WLT 1276-5
PROJECT/ SITE:	Oakville Land Assembly , Oakville, William Halton Pkwy West	**PROJECT No.:**	12669624
Borehole No.:	MW 25-18	Sample No.:	Run 1
Depth, m:	3.05 - 3.35 m (10' - 11')	Date Sampled:	June 24, 2025
Lithologic Description:	Limy Shale		

Specimen No.	Direction of Loading*		Thickness	Diameter	Equivalent Core Diameter D_e	Failure Load P	Point Load Strength Index I_s	Corrected Point Load Strength Index I_{s50}	Estimated Uniaxial Compressive Strength σ_c
			mm	mm	mm	kN	MPa	MPa	MPa
1	a	⊥	36.00	60.73	36.0	1.9	0.7	0.6	16.3
2	a	⊥	32.00	60.73	32.0	1.8	0.7	0.6	18.2
3	a	⊥	48.00	60.73	48.0	3.4	0.9	0.9	22.3
4	a	⊥	47.00	60.73	47.0	5.4	1.5	1.5	36.6
5	a	⊥	20.00	60.73	20.0	3.6	2.3	1.5	56.4
6	a	⊥	33.00	60.73	33.0	9.0	3.5	2.9	86.5
							Mean	**1.3**	**39.4**

*d = diametral ⊥ = perpendicular to plane of weakness

a = axial // = parallel to plane of weakness

REMARKS: Tested at "as received" moisture content

PERFORMED BY:	I. Nasseri Moghadam	**DATE:**	July 7, 2025
VERIFIED BY:	M. Braverman	**DATE:**	July 7, 2025

Uniaxial Compressive Strength of Intact Rock Core Specimens
(ASTM D7012 - Method C)

CLIENT:	Infrastructure Ontario	**LAB No.:**	WLT 1276-2
PROJECT/ SITE:	Oakville Land Assembly , Oakville, William Halton Pkwy West	**PROJECT No.:**	12669624

Borehole No.:	MW 25 - 07	**Sample ID:**	R3
Depth:	5.49 - 5.64 m (18' - 18'6")	**Date Sampled:**	June 20, 2025

Lithological Description: Shale

Initial Specimen Parameters	
Diameter, mm	60.5
Height, mm	136.1
Height-to-Diameter Ratio	2.3
Volume, cm^3	390.6
Mass, g	1040.5
Bulk Density, kg/m^3	2664
Moisture Condition	As-received
Moisture Content, %	1.9

Maximum Applied Load, kN	75.8
Compressive Strength, MPa	26.4

REMARKS:

PERFORMED BY:	A.Hunter	**DATE:**	July 7, 2025
VERIFIED BY:	Michael Braverman	**DATE:**	July 9, 2025

Uniaxial Compressive Strength of Intact Rock Core Specimens
(ASTM D7012 - Method C)

CLIENT:	Infrastructure Ontario	**LAB No.:**	WLT 1276-4
PROJECT/ SITE:	Oakville Land Assembly , Oakville, William Halton Pkwy West	**PROJECT No.:**	12669624

Borehole No.:	MW 25 - 11	**Sample ID:**	R3
Depth:	5.18 - 5.33 m (17' - 17'6")	**Date Sampled:**	June 23, 2025

Lithological Description: Limy Shale

Initial Specimen Parameters	
Diameter, mm	60.4
Height, mm	147.6
Height-to-Diameter Ratio	2.4
Volume, cm^3	422.9
Mass, g	1137.0
Bulk Density, kg/m^3	2689
Moisture Condition	As-received
Moisture Content, %	2.5

Maximum Applied Load, kN	78.8
Compressive Strength, MPa	27.5

REMARKS:

PERFORMED BY:	A.Hunter	**DATE:**	July 7, 2025
VERIFIED BY:	Michael Braverman	**DATE:**	July 9, 2025

Uniaxial Compressive Strength of Intact Rock Core Specimens
(ASTM D7012 - Method C)

CLIENT:	Infrastructure Ontario	**LAB No.:**	WLT 1276-6
PROJECT/ SITE:	Oakville Land Assembly , Oakville, William Halton Pkwy West	**PROJECT No.:**	12669624
Borehole No.:	MW 25 - 18	**Sample ID:**	R3
Depth:	5.03 - 5.18 m ('16'6" - 17')	**Date Sampled:**	June 24, 2025
Lithological Description:	Limy Shale		

Initial Specimen Parameters	
Diameter, mm	60.4
Height, mm	128.7
Height-to-Diameter Ratio	2.1
Volume, cm^3	369.3
Mass, g	982.6
Bulk Density, kg/m^3	2660
Moisture Condition	As-received
Moisture Content, %	2.3

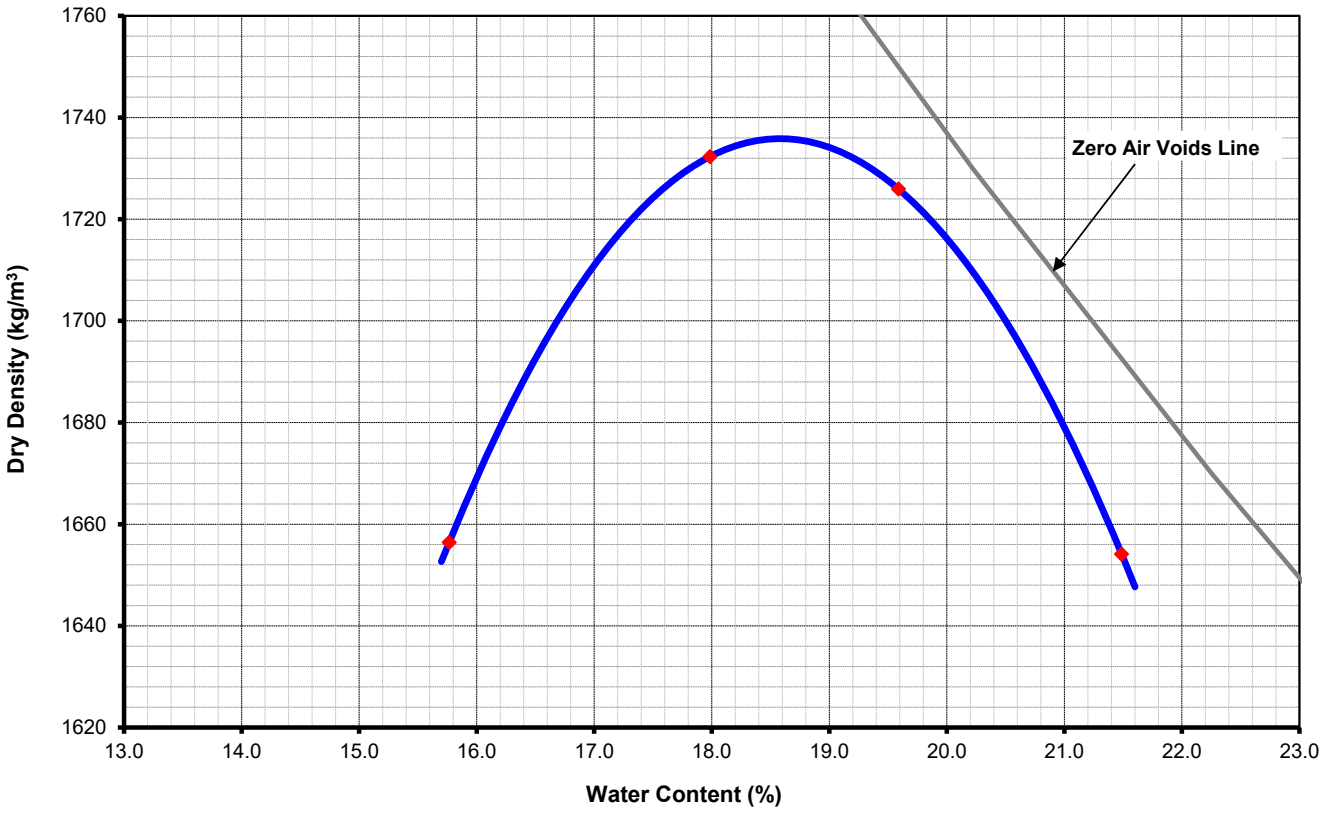
Maximum Applied Load, kN	123.3
Compressive Strength, MPa	43.0

REMARKS:

PERFORMED BY:	A.Hunter	**DATE:**	July 7, 2025
VERIFIED BY:	Michael Braverman	**DATE:**	July 9, 2025

Standard Proctor Test (ASTM D698)

Client :	Infrastructure Ontario	**Lab No :**	WLA 1446-4
Project/Site :	Oakville Land Assembly, Oakville/ William Halton Pkwy West	**Project No :**	12669624



Prepared Sample:	Dry	x	Moist	--			Assumed G_s:	2.75
ASTM D698 Test Method:	A	x	B	--	C	--	Type of Hammer:	Manual
		4.75 mm		9.50 mm		19.0 mm		

Soil Description:	Silty Clay
Material Type:	Native Borehole Sample
Proposed Use:	--
Sample Identification:	MW25-07
Sample Location:	2.5 ft - 4.5 ft (0.76 m - 1.37 m)
Aggregate Supplier / Pit Name:	--
Sample Date:	June 20, 2025
Sampled By:	Reza Bay

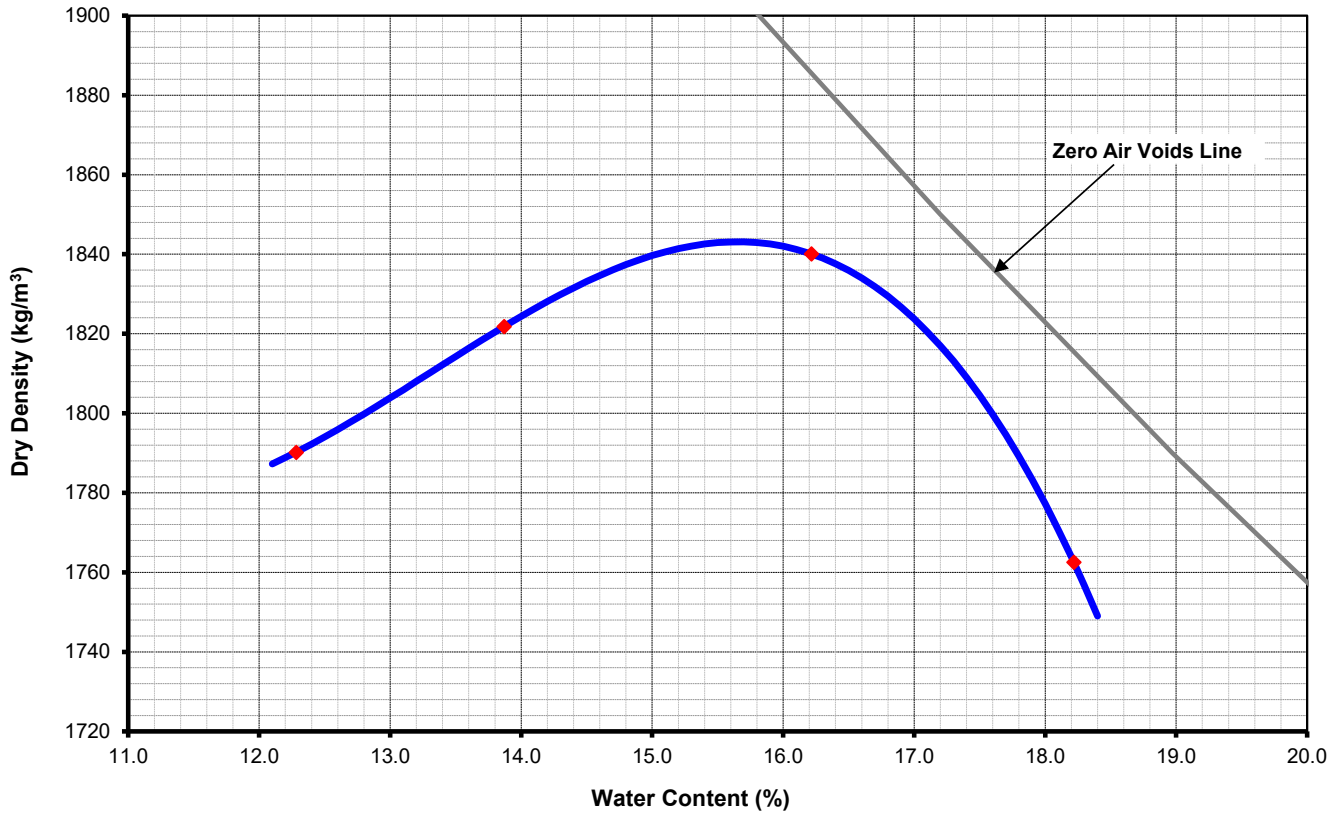
As Received Moisture:	**17.6**	**%**
Max Wet Density:	**2059**	**kg/m^3**
Corrected Wet Density:	**2059**	**kg/m^3**
Max. Dry Density:	**1736**	**kg/m^3**
Optimum Moisture:	**18.6**	**%**
% Retained on 4.75 mm:	**2.5**	**%**
Corrected Dry Density:	**1736**	**kg/m^3**
Corrected Opt. Moisture:	**18.6**	**%**

Remarks :

Performed by :	Riley Cowperthwaite / Melanie Mitchell	**Date :**	July 3, 2025
Verified by :	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date :**	July 4, 2025
Laboratory Location :	GHD Limited - 140 Bathurst Drive, Waterloo, ON		

Standard Proctor Test (ASTM D698)

Client :	Infrastructure Ontario	**Lab No :**	WLA 1448-8
Project/Site :	Oakville Land Assembly, Oakville/ William Halton Pkwy West	**Project No :**	12669624



Prepared Sample:	Dry	x	Moist	--			Assumed G_s:	2.80
ASTM D698 Test Method:	A	x	B	--	C	--	Type of Hammer:	Manual
		4.75 mm		9.50 mm		19.0 mm		

Soil Description:	Clayey sandy silt, some gravel
Material Type:	-
Proposed Use:	-
Sample Identification:	BH25-10
Sample Location:	5.0 ft - 7.0 ft (1.5 m - 2.1 m)
Aggregate Supplier / Pit Name:	-
Sample Date:	-
Sampled By:	-

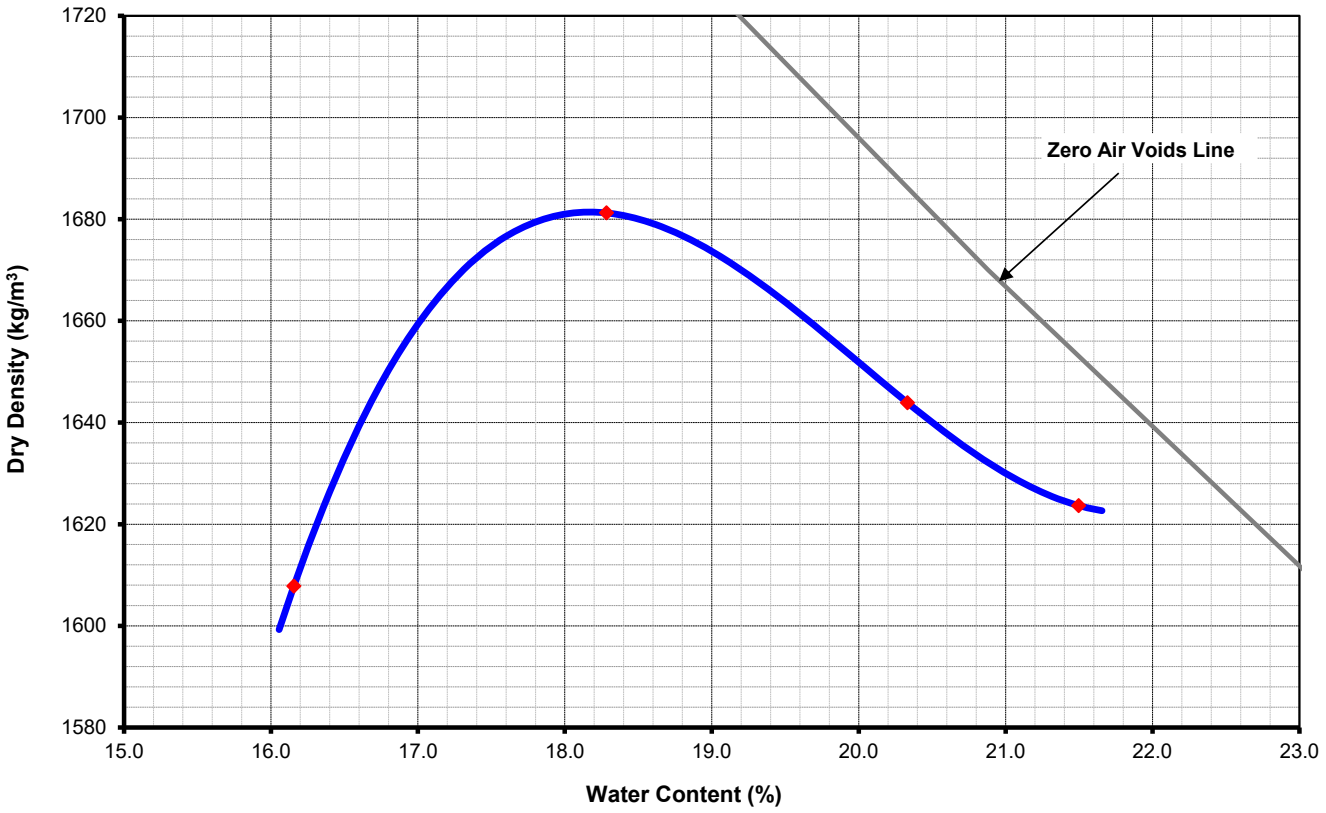
As Received Moisture:	**7.6**	**%**
Max Wet Density:	**2132**	**kg/m^3**
Corrected Wet Density:	**2182**	**kg/m^3**
Max. Dry Density:	**1843**	**kg/m^3**
Optimum Moisture:	**15.7**	**%**
% Retained on 4.75 mm:	**10.8**	**%**
Corrected Dry Density:	**1914**	**kg/m^3**
Corrected Opt. Moisture:	**14.0**	**%**

Remarks :

Performed by :	Riley Cowperthwaite	**Date :**	July 4, 2025
Verified by :	Abdul Hafeez Khan, P.Eng.; Lab. Manager	**Date :**	July 21, 2025
Laboratory Location :	GHD Limited - 140 Bathurst Drive, Waterloo, ON		

Standard Proctor Test (ASTM D698)

Client :	Infrastructure Ontario	**Lab No :**	WLA 1446-10
Project/Site :	Oakville Land Assembly, Oakville/ William Halton Pkwy West	**Project No :**	12669624



Prepared Sample:	Dry	x	Moist	--			Assumed G_s:	2.65
ASTM D698 Test Method:	A	x	B	--	C	--	Type of Hammer:	Manual
		4.75 mm		9.50 mm		19.0 mm		

Soil Description:	Silty Clay
Material Type:	Native Borehole Sample
Proposed Use:	--
Sample Identification:	MW25-14
Sample Location:	0.0 ft - 2.0 ft (0.0 m - 0.6 m)
Aggregate Supplier / Pit Name:	--
Sample Date:	June 18, 2025
Sampled By:	Reza Bay

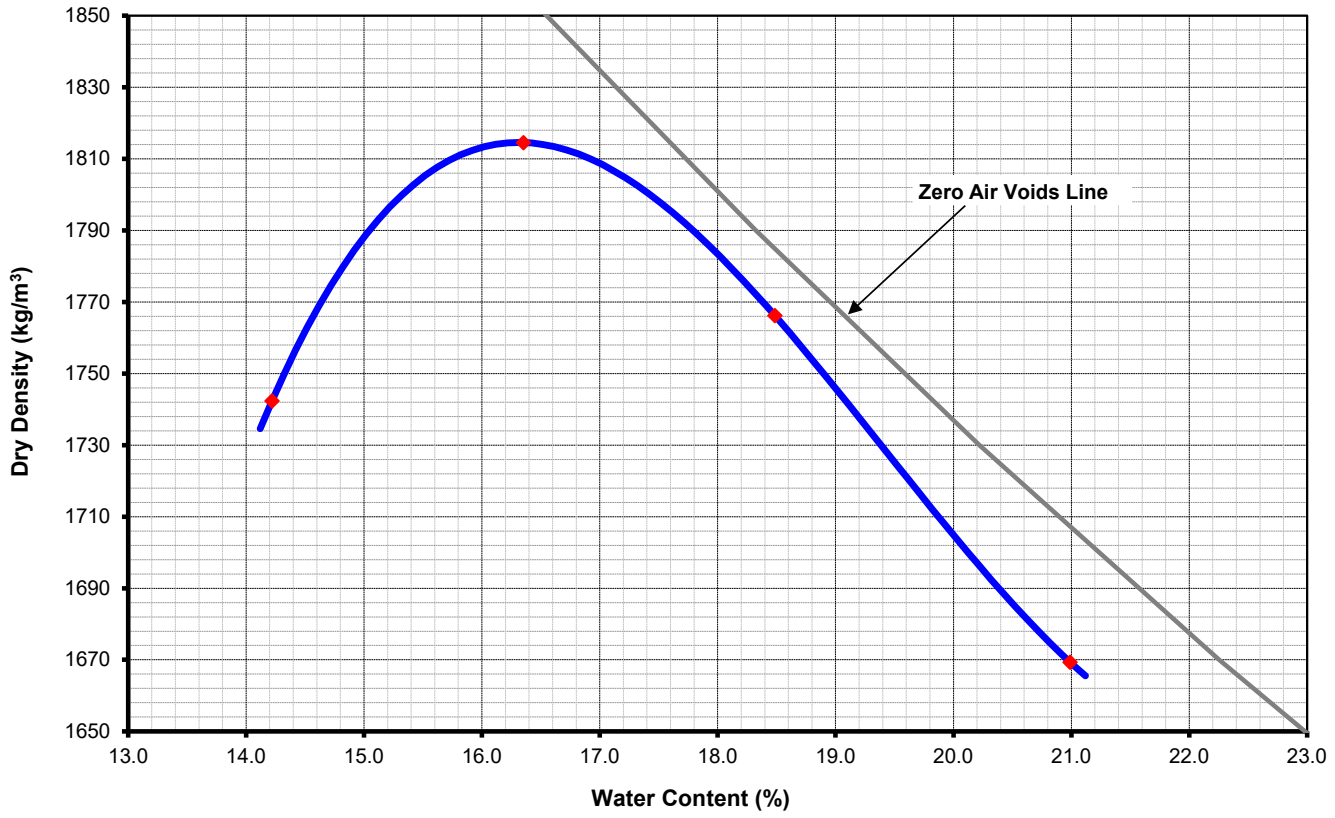
As Received Moisture:	**16.7**	**%**
Max Wet Density:	**1987**	**kg/m^3**
Corrected Wet Density:	**2025**	**kg/m^3**
Max. Dry Density:	**1681**	**kg/m^3**
Optimum Moisture:	**18.2**	**%**
% Retained on 4.75 mm:	**8.5**	**%**
Corrected Dry Density:	**1736**	**kg/m^3**
Corrected Opt. Moisture:	**16.6**	**%**

Remarks :

Performed by :	Riley Cowperthwaite / Melanie Mitchell	**Date :**	June 26, 2025
Verified by :	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date :**	July 4, 2025
Laboratory Location :	GHD Limited - 140 Bathurst Drive, Waterloo, ON		

Standard Proctor Test (ASTM D698)

Client :	Infrastructure Ontario	**Lab No :**	WLA 1448-15
Project/Site :	Oakville Land Assembly, Oakville/ William Halton Pkwy West	**Project No :**	12669624



Prepared Sample:	Dry	x	Moist	--			Assumed G_s:	2.75
ASTM D698 Test Method:	A	x	B	--	C	--	Type of Hammer:	Manual
		4.75 mm		9.50 mm		19.0 mm		

Soil Description:	Clayey silt, some sand, trace gravel
Material Type:	-
Proposed Use:	-
Sample Identification:	MW25-18
Sample Location:	-
Aggregate Supplier / Pit Name:	-
Sample Date:	-
Sampled By:	-

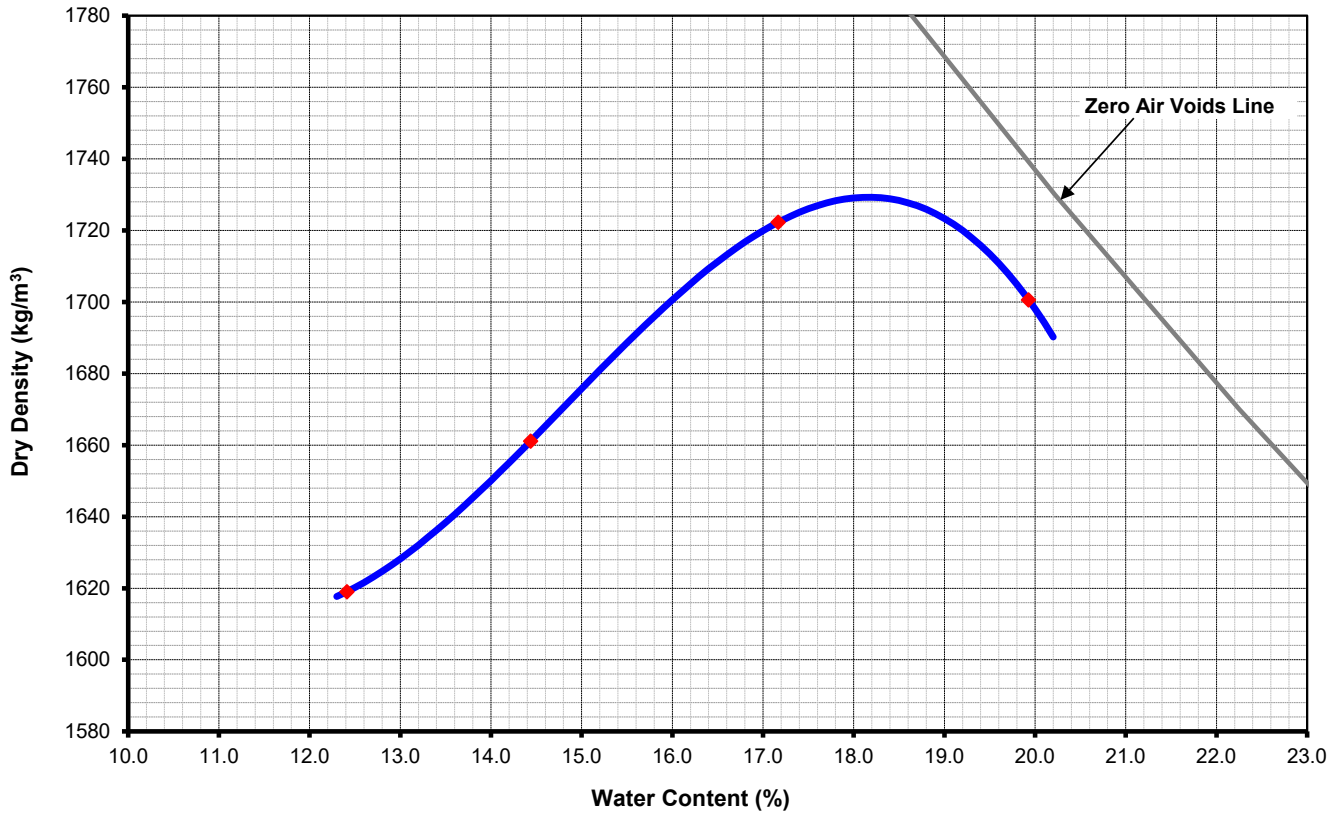
As Received Moisture:	**13.8**	**%**
Max Wet Density:	**2110**	**kg/m^3**
Corrected Wet Density:	**2136**	**kg/m^3**
Max. Dry Density:	**1815**	**kg/m^3**
Optimum Moisture:	**16.3**	**%**
% Retained on 4.75 mm:	**6.0**	**%**
Corrected Dry Density:	**1852**	**kg/m^3**
Corrected Opt. Moisture:	**15.3**	**%**

Remarks :

Performed by :	Riley Cowperthwaite	**Date :**	July 4, 2025
Verified by :	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date :**	July 21, 2025
Laboratory Location :	GHD Limited - 140 Bathurst Drive, Waterloo, ON		

Standard Proctor Test (ASTM D698)

Client :	Infrastructure Ontario	**Lab No :**	WLA 1448-21
Project/Site :	Oakville Land Assembly, Oakville/ William Halton Pkwy West	**Project No :**	12669624



Prepared Sample:	Dry	x	Moist	--			Assumed G_s:	2.75
ASTM D698 Test Method:	A	x	B	--	C	--	Type of Hammer:	Manual
		4.75 mm		9.50 mm		19.0 mm		

Soil Description:	Clayey sandy silt, trace gravel
Material Type:	-
Proposed Use:	-
Sample Identification:	BH25-23
Sample Location:	0.0 ft - 2.0 ft (0.0 m - 0.6 m)
Aggregate Supplier / Pit Name:	-
Sample Date:	-
Sampled By:	-

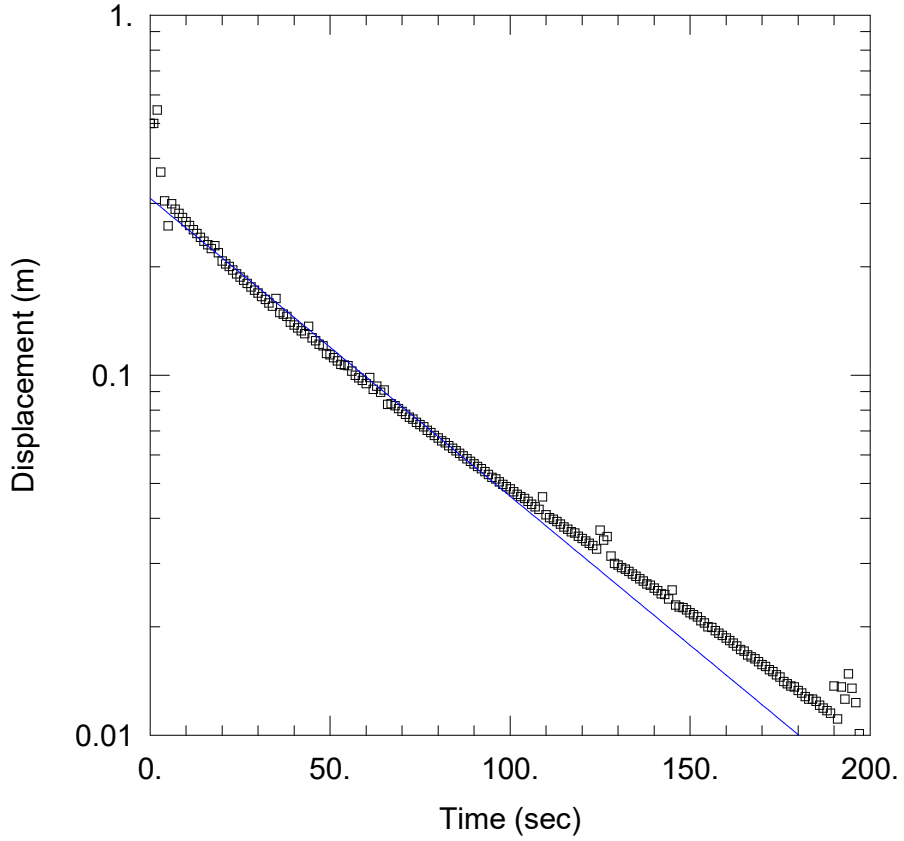
As Received Moisture:	**17.2**	**%**
Max Wet Density:	**2044**	**kg/m^3**
Corrected Wet Density:	**2069**	**kg/m^3**
Max. Dry Density:	**1729**	**kg/m^3**
Optimum Moisture:	**18.2**	**%**
% Retained on 4.75 mm:	**5.6**	**%**
Corrected Dry Density:	**1766**	**kg/m^3**
Corrected Opt. Moisture:	**17.2**	**%**

Remarks :

Performed by :	Riley Cowperthwaite	**Date :**	July 4, 2025
Verified by :	Abdul Hafeez Khan, P.Eng.; Laboratory Manager	**Date :**	July 21, 2025
Laboratory Location :	GHD Limited - 140 Bathurst Drive, Waterloo, ON		

Appendix D

Single Well Response Test Analyses



MW25-07 FALLING HEAD TEST

Data Set: \...\MW25_07_Falling.aqt
Date: 08/05/25 Time: 10:29:06

PROJECT INFORMATION

Company: GHD Ltd.
Client: Infrastructure Ontario
Project: 12669624
Location: Oakville, Ontario
Test Well: MW25-07
Test Date: 7/11/2025

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

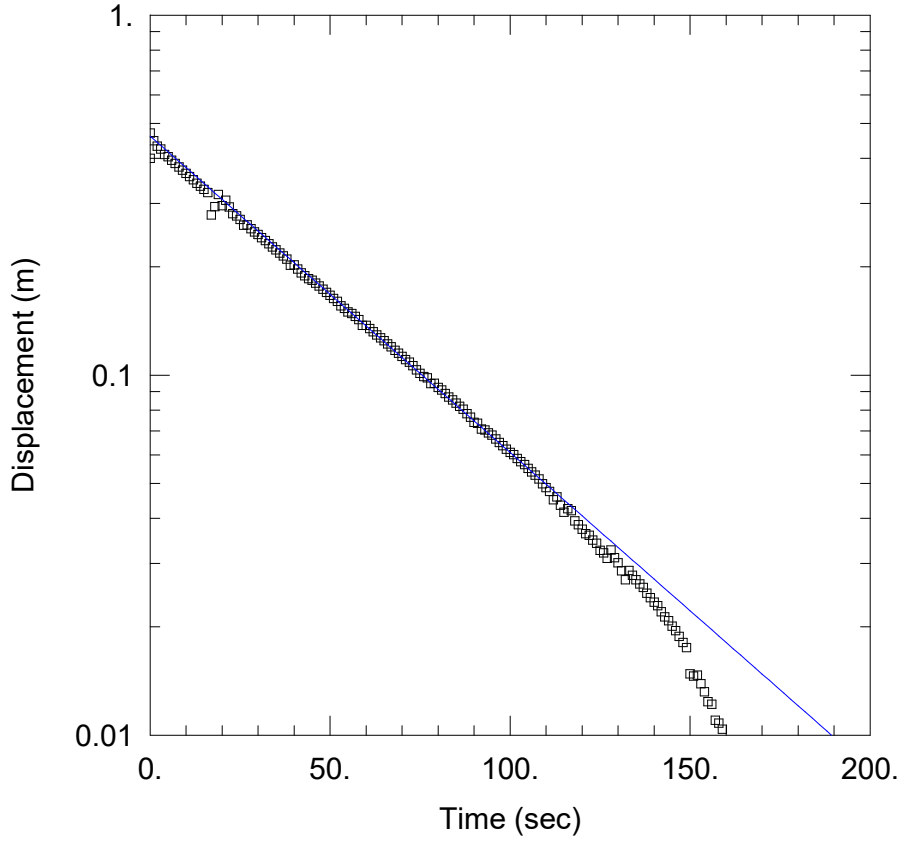
K = 0.0008694 cm/sec
y0 = 0.31 m

AQUIFER DATA

Saturated Thickness: 3.76 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (MW25-07)

Initial Displacement: 0.5 m
Total Well Penetration Depth: 3.76 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.76 m
Screen Length: 3.05 m
Well Radius: 0.0325 m



MW25-07 RISING HEAD TEST

Data Set: \...\MW25_07_Rising.aqt
Date: 08/05/25 Time: 10:54:38

PROJECT INFORMATION

Company: GHD Ltd.
Client: Infrastructure Ontario
Project: 12669624
Location: Oakville, Ontario
Test Well: MW25-07
Test Date: 7/11/2025

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0009233 cm/sec
y0 = 0.4613 m

AQUIFER DATA

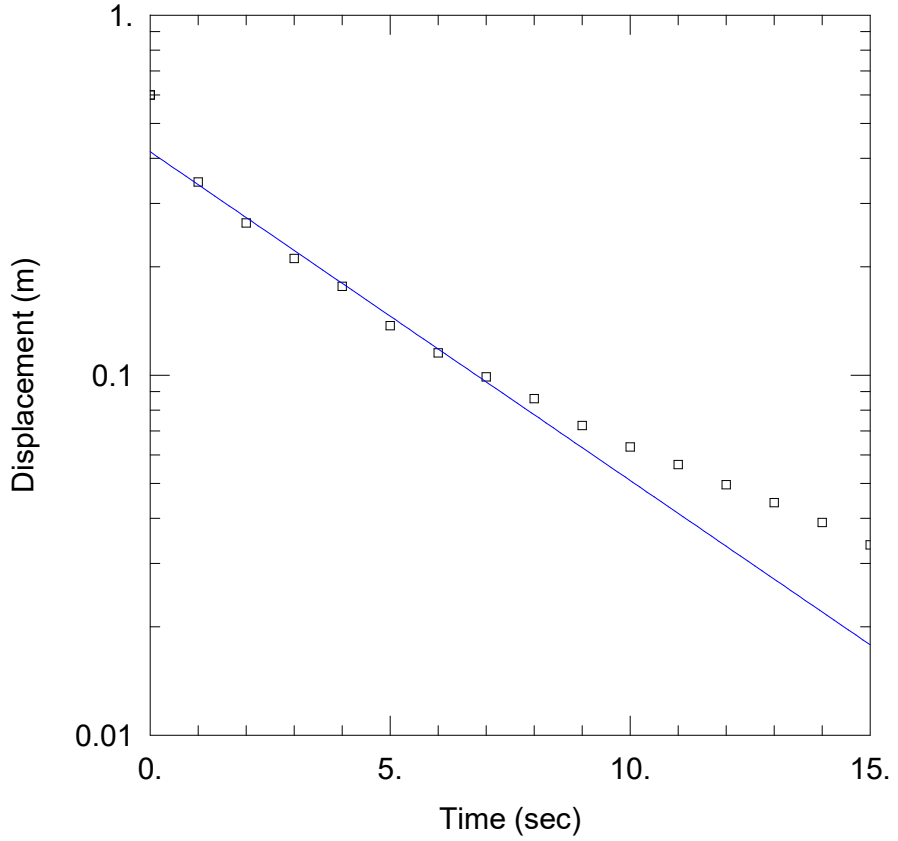
Saturated Thickness: 3.76 m

Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (MW25-07)

Initial Displacement: 0.4 m
Total Well Penetration Depth: 3.76 m
Casing Radius: 0.0254 m

Static Water Column Height: 3.76 m
Screen Length: 3.05 m
Well Radius: 0.0325 m



MW25-11 RISING HEAD 1

Data Set: \...\MW25_11_Rising_1.aqt
Date: 08/05/25 Time: 10:40:29

PROJECT INFORMATION

Company: GHD Ltd.
Client: Infrastructure Ontario
Project: 12669624
Location: Oakville, ON
Test Well: MW25-11
Test Date: 7/11/2025

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

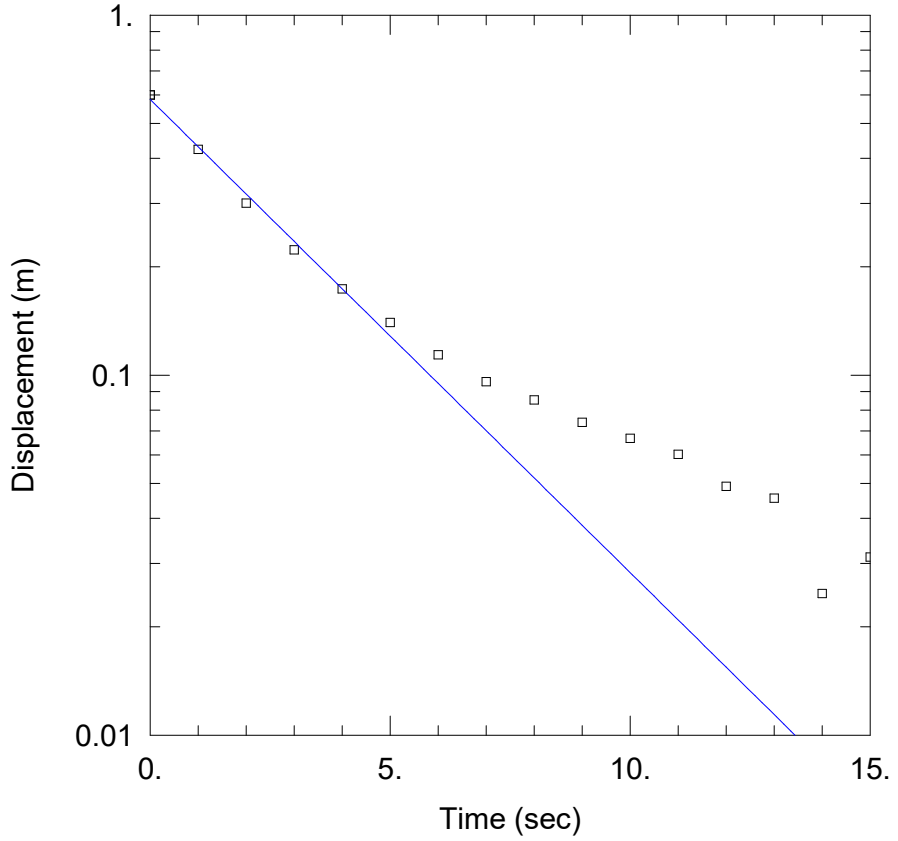
K = 0.01098 cm/sec
y0 = 0.4174 m

AQUIFER DATA

Saturated Thickness: 2.44 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (MW25-11)

Initial Displacement: 0.6 m
Total Well Penetration Depth: 2.44 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.44 m
Screen Length: 2.44 m
Well Radius: 0.0325 m
Gravel Pack Porosity: 0.3



MW25-11 RISING HEAD 2

Data Set: \...\MW25_11_Rising_2.aqt
Date: 08/05/25 Time: 10:53:55

PROJECT INFORMATION

Company: GHD Ltd.
Client: Infrastructure Ontario
Project: 12669624
Location: Oakville, ON
Test Well: MW25-11
Test Date: 7/11/2025

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.01581 cm/sec
y0 = 0.5835 m

AQUIFER DATA

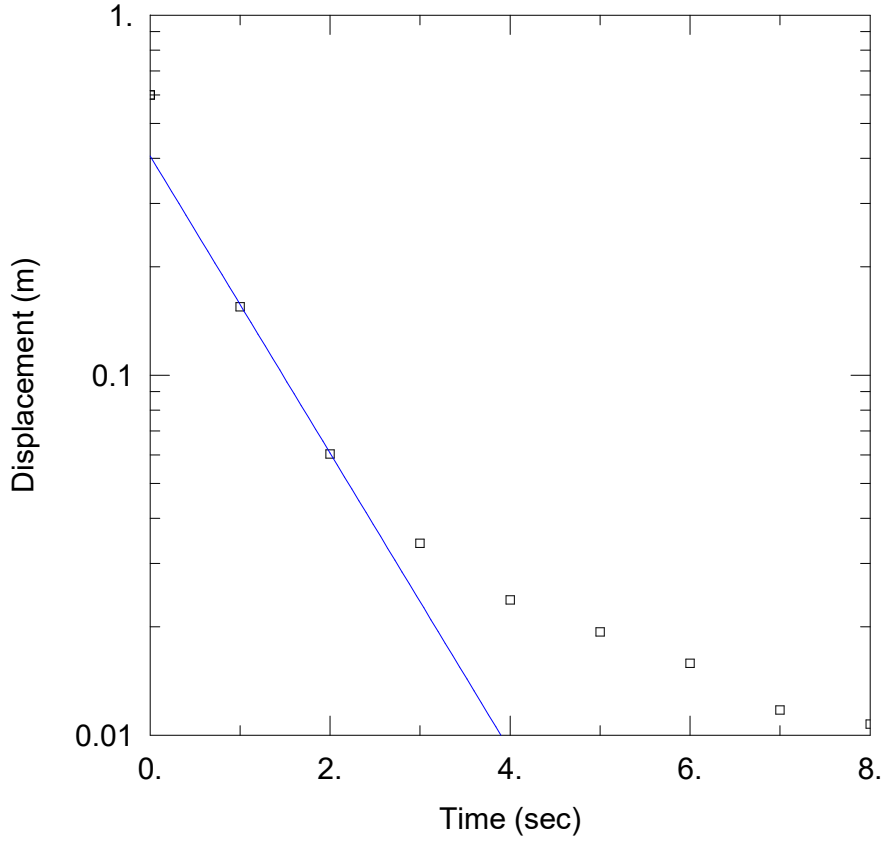
Saturated Thickness: 2.44 m

Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (MW25-11)

Initial Displacement: 0.6 m
Total Well Penetration Depth: 2.44 m
Casing Radius: 0.0254 m

Static Water Column Height: 2.44 m
Screen Length: 2.44 m
Well Radius: 0.0325 m
Gravel Pack Porosity: 0.3



MW25-18 RISING HEAD 1

Data Set: \...\MW25_18_Rising_1.aqt
Date: 08/05/25 Time: 10:52:49

PROJECT INFORMATION

Company: GHD Ltd.
Client: Infrastructure Ontario
Project: 12669624
Location: Oakville, ON
Test Well: MW25-18
Test Date: 7/11/2025

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.07826 cm/sec
y0 = 0.4062 m

AQUIFER DATA

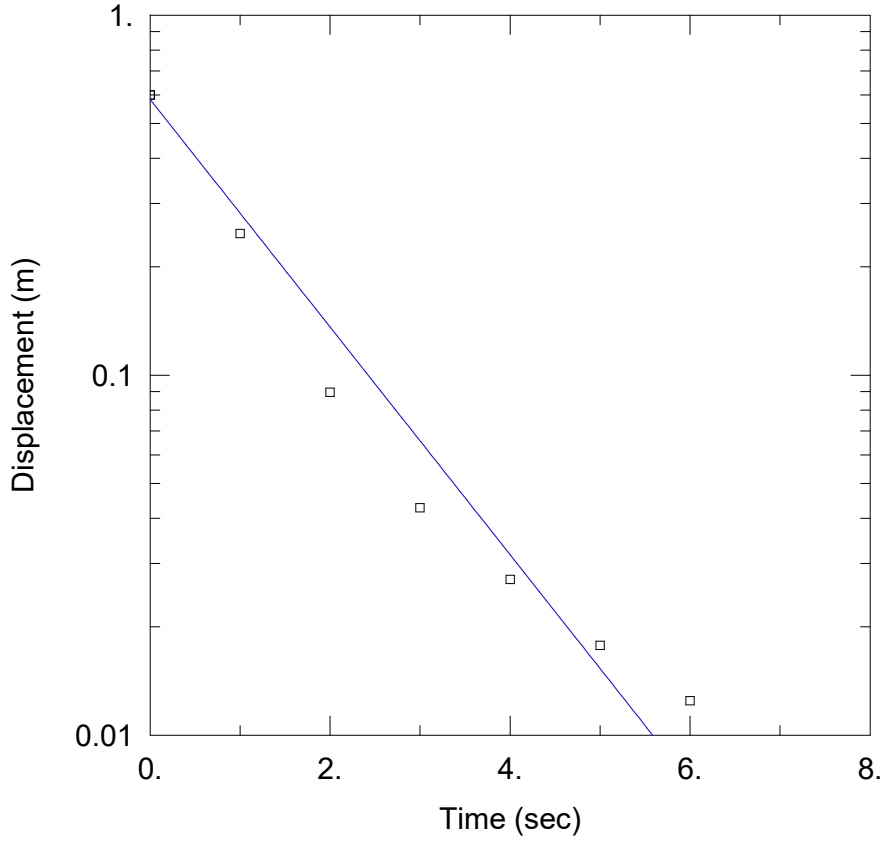
Saturated Thickness: 2.54 m

Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (MW25-18)

Initial Displacement: 0.6 m
Total Well Penetration Depth: 1.5 m
Casing Radius: 0.0254 m

Static Water Column Height: 2.54 m
Screen Length: 1.5 m
Well Radius: 0.0325 m
Gravel Pack Porosity: 0.3



MW25-18 RISING HEAD 2

Data Set: \...\MW25_18_Rising_2.aqt
Date: 08/05/25 Time: 10:52:08

PROJECT INFORMATION

Company: GHD Ltd.
Client: Infrastructure Ontario
Project: 12669624
Location: Oakville, ON
Test Well: MW25-18
Test Date: 7/11/2025

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.05995 cm/sec
y0 = 0.5833 m

AQUIFER DATA

Saturated Thickness: 2.54 m
Anisotropy Ratio (Kz/Kr): 0.2

WELL DATA (MW25-18)

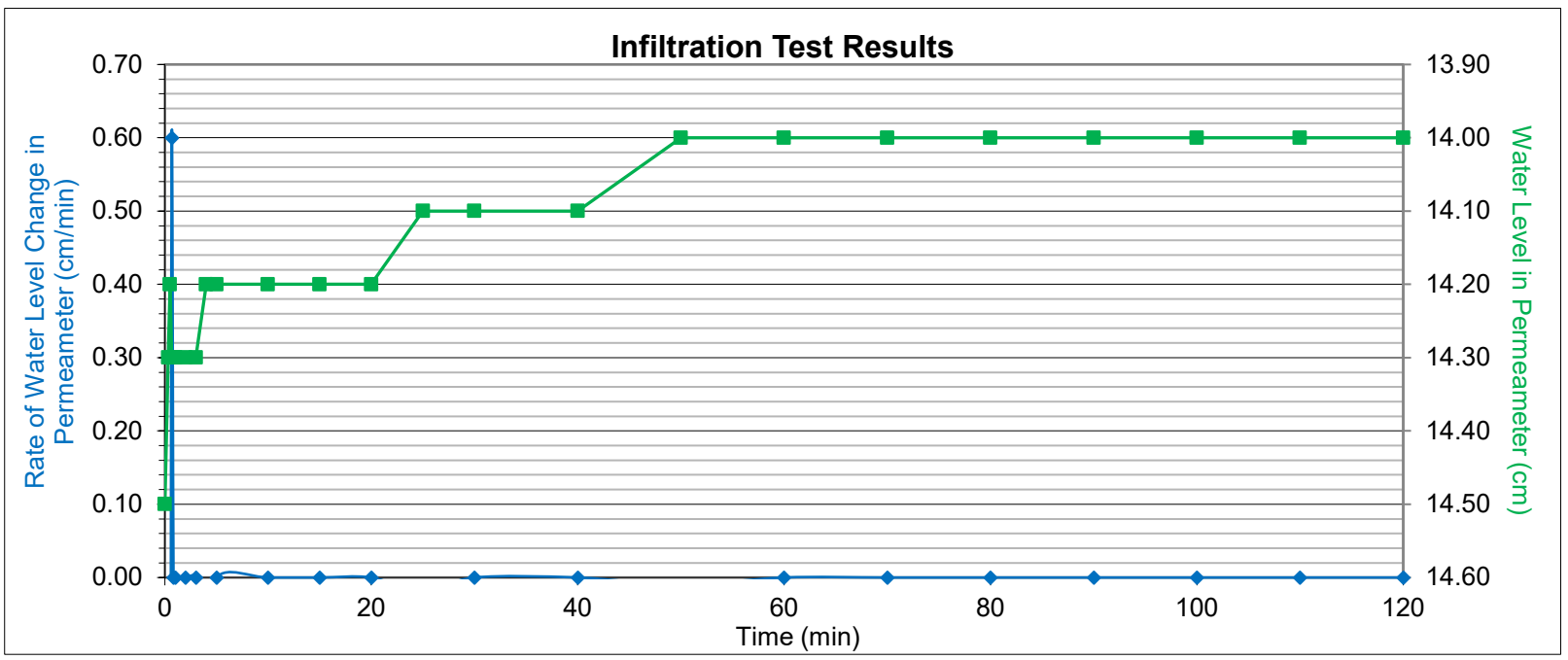
Initial Displacement: 0.6 m
Total Well Penetration Depth: 1.5 m
Casing Radius: 0.0254 m
Static Water Column Height: 2.54 m
Screen Length: 1.5 m
Well Radius: 0.0325 m
Gravel Pack Porosity: 0.3

Appendix E

Guelph Permeameter Analyses

Test Location	GP-1
Date of Test	June 26, 2025
GHD Field Personnel	D.Berriman
Depth of Test	0.33 m BGS
Field Soil Description	Silty Clay, with some coarse sand/fine gravel, reddish, high plasticity, moist

Grain Size Analysis Results (%)	
gravel	N/A
sand	N/A
silt & clay	N/A



hydraulic conductivity, field saturated[1] (K_{fs}) = - *cm/s*

approximate infiltration rate[2] = $\left(\frac{K_{fs}}{6 \times 10^{-11}}\right)^{\frac{1}{3.7363}}$ *mm/h*

= - *mm/h*

percolation time = (infiltration rate)$^{-1}$ x (60 min/h) X (10 mm/cm)
= - *min/cm*

Notes: (1) see Figure C2 for calculation of K_{fs}
(2) Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997.
Supplementary Guidelines to Ontario Building Code 1997.
SG-6 Percolations Times and Soil Descriptions. Toronto, Ontario.

INFRASTUCTURE ONTARIO
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
HYDROGEOLOGICAL ASSESSMENT

GUELPH PERMEAMETER TEST RESULTS (GP-1) **Figure 1A**

12669624

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm²
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 10
Enter the Borehole Radius ("a" in cm): 2.54

Enter the soil texture-structure category (enter one of the below numbers): 2

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Res Type	35.22
H	10
a	2.54
H/a	3.937
a*	0.04
C0.01	1.336
C0.04	1.422
C0.12	1.434
C0.36	1.434
C	1.422
R	0.000
Q	0
pi	3.142

α*= cm⁻¹

C = 1.42241
Q = 0

K_{fs} = cm/sec, cm/min, m/sec, inch/min, inch/sec

Φ_m = cm²/min

Single Head Method (2)

Reservoir Cross-sectional area in cm²
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 10
Enter the Borehole Radius ("a" in cm): 2.54

Enter the soil texture-structure category (enter one of the below numbers): 2

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Res Type	35.22
H	10
a	2.54
H/a	3.93701
a*	0.04
C0.01	1.33633
C0.04	1.42241
C0.12	1.43431
C0.36	1.43431
C	1.42241
R	0.000
Q	0
pi	3.1415

α*= cm⁻¹

C = 1.42241
Q = 0

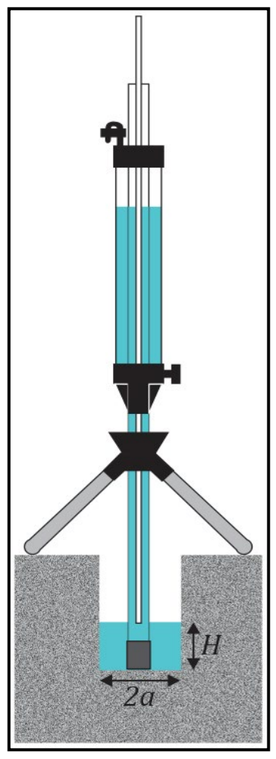
K_{fs} = cm/sec, cm/min, m/ses, inch/min, inch/sec

Φ_m = cm²/min

Average

K_{fs} = cm/sec, cm/min, m/s, inch/min, inch/sec

Φ_m = cm²/min



Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	α^*(cm^{-1})	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121(H_2/a)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091(H_1/a)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091(H_2/a)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm²/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{a^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)a^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_2 = \frac{H_1 C_2}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $\Phi_m = G_3Q_1 - G_4Q_2$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	

(Adapted from "Guelph Permeameter Calculations" spreadsheet provided by equipment manufacturer, Soilmoisture Equipment Corp.)

INFRASTUCTURE ONTARIO
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HYDROGEOLOGICAL ASSESSMENT

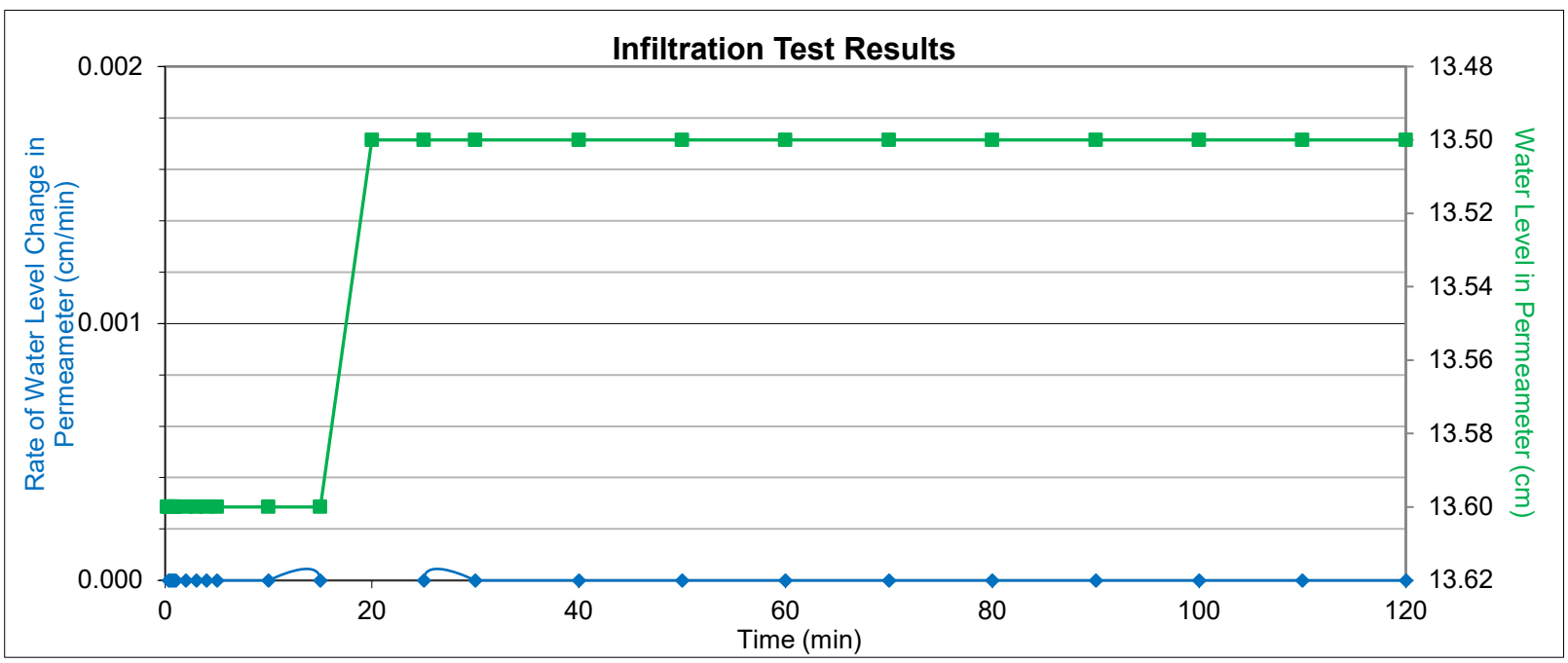
GUELPH PERMEAMETER TEST RESULTS (GP-1)

Figure 1B

12669624

Test Location	GP-2
Date of Test	June 26, 2025
GHD Field Personnel	D.Berriman
Depth of Test	0.48 m BGS
Field Soil Description	Silty Clay, reddish, high plasticity, moist

Grain Size Analysis Results (%)	
gravel	N/A
sand	N/A
silt & clay	N/A



hydraulic conductivity, field saturated[(1)] (K_{fs}) = - *cm/s*

approximate infiltration rate[(2)] = $\left(\frac{K_{fs}}{6 \times 10^{-11}}\right)^{\frac{1}{3.7363}}$ *mm/h*

= - *mm/h*

percolation time = (infiltration rate)$^{-1}$ x (60 min/h) X (10 mm/cm)
= - *min/cm*

Notes: (1) see Figure C2 for calculation of K_{fs}
(2) Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997.
Supplementary Guidelines to Ontario Building Code 1997.
SG-6 Percolations Times and Soil Descriptions. Toronto, Ontario.

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HYDROGEOLOGICAL ASSESSMENT

GUELPH PERMEAMETER TEST RESULTS (GP-2) **Figure 2A**

12669624

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm²

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 10

Enter the Borehole Radius ("a" in cm): 2.54

Enter the soil texture-structure category (enter one of the below numbers): 2

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Res Type	35.22
H	10
a	2.54
H/a	3.937
a*	0.04
C0.01	1.336
C0.04	1.422
C0.12	1.434
C0.36	1.434
C	1.422
R	0.000
Q	0
pi	3.142

α*= cm⁻¹

C =

Q =

K_{fs} = cm/sec, cm/min, m/sec, inch/min, inch/sec

Φ_m = cm²/min

Single Head Method (2)

Reservoir Cross-sectional area in cm²

(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22

Enter water Head Height ("H" in cm): 10

Enter the Borehole Radius ("a" in cm): 2.54

Enter the soil texture-structure category (enter one of the below numbers): 2

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Res Type	35.22
H	10
a	2.54
H/a	3.93701
a*	0.04
C0.01	1.33633
C0.04	1.42241
C0.12	1.43431
C0.36	1.43431
C	1.42241
R	0.000
Q	0
pi	3.1415

α*= cm⁻¹

C =

Q =

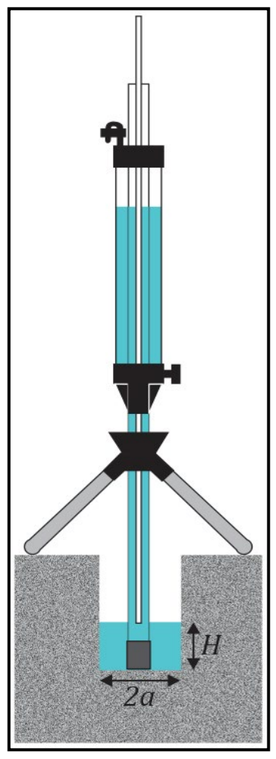
K_{fs} = cm/sec, cm/min, m/ses, inch/min, inch/sec

Φ_m = cm²/min

Average

K_{fs} = cm/sec, cm/min, m/s, inch/min, inch/sec

Φ_m = cm²/min



Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	α^*(cm^{-1})	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121(H_2/a)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091(H_1/a)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091(H_2/a)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm²/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{a^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)a^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_2 = \frac{H_1 C_2}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $\Phi_m = G_3Q_1 - G_4Q_2$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	

(Adapted from "Guelph Permeameter Calculations" spreadsheet provided by equipment manufacturer, Soilmoisture Equipment Corp.)

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HYDROGEOLOGICAL ASSESSMENT

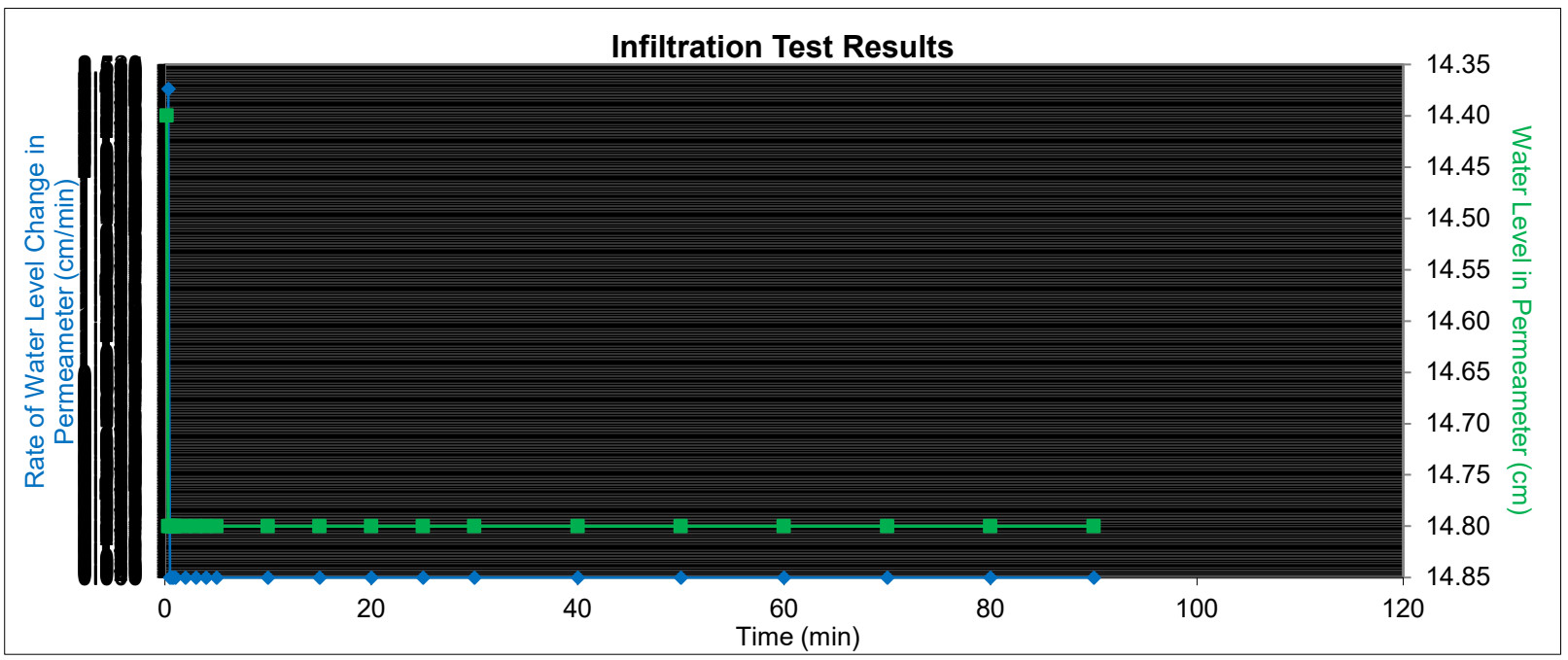
GUELPH PERMEAMETER TEST RESULTS (GP-2)

Figure 2B

12669624

Test Location	GP-2
Date of Test	June 27, 2025
GHD Field Personnel	D.Berriman
Depth of Test	0.00 m BGS
Field Soil Description	Silty Clay, reddish, high plasticity, moist

Grain Size Analysis Results (%)	
gravel	N/A
sand	N/A
silt & clay	N/A



hydraulic conductivity, field saturated[(1)] (K_{fs}) = - *cm/s*

approximate infiltration rate[(2)] = $\left(\frac{K_{fs}}{6 \times 10^{-11}}\right)^{\frac{1}{3.7363}}$ *mm/h*

= - *mm/h*

percolation time = (infiltration rate)$^{-1}$ x (60 min/h) X (10 mm/cm)
= - *min/cm*

Notes: (1) see Figure C2 for calculation of K_{fs}
(2) Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997.
Supplementary Guidelines to Ontario Building Code 1997.
SG-6 Percolations Times and Soil Descriptions. Toronto, Ontario.

INFRASTUCTURE ONTARIO
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Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
HYDROGEOLOGICAL ASSESSMENT

GUELPH PERMEAMETER TEST RESULTS (GP-2) **Figure 3A**

12669624

Input

Result

Single Head Method (1)

Reservoir Cross-sectional area in cm²
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 10
Enter the Borehole Radius ("a" in cm): 2.54

Enter the soil texture-structure category (enter one of the below numbers): 2

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Res Type	35.22
H	10
a	2.54
H/a	3.937
a*	0.04
C0.01	1.336
C0.04	1.422
C0.12	1.434
C0.36	1.434
C	1.422
R	0.000
Q	0
pi	3.142

α*= 0.04 cm^{-1}

C = 1.42241
Q = 0

K_{fs} = cm/sec, cm/min, m/sec, inch/min, inch/sec

Φ_m = cm^2/min

Single Head Method (2)

Reservoir Cross-sectional area in cm²
(enter "35.22" for Combined and "2.16" for Inner reservoir): 35.22
Enter water Head Height ("H" in cm): 10
Enter the Borehole Radius ("a" in cm): 2.54

Enter the soil texture-structure category (enter one of the below numbers): 2

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): 0.0000

Res Type	35.22
H	10
a	2.54
H/a	3.93701
a*	0.04
C0.01	1.33633
C0.04	1.42241
C0.12	1.43431
C0.36	1.43431
C	1.42241
R	0.000
Q	0
pi	3.1415

α*= 0.04 cm^{-1}

C = 1.42241
Q = 0

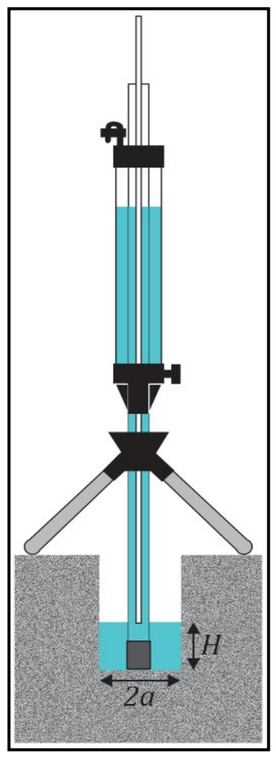
K_{fs} = cm/sec, cm/min, m/ses, inch/min, inch/sec

Φ_m = cm^2/min

Average

K_{fs} = cm/sec, cm/min, m/s, inch/min, inch/sec

Φ_m = cm^2/min



Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121(H_2/a)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091(H_1/a)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091(H_2/a)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), α^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{a^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)a^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_2 = \frac{H_1 C_2}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $\Phi_m = G_3Q_1 - G_4Q_2$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	

(Adapted from "Guelph Permeameter Calculations" spreadsheet provided by equipment manufacturer, Soilmoisture Equipment Corp.)

INFRASTUCTURE ONTARIO
WILLIAN HALTON PARKWAY, OAKVILLE, ONTARIO
Proposed MECP-MLITSD Science Facility Complex
HYDROGEOLOGICAL ASSESSMENT

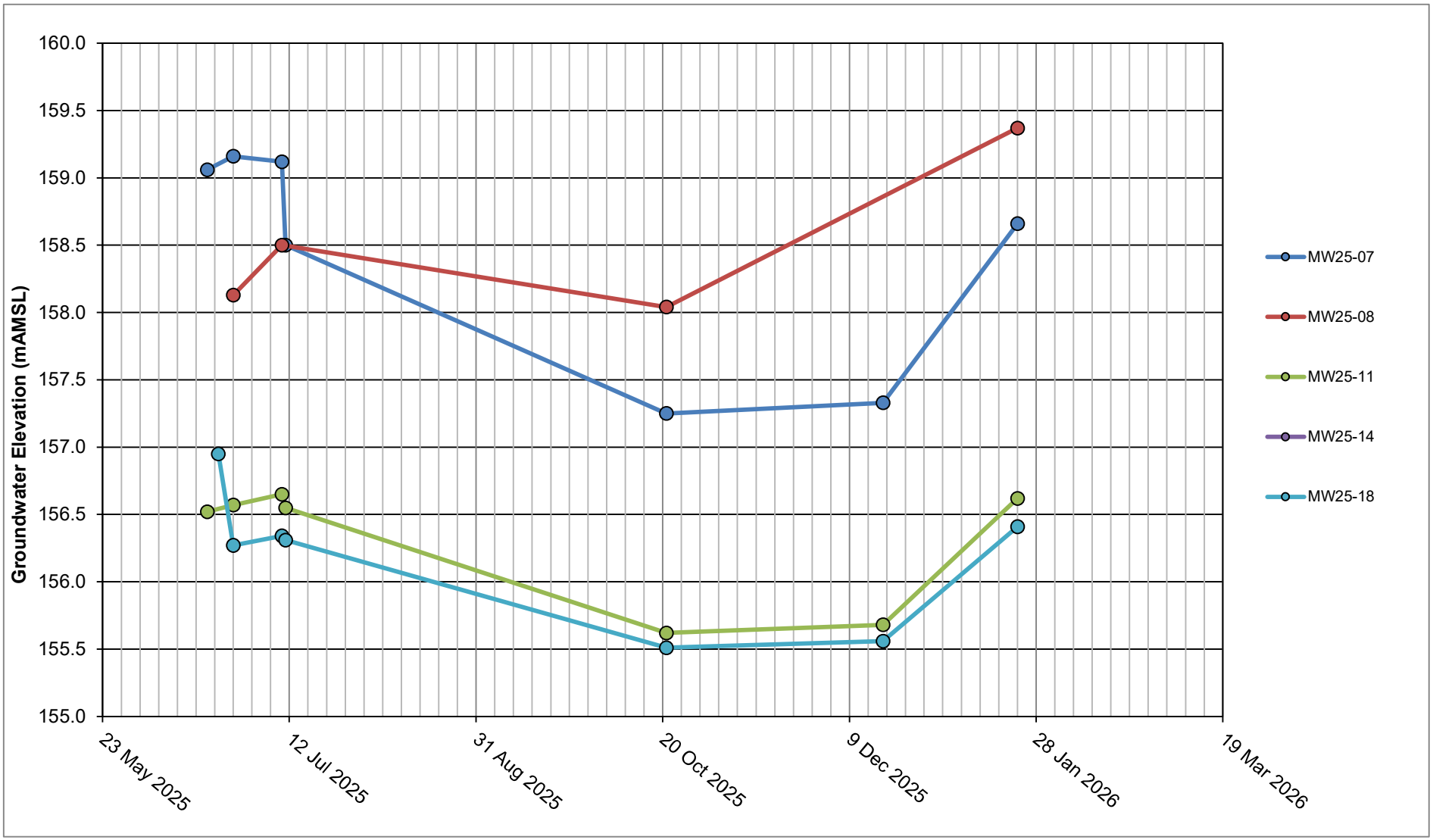
GUELPH PERMEAMETER TEST RESULTS (GP-3)

Figure 3B

12669624

Appendix F

Groundwater Elevation Hydrographs



INFRASTRUCTURE ONTARIO
OAKVILLE LAND ASSEMBLY - WILLIAM HALTON PARKWAY, OAKVILLE, ONTARIO
PROPOSED MECP-MLITSD SCIENCE FACILITY COMPLEX
HYDROGEOLOGICAL ASSESSMENT

GROUNDWATER ELEVATION HYDROGRAPHS

Project No. **12669624**
Date **March 2026**

Appendix F

Filename: \\ghdnet\ghd\CA\Markham\Projects\662\12669624\Workshare\RPT\12669624-RPT-4-Hydrogeological\updated since 2025-08 submission\12669624-RPT-4-T3.4 3.5 -GW Levels V2 sa.xlsx
Plot Date: 26 Mar 2026 10:58 AM

Appendix G

Laboratory Certificates of Analysis

CERTIFICATE OF ANALYSIS

Work Order	: **WT2518420**	Page	: 1 of 6
Client	: **GHD Limited**	Laboratory	: ALS Environmental - Waterloo
Contact	: Sean Andreou	Account Manager	: Rick Hawthorne
Address	: 455 Phillip Street Waterloo ON Canada N2L 3X2	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 12669624-110.110.20	Date Samples Received	: 10-Jul-2025 15:40
PO	: 735-pending	Date Analysis Commenced	: 10-Jul-2025
C-O-C number	: ----	Issue Date	: 17-Jul-2025 17:32
Sampler	: DB		
Site	: ----		
Quote number	: 12669624-ExC-02-July 2025 Halton Oakville PWQO-PO 735-014356 PWQO ODWS and Ontario Bylaw		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amaninder Dhillon	Team Lead - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Andrea Armstrong	Department Manager - Air Quality and Volatiles	VOC, Waterloo, Ontario
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Inorganics, Waterloo, Ontario
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario
Hannah Lewis	Inorganics Analyst	Inorganics, Waterloo, Ontario
Jocelyn Kennedy	Department Manager - Semi-Volatile Organics	Organics, Waterloo, Ontario
Jon Fisher	Laboratory Manager - Environmental	Metals, Waterloo, Ontario
Ruby Sujeepan	Analyst	Microbiology, Waterloo, Ontario
Sanja Risticevic	Department Manager - LCMS	LCMS, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.
Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).
Measurement Uncertainty: The reported uncertainties in this report are expanded uncertainties calculated using a coverage factor of 2, which gives a level of confidence of approximately 95%.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Unit	*Description*
µg/L	micrograms per litre
mg/L	milligrams per litre
MPN/100mL	most probable number per hundred millilitres
pH units	pH units

>: greater than.
<: less than.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
BODL	*Limit of Reporting for BOD was increased to account for the largest volume of sample tested.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*

Analytical Results

WT2518420-001

Sub-Matrix:**Water** (Matrix: **Water**)

Client sample ID: GW-12669624-071025-DB-001

Client sampling date / time: 10-Jul-2025

Analyte	CAS Number	Result		LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Physical Tests									
pH	----	8.04		0.10	pH units	E108/WT	12-Jul-2025	14-Jul-2025	2103495
Solids, total suspended [TSS]	----	4.5		3.0	mg/L	E160/WT	-	15-Jul-2025	2107049
Anions and Nutrients									
Fluoride	16984-48-8	0.223	DLDS,	0.100	mg/L	E235.F/WT	12-Jul-2025	15-Jul-2025	2103490
Kjeldahl nitrogen, total [TKN]	----	0.432		0.050	mg/L	E318/WT	14-Jul-2025	14-Jul-2025	2101192
Phosphorus, total	7723-14-0	0.0028		0.0020	mg/L	E372-U/WT	11-Jul-2025	15-Jul-2025	2101191
Sulfate (as SO4)	14808-79-8	212	DLDS,	1.50	mg/L	E235.SO4/WT	12-Jul-2025	15-Jul-2025	2103491
Cyanides									
Cyanide, strong acid dissociable (Total)	----	<0.0020		0.0020	mg/L	E333/WT	11-Jul-2025	11-Jul-2025	2101172
Microbiological Tests									
Coliforms, Escherichia coli [E. coli]	----	1		1	MPN/100mL	E010.QT97/WT	-	11-Jul-2025	2101385
Total Metals									
Aluminum, total	7429-90-5	0.0356	DLHC,	0.0300	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Antimony, total	7440-36-0	<0.00100	DLHC,	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Arsenic, total	7440-38-2	<0.00100	DLHC,	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Beryllium, total	7440-41-7	<0.000200	DLHC,	0.000200	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Cadmium, total	7440-43-9	<0.0000500	DLHC,	0.0000500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Chromium, total	7440-47-3	<0.00500	DLHC,	0.00500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Cobalt, total	7440-48-4	<0.00100	DLHC,	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Copper, total	7440-50-8	<0.00500	DLHC,	0.00500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Iron, total	7439-89-6	<0.100	DLHC,	0.100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Lead, total	7439-92-1	<0.000500	DLHC,	0.000500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Manganese, total	7439-96-5	0.00626	DLHC,	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Mercury, total	7439-97-6	<0.0000050		0.0000050	mg/L	E508/WT	15-Jul-2025	15-Jul-2025	2105298
Molybdenum, total	7439-98-7	0.00232	DLHC,	0.000500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Nickel, total	7440-02-0	<0.00500	DLHC,	0.00500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Selenium, total	7782-49-2	<0.000500	DLHC,	0.000500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Silver, total	7440-22-4	<0.000100	DLHC,	0.000100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Tin, total	7440-31-5	<0.00100	DLHC,	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Titanium, total	7440-32-6	<0.00300	DLHC,	0.00300	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Zinc, total	7440-66-6	<0.0300	DLHC,	0.0300	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Speciated Metals									
Chromium, hexavalent [Cr VI], total	18540-29-9	<0.00050		0.00050	mg/L	E532/WT	-	11-Jul-2025	2101746
Aggregate Organics									
Biochemical oxygen demand [BOD]	----	<3.0	BODL,	3.0	mg/L	E550/WT	-	12-Jul-2025	2103724
Oil & grease (gravimetric)	----	<5.0		5.0	mg/L	E567/WT	13-Jul-2025	17-Jul-2025	2104489
Oil & grease, animal/vegetable (gravimetric)	----	<5.0		5	mg/L	EC567A.SG/WT	-	17-Jul-2025	-
Oil & grease, mineral (gravimetric)	----	<5.0		5.0	mg/L	E567SG/WT	13-Jul-2025	17-Jul-2025	2104490
Phenols, total (4AAP)	----	0.0045		0.0010	mg/L	E562/WT	11-Jul-2025	14-Jul-2025	2101193
Volatile Organic Compounds									
Benzene	71-43-2	<0.50		0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Chloroform	67-66-3	<0.50		0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Dichlorobenzene, 1,2-	95-50-1	<0.50		0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Dichlorobenzene, 1,4-	106-46-7	<0.50		0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796

Analytical Results

WT2518420-001

Sub-Matrix:**Water**
(Matrix: **Water**)

Client sample ID: GW-12669624-071025-DB-001
Client sampling date / time: 10-Jul-2025

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Volatile Organic Compounds								
Dichloroethylene, cis-1,2-	156-59-2	<0.50	0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Dichloromethane	75-09-2	<1.0	1.0	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Dichloropropylene, trans-1,3-	10061-02-6	<0.30	0.30	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Ethylbenzene	100-41-4	<0.50	0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Tetrachloroethane, 1,1,2,2-	79-34-5	<0.50	0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Tetrachloroethylene	127-18-4	<0.50	0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Toluene	108-88-3	<0.50	0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Trichloroethylene	79-01-6	<0.50	0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Xylene, m+p-	179601-23-1	<0.40	0.40	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Xylene, o-	95-47-6	<0.30	0.30	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Xylenes, total	1330-20-7	<0.50	0.50	µg/L	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Volatile Organic Compounds Surrogates								
Bromofluorobenzene, 4-	460-00-4	99.0	1.0	%	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Difluorobenzene, 1,4-	540-36-3	96.8	1.0	%	E611D/WT	10-Jul-2025	11-Jul-2025	2100796
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	83-32-9	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Acenaphthylene	208-96-8	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Anthracene	120-12-7	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Benz(a)anthracene	56-55-3	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Benzo(a)pyrene	50-32-8	<0.0050	0.0050	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Benzo(b+j)fluoranthene	n/a	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Benzo(g,h,i)perylene	191-24-2	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Benzo(k)fluoranthene	207-08-9	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Chrysene	218-01-9	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Dibenz(a,h)anthracene	53-70-3	<0.0050	0.0050	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Fluoranthene	206-44-0	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Fluorene	86-73-7	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Indeno(1,2,3-c,d)pyrene	193-39-5	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Methylnaphthalene, 1-	90-12-0	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Methylnaphthalene, 2-	91-57-6	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Naphthalene	91-20-3	<0.050	0.050	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Phenanthrene	85-01-8	<0.020	0.020	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Pyrene	129-00-0	<0.010	0.010	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
PAHs, total (CCME sewer 18)	n/a	<0.070	0.07	µg/L	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Polycyclic Aromatic Hydrocarbons Surrogates								
Chrysene-d12	1719-03-5	86.4	0.1	%	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Naphthalene-d8	1146-65-2	92.2	0.1	%	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Phenanthrene-d10	1517-22-2	96.4	0.1	%	E641A/WT	11-Jul-2025	14-Jul-2025	2101934
Phthalate Esters								
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	<0.60	0.60	µg/L	E625A/WT	14-Jul-2025	14-Jul-2025	2104573
Di-n-butyl phthalate	84-74-2	<1.0	1.0	µg/L	E625A/WT	14-Jul-2025	14-Jul-2025	2104573
Semi-Volatile Organics								
Dichlorobenzidine, 3,3'-	91-94-1	<0.40	0.40	µg/L	E625A/WT	14-Jul-2025	14-Jul-2025	2104573
Semi-Volatile Organics Surrogates								
Fluorobiphenyl, 2-	321-60-8	76.3	1.0	%	E625A/WT	14-Jul-2025	14-Jul-2025	2104573

Analytical Results

WT2518420-001

Sub-Matrix:**Water**
(Matrix: **Water**)

Client sample ID: GW-12669624-071025-DB-001
Client sampling date / time: 10-Jul-2025

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Semi-Volatile Organics Surrogates								
Nitrobenzene-d5	4165-60-0	84.6	1.0	%	E625A/WT	14-Jul-2025	14-Jul-2025	2104573
Terphenyl-d14, p-	1718-51-0	100	1.0	%	E625A/WT	14-Jul-2025	14-Jul-2025	2104573
Chlorinated Phenolics								
Pentachlorophenol [PCP]	87-86-5	<0.50	0.50	µg/L	E625A/WT	14-Jul-2025	14-Jul-2025	2104573
Phenolics Surrogates								
Tribromophenol, 2,4,6-	118-79-6	95.7	0.50	%	E625A/WT	14-Jul-2025	14-Jul-2025	2104573
Nonylphenols								
Nonylphenol [NP]	84852-15-3	<0.40	0.40	µg/L	E749A/WT	11-Jul-2025	11-Jul-2025	2101126
Nonylphenol diethoxylate [NP2EO]	20427-84-3	<0.10	0.10	µg/L	E749B/WT	11-Jul-2025	11-Jul-2025	2101125
Nonylphenol ethoxylates, mono+di	n/a	<2.0	2	µg/L	E749B/WT	11-Jul-2025	11-Jul-2025	2101125
Nonylphenol monoethoxylate [NP1EO]	27986-36-3	<0.40	0.40	µg/L	E749B/WT	11-Jul-2025	11-Jul-2025	2101125
Polychlorinated Biphenyls								
Aroclor 1016	12674-11-2	<0.020	0.020	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Aroclor 1221	11104-28-2	<0.020	0.020	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Aroclor 1232	11141-16-5	<0.020	0.020	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Aroclor 1242	53469-21-9	<0.020	0.020	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Aroclor 1248	12672-29-6	<0.020	0.020	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Aroclor 1254	11097-69-1	<0.020	0.020	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Aroclor 1260	11096-82-5	<0.020	0.020	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Aroclor 1262	37324-23-5	<0.020	0.020	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Aroclor 1268	11100-14-4	<0.020	0.020	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Polychlorinated biphenyls [PCBs], total	n/a	<0.060	0.060	µg/L	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Polychlorinated Biphenyls Surrogates								
Decachlorobiphenyl	2051-24-3	104	0.1	%	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Tetrachloro-m-xylene	877-09-8	87.3	0.1	%	E687/WT	11-Jul-2025	11-Jul-2025	2101145
Organochlorine Pesticides								
Aldrin	309-00-2	<0.0080	0.0080	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
Chlordane, cis- (alpha)	5103-71-9	<0.0080	0.0080	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
Chlordane, total	57-74-9	<0.011	0.011	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
Chlordane, trans- (gamma)	5103-74-2	<0.0080	0.0080	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
DDD, 2,4'-	53-19-0	<0.0040	0.0040	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
DDD, 4,4'-	72-54-8	<0.0040	0.0040	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
DDE, 2,4'-	3424-82-6	<0.0040	0.0040	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
DDE, 4,4'-	72-55-9	<0.0040	0.0040	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
DDT, 2,4'-	789-02-6	<0.0040	0.0040	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
DDT, 4,4'-	50-29-3	<0.0040	0.0040	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
Dieldrin	60-57-1	<0.0080	0.0080	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
Hexachlorocyclohexane, gamma-	58-89-9	<0.0080	0.0080	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
Mirex	2385-85-5	<0.0080	0.0080	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
Aldrin + Dieldrin	----	<0.011	0.011	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
DDT + metabolites, total	----	<0.010	0.01	µg/L	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
Organochlorine Pesticides Surrogates								
Decachlorobiphenyl	2051-24-3	84.1	0.10	%	E660F/WT	11-Jul-2025	14-Jul-2025	2101144
Tetrachloro-m-xylene	877-09-8	86.0	0.10	%	E660F/WT	11-Jul-2025	14-Jul-2025	2101144

Please refer to the General Comments section for an explanation of any result qualifiers detected.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2518420**	Page	: 1 of 12
Client	: **GHD Limited**	Laboratory	: ALS Environmental - Waterloo
Contact	: Sean Andreou	Account Manager	: Rick Hawthorne
Address	: 455 Phillip Street Waterloo ON Canada N2L 3X2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 12669624-110.110.20	Date Samples Received	: 10-Jul-2025 15:40
PO	: 735-pending	Issue Date	: 17-Jul-2025 17:32
C-O-C number	: ----		
Sampler	: DB		
Site	: ----		
Quote number	: 12669624-ExC-02-July 2025 Halton Oakville PWQO-PO 735-014356 PWQO ODWS and Ontario Bylaw		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Method Blank (MB) Values								
Anions and Nutrients	QC-2101191-001	----	Phosphorus, total	7723-14-0	E372-U	0.0024 B mg/L	0.002 mg/L	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-4d] GW-12669624-071025-DB-001	E550	10-Jul-2025	----	----	----		12-Jul-2025	4 days	2 days	✓
Aggregate Organics : Mineral Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) GW-12669624-071025-DB-001	E567SG	10-Jul-2025	13-Jul-2025	28 days	3 days	✓	17-Jul-2025	28 days	3 days	✓
Aggregate Organics : Oil & Grease by Gravimetry										
Amber glass (hydrochloric acid) GW-12669624-071025-DB-001	E567	10-Jul-2025	13-Jul-2025	28 days	3 days	✓	17-Jul-2025	28 days	3 days	✓
Aggregate Organics : Phenols (4AAP) in Water by Colorimetry										
Amber glass total (sulfuric acid) [ON MECP] GW-12669624-071025-DB-001	E562	10-Jul-2025	11-Jul-2025	28 days	2 days	✓	11-Jul-2025	28 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] GW-12669624-071025-DB-001	E235.F	10-Jul-2025	12-Jul-2025	28 days	3 days	✓	15-Jul-2025	28 days	3 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] GW-12669624-071025-DB-001	E235.SO4	10-Jul-2025	12-Jul-2025	28 days	3 days	✓	15-Jul-2025	28 days	3 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) [ON MECP] GW-12669624-071025-DB-001	E318	10-Jul-2025	14-Jul-2025	28 days	4 days	✓	14-Jul-2025	28 days	4 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP] GW-12669624-071025-DB-001	E372-U	10-Jul-2025	11-Jul-2025	28 days	2 days	✓	14-Jul-2025	28 days	2 days	✓
Chlorinated Phenolics : BNA (Routine List) by GC-MS-MS										
Amber glass/Teflon lined septa cap - SVOCs (sodium thiosulfate) [ON MECP] GW-12669624-071025-DB-001	E625A	10-Jul-2025	14-Jul-2025	14 days	4 days	✓	14-Jul-2025	40 days	0 days	✓
Cyanides : Total Cyanide										
Opaque HDPE - total (sodium hydroxide) GW-12669624-071025-DB-001	E333	10-Jul-2025	11-Jul-2025	14 days	2 days	✓	11-Jul-2025	14 days	2 days	✓
Microbiological Tests : Total Coliforms and E. coli (Enzyme Substrate, 97 Well Tray)										
Sterile HDPE (sodium thiosulfate) [ON MECP] GW-12669624-071025-DB-001	E010.QT97	10-Jul-2025	----	----	----		11-Jul-2025	48 hrs	34 hrs	✓
Nonylphenols : Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode										
Amber glass/Teflon lined cap - LCMS GW-12669624-071025-DB-001	E749B	10-Jul-2025	11-Jul-2025	7 days	1 days	✓	11-Jul-2025	7 days	0 days	✓
Nonylphenols : Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode										
Amber glass/Teflon lined cap - LCMS GW-12669624-071025-DB-001	E749A	10-Jul-2025	11-Jul-2025	7 days	1 days	✓	11-Jul-2025	7 days	0 days	✓
Organochlorine Pesticides : OCP Analysis by GC-MS-MS										
Amber glass/Teflon lined cap [ON MECP] GW-12669624-071025-DB-001	E660F	10-Jul-2025	11-Jul-2025	14 days	1 days	✓	14-Jul-2025	40 days	3 days	✓
Phthalate Esters : BNA (Routine List) by GC-MS-MS										
Amber glass/Teflon lined septa cap - SVOCs (sodium thiosulfate) [ON MECP] GW-12669624-071025-DB-001	E625A	10-Jul-2025	14-Jul-2025	14 days	4 days	✓	14-Jul-2025	40 days	0 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] GW-12669624-071025-DB-001	E108	10-Jul-2025	12-Jul-2025	14 days	3 days	✓	14-Jul-2025	14 days	3 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
GW-12669624-071025-DB-001	E160	10-Jul-2025	----	----	----		15-Jul-2025	7 days	6 days	✓
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
GW-12669624-071025-DB-001	E687	10-Jul-2025	11-Jul-2025	14 days	1 days	✓	11-Jul-2025	40 days	0 days	✓
Polycyclic Aromatic Hydrocarbons : PAHs in Water by Hexane LVI GC-MS										
Amber glass/Teflon lined cap (sodium bisulfate)										
GW-12669624-071025-DB-001	E641A	10-Jul-2025	11-Jul-2025	14 days	2 days	✓	14-Jul-2025	40 days	3 days	✓
Semi-Volatile Organics : BNA (Routine List) by GC-MS-MS										
Amber glass/Teflon lined septa cap - SVOCs (sodium thiosulfate) [ON MECP]										
GW-12669624-071025-DB-001	E625A	10-Jul-2025	14-Jul-2025	14 days	4 days	✓	14-Jul-2025	40 days	0 days	✓
Speciated Metals : Total Hexavalent Chromium (Cr VI) by IC										
HDPE - total (NaOH+Buf) [ON MECP]										
GW-12669624-071025-DB-001	E532	10-Jul-2025	----	----	----		11-Jul-2025	28 days	2 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
GW-12669624-071025-DB-001	E508	10-Jul-2025	15-Jul-2025	28 days	5 days	✓	15-Jul-2025	28 days	5 days	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
GW-12669624-071025-DB-001	E420	10-Jul-2025	11-Jul-2025	180 days	1 days	✓	11-Jul-2025	180 days	1 days	✓
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
GW-12669624-071025-DB-001	E611D	10-Jul-2025	10-Jul-2025	14 days	1 days	✓	11-Jul-2025	14 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: ✗ = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Total Coliforms and E. coli (Enzyme Substrate, 97 Well Tray)	E010.QT97	2101385	1	2	50.0	5.0	✓
pH by Meter	E108	2103495	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	2107049	1	20	5.0	4.7	✓
Fluoride in Water by IC	E235.F	2103490	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2103491	1	4	25.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2101192	1	19	5.2	5.0	✓
Total Cyanide	E333	2101172	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2101191	1	26	3.8	5.0	✗
Total Metals in Water by CRC ICPMS	E420	2100854	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	2105298	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	2101746	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	2103724	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	2101193	1	19	5.2	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	2100796	1	17	5.8	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	2101126	1	12	8.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	2101125	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
pH by Meter	E108	2103495	1	15	6.6	5.0	✓
TSS by Gravimetry	E160	2107049	1	20	5.0	4.7	✓
Fluoride in Water by IC	E235.F	2103490	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2103491	1	4	25.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2101192	1	19	5.2	5.0	✓
Total Cyanide	E333	2101172	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2101191	2	26	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2100854	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	2105298	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	2101746	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	2103724	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	2101193	1	19	5.2	5.0	✓
Oil & Grease by Gravimetry	E567	2104489	1	15	6.6	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	2104490	1	3	33.3	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	2100796	1	17	5.8	5.0	✓
BNA (Routine List) by GC-MS-MS	E625A	2104573	1	18	5.5	5.0	✓
PAHs in Water by Hexane LVI GC-MS	E641A	2101934	1	3	33.3	5.0	✓
OCP Analysis by GC-MS-MS	E660F	2101144	1	7	14.2	5.0	✓
PCB Aroclors by GC-MS	E687	2101145	1	1	100.0	4.7	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	2101126	1	12	8.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	2101125	1	12	8.3	5.0	✓
Method Blanks (MB)							
Total Coliforms and E. coli (Enzyme Substrate, 97 Well Tray)	E010.QT97	2101385	1	2	50.0	5.0	✓
TSS by Gravimetry	E160	2107049	1	20	5.0	4.7	✓
Fluoride in Water by IC	E235.F	2103490	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2103491	1	4	25.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2101192	1	19	5.2	5.0	✓
Total Cyanide	E333	2101172	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2101191	2	26	7.6	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2100854	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	2105298	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	2101746	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	2103724	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	2101193	1	19	5.2	5.0	✓
Oil & Grease by Gravimetry	E567	2104489	1	15	6.6	5.0	✓
Mineral Oil & Grease by Gravimetry	E567SG	2104490	1	3	33.3	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	2100796	1	17	5.8	5.0	✓
BNA (Routine List) by GC-MS-MS	E625A	2104573	1	18	5.5	5.0	✓
PAHs in Water by Hexane LVI GC-MS	E641A	2101934	1	3	33.3	5.0	✓
OCP Analysis by GC-MS-MS	E660F	2101144	1	7	14.2	5.0	✓
PCB Aroclors by GC-MS	E687	2101145	1	1	100.0	4.7	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	2101126	1	12	8.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	2101125	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Fluoride in Water by IC	E235.F	2103490	1	5	20.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2103491	1	4	25.0	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2101192	1	19	5.2	5.0	✓
Total Cyanide	E333	2101172	1	9	11.1	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2101191	1	26	3.8	5.0	×
Total Metals in Water by CRC ICPMS	E420	2100854	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	2105298	1	20	5.0	5.0	✓
Total Hexavalent Chromium (Cr VI) by IC	E532	2101746	1	20	5.0	5.0	✓
Phenols (4AAP) in Water by Colorimetry	E562	2101193	1	19	5.2	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	2100796	1	17	5.8	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	2101126	1	12	8.3	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	2101125	1	12	8.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Coliforms and E. coli (Enzyme Substrate, 97 Well Tray)	E010.QT97 ALS Environmental - Waterloo	Water	APHA 9223 (mod)	The enzyme substrate test simultaneously detects Total Coliforms and E. coli in a 100 mL sample after incubation at 35.0 ±0.5°C for either 18 or 24 hours (dependent on reagent used). This method uses the 97 well Quanti-Tray.
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
TSS by Gravimetry	E160 ALS Environmental - Waterloo	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Total Cyanide	E333 ALS Environmental - Waterloo	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Mercury in Water by CVAAS	E508 ALS Environmental - Waterloo	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Total Hexavalent Chromium (Cr VI) by IC	E532 ALS Environmental - Waterloo	Water	APHA 3500-Cr C (Ion Chromatography)	Hexavalent Chromium is measured by Ion chromatography-Post column reaction and UV detection. Results are based on an un-filtered, field-preserved sample.
Biochemical Oxygen Demand - 5 day	E550 ALS Environmental - Waterloo	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Phenols (4AAP) in Water by Colorimetry	E562 ALS Environmental - Waterloo	Water	EPA 9066	This automated method is based on the distillation of phenol and subsequent reaction of the distillate with alkaline ferricyanide (K3Fe(CN)6) and 4-amino-antipyrine (4-AAP) to form a red complex which is measured colorimetrically.
Oil & Grease by Gravimetry	E567 ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane and the extract is evaporated to dryness. The residue is then weighed to determine Oil and Grease.
Mineral Oil & Grease by Gravimetry	E567SG ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane, followed by silica gel treatment after which the extract is evaporated to dryness. The residue is then weighed to determine Mineral Oil and Grease.
VOCs (Eastern Canada List) by Headspace GC-MS	E611D ALS Environmental - Waterloo	Water	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
BNA (Routine List) by GC-MS-MS	E625A ALS Environmental - Waterloo	Water	EPA 8270E (mod)	BNA are analyzed by GC-MS-MS.
PAHs in Water by Hexane LVI GC-MS	E641A ALS Environmental - Waterloo	Water	EPA 8270E (mod)	Polycyclic Aromatic Hydrocarbons (PAHs) are analyzed by large volume injection (LVI) GC-MS.
OCP Analysis by GC-MS-MS	E660F ALS Environmental - Waterloo	Water	EPA 8270E (mod)	Pesticides are analyzed by GC-MS-MS
PCB Aroclors by GC-MS	E687 ALS Environmental - Waterloo	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A ALS Environmental - Waterloo	Water	ASTM D7485-16 (mod)	An aliquot of 5.0 mL of sample is spiked with internal standards and analyzed by Direct Aqueous Injection and LC-MS-MS-Negative mode.
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B ALS Environmental - Waterloo	Water	ASTM D7485-16 (mod)	An aliquot of 5.0 mL of sample is spiked with internal standards and analyzed by Direct Aqueous Injection and LC-MS-MS.
Animal & Vegetable Oil & Grease by Gravimetry	EC567A.SG ALS Environmental - Waterloo	Water	APHA 5520 (mod)	Animal & vegetable oil and grease is calculated as follows: Oil & Grease (gravimetric) minus Mineral Oil & Grease (gravimetric)

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Digestion for TKN in water	EP318 ALS Environmental - Waterloo	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Digestion for Total Phosphorus in water	EP372 ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Oil & Grease Extraction for Gravimetry	EP567 ALS Environmental - Waterloo	Water	BC MOE Lab Manual (Oil & Grease) (mod)	The entire water sample is extracted with hexane by liquid-liquid extraction.
VOCs Preparation for Headspace Analysis	EP581 ALS Environmental - Waterloo	Water	EPA 5021A (mod)	Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler. An aliquot of the headspace is then injected into a GC-MS-FID.
PHCs and PAHs Hexane Extraction	EP601 ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Petroleum Hydrocarbons (PHCs) and Polycyclic Aromatic Hydrocarbons (PAHs) are extracted using a hexane liquid-liquid extraction.
BNA Extraction	EP625 ALS Environmental - Waterloo	Water	EPA 3510C (mod)	SVOCs are extracted from aqueous sample using DCM liquid-liquid extraction.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 ALS Environmental - Waterloo	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation of Nonylphenol and Nonylphenol Ethoxylates	EP749 ALS Environmental - Waterloo	Water	ASTM D7485-16 (mod)	An aliquot of 5.0 mL of sample is spiked with internal standards and analyzed by Direct Aqueous Injection and LC-MS/MS.

QUALITY CONTROL REPORT

Work Order	: **WT2518420**	Page	: 1 of 15
Client	: GHD Limited	Laboratory	: ALS Environmental - Waterloo
Contact	: Sean Andreou	Account Manager	: Rick Hawthorne
Address	: 455 Phillip Street Waterloo ON Canada N2L 3X2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 12669624-110.110.20	Date Samples Received	: 10-Jul-2025 15:40
PO	: 735-pending	Date Analysis Commenced	: 10-Jul-2025
C-O-C number	: ----	Issue Date	: 17-Jul-2025 17:32
Sampler	: DB		
Site	: ----		
Quote number	: 12669624-ExC-02-July 2025 Halton Oakville PWQO-PO 735-014356 PWQO ODWS and Ontario Bylaw		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amaninder Dhillon	Team Lead - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
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Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
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Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
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Jon Fisher	Laboratory Manager - Environmental	Waterloo Metals, Waterloo, Ontario
Ruby Sujeepan	Analyst	Waterloo Microbiology, Waterloo, Ontario
Sanja Risticevic	Department Manager - LCMS	Waterloo LCMS, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 2103495)											
WT2518397-001	Anonymous	pH	----	E108	0.10	pH units	8.17	7.86	3.87%	4%	----
Physical Tests (QC Lot: 2107049)											
WT2518326-004	Anonymous	Solids, total suspended [TSS]	----	E160	150	mg/L	18800	18600	0.696%	20%	----
Anions and Nutrients (QC Lot: 2101191)											
WT2518120-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0400	mg/L	13.4	13.4	0.258%	20%	----
Anions and Nutrients (QC Lot: 2101192)											
WT2518164-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	0.500	mg/L	37.5	36.9	1.65%	20%	----
Anions and Nutrients (QC Lot: 2103490)											
WT2518397-001	Anonymous	Fluoride	16984-48-8	E235.F	0.040	mg/L	0.077	0.073	0.003	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2103491)											
WT2518397-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.60	mg/L	14.5	14.3	1.34%	20%	----
Cyanides (QC Lot: 2101172)											
WT2518354-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0050	mg/L	0.0196	0.0196	0	Diff <2x LOR	----
Microbiological Tests (QC Lot: 2101385)											
WT2518028-001	Anonymous	Coliforms, Escherichia coli [E. coli]	----	E010.QT97	1	MPN/100mL	<1	<1	0	Diff <2x LOR	----
Total Metals (QC Lot: 2100854)											
WT2518420-001	GW-12669624-071025-DB-001	Aluminum, total	7429-90-5	E420	0.0300	mg/L	0.0356	0.0336	0.0020	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Beryllium, total	7440-41-7	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.00626	0.00584	0.00041	Diff <2x LOR	----
		Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.00232	0.00233	0.000006	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 2100854) - continued											
WT2518420-001	GW-12669624-071025-DB-001	Selenium, total	7782-49-2	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Tin, total	7440-31-5	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00300	mg/L	<0.00300	<0.00300	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
Total Metals (QC Lot: 2105298)											
TY2507409-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
Speciated Metals (QC Lot: 2101746)											
HA2502244-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.00050	mg/L	0.00057	0.00056	0.000008	Diff <2x LOR	----
Aggregate Organics (QC Lot: 2101193)											
TY2507320-001	Anonymous	Phenols, total (4AAP)	----	E562	0.0010	mg/L	0.0600	0.0595	0.937%	20%	----
Aggregate Organics (QC Lot: 2103724)											
WT2518420-001	GW-12669624-071025-DB-001	Biochemical oxygen demand [BOD]	----	E550	3.0	mg/L	<3.0	<3.0	0.0%	30%	----
Volatile Organic Compounds (QC Lot: 2100796)											
WT2518386-001	Anonymous	Benzene	71-43-2	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Chloroform	67-66-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	0.50	µg/L	4.62	4.51	2.41%	30%	----
		Dichloromethane	75-09-2	E611D	1.0	µg/L	<1.0	<1.0	0	Diff <2x LOR	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Ethylbenzene	100-41-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tetrachloroethylene	127-18-4	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Toluene	108-88-3	E611D	0.50	µg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Trichloroethylene	79-01-6	E611D	0.50	µg/L	6.96	6.85	1.59%	30%	----
		Xylene, m+p-	179601-23-1	E611D	0.40	µg/L	<0.40	<0.40	0	Diff <2x LOR	----
		Xylene, o-	95-47-6	E611D	0.30	µg/L	<0.30	<0.30	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 2101125)											
WT2518185-001	Anonymous	Nonylphenol diethoxylate [NP2EO]	20427-84-3	E749B	0.34	µg/L	<0.34	<0.34	0	Diff <2x LOR	----
		Nonylphenol monoethoxylate [NP1EO]	27986-36-3	E749B	0.57	µg/L	<0.57	<0.57	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 2101126)											
WT2518185-001	Anonymous	Nonylphenol [NP]	84852-15-3	E749A	0.44	µg/L	<0.44	<0.44	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 2107049)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 2101191)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	# 0.0024	B
Anions and Nutrients (QCLot: 2101192)						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Anions and Nutrients (QCLot: 2103490)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2103491)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 2106322)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Cyanides (QCLot: 2101172)						
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	<0.0020	----
Microbiological Tests (QCLot: 2101385)						
Coliforms, Escherichia coli [E. coli]	----	E010.QT97	1	MPN/100mL	<1	----
Total Metals (QCLot: 2100854)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Tin, total	7440-31-5	E420	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Total Metals (QCLot: 2100854) - continued						
Titanium, total	7440-32-6	E420	0.0003	mg/L	<0.00030	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Total Metals (QCLot: 2105298)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Speciated Metals (QCLot: 2101746)						
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	<0.00050	----
Aggregate Organics (QCLot: 2101193)						
Phenols, total (4AAP)	----	E562	0.001	mg/L	<0.0010	----
Aggregate Organics (QCLot: 2103724)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----
Aggregate Organics (QCLot: 2104489)						
Oil & grease (gravimetric)	----	E567	5	mg/L	<5.0	----
Aggregate Organics (QCLot: 2104490)						
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	<5.0	----
Volatile Organic Compounds (QCLot: 2100796)						
Benzene	71-43-2	E611D	0.5	µg/L	<0.50	----
Chloroform	67-66-3	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	<0.50	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	<0.50	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	<0.50	----
Dichloromethane	75-09-2	E611D	1	µg/L	<1.0	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	<0.30	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	<0.50	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	<0.50	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	<0.50	----
Toluene	108-88-3	E611D	0.5	µg/L	<0.50	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	<0.50	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	<0.40	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	<0.30	----
Polycyclic Aromatic Hydrocarbons (QCLot: 2101934)						
Acenaphthene	83-32-9	E641A	0.01	µg/L	<0.010	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	<0.010	----
Anthracene	120-12-7	E641A	0.01	µg/L	<0.010	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	<0.010	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	<0.0050	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 2101934) - continued						
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	<0.010	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	<0.010	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	<0.010	----
Chrysene	218-01-9	E641A	0.01	µg/L	<0.010	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	<0.0050	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	<0.010	----
Fluorene	86-73-7	E641A	0.01	µg/L	<0.010	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	<0.010	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	<0.010	----
Naphthalene	91-20-3	E641A	0.05	µg/L	<0.050	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	<0.020	----
Pyrene	129-00-0	E641A	0.01	µg/L	<0.010	----
Phthalate Esters (QCLot: 2104573)						
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E625A	0.6	µg/L	<0.60	----
Di-n-butyl phthalate	84-74-2	E625A	1	µg/L	<1.0	----
Semi-Volatile Organics (QCLot: 2104573)						
Dichlorobenzidine, 3,3'-	91-94-1	E625A	0.4	µg/L	<0.40	----
Chlorinated Phenolics (QCLot: 2104573)						
Pentachlorophenol [PCP]	87-86-5	E625A	0.5	µg/L	<0.50	----
Nonylphenols (QCLot: 2101125)						
Nonylphenol diethoxylate [NP2EO]	20427-84-3	E749B	0.1	µg/L	<0.10	----
Nonylphenol monoethoxylate [NP1EO]	27986-36-3	E749B	0.4	µg/L	<0.40	----
Nonylphenols (QCLot: 2101126)						
Nonylphenol [NP]	84852-15-3	E749A	0.4	µg/L	<0.40	----
Polychlorinated Biphenyls (QCLot: 2101145)						
Aroclor 1016	12674-11-2	E687	0.02	µg/L	<0.020	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	<0.020	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	<0.020	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	<0.020	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	<0.020	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	<0.020	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	<0.020	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	<0.020	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	<0.020	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Organochlorine Pesticides (QCLot: 2101144)						
Aldrin	309-00-2	E660F	0.008	µg/L	<0.0080	----
Chlordane, cis- (alpha)	5103-71-9	E660F	0.008	µg/L	<0.0080	----
Chlordane, trans- (gamma)	5103-74-2	E660F	0.008	µg/L	<0.0080	----
DDD, 2,4'-	53-19-0	E660F	0.004	µg/L	<0.0040	----
DDD, 4,4'-	72-54-8	E660F	0.004	µg/L	<0.0040	----
DDE, 2,4'-	3424-82-6	E660F	0.004	µg/L	<0.0040	----
DDE, 4,4'-	72-55-9	E660F	0.004	µg/L	<0.0040	----
DDT, 2,4'-	789-02-6	E660F	0.004	µg/L	<0.0040	----
DDT, 4,4'-	50-29-3	E660F	0.004	µg/L	<0.0040	----
Dieldrin	60-57-1	E660F	0.008	µg/L	<0.0080	----
Hexachlorocyclohexane, gamma-	58-89-9	E660F	0.008	µg/L	<0.0080	----
Mirex	2385-85-5	E660F	0.008	µg/L	<0.0080	----

Qualifiers

Qualifier	Description
B	*Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.*

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 2103495)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 2107049)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	99.5	85.0	115	----
Anions and Nutrients (QCLot: 2101191)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.333 mg/L	95.4	80.0	120	----
Anions and Nutrients (QCLot: 2101192)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 2103490)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	98.3	90.0	110	----
Anions and Nutrients (QCLot: 2103491)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	100	90.0	110	----
Anions and Nutrients (QCLot: 2106322)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.333 mg/L	95.6	80.0	120	----
Cyanides (QCLot: 2101172)									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	94.9	80.0	120	----
Total Metals (QCLot: 2100854)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	108	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	108	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	115	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	103	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	108	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.012 mg/L	108	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.012 mg/L	107	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.012 mg/L	106	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	107	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	106	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.012 mg/L	108	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.012 mg/L	106	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	108	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike: Target Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Total Metals (QCLot: 2100854) - continued									
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	110	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	106	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.012 mg/L	104	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	108	80.0	120	----
Total Metals (QCLot: 2105298)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0 mg/L	97.9	80.0	120	----
Speciated Metals (QCLot: 2101746)									
Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0005	mg/L	0.025 mg/L	93.9	80.0	120	----
Aggregate Organics (QCLot: 2101193)									
Phenols, total (4AAP)	----	E562	0.001	mg/L	0.02 mg/L	101	85.0	115	----
Aggregate Organics (QCLot: 2103724)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	92.7	85.0	115	----
Aggregate Organics (QCLot: 2104489)									
Oil & grease (gravimetric)	----	E567	5	mg/L	200 mg/L	101	70.0	130	----
Aggregate Organics (QCLot: 2104490)									
Oil & grease, mineral (gravimetric)	----	E567SG	5	mg/L	100 mg/L	92.6	70.0	130	----
Volatile Organic Compounds (QCLot: 2100796)									
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	107	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	108	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	98.1	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	98.7	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	110	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	106	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	95.5	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	94.0	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	106	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	93.7	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	97.7	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	101	70.0	130	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	95.3	70.0	130	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	95.1	70.0	130	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Polycyclic Aromatic Hydrocarbons (QCLot: 2101934)									
Acenaphthene	83-32-9	E641A	0.01	µg/L	0.526 µg/L	89.0	50.0	140	----
Acenaphthylene	208-96-8	E641A	0.01	µg/L	0.526 µg/L	84.3	50.0	140	----
Anthracene	120-12-7	E641A	0.01	µg/L	0.526 µg/L	79.0	50.0	140	----
Benz(a)anthracene	56-55-3	E641A	0.01	µg/L	0.526 µg/L	87.1	50.0	140	----
Benzo(a)pyrene	50-32-8	E641A	0.005	µg/L	0.526 µg/L	80.2	50.0	140	----
Benzo(b+j)fluoranthene	n/a	E641A	0.01	µg/L	0.526 µg/L	83.8	50.0	140	----
Benzo(g,h,i)perylene	191-24-2	E641A	0.01	µg/L	0.526 µg/L	100	50.0	140	----
Benzo(k)fluoranthene	207-08-9	E641A	0.01	µg/L	0.526 µg/L	81.4	50.0	140	----
Chrysene	218-01-9	E641A	0.01	µg/L	0.526 µg/L	85.3	50.0	140	----
Dibenz(a,h)anthracene	53-70-3	E641A	0.005	µg/L	0.526 µg/L	85.0	50.0	140	----
Fluoranthene	206-44-0	E641A	0.01	µg/L	0.526 µg/L	88.4	50.0	140	----
Fluorene	86-73-7	E641A	0.01	µg/L	0.526 µg/L	86.8	50.0	140	----
Indeno(1,2,3-c,d)pyrene	193-39-5	E641A	0.01	µg/L	0.526 µg/L	91.5	50.0	140	----
Methylnaphthalene, 1-	90-12-0	E641A	0.01	µg/L	0.526 µg/L	84.9	50.0	140	----
Methylnaphthalene, 2-	91-57-6	E641A	0.01	µg/L	0.526 µg/L	87.2	50.0	140	----
Naphthalene	91-20-3	E641A	0.05	µg/L	0.526 µg/L	83.0	50.0	140	----
Phenanthrene	85-01-8	E641A	0.02	µg/L	0.526 µg/L	92.1	50.0	140	----
Pyrene	129-00-0	E641A	0.01	µg/L	0.526 µg/L	90.0	50.0	140	----
Phthalate Esters (QCLot: 2104573)									
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E625A	0.6	µg/L	33.7 µg/L	123	50.0	140	----
Di-n-butyl phthalate	84-74-2	E625A	1	µg/L	33.7 µg/L	103	50.0	140	----
Semi-Volatile Organics (QCLot: 2104573)									
Dichlorobenzidine, 3,3'-	91-94-1	E625A	0.4	µg/L	8.42 µg/L	60.6	50.0	140	----
Chlorinated Phenolics (QCLot: 2104573)									
Pentachlorophenol [PCP]	87-86-5	E625A	0.5	µg/L	25.3 µg/L	101	50.0	140	----
Nonylphenols (QCLot: 2101125)									
Nonylphenol diethoxylate [NP2EO]	20427-84-3	E749B	0.1	µg/L	2 µg/L	93.7	60.0	140	----
Nonylphenol monoethoxylate [NP1EO]	27986-36-3	E749B	0.4	µg/L	10 µg/L	68.0	60.0	140	----
Nonylphenols (QCLot: 2101126)									
Nonylphenol [NP]	84852-15-3	E749A	0.4	µg/L	10 µg/L	103	60.0	140	----
Polychlorinated Biphenyls (QCLot: 2101145)									

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Polychlorinated Biphenyls (QCLot: 2101145) - continued									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	90.6	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	90.6	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	90.6	60.0	140	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	90.6	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	69.2	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	88.9	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	101	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	101	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	101	60.0	140	----
Organochlorine Pesticides (QCLot: 2101144)									
Aldrin	309-00-2	E660F	0.008	µg/L	0.2 µg/L	69.0	50.0	150	----
Chlordane, cis- (alpha)	5103-71-9	E660F	0.008	µg/L	0.2 µg/L	78.0	50.0	150	----
Chlordane, trans- (gamma)	5103-74-2	E660F	0.008	µg/L	0.2 µg/L	78.5	50.0	150	----
DDD, 2,4'-	53-19-0	E660F	0.004	µg/L	0.2 µg/L	74.0	50.0	150	----
DDD, 4,4'-	72-54-8	E660F	0.004	µg/L	0.2 µg/L	62.7	50.0	150	----
DDE, 2,4'-	3424-82-6	E660F	0.004	µg/L	0.2 µg/L	79.4	50.0	150	----
DDE, 4,4'-	72-55-9	E660F	0.004	µg/L	0.2 µg/L	74.0	50.0	150	----
DDT, 2,4'-	789-02-6	E660F	0.004	µg/L	0.2 µg/L	58.9	50.0	150	----
DDT, 4,4'-	50-29-3	E660F	0.004	µg/L	0.2 µg/L	79.4	50.0	150	----
Dieldrin	60-57-1	E660F	0.008	µg/L	0.2 µg/L	73.5	50.0	150	----
Hexachlorocyclohexane, gamma-	58-89-9	E660F	0.008	µg/L	0.2 µg/L	71.2	50.0	150	----
Mirex	2385-85-5	E660F	0.008	µg/L	0.2 µg/L	81.0	50.0	150	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 2101191)										
WT2518120-001	Anonymous	Phosphorus, total	7723-14-0	E372-U	ND mg/L	----	ND	70.0	130	----
Anions and Nutrients (QCLot: 2101192)										
WT2518164-001	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	ND mg/L	----	ND	70.0	130	----
Anions and Nutrients (QCLot: 2103490)										
WT2518397-001	Anonymous	Fluoride	16984-48-8	E235.F	1.95 mg/L	2 mg/L	97.6	75.0	125	----
Anions and Nutrients (QCLot: 2103491)										
WT2518397-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	197 mg/L	200 mg/L	98.3	75.0	125	----
Cyanides (QCLot: 2101172)										
WT2518354-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.219 mg/L	0.25 mg/L	87.6	75.0	125	----
Total Metals (QCLot: 2100854)										
WT2518423-001	Anonymous	Aluminum, total	7429-90-5	E420	0.108 mg/L	0.1 mg/L	108	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0519 mg/L	0.05 mg/L	104	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0546 mg/L	0.05 mg/L	109	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00485 mg/L	0.005 mg/L	97.0	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00473 mg/L	0.005 mg/L	94.5	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0136 mg/L	0.012 mg/L	108	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0128 mg/L	0.012 mg/L	103	70.0	130	----
		Copper, total	7440-50-8	E420	0.0119 mg/L	0.012 mg/L	94.9	70.0	130	----
		Iron, total	7439-89-6	E420	0.058 mg/L	0.05 mg/L	116	70.0	130	----
		Lead, total	7439-92-1	E420	0.0233 mg/L	0.025 mg/L	93.3	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0129 mg/L	0.012 mg/L	103	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0135 mg/L	0.012 mg/L	108	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0245 mg/L	0.025 mg/L	98.0	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0523 mg/L	0.05 mg/L	105	70.0	130	----
		Silver, total	7440-22-4	E420	0.00448 mg/L	0.005 mg/L	89.6	70.0	130	----
		Tin, total	7440-31-5	E420	0.0260 mg/L	0.025 mg/L	104	70.0	130	----
		Titanium, total	7440-32-6	E420	0.0138 mg/L	0.012 mg/L	111	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0223 mg/L	0.025 mg/L	89.4	70.0	130	----
Total Metals (QCLot: 2105298)										
TY2507411-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000901 mg/L	0 mg/L	90.1	70.0	130	----
Speciated Metals (QCLot: 2101746)										
HA2502244-001	Anonymous	Chromium, hexavalent [Cr VI], total	18540-29-9	E532	0.0386 mg/L	0.04 mg/L	96.4	70.0	130	----
Aggregate Organics (QCLot: 2101193)										
TY2507320-001	Anonymous	Phenols, total (4AAP)	----	E562	ND mg/L	----	ND	75.0	125	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Volatile Organic Compounds (QCLot: 2100796)										
WT2518386-001	Anonymous	Benzene	71-43-2	E611D	103 µg/L	100 µg/L	103	60.0	140	----
		Chloroform	67-66-3	E611D	105 µg/L	100 µg/L	105	60.0	140	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	96.0 µg/L	100 µg/L	96.0	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	96.2 µg/L	100 µg/L	96.2	60.0	140	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	108 µg/L	100 µg/L	108	60.0	140	----
		Dichloromethane	75-09-2	E611D	105 µg/L	100 µg/L	105	60.0	140	----
		Dichloropropylene, trans-1,3-	10061-02-6	E611D	104 µg/L	100 µg/L	104	60.0	140	----
		Ethylbenzene	100-41-4	E611D	88.0 µg/L	100 µg/L	88.0	60.0	140	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	109 µg/L	100 µg/L	109	60.0	140	----
		Tetrachloroethylene	127-18-4	E611D	87.5 µg/L	100 µg/L	87.5	60.0	140	----
		Toluene	108-88-3	E611D	90.3 µg/L	100 µg/L	90.3	60.0	140	----
		Trichloroethylene	79-01-6	E611D	97.6 µg/L	100 µg/L	97.6	60.0	140	----
		Xylene, m+p-	179601-23-1	E611D	180 µg/L	200 µg/L	89.8	60.0	140	----
		Xylene, o-	95-47-6	E611D	90.5 µg/L	100 µg/L	90.5	60.0	140	----
Nonylphenols (QCLot: 2101125)										
WT2518185-001	Anonymous	Nonylphenol diethoxylate [NP2EO]	20427-84-3	E749B	1.89 µg/L	2 µg/L	94.7	50.0	140	----
		Nonylphenol monoethoxylate [NP1EO]	27986-36-3	E749B	9.10 µg/L	10 µg/L	91.0	50.0	140	----
Nonylphenols (QCLot: 2101126)										
WT2518185-001	Anonymous	Nonylphenol [NP]	84852-15-3	E749A	12.0 µg/L	10 µg/L	120	50.0	140	----

B-555 MW-191
GC-407 L-452
CGG-626 CN-146
OR-761 SC-327
VW-099

Chain of Custody (COC) / Analytical Request Form

COC Number: 20 -

Canada Toll Free: 1 800 668 9878

Page

Environmental Division Waterloo
Work Order Reference
WT2518420

Telephone : +1 519 886 6910

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	GHD Ltd. (Acct GHDL100)
Contact:	Jennifer Balkwill
Phone:	519-884-0510
	Company address below will appear on the final report
Street:	455 Phillip St.
City/Province:	Waterloo, ON
Postal Code:	N2L 3X2
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	GHD Ltd. (GHDL100)
Contact:	

Reports / Recipients	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☑ YES ☐ NO ☐ N/A
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	Jennifer.Balkwill@ghd.com
Email 2	See SSOW/PO
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	accountspayableCDN@ghd.com
Email 2	

Turnaround Time (TAT) Requested
☑ Routine [R] if received by 3pm M-F - no surcharges apply
☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and routine tests
Date and Time Required for all E&P TATs:	

For tests that can not be performed according to the TAT you will be contacted.

Project Information	
ALS Account # / Quote #:	WT2025GHDL1000091
Job #:	12669624-110.110.20
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	D. Berriman

ALS Lab Work Order # (lab use only):

ALS Contact: Rick H **Sampler:**

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Oakville sewer use bylaw/Halton Reg	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	GW-12669624-071025-DB - 001	10-07-25	14:00	WATER	19	X			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Town of Oakville sewer use bylaw/Halton Region sewer use bylaw

SAMPLE RECEIPT DETAILS (lab use only)

Cooling Method: ☐ NONE ☑ ICE ☐ ICE PACKS ☐ FROZEN ☑ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
22.0				11.8			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: July 10.25	Time: 15:30	Received by: Fahad M	Date: 10 July 25	Time: 15:40	Received by:	Date: July 10	Time: 6

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

CERTIFICATE OF ANALYSIS

Work Order	: **WT2518423**	Page	: 1 of 5
Client	: **GHD Limited**	Laboratory	: ALS Environmental - Waterloo
Contact	: Sean Andreou	Account Manager	: Rick Hawthorne
Address	: 455 Phillip Street Waterloo ON Canada N2L 3X2	Address	: 60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 12669624-110.110.20	Date Samples Received	: 10-Jul-2025 15:36
PO	: 735-pending	Date Analysis Commenced	: 11-Jul-2025
C-O-C number	: ----	Issue Date	: 17-Jul-2025 18:43
Sampler	: DB		
Site	: ----		
Quote number	: 12669624-ExC-02-July 2025 Halton Oakville PWQO-PO 735-014356 PWQO ODWS and Ontario Bylaw		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Fleming	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Anthony Calero	Supervisor - Inorganic	Inorganics, Calgary, Alberta
Ayesha Moughal	Account Manager Assistant	Administration, Waterloo, Ontario
Hannah Lewis	Inorganics Analyst	Inorganics, Waterloo, Ontario
Jon Fisher	Laboratory Manager - Environmental	Inorganics, Waterloo, Ontario
Jon Fisher	Laboratory Manager - Environmental	Metals, Waterloo, Ontario
Nik Perkio	Senior Analyst	Centralized Prep, Waterloo, Ontario
Nik Perkio	Senior Analyst	Inorganics, Waterloo, Ontario
Nik Perkio	Senior Analyst	Metals, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Inorganics, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.
Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).
Measurement Uncertainty: The reported uncertainties in this report are expanded uncertainties calculated using a coverage factor of 2, which gives a level of confidence of approximately 95%.
Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Unit	*Description*
-	no units
%	percent
°C	degrees celsius
µS/cm	microsiemens per centimetre
CU	colour units (1 cu = 1 mg/l pt)
meq/L	milliequivalents per litre
mg/L	milligrams per litre
NTU	nephelometric turbidity units
pH units	pH units

>: greater than.
<: less than.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

Qualifier	*Description*
BODL	*Limit of Reporting for BOD was increased to account for the largest volume of sample tested.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*

Analytical Results

WT2518423-001

Sub-Matrix:**Water**
(Matrix: **Water**)

Client sample ID: GW-12669624-071025-DB-001
Client sampling date / time: 10-Jul-2025 14:00

Analyte	CAS Number	Result		LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Field Tests									
pH, field	----	7.12		0.01	pH units	EF001/WT	-	16-Jul-2025	-
Temperature, field	----	21.0		0.01	°C	EF001/WT	-	16-Jul-2025	-
Sample Preparation									
Dissolved carbon filtration location	----	field		-	-	EP358/WT	-	12-Jul-2025	2103371
Physical Tests									
Alkalinity, bicarbonate (as CaCO3)	----	275		2.0	mg/L	E290/WT	11-Jul-2025	14-Jul-2025	2101882
Alkalinity, carbonate (as CaCO3)	----	<2.0		2.0	mg/L	E290/WT	11-Jul-2025	14-Jul-2025	2101882
Alkalinity, hydroxide (as CaCO3)	----	<2.0		2.0	mg/L	E290/WT	11-Jul-2025	14-Jul-2025	2101882
Alkalinity, phenolphthalein (as CaCO3)	----	<2.0		2.0	mg/L	E290/WT	11-Jul-2025	14-Jul-2025	2101882
Alkalinity, total (as CaCO3)	----	275		2.0	mg/L	E290/WT	11-Jul-2025	14-Jul-2025	2101882
Colour, true	----	<2.0		2.0	CU	E329-L/WT	11-Jul-2025	11-Jul-2025	2101876
Conductivity	----	1290		2.0	µS/cm	E100/WT	11-Jul-2025	14-Jul-2025	2101884
Hardness (as CaCO3), dissolved	----	534		0.50	mg/L	EC100/WT	-	14-Jul-2025	-
pH	----	7.80		0.10	pH units	E108/WT	11-Jul-2025	14-Jul-2025	2101885
Solids, total dissolved [TDS]	----	669		10	mg/L	E162/WT	-	16-Jul-2025	2109138
Solids, total suspended [TSS]	----	<3.0		3.0	mg/L	E160/WT	-	16-Jul-2025	2109121
Turbidity	----	0.92		0.10	NTU	E121/WT	-	11-Jul-2025	2101074
Anions and Nutrients									
Ammonia, total (as N)	7664-41-7	0.162		0.0050	mg/L	E298/WT	11-Jul-2025	14-Jul-2025	2102599
Ammonia, un-ionized (as NH3), field	7664-41-7	0.0011		0.001	mg/L	EC298A/WT	-	15-Jul-2025	-
Chloride	16887-00-6	140	DLDS,	2.50	mg/L	E235.Cl/WT	11-Jul-2025	14-Jul-2025	2101880
Fluoride	16984-48-8	0.258	DLDS,	0.100	mg/L	E235.F/WT	11-Jul-2025	14-Jul-2025	2101877
Kjeldahl nitrogen, total [TKN]	----	0.476		0.050	mg/L	E318/WT	14-Jul-2025	14-Jul-2025	2102601
Nitrate (as N)	14797-55-8	2.93	DLDS,	0.100	mg/L	E235.NO3/WT	11-Jul-2025	14-Jul-2025	2101878
Nitrate + Nitrite (as N)	----	2.93		0.112	mg/L	EC235.N+N/WT	-	15-Jul-2025	-
Nitrite (as N)	14797-65-0	<0.050	DLDS,	0.050	mg/L	E235.NO2/WT	11-Jul-2025	14-Jul-2025	2101879
Nitrogen, total organic	----	0.314		0.093	mg/L	EC363/WT	-	15-Jul-2025	-
Phosphate, ortho-, dissolved (as P)	14265-44-2	<0.0010		0.0010	mg/L	E378-U/WT	11-Jul-2025	15-Jul-2025	2101886
Phosphorus, total	7723-14-0	0.0025		0.0020	mg/L	E372-U/WT	14-Jul-2025	15-Jul-2025	2102598
Sulfate (as SO4)	14808-79-8	223	DLDS,	1.50	mg/L	E235.SO4/WT	11-Jul-2025	14-Jul-2025	2101881
Cyanides									
Cyanide, strong acid dissociable (Total)	----	<0.0020		0.0020	mg/L	E333/WT	11-Jul-2025	11-Jul-2025	2101172
Organic / Inorganic Carbon									
Carbon, dissolved organic [DOC]	----	1.62		0.50	mg/L	E358-L/WT	12-Jul-2025	16-Jul-2025	2103371
Total Sulfides									
Sulfide, total (as S)	18496-25-8	<0.0015		0.0015	mg/L	E395/CG	-	12-Jul-2025	2103725
Sulfide, total (as H2S)	7783-06-4	<0.0016		0.0016	mg/L	E395/CG	-	12-Jul-2025	2103725
Ion Balance									
Anion sum	----	14.3		0.10	meq/L	EC101/WT	-	17-Jul-2025	-
Cation sum	----	13.9		0.10	meq/L	EC101/WT	-	17-Jul-2025	-
Ion balance (APHA)	----	-1.42		0.01	%	EC101/WT	-	17-Jul-2025	-
Total Metals									
Aluminum, total	7429-90-5	0.0365	DLHC,	0.0300	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Antimony, total	7440-36-0	<0.00100	DLHC,	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Arsenic, total	7440-38-2	<0.00100	DLHC,	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854

Analytical Results

WT2518423-001

Sub-Matrix:**Water**
(Matrix: **Water**)

Client sample ID: GW-12669624-071025-DB-001
Client sampling date / time: 10-Jul-2025 14:00

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Total Metals								
Barium, total	7440-39-3	0.0671 DLHC	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Beryllium, total	7440-41-7	<0.000200 DLHC	0.000200	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Boron, total	7440-42-8	0.710 DLHC	0.100	mg/L	E420/WT	11-Jul-2025	14-Jul-2025	2100854
Cadmium, total	7440-43-9	<0.0000500 DLHC	0.0000500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Calcium, total	7440-70-2	128 DLHC	0.500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Chromium, total	7440-47-3	<0.00500 DLHC	0.00500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Cobalt, total	7440-48-4	<0.00100 DLHC	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Copper, total	7440-50-8	<0.00500 DLHC	0.00500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Iron, total	7439-89-6	<0.100 DLHC	0.100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Lead, total	7439-92-1	<0.000500 DLHC	0.000500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Manganese, total	7439-96-5	0.00805 DLHC	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Molybdenum, total	7439-98-7	0.00242 DLHC	0.000500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Nickel, total	7440-02-0	<0.00500 DLHC	0.00500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Phosphorus, total	7723-14-0	<0.500 DLHC	0.500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Selenium, total	7782-49-2	<0.000500 DLHC	0.000500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Silver, total	7440-22-4	<0.000100 DLHC	0.000100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Sodium, total	7440-23-5	75.1 DLHC	0.500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Thallium, total	7440-28-0	<0.000100 DLHC	0.000100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Tungsten, total	7440-33-7	<0.00100 DLHC	0.00100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Uranium, total	7440-61-1	0.00640 DLHC	0.000100	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Vanadium, total	7440-62-2	<0.00500 DLHC	0.00500	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Zinc, total	7440-66-6	<0.0300 DLHC	0.0300	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Zirconium, total	7440-67-7	<0.00200 DLHC	0.00200	mg/L	E420/WT	11-Jul-2025	11-Jul-2025	2100854
Dissolved Metals								
Aluminum, dissolved	7429-90-5	<0.0100 DLHC	0.0100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Antimony, dissolved	7440-36-0	<0.00100 DLHC	0.00100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Arsenic, dissolved	7440-38-2	<0.00100 DLHC	0.00100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Barium, dissolved	7440-39-3	0.0685 DLHC	0.00100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Beryllium, dissolved	7440-41-7	<0.000200 DLHC	0.000200	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Bismuth, dissolved	7440-69-9	<0.000500 DLHC	0.000500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Boron, dissolved	7440-42-8	0.645 DLHC	0.100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Cadmium, dissolved	7440-43-9	<0.0000500 DLHC	0.0000500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Calcium, dissolved	7440-70-2	127 DLHC	0.500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Cesium, dissolved	7440-46-2	<0.000100 DLHC	0.000100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Chromium, dissolved	7440-47-3	<0.00500 DLHC	0.00500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Cobalt, dissolved	7440-48-4	<0.00100 DLHC	0.00100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Copper, dissolved	7440-50-8	<0.00200 DLHC	0.00200	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Iron, dissolved	7439-89-6	<0.100 DLHC	0.100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Lead, dissolved	7439-92-1	<0.000500 DLHC	0.000500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Lithium, dissolved	7439-93-2	0.0597 DLHC	0.0100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Magnesium, dissolved	7439-95-4	52.7 DLHC	0.0500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Manganese, dissolved	7439-96-5	0.00530 DLHC	0.00100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Molybdenum, dissolved	7439-98-7	0.00237 DLHC	0.000500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Nickel, dissolved	7440-02-0	<0.00500 DLHC	0.00500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Phosphorus, dissolved	7723-14-0	<0.500 DLHC	0.500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960

Analytical Results

WT2518423-001

Sub-Matrix:**Water** (Matrix: **Water**)

Client sample ID: GW-12669624-071025-DB-001

Client sampling date / time: 10-Jul-2025 14:00

Analyte	CAS Number	Result	LOR	Unit	Method/Lab	Prep Date	Analysis Date	QCLot
Dissolved Metals								
Potassium, dissolved	7440-09-7	6.28 DLHC,	0.500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Rubidium, dissolved	7440-17-7	0.00312 DLHC,	0.00200	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Selenium, dissolved	7782-49-2	<0.000500 DLHC,	0.000500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Silicon, dissolved	7440-21-3	4.21 DLHC,	0.500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Silver, dissolved	7440-22-4	<0.000100 DLHC,	0.000100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Sodium, dissolved	7440-23-5	69.8 DLHC,	0.500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Strontium, dissolved	7440-24-6	6.41 DLHC,	0.00200	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Sulfur, dissolved	7704-34-9	72.4 DLHC,	5.00	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Tellurium, dissolved	13494-80-9	<0.00200 DLHC,	0.00200	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Thallium, dissolved	7440-28-0	<0.000100 DLHC,	0.000100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Thorium, dissolved	7440-29-1	<0.00100 DLHC,	0.00100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Tin, dissolved	7440-31-5	<0.00100 DLHC,	0.00100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Titanium, dissolved	7440-32-6	<0.00300 DLHC,	0.00300	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Tungsten, dissolved	7440-33-7	<0.00100 DLHC,	0.00100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Uranium, dissolved	7440-61-1	0.00633 DLHC,	0.000100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Vanadium, dissolved	7440-62-2	<0.00500 DLHC,	0.00500	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Zinc, dissolved	7440-66-6	<0.0100 DLHC,	0.0100	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Zirconium, dissolved	7440-67-7	<0.00300 DLHC,	0.00300	mg/L	E421/WT	11-Jul-2025	11-Jul-2025	2100960
Dissolved metals filtration location	----	Field	-	-	EP421/WT	-	11-Jul-2025	2100960
Aggregate Organics								
Biochemical oxygen demand [BOD]	----	<3.0 BODL,	3.0	mg/L	E550/WT	-	12-Jul-2025	2103724

Please refer to the General Comments section for an explanation of any result qualifiers detected.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2518423**	Page	: 1 of 13
Client	: **GHD Limited**	Laboratory	: ALS Environmental - Waterloo
Contact	: Sean Andreou	Account Manager	: Rick Hawthorne
Address	: 455 Phillip Street Waterloo ON Canada N2L 3X2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 12669624-110.110.20	Date Samples Received	: 10-Jul-2025 15:36
PO	: 735-pending	Issue Date	: 17-Jul-2025 18:44
C-O-C number	: ----		
Sampler	: DB		
Site	: ----		
Quote number	: 12669624-ExC-02-July 2025 Halton Oakville PWQO-PO 735-014356 PWQO ODWS and Ontario Bylaw		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- Matrix Spike outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Water**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Matrix Spike (MS) Recoveries								
Dissolved Metals	Anonymous	Anonymous	Selenium, dissolved	7782-49-2	E421	135 % K	70.0-130%	Recovery greater than upper data quality objective

Result Qualifiers

Qualifier	Description
K	*Matrix Spike recovery outside ALS DQO due to sample matrix effects.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times* Rec	*Holding Times* Actual	*Eval*	*Analysis Date*	*Holding Times* Rec	*Holding Times* Actual	*Eval*
Aggregate Organics : Biochemical Oxygen Demand - 5 day										
HDPE [BOD HT-4d] GW-12669624-071025-DB-001	E550	10-Jul-2025	----	----	----		12-Jul-2025	4 days	1 days	✓
Anions and Nutrients : Ammonia by Fluorescence										
Amber glass total (sulfuric acid) [ON MECP] GW-12669624-071025-DB-001	E298	10-Jul-2025	11-Jul-2025	28 days	1 days	✓	14-Jul-2025	28 days	1 days	✓
Anions and Nutrients : Chloride in Water by IC										
HDPE [ON MECP] GW-12669624-071025-DB-001	E235.Cl	10-Jul-2025	11-Jul-2025	28 days	1 days	✓	14-Jul-2025	28 days	1 days	✓
Anions and Nutrients : Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)										
HDPE [ON MECP] GW-12669624-071025-DB-001	E378-U	10-Jul-2025	11-Jul-2025	7 days	1 days	✓	15-Jul-2025	7 days	1 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] GW-12669624-071025-DB-001	E235.F	10-Jul-2025	11-Jul-2025	28 days	1 days	✓	14-Jul-2025	28 days	1 days	✓
Anions and Nutrients : Nitrate in Water by IC										
HDPE [ON MECP] GW-12669624-071025-DB-001	E235.NO3	10-Jul-2025	11-Jul-2025	7 days	1 days	✓	14-Jul-2025	7 days	1 days	✓
Anions and Nutrients : Nitrite in Water by IC										
HDPE [ON MECP] GW-12669624-071025-DB-001	E235.NO2	10-Jul-2025	11-Jul-2025	7 days	1 days	✓	14-Jul-2025	7 days	1 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP]										
GW-12669624-071025-DB-001	E235.SO4	10-Jul-2025	11-Jul-2025	28 days	1 days	✓	14-Jul-2025	28 days	1 days	✓
Anions and Nutrients : Total Kjeldahl Nitrogen by Fluorescence (Low Level)										
Amber glass total (sulfuric acid) [ON MECP]										
GW-12669624-071025-DB-001	E318	10-Jul-2025	14-Jul-2025	28 days	4 days	✓	14-Jul-2025	28 days	4 days	✓
Anions and Nutrients : Total Phosphorus by Colourimetry (0.002 mg/L)										
Amber glass total (sulfuric acid) [ON MECP]										
GW-12669624-071025-DB-001	E372-U	10-Jul-2025	14-Jul-2025	28 days	4 days	✓	15-Jul-2025	28 days	4 days	✓
Cyanides : Total Cyanide										
Opaque HDPE - total (sodium hydroxide)										
GW-12669624-071025-DB-001	E333	10-Jul-2025	11-Jul-2025	14 days	1 days	✓	11-Jul-2025	14 days	1 days	✓
Dissolved Metals : Dissolved Metals in Water by CRC ICPMS										
HDPE dissolved (nitric acid)										
GW-12669624-071025-DB-001	E421	10-Jul-2025	11-Jul-2025	180 days	1 days	✓	11-Jul-2025	180 days	1 days	✓
Field Tests : Field pH,EC,Salinity, TDS, Cl2,ClO2,ORP,DO, Turbidity,T,T-P,o-PO4,NH3,Chloramine										
HDPE [BOD HT-4d]										
GW-12669624-071025-DB-001	EF001	10-Jul-2025	----	----	----		16-Jul-2025	----	----	
Organic / Inorganic Carbon : Dissolved Organic Carbon by Combustion (Low Level)										
Amber glass dissolved (sulfuric acid) [ON MECP]										
GW-12669624-071025-DB-001	E358-L	10-Jul-2025	12-Jul-2025	28 days	2 days	✓	16-Jul-2025	28 days	2 days	✓
Physical Tests : Alkalinity Species by Titration										
HDPE [ON MECP]										
GW-12669624-071025-DB-001	E290	10-Jul-2025	11-Jul-2025	14 days	1 days	✓	14-Jul-2025	14 days	1 days	✓
Physical Tests : Colour (True) by Spectrometer (2 CU)										
HDPE [ON MECP]										
GW-12669624-071025-DB-001	E329-L	10-Jul-2025	11-Jul-2025	53 hrs	26 hrs	✓	11-Jul-2025	53 hrs	26 hrs	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Water										
HDPE [ON MECP]										
GW-12669624-071025-DB-001	E100	10-Jul-2025	11-Jul-2025	28 days	1 days	✓	14-Jul-2025	28 days	1 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP]										
GW-12669624-071025-DB-001	E108	10-Jul-2025	11-Jul-2025	14 days	1 days	✓	14-Jul-2025	14 days	1 days	✓
Physical Tests : TDS by Gravimetry										
HDPE [ON MECP]										
GW-12669624-071025-DB-001	E162	10-Jul-2025	----	----	----		16-Jul-2025	7 days	6 days	✓
Physical Tests : TSS by Gravimetry										
HDPE [ON MECP]										
GW-12669624-071025-DB-001	E160	10-Jul-2025	----	----	----		16-Jul-2025	7 days	6 days	✓
Physical Tests : Turbidity by Nephelometry										
HDPE [BOD HT-4d]										
GW-12669624-071025-DB-001	E121	10-Jul-2025	----	----	----		11-Jul-2025	48 hrs	17 hrs	✓
Total Metals : Total Metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
GW-12669624-071025-DB-001	E420	10-Jul-2025	11-Jul-2025	180 days	1 days	✓	11-Jul-2025	180 days	1 days	✓
Total Sulfides : Total Sulfide by Colourimetry (Automated Flow)										
HDPE total (zinc acetate+sodium hydroxide)										
GW-12669624-071025-DB-001	E395	10-Jul-2025	----	----	----		12-Jul-2025	7 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Conductivity in Water	E100	2101884	1	17	5.8	5.0	✓
pH by Meter	E108	2101885	1	3	33.3	5.0	✓
Turbidity by Nephelometry	E121	2101074	1	4	25.0	5.0	✓
TSS by Gravimetry	E160	2109121	1	20	5.0	4.7	✓
TDS by Gravimetry	E162	2109138	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	2101880	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	2101877	1	14	7.1	5.0	✓
Nitrite in Water by IC	E235.NO2	2101879	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	2101878	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2101881	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	2101882	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	2102599	1	12	8.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2102601	1	10	10.0	5.0	✓
Colour (True) by Spectrometer (2 CU)	E329-L	2101876	1	17	5.8	5.0	✓
Total Cyanide	E333	2101172	1	9	11.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	2103371	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2102598	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2101886	1	20	5.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	2103725	1	11	9.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2100854	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	2100960	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	2103724	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Conductivity in Water	E100	2101884	1	17	5.8	5.0	✓
pH by Meter	E108	2101885	1	3	33.3	5.0	✓
Turbidity by Nephelometry	E121	2101074	1	4	25.0	5.0	✓
TSS by Gravimetry	E160	2109121	1	20	5.0	4.7	✓
TDS by Gravimetry	E162	2109138	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	2101880	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	2101877	1	14	7.1	5.0	✓
Nitrite in Water by IC	E235.NO2	2101879	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	2101878	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2101881	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	2101882	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	2102599	1	12	8.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2102601	1	10	10.0	5.0	✓

Matrix: **Water**

Evaluation: × = QC frequency outside specification; ✓ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Control Samples (LCS) - Continued							
Colour (True) by Spectrometer (2 CU)	E329-L	2101876	1	17	5.8	5.0	✓
Total Cyanide	E333	2101172	1	9	11.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	2103371	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2102598	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2101886	1	20	5.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	2103725	1	11	9.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2100854	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	2100960	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	2103724	1	20	5.0	5.0	✓
Method Blanks (MB)							
Conductivity in Water	E100	2101884	1	17	5.8	5.0	✓
Turbidity by Nephelometry	E121	2101074	1	4	25.0	5.0	✓
TSS by Gravimetry	E160	2109121	1	20	5.0	4.7	✓
TDS by Gravimetry	E162	2109138	1	20	5.0	5.0	✓
Chloride in Water by IC	E235.Cl	2101880	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	2101877	1	14	7.1	5.0	✓
Nitrite in Water by IC	E235.NO2	2101879	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	2101878	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2101881	1	20	5.0	5.0	✓
Alkalinity Species by Titration	E290	2101882	1	18	5.5	5.0	✓
Ammonia by Fluorescence	E298	2102599	1	12	8.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2102601	1	10	10.0	5.0	✓
Colour (True) by Spectrometer (2 CU)	E329-L	2101876	1	17	5.8	5.0	✓
Total Cyanide	E333	2101172	1	9	11.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	2103371	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2102598	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2101886	1	20	5.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	2103725	1	11	9.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2100854	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	2100960	1	20	5.0	5.0	✓
Biochemical Oxygen Demand - 5 day	E550	2103724	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Chloride in Water by IC	E235.Cl	2101880	1	17	5.8	5.0	✓
Fluoride in Water by IC	E235.F	2101877	1	14	7.1	5.0	✓
Nitrite in Water by IC	E235.NO2	2101879	1	20	5.0	5.0	✓
Nitrate in Water by IC	E235.NO3	2101878	1	20	5.0	5.0	✓
Sulfate in Water by IC	E235.SO4	2101881	1	20	5.0	5.0	✓
Ammonia by Fluorescence	E298	2102599	1	12	8.3	5.0	✓
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318	2102601	1	10	10.0	5.0	✓

Matrix: **Water**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Matrix Spikes (MS) - Continued							
Total Cyanide	E333	2101172	1	9	11.1	5.0	✓
Dissolved Organic Carbon by Combustion (Low Level)	E358-L	2103371	1	20	5.0	5.0	✓
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U	2102598	1	12	8.3	5.0	✓
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U	2101886	1	20	5.0	5.0	✓
Total Sulfide by Colourimetry (Automated Flow)	E395	2103725	1	11	9.0	5.0	✓
Total Metals in Water by CRC ICPMS	E420	2100854	1	20	5.0	5.0	✓
Dissolved Metals in Water by CRC ICPMS	E421	2100960	1	20	5.0	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Water	E100 ALS Environmental - Waterloo	Water	APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a water sample. Conductivity measurements are temperature-compensated to 25°C.
pH by Meter	E108 ALS Environmental - Waterloo	Water	APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C). For high accuracy test results, pH should be measured in the field within the recommended 15 minute hold time.
Turbidity by Nephelometry	E121 ALS Environmental - Waterloo	Water	APHA 2130 B (mod)	Turbidity is measured by the nephelometric method, by measuring the intensity of light scatter under defined conditions.
TSS by Gravimetry	E160 ALS Environmental - Waterloo	Water	APHA 2540 D (mod)	Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, following by drying of the filter at 104 ± 1°C, with gravimetric measurement of the filtered solids. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.
TDS by Gravimetry	E162 ALS Environmental - Waterloo	Water	APHA 2540 C (mod)	Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, with evaporation of the filtrate at 180 ± 2°C for 16 hours or to constant weight, with gravimetric measurement of the residue.
Chloride in Water by IC	E235.Cl ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Fluoride in Water by IC	E235.F ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrite in Water by IC	E235.NO2 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Nitrate in Water by IC	E235.NO3 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Sulfate in Water by IC	E235.SO4 ALS Environmental - Waterloo	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Alkalinity Species by Titration	E290 ALS Environmental - Waterloo	Water	APHA 2320 B (mod)	Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.
Ammonia by Fluorescence	E298 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	Ammonia in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021)
Total Kjeldahl Nitrogen by Fluorescence (Low Level)	E318 ALS Environmental - Waterloo	Water	Method Fialab 100, 2018	TKN in water is determined by automated continuous flow analysis with membrane diffusion and fluorescence detection, after reaction with OPA (ortho-phthalaldehyde). This method is approved under US EPA 40 CFR Part 136 (May 2021).
Colour (True) by Spectrometer (2 CU)	E329-L ALS Environmental - Waterloo	Water	APHA 2120 C (mod)	Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment.
Total Cyanide	E333 ALS Environmental - Waterloo	Water	ISO 14403 (mod)	Total or Strong Acid Dissociable (SAD) Cyanide is determined by Continuous Flow Analyzer (CFA) with in-line UV digestion followed by colourmetric analysis. Method Limitation: High levels of thiocyanate (SCN) may cause positive interference (up to 0.5% of SCN concentration).
Dissolved Organic Carbon by Combustion (Low Level)	E358-L ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Dissolved Organic Carbon (Non-Purgeable), also known as NPOC (dissolved), is a direct measurement of DOC after a filtered (0.45 micron) sample has been acidified and purged to remove inorganic carbon (IC). Analysis is by high temperature combustion with infrared detection of CO2. NPOC does not include volatile organic species that are purged off with IC. For samples where the majority of DC (dissolved carbon) is comprised of IC (which is common), this method is more accurate and more reliable than the DOC by subtraction method (i.e. DC minus DIC).
Total Phosphorus by Colourimetry (0.002 mg/L)	E372-U ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Total Phosphorus is determined colourimetrically using a discrete analyzer after heated persulfate digestion of the sample.
Dissolved Orthophosphate by Colourimetry (Ultra Trace Level 0.001 mg/L)	E378-U ALS Environmental - Waterloo	Water	APHA 4500-P F (mod)	Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. Field filtration is recommended to ensure test results represent conditions at time of sampling.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Total Sulfide by Colourimetry (Automated Flow)	E395 ALS Environmental - Calgary	Water	APHA 4500 -S E-Auto-Colorimetry	Sulfide is determined using the gas dialysis automated methylene blue colourimetric method. Results expressed "as H2S" if reported represent the maximum possible H_2S concentration based on the total sulfide concentration in the sample. The H_2S calculation converts Total Sulfide as (S2-) and reports it as Total Sulfide as (H2S).
Total Metals in Water by CRC ICPMS	E420 ALS Environmental - Waterloo	Water	EPA 200.2/6020B (mod)	Water samples are digested with nitric and hydrochloric acids, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Dissolved Metals in Water by CRC ICPMS	E421 ALS Environmental - Waterloo	Water	APHA 3030B/EPA 6020B (mod)	Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by Collision/Reaction Cell ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.
Biochemical Oxygen Demand - 5 day	E550 ALS Environmental - Waterloo	Water	APHA 5210 B (mod)	Samples are diluted and incubated for a specified time period, after which the oxygen depletion is measured using a dissolved oxygen meter. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.
Dissolved Hardness (Calculated)	EC100 ALS Environmental - Waterloo	Water	APHA 2340B	“Hardness (as CaCO3), dissolved” is calculated from the sum of dissolved Calcium and Magnesium concentrations, expressed in $CaCO_3$ equivalents. “Total Hardness” refers to the sum of Calcium and Magnesium Hardness. Hardness is normally or preferentially calculated from dissolved Calcium and Magnesium concentrations, because it is a property of water due to dissolved divalent cations.
Ion Balance using Dissolved Metals	EC101 ALS Environmental - Waterloo	Water	APHA 1030E	Cation Sum, Anion Sum, and Ion Balance are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Dissolved species are used where available. Minor ions are included where data is present. Ion Balance cannot be calculated accurately for waters with very low electrical conductivity (EC).
Nitrate and Nitrite (as N) (Calculation)	EC235.N+N ALS Environmental - Waterloo	Water	EPA 300.0	Nitrate and Nitrite (as N) is a calculated parameter. Nitrate and Nitrite (as N) = Nitrite (as N) + Nitrate (as N).
Un-ionized and Ionized Ammonia (Calculation) (Field Temperature and pH)	EC298A ALS Environmental - Waterloo	Water	CCME CWQG Ammonia	Un-ionized ammonia is calculated from test results for total ammonia, field temperature and pH, and is expressed in units of mg/L "as N".
Total Organic Nitrogen (Calculation)	EC363 ALS Environmental - Waterloo	Water	APHA 4500-NORG (TKN)/NH3-NITROGEN (NH3)	Total Organic Nitrogen is a calculated parameter. Total Organic Nitrogen = Total Kjeldahl Nitrogen - Ammonia.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Field pH,EC,Salinity, TDS, Cl2,ClO2,ORP,DO, Turbidity,T,T-P,o-PO4,NH3,Chloramine	EF001 ALS Environmental - Waterloo	Water	Field Measurement (Client Supplied)	Field pH,EC,Salinity, TDS, Cl2,ClO2,ORP,DO, Turbidity,T,T-P,o-PO4,NH3 or Chloramine measurements provided by client and recorded on ALS report may affect the validity of results.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Preparation for Ammonia	EP298 ALS Environmental - Waterloo	Water		Sample preparation for Preserved Nutrients Water Quality Analysis.
Digestion for TKN in water	EP318 ALS Environmental - Waterloo	Water	APHA 4500-Norg D (mod)	Samples are digested at high temperature using Sulfuric Acid with Copper catalyst, which converts organic nitrogen sources to Ammonia, which is then quantified by the analytical method as TKN. This method is unsuitable for samples containing high levels of nitrate. If nitrate exceeds TKN concentration by ten times or more, results may be biased low.
Preparation for Dissolved Organic Carbon for Combustion	EP358 ALS Environmental - Waterloo	Water	APHA 5310 B (mod)	Preparation for Dissolved Organic Carbon
Digestion for Total Phosphorus in water	EP372 ALS Environmental - Waterloo	Water	APHA 4500-P E (mod).	Samples are heated with a persulfate digestion reagent.
Dissolved Metals Water Filtration	EP421 ALS Environmental - Waterloo	Water	APHA 3030B	Water samples are filtered (0.45 um), and preserved with HNO3.

QUALITY CONTROL REPORT

Work Order	: **WT2518423**	Page	: 1 of 17
Client	: GHD Limited	Laboratory	: ALS Environmental - Waterloo
Contact	: Sean Andreou	Account Manager	: Rick Hawthorne
Address	: 455 Phillip Street Waterloo ON Canada N2L 3X2	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: +1 519 886 6910
Project	: 12669624-110.110.20	Date Samples Received	: 10-Jul-2025 15:36
PO	: 735-pending	Date Analysis Commenced	: 11-Jul-2025
C-O-C number	: ----	Issue Date	: 17-Jul-2025 18:43
Sampler	: DB		
Site	: ----		
Quote number	: 12669624-ExC-02-July 2025 Halton Oakville PWQO-PO 735-014356 PWQO ODWS and Ontario Bylaw		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Angela Fleming	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Anthony Calero	Supervisor - Inorganic	Calgary Inorganics, Calgary, Alberta
Ayesha Moughal	Account Manager Assistant	Waterloo Administration, Waterloo, Ontario
Hannah Lewis	Inorganics Analyst	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Laboratory Manager - Environmental	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Laboratory Manager - Environmental	Waterloo Metals, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Centralized Prep, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Inorganics, Waterloo, Ontario
Nik Perkio	Senior Analyst	Waterloo Metals, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 2101074)											
WT2518446-003	Anonymous	Turbidity	----	E121	0.10	NTU	50.8	48.1	5.46%	15%	----
Physical Tests (QC Lot: 2101876)											
HA2502277-002	Anonymous	Colour, true	----	E329-L	2.0	CU	16.1	17.0	0.9	Diff <2x LOR	----
Physical Tests (QC Lot: 2101882)											
WT2518423-001	GW-12669624-071025-DB-001	Alkalinity, total (as CaCO3)	----	E290	2.0	mg/L	275	285	3.68%	20%	----
Physical Tests (QC Lot: 2101884)											
WT2518423-001	GW-12669624-071025-DB-001	Conductivity	----	E100	2.0	µS/cm	1290	1310	1.77%	10%	----
Physical Tests (QC Lot: 2101885)											
WT2518423-001	GW-12669624-071025-DB-001	pH	----	E108	0.10	pH units	7.80	7.95	1.90%	4%	----
Physical Tests (QC Lot: 2109121)											
HA2502327-002	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	7.3	7.5	0.2	Diff <2x LOR	----
Physical Tests (QC Lot: 2109138)											
HA2502327-002	Anonymous	Solids, total dissolved [TDS]	----	E162	20	mg/L	275	275	0.182%	20%	----
Anions and Nutrients (QC Lot: 2101877)											
HA2502277-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2101878)											
HA2502277-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	0.020	mg/L	<0.020	<0.020	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2101879)											
HA2502277-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2101880)											
HA2502277-001	Anonymous	Chloride	16887-00-6	E235.Cl	0.50	mg/L	7.71	7.68	0.402%	20%	----
Anions and Nutrients (QC Lot: 2101881)											
HA2502277-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	3.73	3.63	2.60%	20%	----
Anions and Nutrients (QC Lot: 2101886)											
HA2502277-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 2102598)											
HA2502285-004	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0020	mg/L	61.8 µg/L	0.0604	2.32%	20%	----
Anions and Nutrients (QC Lot: 2102599)											

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Anions and Nutrients (QC Lot: 2102599) - continued											
HA2502285-005	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0050	mg/L	0.0627	0.0628	0.159%	20%	----
Anions and Nutrients (QC Lot: 2102601)											
WT2518071-004	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	5.00	mg/L	<5.00	<5.00	0	Diff <2x LOR	----
Cyanides (QC Lot: 2101172)											
WT2518354-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0050	mg/L	0.0196	0.0196	0	Diff <2x LOR	----
Organic / Inorganic Carbon (QC Lot: 2103371)											
WT2518392-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	0.50	mg/L	7.58	7.66	1.05%	20%	----
Total Sulfides (QC Lot: 2103725)											
SK2503921-001	Anonymous	Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	<0.0015	<0.0015	0	Diff <2x LOR	----
Total Metals (QC Lot: 2100854)											
WT2518420-001	Anonymous	Aluminum, total	7429-90-5	E420	0.0300	mg/L	0.0356	0.0336	0.0020	Diff <2x LOR	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Barium, total	7440-39-3	E420	0.00100	mg/L	0.0669	0.0673	0.599%	20%	----
		Beryllium, total	7440-41-7	E420	0.000200	mg/L	<0.000200	<0.000200	0	Diff <2x LOR	----
		Boron, total	7440-42-8	E420	0.100	mg/L	0.716	0.796	0.080	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.0000500	mg/L	<0.0000500	<0.0000500	0	Diff <2x LOR	----
		Calcium, total	7440-70-2	E420	0.500	mg/L	127	128	0.770%	20%	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Iron, total	7439-89-6	E420	0.100	mg/L	<0.100	<0.100	0	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.00626	0.00584	0.00041	Diff <2x LOR	----
		Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.00232	0.00233	0.000006	Diff <2x LOR	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Phosphorus, total	7723-14-0	E420	0.500	mg/L	<0.500	<0.500	0	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000500	mg/L	<0.000500	<0.000500	0	Diff <2x LOR	----
		Silver, total	7440-22-4	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Sodium, total	7440-23-5	E420	0.500	mg/L	68.4	68.7	0.440%	20%	----
		Thallium, total	7440-28-0	E420	0.000100	mg/L	<0.000100	<0.000100	0	Diff <2x LOR	----
		Tungsten, total	7440-33-7	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Uranium, total	7440-61-1	E420	0.000100	mg/L	0.00638	0.00642	0.640%	20%	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Total Metals (QC Lot: 2100854) - continued											
WT2518420-001	Anonymous	Vanadium, total	7440-62-2	E420	0.00500	mg/L	<0.00500	<0.00500	0	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	<0.0300	<0.0300	0	Diff <2x LOR	----
		Zirconium, total	7440-67-7	E420	0.00200	mg/L	<0.00200	<0.00200	0	Diff <2x LOR	----
Dissolved Metals (QC Lot: 2100960)											
BU2501871-009	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Antimony, dissolved	7440-36-0	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Arsenic, dissolved	7440-38-2	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Barium, dissolved	7440-39-3	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Beryllium, dissolved	7440-41-7	E421	0.000020	mg/L	<0.000020	<0.000020	0	Diff <2x LOR	----
		Bismuth, dissolved	7440-69-9	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Boron, dissolved	7440-42-8	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Cadmium, dissolved	7440-43-9	E421	0.0000050	mg/L	<0.0000050	<0.0000050	0	Diff <2x LOR	----
		Calcium, dissolved	7440-70-2	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Cesium, dissolved	7440-46-2	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Chromium, dissolved	7440-47-3	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, dissolved	7440-48-4	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Copper, dissolved	7440-50-8	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Iron, dissolved	7439-89-6	E421	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Lead, dissolved	7439-92-1	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Lithium, dissolved	7439-93-2	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Magnesium, dissolved	7439-95-4	E421	0.0050	mg/L	<0.0050	<0.0050	0	Diff <2x LOR	----
		Manganese, dissolved	7439-96-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Molybdenum, dissolved	7439-98-7	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Nickel, dissolved	7440-02-0	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Phosphorus, dissolved	7723-14-0	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Potassium, dissolved	7440-09-7	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Rubidium, dissolved	7440-17-7	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Selenium, dissolved	7782-49-2	E421	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
		Silicon, dissolved	7440-21-3	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Silver, dissolved	7440-22-4	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Sodium, dissolved	7440-23-5	E421	0.050	mg/L	<0.050	<0.050	0	Diff <2x LOR	----
		Strontium, dissolved	7440-24-6	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----
		Sulfur, dissolved	7704-34-9	E421	0.50	mg/L	<0.50	<0.50	0	Diff <2x LOR	----
		Tellurium, dissolved	13494-80-9	E421	0.00020	mg/L	<0.00020	<0.00020	0	Diff <2x LOR	----

Sub-Matrix: **Water**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Dissolved Metals (QC Lot: 2100960) - continued											
BU2501871-009	Anonymous	Thallium, dissolved	7440-28-0	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Thorium, dissolved	7440-29-1	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, dissolved	7440-31-5	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Titanium, dissolved	7440-32-6	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
		Tungsten, dissolved	7440-33-7	E421	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Uranium, dissolved	7440-61-1	E421	0.000010	mg/L	<0.000010	<0.000010	0	Diff <2x LOR	----
		Vanadium, dissolved	7440-62-2	E421	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Zinc, dissolved	7440-66-6	E421	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Zirconium, dissolved	7440-67-7	E421	0.00030	mg/L	<0.00030	<0.00030	0	Diff <2x LOR	----
Aggregate Organics (QC Lot: 2103724)											
WT2518420-001	Anonymous	Biochemical oxygen demand [BOD]	----	E550	3.0	mg/L	<3.0	<3.0	0.0%	30%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 2101074)						
Turbidity	----	E121	0.1	NTU	<0.10	----
Physical Tests (QCLot: 2101876)						
Colour, true	----	E329-L	2	CU	<2.0	----
Physical Tests (QCLot: 2101882)						
Alkalinity, bicarbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
Alkalinity, carbonate (as CaCO3)	----	E290	1	mg/L	<1.0	----
Alkalinity, hydroxide (as CaCO3)	----	E290	1	mg/L	<1.0	----
Alkalinity, phenolphthalein (as CaCO3)	----	E290	1	mg/L	<1.0	----
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	<1.0	----
Physical Tests (QCLot: 2101884)						
Conductivity	----	E100	1	µS/cm	<1.0	----
Physical Tests (QCLot: 2109121)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Physical Tests (QCLot: 2109138)						
Solids, total dissolved [TDS]	----	E162	10	mg/L	<10	----
Anions and Nutrients (QCLot: 2101877)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2101878)						
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 2101879)						
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	<0.010	----
Anions and Nutrients (QCLot: 2101880)						
Chloride	16887-00-6	E235.Cl	0.5	mg/L	<0.50	----
Anions and Nutrients (QCLot: 2101881)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Anions and Nutrients (QCLot: 2101886)						
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	<0.0010	----
Anions and Nutrients (QCLot: 2102598)						
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	<0.0020	----
Anions and Nutrients (QCLot: 2102599)						
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	<0.0050	----
Anions and Nutrients (QCLot: 2102601)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Anions and Nutrients (QCLot: 2102601) - continued						
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	<0.050	----
Cyanides (QCLot: 2101172)						
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	<0.0020	----
Organic / Inorganic Carbon (QCLot: 2103371)						
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	<0.50	----
Total Sulfides (QCLot: 2103725)						
Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	<0.0015	----
Total Metals (QCLot: 2100854)						
Aluminum, total	7429-90-5	E420	0.003	mg/L	<0.0030	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	<0.00010	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	<0.00010	----
Barium, total	7440-39-3	E420	0.0001	mg/L	<0.00010	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	<0.000020	----
Boron, total	7440-42-8	E420	0.01	mg/L	<0.010	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	<0.0000050	----
Calcium, total	7440-70-2	E420	0.05	mg/L	<0.050	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	<0.00050	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	<0.00010	----
Copper, total	7440-50-8	E420	0.0005	mg/L	<0.00050	----
Iron, total	7439-89-6	E420	0.01	mg/L	<0.010	----
Lead, total	7439-92-1	E420	0.00005	mg/L	<0.000050	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	<0.00010	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	<0.000050	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	<0.00050	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	<0.050	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	<0.000050	----
Silver, total	7440-22-4	E420	0.00001	mg/L	<0.000010	----
Sodium, total	7440-23-5	E420	0.05	mg/L	<0.050	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	<0.000010	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	<0.00010	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	<0.000010	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	<0.00050	----
Zinc, total	7440-66-6	E420	0.003	mg/L	<0.0030	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	<0.00020	----
Dissolved Metals (QCLot: 2100960)						

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 2100960) - continued						
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	<0.0010	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	<0.00010	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	<0.00010	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	<0.00010	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	<0.000020	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	<0.000050	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	<0.010	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	<0.0000050	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	<0.050	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	<0.000010	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	<0.00050	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	<0.00010	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	<0.00020	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	<0.010	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	<0.000050	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	<0.0010	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	<0.0050	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	<0.00010	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	<0.000050	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	<0.00050	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	<0.050	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	<0.050	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	<0.00020	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	<0.000050	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	<0.050	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	<0.000010	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	<0.050	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	<0.00020	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	<0.50	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	<0.00020	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	<0.000010	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	<0.00010	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	<0.00010	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	<0.00030	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	<0.00010	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Dissolved Metals (QCLot: 2100960) - continued						
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	<0.000010	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	<0.00050	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	<0.0010	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	<0.00020	----
Aggregate Organics (QCLot: 2103724)						
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	<2.0	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 2101074)									
Turbidity	----	E121	0.1	NTU	200 NTU	97.0	85.0	115	----
Physical Tests (QCLot: 2101876)									
Colour, true	----	E329-L	2	CU	25 CU	101	85.0	115	----
Physical Tests (QCLot: 2101882)									
Alkalinity, total (as CaCO3)	----	E290	1	mg/L	150 mg/L	102	85.0	115	----
Physical Tests (QCLot: 2101884)									
Conductivity	----	E100	1	µS/cm	1410 µS/cm	99.3	90.0	110	----
Physical Tests (QCLot: 2101885)									
pH	----	E108	----	pH units	7 pH units	100	98.0	102	----
Physical Tests (QCLot: 2109121)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	101	85.0	115	----
Physical Tests (QCLot: 2109138)									
Solids, total dissolved [TDS]	----	E162	10	mg/L	1000 mg/L	99.7	85.0	115	----
Anions and Nutrients (QCLot: 2101877)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	104	90.0	110	----
Anions and Nutrients (QCLot: 2101878)									
Nitrate (as N)	14797-55-8	E235.NO3	0.02	mg/L	2.5 mg/L	100.0	90.0	110	----
Anions and Nutrients (QCLot: 2101879)									
Nitrite (as N)	14797-65-0	E235.NO2	0.01	mg/L	0.5 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 2101880)									
Chloride	16887-00-6	E235.Cl	0.5	mg/L	100 mg/L	101	90.0	110	----
Anions and Nutrients (QCLot: 2101881)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 2101886)									
Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.001	mg/L	0.05 mg/L	94.1	80.0	120	----
Anions and Nutrients (QCLot: 2102598)									
Phosphorus, total	7723-14-0	E372-U	0.002	mg/L	0.333 mg/L	97.4	80.0	120	----
Anions and Nutrients (QCLot: 2102599)									
Ammonia, total (as N)	7664-41-7	E298	0.005	mg/L	0.2 mg/L	97.5	85.0	115	----
Anions and Nutrients (QCLot: 2102601)									
Kjeldahl nitrogen, total [TKN]	----	E318	0.05	mg/L	4 mg/L	108	75.0	125	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Target Concentration	LCS	Low	High	Qualifier
Cyanides (QCLot: 2101172)									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	94.9	80.0	120	----
Organic / Inorganic Carbon (QCLot: 2103371)									
Carbon, dissolved organic [DOC]	----	E358-L	0.5	mg/L	8.57 mg/L	94.0	80.0	120	----
Total Sulfides (QCLot: 2103725)									
Sulfide, total (as S)	18496-25-8	E395	0.0015	mg/L	0.08 mg/L	105	80.0	120	----
Total Metals (QCLot: 2100854)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	108	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	108	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	115	80.0	120	----
Barium, total	7440-39-3	E420	0.0001	mg/L	0.012 mg/L	109	80.0	120	----
Beryllium, total	7440-41-7	E420	0.00002	mg/L	0.005 mg/L	103	80.0	120	----
Boron, total	7440-42-8	E420	0.01	mg/L	0.05 mg/L	98.9	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	108	80.0	120	----
Calcium, total	7440-70-2	E420	0.05	mg/L	2.5 mg/L	103	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.012 mg/L	108	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.012 mg/L	107	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.012 mg/L	106	80.0	120	----
Iron, total	7439-89-6	E420	0.01	mg/L	0.05 mg/L	107	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	106	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.012 mg/L	108	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.012 mg/L	106	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	108	80.0	120	----
Phosphorus, total	7723-14-0	E420	0.05	mg/L	0.5 mg/L	110	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	110	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	103	80.0	120	----
Sodium, total	7440-23-5	E420	0.05	mg/L	2.5 mg/L	109	80.0	120	----
Thallium, total	7440-28-0	E420	0.00001	mg/L	0.05 mg/L	105	80.0	120	----
Tungsten, total	7440-33-7	E420	0.0001	mg/L	0.005 mg/L	106	80.0	120	----
Uranium, total	7440-61-1	E420	0.00001	mg/L	0 mg/L	104	80.0	120	----
Vanadium, total	7440-62-2	E420	0.0005	mg/L	0.025 mg/L	108	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	108	80.0	120	----
Zirconium, total	7440-67-7	E420	0.0002	mg/L	0.005 mg/L	103	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Target Concentration	LCS	Low	High	Qualifier
Dissolved Metals (QCLot: 2100960)									
Aluminum, dissolved	7429-90-5	E421	0.001	mg/L	0.1 mg/L	104	80.0	120	----
Antimony, dissolved	7440-36-0	E421	0.0001	mg/L	0.05 mg/L	101	80.0	120	----
Arsenic, dissolved	7440-38-2	E421	0.0001	mg/L	0.05 mg/L	108	80.0	120	----
Barium, dissolved	7440-39-3	E421	0.0001	mg/L	0.012 mg/L	102	80.0	120	----
Beryllium, dissolved	7440-41-7	E421	0.00002	mg/L	0.005 mg/L	97.2	80.0	120	----
Bismuth, dissolved	7440-69-9	E421	0.00005	mg/L	0.05 mg/L	101	80.0	120	----
Boron, dissolved	7440-42-8	E421	0.01	mg/L	0.05 mg/L	94.6	80.0	120	----
Cadmium, dissolved	7440-43-9	E421	0.000005	mg/L	0.005 mg/L	103	80.0	120	----
Calcium, dissolved	7440-70-2	E421	0.05	mg/L	2.5 mg/L	97.9	80.0	120	----
Cesium, dissolved	7440-46-2	E421	0.00001	mg/L	0.002 mg/L	102	80.0	120	----
Chromium, dissolved	7440-47-3	E421	0.0005	mg/L	0.012 mg/L	103	80.0	120	----
Cobalt, dissolved	7440-48-4	E421	0.0001	mg/L	0.012 mg/L	102	80.0	120	----
Copper, dissolved	7440-50-8	E421	0.0002	mg/L	0.012 mg/L	101	80.0	120	----
Iron, dissolved	7439-89-6	E421	0.01	mg/L	0.05 mg/L	101	80.0	120	----
Lead, dissolved	7439-92-1	E421	0.00005	mg/L	0.025 mg/L	101	80.0	120	----
Lithium, dissolved	7439-93-2	E421	0.001	mg/L	0.012 mg/L	94.6	80.0	120	----
Magnesium, dissolved	7439-95-4	E421	0.005	mg/L	2.5 mg/L	107	80.0	120	----
Manganese, dissolved	7439-96-5	E421	0.0001	mg/L	0.012 mg/L	102	80.0	120	----
Molybdenum, dissolved	7439-98-7	E421	0.00005	mg/L	0.012 mg/L	101	80.0	120	----
Nickel, dissolved	7440-02-0	E421	0.0005	mg/L	0.025 mg/L	102	80.0	120	----
Phosphorus, dissolved	7723-14-0	E421	0.05	mg/L	0.5 mg/L	104	80.0	120	----
Potassium, dissolved	7440-09-7	E421	0.05	mg/L	2.5 mg/L	102	80.0	120	----
Rubidium, dissolved	7440-17-7	E421	0.0002	mg/L	0.005 mg/L	102	80.0	120	----
Selenium, dissolved	7782-49-2	E421	0.00005	mg/L	0.05 mg/L	104	80.0	120	----
Silicon, dissolved	7440-21-3	E421	0.05	mg/L	0.5 mg/L	103	60.0	140	----
Silver, dissolved	7440-22-4	E421	0.00001	mg/L	0.005 mg/L	99.0	80.0	120	----
Sodium, dissolved	7440-23-5	E421	0.05	mg/L	2.5 mg/L	103	80.0	120	----
Strontium, dissolved	7440-24-6	E421	0.0002	mg/L	0.012 mg/L	100	80.0	120	----
Sulfur, dissolved	7704-34-9	E421	0.5	mg/L	2.5 mg/L	104	80.0	120	----
Tellurium, dissolved	13494-80-9	E421	0.0002	mg/L	0.005 mg/L	101	80.0	120	----
Thallium, dissolved	7440-28-0	E421	0.00001	mg/L	0.05 mg/L	101	80.0	120	----
Thorium, dissolved	7440-29-1	E421	0.0001	mg/L	0.005 mg/L	98.7	80.0	120	----
Tin, dissolved	7440-31-5	E421	0.0001	mg/L	0.025 mg/L	101	80.0	120	----
Titanium, dissolved	7440-32-6	E421	0.0003	mg/L	0.012 mg/L	96.7	80.0	120	----
Tungsten, dissolved	7440-33-7	E421	0.0001	mg/L	0.005 mg/L	102	80.0	120	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike: Target Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Dissolved Metals (QCLot: 2100960) - continued									
Uranium, dissolved	7440-61-1	E421	0.00001	mg/L	0 mg/L	102	80.0	120	----
Vanadium, dissolved	7440-62-2	E421	0.0005	mg/L	0.025 mg/L	104	80.0	120	----
Zinc, dissolved	7440-66-6	E421	0.001	mg/L	0.025 mg/L	103	80.0	120	----
Zirconium, dissolved	7440-67-7	E421	0.0002	mg/L	0.005 mg/L	99.4	80.0	120	----
Aggregate Organics (QCLot: 2103724)									
Biochemical oxygen demand [BOD]	----	E550	2	mg/L	198 mg/L	92.7	85.0	115	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Anions and Nutrients (QCLot: 2101877)										
HA2502277-001	Anonymous	Fluoride	16984-48-8	E235.F	1.04 mg/L	1 mg/L	104	75.0	125	----
Anions and Nutrients (QCLot: 2101878)										
HA2502277-001	Anonymous	Nitrate (as N)	14797-55-8	E235.NO3	2.49 mg/L	2.5 mg/L	99.6	75.0	125	----
Anions and Nutrients (QCLot: 2101879)										
HA2502277-001	Anonymous	Nitrite (as N)	14797-65-0	E235.NO2	0.510 mg/L	0.5 mg/L	102	75.0	125	----
Anions and Nutrients (QCLot: 2101880)										
HA2502277-001	Anonymous	Chloride	16887-00-6	E235.Cl	99.7 mg/L	100 mg/L	99.7	75.0	125	----
Anions and Nutrients (QCLot: 2101881)										
HA2502277-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	100 mg/L	100 mg/L	100	75.0	125	----
Anions and Nutrients (QCLot: 2101886)										
HA2502277-001	Anonymous	Phosphate, ortho-, dissolved (as P)	14265-44-2	E378-U	0.0183 mg/L	0.02 mg/L	93.2	70.0	130	----
Anions and Nutrients (QCLot: 2102598)										
HA2502285-004	Anonymous	Phosphorus, total	7723-14-0	E372-U	0.0844 mg/L	0.1 mg/L	84.4	70.0	130	----
Anions and Nutrients (QCLot: 2102599)										
HA2502285-005	Anonymous	Ammonia, total (as N)	7664-41-7	E298	0.0851 mg/L	0.1 mg/L	85.1	75.0	125	----
Anions and Nutrients (QCLot: 2102601)										
WT2518071-004	Anonymous	Kjeldahl nitrogen, total [TKN]	----	E318	288 mg/L	250 mg/L	115	70.0	130	----
Cyanides (QCLot: 2101172)										
WT2518354-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.219 mg/L	0.25 mg/L	87.6	75.0	125	----
Organic / Inorganic Carbon (QCLot: 2103371)										
WT2518392-001	Anonymous	Carbon, dissolved organic [DOC]	----	E358-L	ND mg/L	----	ND	70.0	130	----
Total Sulfides (QCLot: 2103725)										
CG2509571-001	Anonymous	Sulfide, total (as S)	18496-25-8	E395	0.111 mg/L	0.1 mg/L	111	75.0	125	----
Total Metals (QCLot: 2100854)										
WT2518423-001	GW-12669624-071025-DB-001	Aluminum, total	7429-90-5	E420	0.108 mg/L	0.1 mg/L	108	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0519 mg/L	0.05 mg/L	104	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0546 mg/L	0.05 mg/L	109	70.0	130	----
		Barium, total	7440-39-3	E420	ND mg/L	----	ND	70.0	130	----
		Beryllium, total	7440-41-7	E420	0.00485 mg/L	0.005 mg/L	97.0	70.0	130	----
		Boron, total	7440-42-8	E420	ND mg/L	----	ND	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00473 mg/L	0.005 mg/L	94.5	70.0	130	----
		Calcium, total	7440-70-2	E420	ND mg/L	----	ND	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Total Metals (QCLot: 2100854) - continued										
WT2518423-001	GW-12669624-071025-DB-001	Chromium, total	7440-47-3	E420	0.0136 mg/L	0.012 mg/L	108	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0128 mg/L	0.012 mg/L	103	70.0	130	----
		Copper, total	7440-50-8	E420	0.0119 mg/L	0.012 mg/L	94.9	70.0	130	----
		Iron, total	7439-89-6	E420	0.058 mg/L	0.05 mg/L	116	70.0	130	----
		Lead, total	7439-92-1	E420	0.0233 mg/L	0.025 mg/L	93.3	70.0	130	----
		Manganese, total	7439-96-5	E420	0.0129 mg/L	0.012 mg/L	103	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0135 mg/L	0.012 mg/L	108	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0245 mg/L	0.025 mg/L	98.0	70.0	130	----
		Phosphorus, total	7723-14-0	E420	0.535 mg/L	0.5 mg/L	107	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0523 mg/L	0.05 mg/L	105	70.0	130	----
		Silver, total	7440-22-4	E420	0.00448 mg/L	0.005 mg/L	89.6	70.0	130	----
		Sodium, total	7440-23-5	E420	ND mg/L	----	ND	70.0	130	----
		Thallium, total	7440-28-0	E420	0.0472 mg/L	0.05 mg/L	94.5	70.0	130	----
		Tungsten, total	7440-33-7	E420	0.00523 mg/L	0.005 mg/L	105	70.0	130	----
		Uranium, total	7440-61-1	E420	ND mg/L	----	ND	70.0	130	----
		Vanadium, total	7440-62-2	E420	0.0280 mg/L	0.025 mg/L	112	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0223 mg/L	0.025 mg/L	89.4	70.0	130	----
		Zirconium, total	7440-67-7	E420	0.00535 mg/L	0.005 mg/L	107	70.0	130	----
Dissolved Metals (QCLot: 2100960)										
BU2501871-010	Anonymous	Aluminum, dissolved	7429-90-5	E421	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		Antimony, dissolved	7440-36-0	E421	0.0558 mg/L	0.05 mg/L	112	70.0	130	----
		Arsenic, dissolved	7440-38-2	E421	0.0614 mg/L	0.05 mg/L	123	70.0	130	----
		Barium, dissolved	7440-39-3	E421	0.0133 mg/L	0.012 mg/L	106	70.0	130	----
		Beryllium, dissolved	7440-41-7	E421	0.00559 mg/L	0.005 mg/L	112	70.0	130	----
		Bismuth, dissolved	7440-69-9	E421	0.0508 mg/L	0.05 mg/L	102	70.0	130	----
		Boron, dissolved	7440-42-8	E421	0.049 mg/L	0.05 mg/L	98.4	70.0	130	----
		Cadmium, dissolved	7440-43-9	E421	0.00572 mg/L	0.005 mg/L	114	70.0	130	----
		Calcium, dissolved	7440-70-2	E421	2.51 mg/L	2.5 mg/L	100	70.0	130	----
		Cesium, dissolved	7440-46-2	E421	0.00264 mg/L	0.002 mg/L	106	70.0	130	----
		Chromium, dissolved	7440-47-3	E421	0.0130 mg/L	0.012 mg/L	104	70.0	130	----
		Cobalt, dissolved	7440-48-4	E421	0.0129 mg/L	0.012 mg/L	103	70.0	130	----
		Copper, dissolved	7440-50-8	E421	0.0132 mg/L	0.012 mg/L	106	70.0	130	----
		Iron, dissolved	7439-89-6	E421	0.051 mg/L	0.05 mg/L	102	70.0	130	----
		Lead, dissolved	7439-92-1	E421	0.0269 mg/L	0.025 mg/L	107	70.0	130	----
		Lithium, dissolved	7439-93-2	E421	0.0127 mg/L	0.012 mg/L	102	70.0	130	----
		Magnesium, dissolved	7439-95-4	E421	2.72 mg/L	2.5 mg/L	109	70.0	130	----
		Manganese, dissolved	7439-96-5	E421	0.0129 mg/L	0.012 mg/L	103	70.0	130	----
		Molybdenum, dissolved	7439-98-7	E421	0.0132 mg/L	0.012 mg/L	106	70.0	130	----
		Nickel, dissolved	7440-02-0	E421	0.0259 mg/L	0.025 mg/L	104	70.0	130	----
		Phosphorus, dissolved	7723-14-0	E421	0.596 mg/L	0.5 mg/L	119	70.0	130	----
		Potassium, dissolved	7440-09-7	E421	2.61 mg/L	2.5 mg/L	104	70.0	130	----
		Rubidium, dissolved	7440-17-7	E421	0.00527 mg/L	0.005 mg/L	105	70.0	130	----
		Selenium, dissolved	7782-49-2	E421	0.0674 mg/L	0.05 mg/L	135	70.0	130	K
		Silicon, dissolved	7440-21-3	E421	0.533 mg/L	0.5 mg/L	107	70.0	130	----

Sub-Matrix: **Water**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Dissolved Metals (QCLot: 2100960) - continued										
BU2501871-010	Anonymous	Silver, dissolved	7440-22-4	E421	0.00515 mg/L	0.005 mg/L	103	70.0	130	----
		Sodium, dissolved	7440-23-5	E421	2.64 mg/L	2.5 mg/L	106	70.0	130	----
		Strontium, dissolved	7440-24-6	E421	0.0132 mg/L	0.012 mg/L	105	70.0	130	----
		Sulfur, dissolved	7704-34-9	E421	2.80 mg/L	2.5 mg/L	112	70.0	130	----
		Tellurium, dissolved	13494-80-9	E421	0.00652 mg/L	0.005 mg/L	130	70.0	130	----
		Thallium, dissolved	7440-28-0	E421	0.0534 mg/L	0.05 mg/L	107	70.0	130	----
		Thorium, dissolved	7440-29-1	E421	0.00504 mg/L	0.005 mg/L	101	70.0	130	----
		Tin, dissolved	7440-31-5	E421	0.0264 mg/L	0.025 mg/L	105	70.0	130	----
		Titanium, dissolved	7440-32-6	E421	0.0123 mg/L	0.012 mg/L	98.4	70.0	130	----
		Tungsten, dissolved	7440-33-7	E421	0.00542 mg/L	0.005 mg/L	108	70.0	130	----
		Uranium, dissolved	7440-61-1	E421	0.000268 mg/L	0 mg/L	107	70.0	130	----
		Vanadium, dissolved	7440-62-2	E421	0.0262 mg/L	0.025 mg/L	105	70.0	130	----
		Zinc, dissolved	7440-66-6	E421	0.0312 mg/L	0.025 mg/L	125	70.0	130	----
		Zirconium, dissolved	7440-67-7	E421	0.00519 mg/L	0.005 mg/L	104	70.0	130	----

Qualifiers

Qualifier	Description
K	*Matrix Spike recovery outside ALS DQO due to sample matrix effects.*

B-555
GC-407
MM-191
CW-140
~~WT-1005~~
N-002

Chain of Custody (COC) / Analytical Request Form

COC Number: 2

Environmental Division Waterloo

Work Order Reference WT2518423

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Page

Telephone : +1 519 886 691(

Report To	Contact and company name below will appear on the final report
Company:	GHD Ltd. (GHDL100)
Contact:	Jennifer Balkwill
Phone:	519-884-0510
	Company address below will appear on the final report
Street:	455 Phillip St.
City/Province:	Waterloo, ON
Postal Code:	N2L 3X2
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	GHD Ltd. (GHDL100)
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☐ YES ☐ NO ☐ N/A

☐ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: jennifer.balkwill@ghd.com

Email 2: See SSOW/PO

Email 3:

Invoice Recipients

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: accountspayableCDN@ghd.com

Email 2:

Turnaround Time (TAT) Requested

☒ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minim

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minim

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minim

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minim

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge

Fees may apply to rush resuests on weekends, statutory holidays a routine tests

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the TAT requested, you will be contacted.

Project Information

ALS Account # / Quote #:	WT2025GHDL1000091
Job #:	12669624-110.110.20
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Rick H

Sampler: D Berriman

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Total Metals - (Select List)	Dissolved ICP-MS Metals Full Scan F/P	Ion Balance (only ion balance)	pH,TDS,TSS,Turbidity	Colour-True, Hardness-D-Calc	DOC (Field Filter)	BOD,Speciated Alkalinity, Conductivit	TKN,NH3 - unionized	Phosphorus (total) low-level PWQO	Sulphide, Anions7 (No Br)	Nitrogen-Organic, Nitrogen, Total	Cyanide (CN), total	Field Ph	Field Temp	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	GW-12669624-071025-DB - 001	10-07-25	14:00	Water	9	X	X	X	X	X	X	X	X	X	X	X	X	20.98	7.12			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

Total ICP-MS Metals Scan (select list - see SSOW)
Dissolved ICP-MS Metals Full Scan

SAMPLE RECEIPT DETAILS (lab use only)

Cooling Method: ☐ NONE ☑ ICE ☐ ICE PACKS ☐ FROZEN ☑ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
16.7				19.4			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
D Berriman	July 10 25	14:30

INITIAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
Fahad-M	10 July 2025	15:36

FINAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
	July 10	6

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Appendix H

MECP Well Records

MECP WELL RECORD LISTINGS

Ministry of the Environment, Conservation & Parks (MECP)

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	165.05

Latitude: 43.44808
Longitude: -79.769977

Well ID: 7168141

LOCATION

Lot:	n/a	**Tag:**	A101063
Con:	n/a	**Audit No:**	M08459
Municipality:	HALTON	**Contractor License:**	6607
Township:	OAKVILLE TOWN	**Well Completion Date:**	03-16-2011
Street:		**Received Date:**	09-01-2011
City:	n/a		

WELL

Well Status:	<null>	**Well Depth (m):**	0
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	
Boring Method:		**Water Kind:**	

PUMP TEST

Test Method:		**Pipe ID:**	
Pump Set (m):		**Pump Test ID**	
SWL (ft)		**Flowing:**	
Final Level:		**Pump Duration (hr):**	
Pump Rate:		**Pump Duration (m):**	
Recom. Rate:			

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	159.91

Latitude: 43.45203
Longitude: -79.76389

Well ID: 7174483

LOCATION

Lot:	n/a	**Tag:**	
Con:	n/a	**Audit No:**	Z135893
Municipality:	HALTON	**Contractor License:**	7238
Township:	OAKVILLE TOWN	**Well Completion Date:**	08-31-2011
Street:	DUNDAS ST. W & THIRD LINE	**Received Date:**	01-03-2012
City:	Oakville		

WELL

Well Status:	Abandoned-Other	**Well Depth (m):**	0
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	m
Boring Method:	n/a	**Water Kind:**	

PUMP TEST

Test Method:		**Pipe ID:**	
Pump Set (m):		**Pump Test ID**	
SWL (ft)		**Flowing:**	
Final Level:		**Pump Duration (hr):**	
Pump Rate:		**Pump Duration (m):**	
Recom. Rate:			

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1004033389	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	n/a	n/a	n/a	n/a	0	n/a m

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	158.81

Latitude: 43.452542
Longitude: -79.760431

Well ID: 7174484

LOCATION

Lot: n/a
Con: n/a
Municipality: HALTON
Township: OAKVILLE TOWN
Street: DUNDAS ST WE & THIRD LINE
City: Oakville

Tag:
Audit No: Z135892
Contractor License: 7238
Well Completion Date: 08-31-2011
Received Date: 01-03-2012

WELL

Well Status: Abandoned-Other
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water: m
Water Kind:

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1004033398	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	164.56

Latitude: 43.451955
Longitude: -79.770232

Well ID: 7174485

LOCATION

Lot: n/a
Con: n/a
Municipality: HALTON
Township: OAKVILLE TOWN
Street: DUNDAS ST W & 3RD LINE
City: Oakville

Tag:
Audit No: Z135896
Contractor License: 7238
Well Completion Date: 08-31-2011
Received Date: 01-03-2012

WELL

Well Status: Abandoned-Other
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water: m
Water Kind:

TEST

Test Method:
Pump Set (m):
SWL (ft)

Pipe ID:
Pump Test ID
Flowing:

PUMP

Final Level: **Pump Duration (hr):**
Pump Rate: **Pump Duration (m):**
Recom. Rate:

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1004033407	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	159.03

Latitude: 43.450668
Longitude: -79.761162

Well ID: 7174486

LOCATION

Lot: n/a **Tag:**
Con: n/a **Audit No:** Z135891
Municipality: HALTON **Contractor License:** 7238
Township: OAKVILLE TOWN **Well Completion Date:** 08-31-2011
Street: DUNDAS ST W @ 3RD LINE **Received Date:** 01-03-2012
City: OAKVILLE

WELL

Well Status: Abandoned-Other **Well Depth (m):** 0
Prim. Use: n/a **Depth to Bedrock (m):** n/a
Sec. Use: n/a **Depth to Water:** m
Boring Method: n/a **Water Kind:**

PUMP TEST

Test Method: **Pipe ID:**
Pump Set (m): **Pump Test ID**
SWL (ft) **Flowing:**
Final Level: **Pump Duration (hr):**
Pump Rate: **Pump Duration (m):**
Recom. Rate:

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1004033416	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	161.81

Latitude: 43.449941
Longitude: -79.76638

Well ID: 7174487

LOCATION

Lot: n/a **Tag:**
Con: n/a **Audit No:** Z135899
Municipality: HALTON **Contractor License:** 7238
Township: OAKVILLE TOWN **Well Completion Date:** 08-31-2011
Street: DUNDAS ST. W AND 3RD LINE **Received Date:** 01-03-2012
City: Oakville

WELL

Well Status: Abandoned-Other **Well Depth (m):** 0
Prim. Use: n/a **Depth to Bedrock (m):** n/a
Sec. Use: n/a **Depth to Water:** m
Boring Method: n/a **Water Kind:**

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1004033425	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	160.00

Latitude: 43.452446
Longitude: -79.764858

Well ID: 7174488

LOCATION

Lot: n/a
Con: n/a
Municipality: HALTON
Township: OAKVILLE TOWN
Street: DUNDAS ST. W. & THIRD LINE
City: Oakville

Tag:
Audit No: Z135894
Contractor License: 7238
Well Completion Date: 08-31-2011
Received Date: 01-03-2012

WELL

Well Status: Abandoned-Other
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water: m
Water Kind:

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1004033433	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	158.98

Latitude: 43.448293
Longitude: -79.764658

Well ID: 7174489

LOCATION

Lot: n/a
Con: n/a
Municipality: HALTON
Township: OAKVILLE TOWN
Street: DUNDAS ST. W. & 3RD LINE
City: Oakville

Tag:
Audit No: Z135898
Contractor License: 7238
Well Completion Date: 08-31-2011
Received Date: 01-03-2012

ELL

Well Status: <null>
Prim. Use:

Well Depth (m): 0
Depth to Bedrock (m): n/a

WE

Sec. Use: n/a
Boring Method: n/a

Depth to Water: m
Water Kind:

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1004033483	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	162.14

Latitude: 43.452867
Longitude: -79.767976

Well ID: **7174490**

LOCATION

Lot: n/a
Con: n/a
Municipality: HALTON
Township: OAKVILLE TOWN
Street: DUNDAS ST. W & 3RD LINE
City: OAKVILLE

Tag:
Audit No: Z135897
Contractor License: 7238
Well Completion Date: 08-31-2011
Received Date: 01-03-2012

WELL

Well Status: <null>
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water: m
Water Kind:

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1004033503	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	164.64

Latitude: 43.452028
Longitude: -79.770329

Well ID: **7174491**

LOCATION

Lot: n/a
Con: n/a
Municipality: HALTON
Township: OAKVILLE TOWN
Street: DUNDAS ST & 3RD LINE
City: Oakville

Tag:
Audit No: Z135895
Contractor License: 7238
Well Completion Date: 08-31-2011
Received Date: 01-03-2012

WELL

Well Status: Abandoned-Other
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water: m
Water Kind:

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	1004033511	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	160.36

Latitude: 43.451265
Longitude: -79.765586

Well ID: **7218424**

LOCATION

Lot: n/a
Con: n/a
Municipality: HALTON
Township: OAKVILLE TOWN
Street:
City: n/a

Tag:
Audit No: C24696
Contractor License: 7215
Well Completion Date: 01-30-2014
Received Date: 03-27-2014

WELL

Well Status: <null>
Prim. Use: n/a
Sec. Use: n/a
Boring Method:

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water:
Water Kind:

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	158.94

Latitude: 43.451071
Longitude: -79.760968

Well ID: **7241070**

TION

Lot: n/a
Con: n/a
Municipality:

Tag: A174009
Audit No: Z204096
Contractor License: 7247

LOCA

Township: OAKVILLE TOWN
Street: N.E. CORNER OF 3RD LINE & DUNDAS STREET
City: Oakville

Well Completion Date: 02-18-2015
Received Date: 05-06-2015

WELL

Well Status: Monitoring and Test Hole
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Rotary (Convent.)

Well Depth (m): 3.048
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: Other

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth	
1	1005609432	2	inch	PLASTIC	0	10	ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth	
1	CLAY	TOPSOIL	GRAVEL	BROWN	0	10	ft
2	CLAY	SAND	GRAVEL	BROWN	10	n/a	ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	159.28

Latitude: 43.453759
Longitude: -79.765573

Well ID: **7247724**

LOCATION

Lot: n/a
Con: n/a
Municipality: HALTON
Township: OAKVILLE TOWN
Street: 2000 GLENORCHY RD.
City: OAKVILLE

Tag:
Audit No: Z203588
Contractor License: 7215
Well Completion Date: 07-17-2015
Received Date: 09-02-2015

WELL

Well Status: Abandoned-Other
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind:

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth	
0	1005743135	n/a	inch	<null>	n/a	n/a	ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	

Latitude: 43.448413
Longitude: -79.764989

Well ID: **7304606**

LOCATION

Lot:	n/a	**Tag:**	A211862
Con:	n/a	**Audit No:**	Z257591
Municipality:	HALTON	**Contractor License:**	7383
Township:	OAKVILLE TOWN	**Well Completion Date:**	02-06-2017
Street:	2135 DUNDAS STREET WEST	**Received Date:**	01-30-2018
City:	Oakville		

WELL

Well Status:	Observation Wells	**Well Depth (m):**	6.096
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	ft
Boring Method:	Boring	**Water Kind:**	

PUMP TEST

Test Method:		**Pipe ID:**	
Pump Set (m):		**Pump Test ID**	
SWL (ft)		**Flowing:**	
Final Level:		**Pump Duration (hr):**	
Pump Rate:		**Pump Duration (m):**	
Recom. Rate:			

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth	
1	1007164819	2	inch	PLASTIC	0	15	ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth	
1	SILT	SAND	n/a	n/a	0	20	ft

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	

Latitude: 43.450393
Longitude: -79.769028

Well ID: **7343129**

LOCATION

Lot:	n/a	**Tag:**	
Con:	n/a	**Audit No:**	Z279817
Municipality:	HALTON	**Contractor License:**	6988
Township:	OAKVILLE TOWN	**Well Completion Date:**	05-01-2019
Street:		**Received Date:**	09-23-2019
City:	n/a		

WELL

Well Status:	Abandoned-Other	**Well Depth (m):**	0
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	m
Boring Method:	n/a	**Water Kind:**	

PUMP TEST

Test Method:		**Pipe ID:**	
Pump Set (m):		**Pump Test ID**	
SWL (ft)		**Flowing:**	
Final Level:		**Pump Duration (hr):**	
Pump Rate:		**Pump Duration (m):**	
Recom. Rate:			

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth	
0	1008124876	n/a	cm	<null>	n/a	n/a	m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth	
0	n/a	n/a	n/a	n/a	n/a	n/a	m

End of Record

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	

Latitude: 43.450105
Longitude: -79.770739

Well ID: 7343130

LOCATION

Lot: 027
Con: 01
Municipality: HALTON
Township: OAKVILLE TOWN
Street:
City: n/a

Tag:
Audit No: Z279816
Contractor License: 6988
Well Completion Date: 05-01-2019
Received Date: 09-23-2019

WELL

Well Status: Abandoned-Other
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water: m
Water Kind:

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1008124884	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
0	n/a	n/a	n/a	n/a	n/a	n/a m

End of Record

---

n/a

Easting:	<null>
Northing:	<null>
Elev (masl):	

Latitude: 43.447777
Longitude: -79.768562

Well ID: 7343131

LOCATION

Lot: 027
Con: 01
Municipality: HALTON
Township: OAKVILLE TOWN
Street:
City: n/a

Tag:
Audit No: Z279818
Contractor License: 6988
Well Completion Date: 05-01-2019
Received Date: 09-23-2019

WELL

Well Status: Abandoned-Other
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water: m
Water Kind:

PUMP TEST

Test Method:
Pump Set (m):
SWL (ft)
Final Level:
Pump Rate:
Recom. Rate:

Pipe ID:
Pump Test ID
Flowing:
Pump Duration (hr):
Pump Duration (m):

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1008124892	n/a	cm	<null>	n/a	n/a m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
0	n/a	n/a	n/a	n/a	n/a	n/a m

End of Record

n/a		
	Easting:	<null>
	Northing:	<null>
	Elev (masl):	

Latitude: 43.452796
Longitude: -79.763108

Well ID: **7354898**

LOCATION

Lot:	n/a	**Tag:**	A287764
Con:	n/a	**Audit No:**	C47924
Municipality:	HALTON	**Contractor License:**	7230
Township:	OAKVILLE TOWN	**Well Completion Date:**	02-26-2020
Street:		**Received Date:**	03-04-2020
City:	n/a		

WELL

Well Status:	<null>	**Well Depth (m):**	0
Prim. Use:	n/a	**Depth to Bedrock (m):**	n/a
Sec. Use:	n/a	**Depth to Water:**	
Boring Method:		**Water Kind:**	

PUMP TEST

Test Method:		**Pipe ID:**	
Pump Set (m):		**Pump Test ID**	
SWL (ft)		**Flowing:**	
Final Level:		**Pump Duration (hr):**	
Pump Rate:		**Pump Duration (m):**	
Recom. Rate:			

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth

End of Record

Appendix I

Construction Water Taking Estimates

Table I.1

Estimated Water Takings and Area of Influence (Steady State) - Utility Excavation
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

Flow to a Trench for a *Unconfined Aquifer*

Information

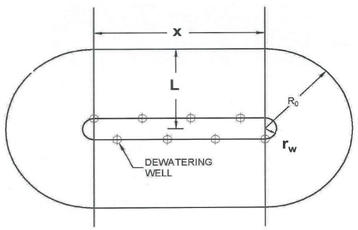
Steady State flow to a trench for an unconfined aquifer.
Use this equation when a/b > 1.5.
Equation 4.0

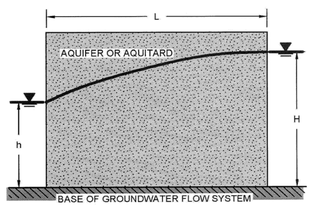
$$Q = \frac{\pi K\left(H^2 - h^2\right)}{\ln R_0 / r_w} + 2\left[\frac{xK\left(H^2 - h^2\right)}{2L}\right]$$

Equation 4.1

$$r_w = \frac{a+b}{\pi}$$

Ro is determined by the Siechardt Equation: Ro = 3000(H-hw)K^0.5 when K is in m/s





Enter Parameters

Shaft or Trench Eq'n Check: **5.0** This number **must be greater than 1.5**; if not, then use a Shaft equation.

K=	**9.20E-03**	cm/s	Input Hydraulic Conductivity in cm/s
=>	7.95E+00	m/day	Hydraulic Conductivity converted to m/day
H=	**2.7**	m	Input height of groundwater pressure
h=	**0**	m	Input dewatering height
x=	**15**	m	Input length of trench
a=	**15**	m	Input length of excavation
b=	**3**	m	Input width of excavation
rw=	**5.73**	m	Input/calculate radius of trench
π=	3.141592654		Pi

Note: L and Ro are the same distance
*Note: Height measurements are relative to base of active groundwater

Calculating L and Ro using: $R_0 = 1.5(Tt/S)^{0.5}$

T=	21.46176	m²/day	Input transmissivity in m²/day
t=	30	days	Input pumping duration in days
S=	0.3		Input storage coefficient
L=Ro=	69.49	m	Line source distance; distance of influence

Alternative equation by Bear (Bear, J., 1979. **Hydraulics of Groundwater**, McGraw-Hill, New York, 569p) $R_0 = 1.5(Tt/S)^{0.5}$ where **T** is transmissivity in **m²/day**, **t** is pumping duration in **days.** $\mathbf{R_o}$ will be in **metres.**

*Note: The above Ro is for comparison. It is not the Ro used to calculate Q below.

Enter additional K values (optional)

K=	**9.20E-03**	**cm/s**	**K=**	**7.9488**	**m/day**
K2=	1.00E-06	cm/s	K2=	0.000864	m/day
K3=	1.00E-05	cm/s	K3=	0.00864	m/day
K4=	1.00E-04	cm/s	K4=	0.0864	m/day
K5=	1.00E-03	cm/s	K5=	0.864	m/day
K6=	1.00E-02	cm/s	K6=	8.64	m/day
K7=	1.00E-01	cm/s	K7=	86.4	m/day
K8=	1.00E+00	cm/s	K8=	864	m/day
K9=	1.00E+01	cm/s	K9=	8640	m/day
K10=	1.00E+02	cm/s	K10=	86400	m/day

Calculated flow rate using Equation 4.0

Results for Ro (radius of influence)				Flow Results in m³/day			Flow Results in L/min			Flow Results in gal/min		
L=	**Ro=**	**83.42**	**m**	**Q=**	**78.40**	**m³/day**	**Q=**	**54.44**	**L/min**	**Q=**	**11.98**	**gal/min**
L2=	Ro2=	6.54	m	Q2=	0.16	m³/day	Q2=	0.11	L/min	Q2=	0.03	gal/min
L3=	Ro3=	8.29	m	Q3=	0.65	m³/day	Q3=	0.45	L/min	Q3=	0.10	gal/min
L4=	Ro4=	13.83	m	Q4=	2.93	m³/day	Q4=	2.03	L/min	Q4=	0.45	gal/min
L5=	Ro5=	25.61	m	Q5=	16.91	m³/day	Q5=	11.74	L/min	Q5=	2.58	gal/min
L6=	Ro6=	86.73	m	Q6=	83.73	m³/day	Q6=	58.14	L/min	Q6=	12.79	gal/min
L7=	Ro7=	261.88	m	Q7=	553.84	m³/day	Q7=	384.59	L/min	Q7=	84.60	gal/min
L8=	Ro8=	815.73	m	Q8=	4,106.90	m³/day	Q8=	2,851.83	L/min	Q8=	627.31	gal/min
L9=	Ro9=	2567.18	m	Q9=	32,783.11	m³/day	Q9=	22,764.59	L/min	Q9=	5,007.50	gal/min
L10=	R10=	8105.73	m	Q10=	273,939.56	m³/day	Q10=	190,223.63	L/min	Q10=	41,843.30	gal/min

Table I.2

Estimated Water Takings and Area of Influence (Steady State) - Slab on Grade Excavation
Hydrogeological Assessment
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

Flow to a Trench for a *Unconfined Aquifer*

Information

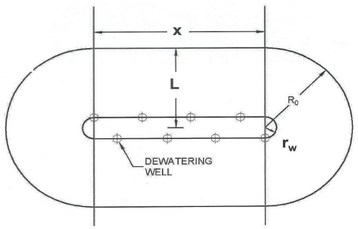
Steady State flow to a trench for an unconfined aquifer.
Use this equation when a/b > 1.5.
Equation 4.0

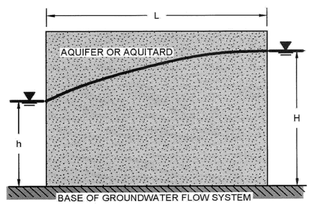
$$Q = \frac{\pi K\left(H^2 - h^2\right)}{\ln R_0 / r_w} + 2\left[\frac{xK\left(H^2 - h^2\right)}{2L}\right]$$

Equation 4.1

$$r_w = \frac{a+b}{\pi}$$

Ro is determined by the Siechardt Equation: Ro = 3000(H-hw)K^0.5 when K is in m/s





Enter Parameters

Shaft or Trench Eq'n Check: **2.1** This number **must be greater than 1.5**; if not, then use a Shaft equation.

K=	**9.20E-03**	cm/s	Input Hydraulic Conductivity in cm/s
=>	7.95E+00	m/day	Hydraulic Conductivity converted to m/day
H=	**1.2**	m	Input height of groundwater pressure
h=	**0**	m	Input dewatering height
x=	**145**	m	Input length of trench
a=	**145**	m	Input length of excavation
b=	**70**	m	Input width of excavation
rw=	**68.47**	m	Input/calculate radius of trench
π=	3.141592654		Pi

Note: L and Ro are the same distance
*Note: Height measurements are relative to base of active groundwater

Calculating L and Ro using: $R_0 = 1.5(Tt/S)^{0.5}$

T=	9.53856	m²/day	Input transmissivity in m²/day
t=	30	days	Input pumping duration in days
S=	0.3		Input storage coefficient
L=Ro=	46.33	m	Line source distance; distance of influence

Alternative equation by Bear (Bear, J., 1979. **Hydraulics of Groundwater**, McGraw-Hill, New York, 569p) $R_o = 1.5(Tt/S)^{0.5}$ where **T** is transmissivity in **m²/day**, **t** is pumping duration in **days.** $\mathbf{R_o}$ will be in **metres.**

*Note: The above Ro is for comparison. It is not the Ro used to calculate Q below.

Enter additional K values (optional)

K=	**9.20E-03**	**cm/s**	**K=**	**7.9488**	**m/day**
K2=	1.00E-06	cm/s	K2=	0.000864	m/day
K3=	1.00E-05	cm/s	K3=	0.00864	m/day
K4=	1.00E-04	cm/s	K4=	0.0864	m/day
K5=	1.00E-03	cm/s	K5=	0.864	m/day
K6=	1.00E-02	cm/s	K6=	8.64	m/day
K7=	1.00E-01	cm/s	K7=	86.4	m/day
K8=	1.00E+00	cm/s	K8=	864	m/day
K9=	1.00E+01	cm/s	K9=	8640	m/day
K10=	1.00E+02	cm/s	K10=	86400	m/day

Calculated flow rate using Equation 4.0

Results for Ro (radius of influence)				Flow Results in m³/day			Flow Results in L/min			Flow Results in gal/min		
L=	**Ro=**	**103.00**	**m**	**Q=**	**104.18**	**m³/day**	**Q=**	**72.34**	**L/min**	**Q=**	**15.91**	**gal/min**
L2=	Ro2=	68.83	m	Q2=	0.75	m³/day	Q2=	0.52	L/min	Q2=	0.11	gal/min
L3=	Ro3=	69.61	m	Q3=	2.40	m³/day	Q3=	1.66	L/min	Q3=	0.37	gal/min
L4=	Ro4=	72.07	m	Q4=	7.88	m³/day	Q4=	5.47	L/min	Q4=	1.20	gal/min
L5=	Ro5=	11.38	m	Q5=	13.67	m³/day	Q5=	9.49	L/min	Q5=	2.09	gal/min
L6=	Ro6=	104.47	m	Q6=	109.78	m³/day	Q6=	76.23	L/min	Q6=	16.77	gal/min
L7=	Ro7=	182.31	m	Q7=	498.07	m³/day	Q7=	345.86	L/min	Q7=	76.08	gal/min
L8=	Ro8=	428.47	m	Q8=	2,552.47	m³/day	Q8=	1,772.44	L/min	Q8=	389.88	gal/min
L9=	Ro9=	1206.89	m	Q9=	15,116.65	m³/day	Q9=	10,497.00	L/min	Q9=	2,309.01	gal/min
L10=	R10=	3668.47	m	Q10=	103,097.29	m³/day	Q10=	71,590.76	L/min	Q10=	15,747.75	gal/min

Appendix J

Water Balance Summary Tables

ECCC Water Budget Data
Site-Specific Water Balance Analysis
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

Oakville-Hamilton			WATER BUDGET MEANS FOR THE PERIOD 1991 - 2024			DC20492
	LAT	43.45	WATER HOLDING CAPACITY	2 mm	HEAT INDEX	44.26
	LONG	79.77	LOWER ZONE	1 mm	A	1.193

DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
1-Jan	-3.9	71	36	19	2	2	0	53	23	2	269
1-Feb	-3.1	61	32	30	3	3	0	60	22	2	331
1-Mar	1.3	60	44	38	11	11	0	71	0	2	390
1-Apr	7.2	80	77	3	34	32	-1	48	0	2	469
1-May	13.9	74	74	0	79	60	-20	15	0	1	542
1-Jun	19.5	71	71	0	119	69	-50	3	0	0	615
1-Jul	22.3	82	82	0	142	77	-65	5	0	0	694
1-Aug	21.7	64	64	0	127	61	-65	3	0	0	758
1-Sep	17.7	67	67	0	87	61	-26	5	0	1	826
1-Oct	10.9	69	69	0	45	40	-5	29	0	1	69
1-Nov	4.8	62	58	3	16	16	-1	45	0	2	131
1-Dec	-0.4	65	44	14	5	5	0	53	7	2	197
AVE	**9.3**	**825**	**718**	**107**	**670**	**437**	**-233**	**390**			

Oakville-Hamilton			WATER BUDGET MEANS FOR THE PERIOD 1991 - 2024			DC20492
	LAT	43.45	WATER HOLDING CAPACITY	10 mm	HEAT INDEX	44.26
	LONG	79.77	LOWER ZONE	6 mm	A	1.193

DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
1-Jan	-3.9	71	36	19	2	2	0	53	23	10	269
1-Feb	-3.1	61	32	30	3	3	0	60	22	10	331
1-Mar	1.3	60	44	38	11	11	0	71	0	10	390
1-Apr	7.2	80	77	3	34	33	-1	48	0	9	469
1-May	13.9	74	74	0	79	64	-16	15	0	4	542
1-Jun	19.5	71	71	0	119	72	-47	2	0	1	615
1-Jul	22.3	82	82	0	142	78	-64	4	0	2	694
1-Aug	21.7	64	64	0	127	62	-65	3	0	1	758
1-Sep	17.7	67	67	0	87	61	-26	4	0	3	826
1-Oct	10.9	69	69	0	45	40	-5	26	0	6	69
1-Nov	4.8	62	58	3	16	16	-1	42	0	10	131
1-Dec	-0.4	65	44	14	5	5	0	53	7	10	197
AVE	**9.3**	**825**	**718**	**107**	**670**	**447**	**-225**	**381**			

Entered by: MI
Reviewed by: SA

Table J1
ECCC Water Budget Data
Site-Specific Water Balance Analysis
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

Oakville-Hamilton	WATER BUDGET MEANS FOR THE PERIOD 1991 - 2024	DC20492

LAT	43.45	WATER HOLDING CAPACITY	125 mm	HEAT INDEX	44.26
LONG	79.77	LOWER ZONE	75 mm	A	1.193

DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
1-Jan	-3.9	71	36	19	2	2	0	37	23	122	269
1-Feb	-3.1	61	32	30	3	3	0	57	22	124	331
1-Mar	1.3	60	44	38	11	11	0	70	0	125	390
1-Apr	7.2	80	77	3	34	34	0	48	0	123	469
1-May	13.9	74	74	0	79	79	0	15	0	103	542
1-Jun	19.5	71	71	0	119	113	-6	1	0	60	615
1-Jul	22.3	82	82	0	142	111	-31	2	0	29	694
1-Aug	21.7	64	64	0	127	79	-48	1	0	12	758
1-Sep	17.7	67	67	0	87	64	-24	0	0	16	826
1-Oct	10.9	69	69	0	45	40	-5	1	0	44	69
1-Nov	4.8	62	58	3	16	16	-1	10	0	79	131
1-Dec	-0.4	65	44	14	5	5	0	25	7	108	197
AVE	**9.3**	**825**	**718**	**107**	**670**	**557**	**-115**	**267**			

Oakville-Hamilton	WATER BUDGET MEANS FOR THE PERIOD 1991 - 2024	DC20492

LAT	43.45	WATER HOLDING CAPACITY	400 mm	HEAT INDEX	44.26
LONG	79.77	LOWER ZONE	240 mm	A	1.193

DATE	TEMP	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACC P
1-Jan	-3.9	71	36	19	2	2	0	17	23	338	269
1-Feb	-3.1	61	32	30	3	3	0	32	22	366	331
1-Mar	1.3	60	44	38	11	11	0	53	0	385	390
1-Apr	7.2	80	77	3	34	34	0	43	0	389	469
1-May	13.9	74	74	0	79	79	0	14	0	369	542
1-Jun	19.5	71	71	0	119	119	0	1	0	321	615
1-Jul	22.3	82	82	0	142	138	-4	0	0	264	694
1-Aug	21.7	64	64	0	127	118	-9	1	0	208	758
1-Sep	17.7	67	67	0	87	79	-9	0	0	196	826
1-Oct	10.9	69	69	0	45	42	-3	1	0	222	69
1-Nov	4.8	62	58	3	16	16	-1	5	0	263	131
1-Dec	-0.4	65	44	14	5	5	0	11	7	305	197
AVE	**9.3**	**825**	**718**	**107**	**670**	**646**	**-26**	**178**			

Entered by: MI
Reviewed by: SA

Land Use Parameters
Site-Specific Water Balance Analysis
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

Existing Conditions

Land Use	WHC	Type of Land Use	Soil Type (HSG)	Infiltration Factor				Area (m^2)
				Topo	Soils	Cover	Total	
Agricultural Cropland	125 mm	Shallow Rooted Crops	Silt Loam (C)	0.25	0.20	0.10	0.55	30,385
						Total	**0.55**	**30,385**

Proposed (Uncontrolled) Conditions

Land Use	WHC	Type of Land Use	Soil Type (HSG)	Infiltration Factor				Area (m^2)
				Topo	Soils	Cover	Total	
Hedgerow	400 mm	Mature Forest	Silt Loam (C)	0.25	0.20	0.20	0.65	1,498
Landscaping Area	125 mm	Urban Lawns	Silt Loam (C)	0.25	0.20	0.10	0.55	7,214
Proposed Industrial Buildings	2 mm	Impervious (Roofs)	N/A	0.00	0.00	0.00	0.00	9,855
Walkways / Parking Lot / Asphalt	10 mm	Impervious (Paved)	N/A	0.00	0.00	0.00	0.00	11,819
						Total	**0.16**	**30,385**

Existing Conditions Water Balance Calculations - Monthly Analysis
Site-Specific Water Balance Analysis
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

Existing Conditions

Total Area	3.04	ha

Site-Specific Water Balance Assessment

Agricultural Cropland	
WHC	***125 mm***
Infiltration Factor	***0.55***
Area (m^2)	***30,385***

Month	***Precipitation***	***Potential Evap.***	***Actual Evap.***	***Surplus***		***Precip. Volume***	***Actual Evap. Volume***	***Surplus Volume***	***Infiltration Volume***	***Surface Runoff Volume***
(-)	**(mm)**	**(mm)**	**(mm)**	**(mm)**	**(m^3)**	**(m^3)**	**(m^3)**	**(m^3)**	**(m^3)**	**(m^3)**
January	71	2	2	37	1,124	2,157	61	1,124	618	506
February	61	3	3	57	1,732	1,853	91	1,732	953	779
March	60	11	11	70	2,127	1,823	334	2,127	1,170	957
April	80	34	34	48	1,458	2,431	1,033	1,458	802	656
May	74	79	79	15	456	2,248	2,400	456	251	205
June	71	119	113	1	30	2,157	3,434	30	17	14
July	82	142	111	2	61	2,492	3,373	61	33	27
August	64	127	79	1	30	1,945	2,400	30	17	14
September	67	87	64	0	0	2,036	1,945	0	0	0
October	69	45	40	1	30	2,097	1,215	30	17	14
November	62	16	16	10	304	1,884	486	304	167	137
December	65	5	5	25	760	1,975	152	760	418	342
Total	**825**	**670**	**557**	**267**	**8,113**	**25,098**	**16,924**	**8,113**	**4,462**	**3,651**

Entered by: MI
Reviewed by: SA

Proposed (Uncontrolled) Conditions Water Balance Calculations - Monthly Analysis
Site-Specific Water Balance Analysis
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

Proposed (Uncontrolled) Conditions

Total Area	3.04	ha

Site-Specific Water Balance Assessment

			Hedgerow			***Landscaping Area***			***Proposed Industrial Buildings***		
			WHC	***400 mm***		***WHC***	***125 mm***		***WHC***	***2 mm***	
			Infiltration Factor	***0.65***		***Infiltration Factor***	***0.55***		***Infiltration Factor***	***0.00***	
			Area (m^2)	***1,498***		***Area (m^2)***	***7,214***		***Area (m^2)***	***9,855***	
Month	***Precipitation***	***Potential Evap.***	***Actual Evap.***	***Surplus***		***Actual Evap.***	***Surplus***		***Actual Evap.***	***Surplus***	
(-)	**(mm)**	**(mm)**	**(mm)**	**(mm)**	**(m^3)**	**(mm)**	**(mm)**	**(m^3)**	**(mm)**	**(mm)**	**(m^3)**
January	71	2	2	17	25	2	37	267	2	53	522
February	61	3	3	32	48	3	57	411	3	60	591
March	60	11	11	53	79	11	70	505	11	71	700
April	80	34	34	43	64	34	48	346	32	48	473
May	74	79	79	14	21	79	15	108	60	15	148
June	71	119	119	1	1	113	1	7	69	3	30
July	82	142	138	0	0	111	2	14	77	5	49
August	64	127	118	1	1	79	1	7	61	3	30
September	67	87	79	0	0	64	0	0	61	5	49
October	69	45	42	1	1	40	1	7	40	29	286
November	62	16	16	5	7	16	10	72	16	45	443
December	65	5	5	11	16	5	25	180	5	53	522
Total	**825**	**670**	**646**	**178**	**267**	**557**	**267**	**1,926**	**437**	**390**	**3,843**

Proposed (Uncontrolled) Conditions Water Balance Calculations - Monthly Analysis
Site-Specific Water Balance Analysis
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

Proposed (Uncontrolled) Conditions

Total Area	3.04	ha

Site-Specific Water Balance Assessment

Walkways / Parking Lot / Asphalt	
WHC	***10 mm***
Infiltration Factor	***0.00***
Area (m^2)	***11,819***

Month	***Precipitation***	***Potential Evap.***	***Actual Evap.***	***Surplus***		***Precip. Volume***	***Actual Evap. Volume***	***Surplus Volume***	***Infiltration Volume***	***Surface Runoff Volume***
(-)	**(mm)**	**(mm)**	**(mm)**	**(mm)**	**(m^3)**	**(m^3)**	**(m^3)**	**(m^3)**	**(m^3)**	**(m^3)**
January	71	2	2	53	626	2,157	61	1,441	163	1,278
February	61	3	3	60	709	1,853	91	1,760	257	1,502
March	60	11	11	71	839	1,823	334	2,123	329	1,794
April	80	34	33	48	567	2,431	1,002	1,451	232	1,219
May	74	79	64	15	177	2,248	2,036	454	73	381
June	71	119	72	2	24	2,157	2,524	62	5	57
July	82	142	78	4	47	2,492	2,688	111	8	103
August	64	127	62	3	35	1,945	2,081	74	5	69
September	67	87	61	4	47	2,036	1,902	97	0	97
October	69	45	40	26	307	2,097	1,218	602	5	597
November	62	16	16	42	496	1,884	486	1,019	45	975
December	65	5	5	53	626	1,975	152	1,346	110	1,236
Total	**825**	**670**	**447**	**381**	**4,503**	**25,098**	**14,575**	**10,539**	**1,233**	**9,306**

Summary of Calculations - Annual
Site-Specific Water Balance Analysis
Proposed MECP-MLITSD Science Facility Complex
Oakville Land Assembly – William Halton Parkway, Oakville, Ontario
Infrastructure Ontario

Existing Conditions											
Land Use	***Area***	***Precipitation***		***Evapotranspiration***		***Surplus/Deficit***		***Infiltration***		***Runoff***	
	(ha)	***(m^3)***	***(mm)***	***(m^3)***	***(mm)***	***(m^3)***	***(mm)***	***(m^3)***	***(mm)***	***(m^3)***	***(mm)***
Agricultural Cropland	3.04	25,070	825	16,925	557	8,110	267	4,460	147	3,650	120
Total	**3.04**	**25,070**	**825**	**16,925**	**557**	**8,110**	**267**	**4,460**	**147**	**3,650**	**120**

Proposed (Uncontrolled) Conditions											
Land Use	***Area***	***Precipitation***		***Evapotranspiration***		***Surplus/Deficit***		***Infiltration***		***Runoff***	
	(ha)	***(m^3)***	***(mm)***	***(m^3)***	***(mm)***	***(m^3)***	***(mm)***	***(m^3)***	***(mm)***	***(m^3)***	***(mm)***
Hedgerow	0.15	1,240	825	970	648	270	180	175	117	95	63
Landscaping Area	0.72	5,950	825	4,020	557	1,925	267	1,060	147	865	120
Proposed Industrial Buildings	0.99	8,130	825	4,305	437	3,845	390	-	-	3,845	390
Walkways / Parking Lot / Asphalt	1.18	9,750	825	5,280	447	4,505	381	-	-	4,505	381
Total	**3.04**	**25,070**	**825**	**14,575**	**480**	**10,545**	**347**	**1,235**	**41**	**9,310**	**306**

Annual Summary											
Existing Conditions	3.04	25,070	825	16,925	557	8,110	267	4,460	147	3,650	120
Proposed (Uncontrolled) Conditions	3.04	25,070	825	14,575	480	10,545	347	1,235	41	9,310	306
Existing to Proposed Difference											
Proposed (Uncontrolled) Conditions	-	-	-	(2,350)	(77)	2,435	80	(3,225)	(106)	5,660	186
Percentage Change	0%	0%	0%	-14%	-14%	30%	30%	-72%	-72%	155%	155%

Notes:
Values are rounded for reporting purposes.
Positive value for infiltration difference is a surplus and a negative value is a deficit.
Positive value for runoff difference is an increase in runoff and a negative value is a decrease in runoff.