December 8, 2025

Ontario Ministry of the Environment, Conservation, and Parks
Environmental Approvals Access and Service Integration Branch
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

Re: Application for Environmental Activity and Sector Registry
Temporary Construction Dewatering
13656-13668 Emil Kolb Parkway
Bolton, Ontario
Project 10377

Dear Director,

Hydrogeology Consulting Services Inc. (HCS) was retained by CAMCOS Living to prepare and submit an Environmental Activity and Sector Registry (EASR) for the above-referenced project.

Previous investigation for each of the two properties includes Geotechnical, Phase I Environmental Site Assessment (ESA), and Scoped Hydrogeological Assessment reports. The 13656 and 13668 Emily Kolb Parkway properties have since been combined into one development proposal titled Bolton Village, and the construction dewatering assessment included below contemplates the most recent development plans for the combined Bolton Village property.

Previous investigation of the combined property includes eleven boreholes drilled between 2021-2023 to assess the subsurface stratigraphy and groundwater conditions, with seven monitoring wells installed. Copies of the borehole logs are attached for reference.

The scoped hydrogeological assessments for 13656 and 13668 Emil Kolb Parkway include detailed discussion of on-site geological and hydrogeological conditions, and have been referenced extensively in the development of this report.

1. MEASURED GROUNDWATER LEVELS

On June 6, 2021, March 28, 2023, and February 25, 2025 the groundwater level observations listed in Table 1 below were collected by HCS Inc. during previous site investigations:

Table 1: Measured Groundwater Levels:

Location	Depth to Groundwater (mBGS)			Groundwater Elevation (mASL)		
	06-Jun-2021	28-Mar-2023	25-Feb-2025	06-Jun-2021	28-Mar-2023	25-Feb-2025
BH 1	--	dry	1.75	--	dry	256.41
BH 2	--	5.48	1.70	--	252.74	256.52
BH 3	--	4.65	0.73	--	254.63	254.63
BH 01	5.10	--	1.00	253.37	--	257.46
BH 04	2.83	--	1.09	255.69	--	257.42
BH 05	4.35	--	1.56	253.62	--	256.41

mBGS – metres below ground surface
mASL – metres above sea level

2. GROUNDWATER CHEMISTRY ANALYSIS RESULTS

On June 6, 2021 one water chemistry sample was obtained from on-site monitoring well BH 01, and on March 28, 2023 one water chemistry sample was obtained from on-site monitoring well BH1. The samples were collected in the appropriate containers, stored in a cooler, and delivered to ALS Environmental Laboratories in Waterloo, Ontario for analysis of Region of Peel's Storm Sewer and Sanitary Sewer Use By-Law chemistry parameters. The laboratory Certificates of Analysis (COA) are attached.

It is important to consider the water chemistry samples were obtained using inertial valves (Waterra) and tubing. The method of water collection inherently results in the inclusion of sediments into the water sample, thereby increasing concentrations of parameters such as colour, turbidity, total suspended solids, total dissolved solids, and total metals where metals are adsorbed onto soil particles. Water chemistry samples analyzed for Total Metals were not filtered during or after collection; however, additional samples were collected for analysis of Dissolved Metals and were laboratory-filtered prior to analysis to provide a more accurate assessment of actual groundwater chemistry.

Additionally, it is important to consider that the 4AAP laboratory analysis for Phenols detects a wide variety of naturally occurring organic substances, along with the chemical Phenol (C_6H_5OH). Measured exceedances of “Phenols” may not be indicative of a contamination issue, but rather groundwater that is influenced by natural environmental factors.

2.1 Region of Peel Storm Sewer Use By-Law

As shown on the attached COAs, the samples from BH 01 and BH 1 exhibited exceedances of the Region of Peel’s Storm Sewer By-Law criteria limits for the following parameters:

- Total Suspended Solids (TSS)
- Total Manganese
- Total Zinc

It is important to note the sampling methodology causes sediments to become suspended in the water column within the well, and likely affected the TSS concentration in the samples.

The presence of sediments in the sample likely resulted in metals adsorbed on to sediment particles influencing the water chemistry analysis results as they are leached into solution by the lab-added preservative in the metals sampling bottle.

2.1.1 Discharge to Municipal Storm Sewers

Based on the analysis results, discharge to municipal storm sewers may require treatment such as settling tanks with flocculation and/or mechanical filtration (e.g. using filter bags) to reduce TSS and metals concentrations to acceptable concentrations.

2.2 Region of Peel Sanitary Sewer Use By-Law

As shown on the attached COAs, the sample from BH 01 exhibited exceedances of the Region of Peel’s Storm Sewer By-Law criteria limits for the following parameters:

- Total Suspended Solids (TSS)

As explained previously it is important to note the sampling methodology causes sediments to become suspended in the water column within the well, and likely affected the TSS concentration in the samples.

The presence of sediments in the sample likely resulted in metals adsorbed on to sediment particles influencing the water chemistry analysis results as they are leached into solution by the lab-added preservative in the metals sampling bottle.

2.2.1 Discharge to Municipal Sanitary Sewers

Based on the analysis results, discharge to municipal sanitary sewers may require treatment such as settling tanks with flocculation and/or mechanical filtration (e.g. using filter bags) to reduce TSS concentrations to acceptable concentrations.

3. SOIL HYDRAULIC CONDUCTIVITY

Hydraulic conductivity estimates for the site soils were determined using single response hydraulic (slug) tests of the soil deposits screened by selected monitoring wells. Estimates of hydraulic conductivity were also made using soil sample grain size analyses and the Kaubisch, Breyer, Kozeny-Carman, and Hazen formulae where appropriate.

3.1.1 Slug Test Results

Prior to conducting slug testing of the monitoring wells, each well was developed (purged) to mitigate smearing during drilling and remove fine-grained material from the sand pack around the well screen and the screened interval.

The slug test methodology followed the procedures developed by Hvorslev (1951), as described in Freeze and Cherry (1979). The slug tests were conducted as falling head tests by introducing a volume (slug) of potable water into the well to cause a temporary rise in the water table; or, as rising head tests by purging a well dry and allowing water to flow naturally back into the well. The displacement and gradual re-equilibration of the water level in the wells was recorded using electronic pressure transducers (dataloggers).

Hvorslev's method is expressed by the following equation:

$$K = \frac{r^2 \ln (L/R)}{2LT_{0.37}}$$

where:

- K = hydraulic conductivity of the tested material (m/sec)
- r = inner radius of the well riser pipe (m)
- R = outer radius of the well riser pipe (m)
- L = length of screen and sand pack (m)
- $T_{0.37}$ = time lag (sec), where $(H-h)/(H-H_0) = 0.37$
- h = water level at each time of measurement (m)
- H_0 = initial water level (m, start of test)
- H = stabilized water level prior to slug testing (m)

The time lag, $T_{0.37}$, represents the time required for the water level to recover to the stabilized level if the initial flow rate from the surrounding aquifer into the well is maintained. This time lag is determined graphically as the time where (H-h) divided by ($H-H_0$) is equal to 0.37.

Graphical analyses of the slug tests are attached, and the hydraulic conductivity estimates are summarized in Table 2 below.

3.1.2 Grain Size Analysis Results

Samples of soil collected from selected boreholes during drilling were submitted to the CMT Engineering Inc. laboratory facility in St. Clements, Ontario for analysis of particle size distribution (grain size). As shown on the attached grain size analysis graphs, the near-surface soils predominantly consist of clay and silt with trace amounts of sand and gravel (i.e. glacial till). The grain size analysis results were used to estimate soil hydraulic conductivity (K) values by applying the Kaubisch, Breyer, Hazen, and Kozeny-Carman formulae where appropriate based on the limitations of each formula. The hydraulic conductivity estimates are summarized in Table 3 below.

It is noted that for all soil samples a high percentage of fine-grained material was present in a sample, requiring the D_{10} value of the sample to be approximated; therefore, calculated values are considered estimates.

Table 2: Estimated Soil Hydraulic Conductivity – Slug Tests

Borehole Name	Screened Interval (mBGS)	Slug Test Hydraulic Conductivity (m/sec)
BH 01*	2.8-5.8	$<1.0 \times 10^{-7}$
BH 04*	3.1-6.1	$<1.0 \times 10^{-7}$
BH 05*	2.6-5.6	$<1.0 \times 10^{-7}$
BH 2*	3.1-6.1	$<1.0 \times 10^{-7}$
BH 3*	3.1-6.1	$<1.0 \times 10^{-7}$

* - $T_{0.37}$ was not achieved; therefore, the hydraulic conductivity value is considered approximate

Table 3: Estimated Soil Hydraulic Conductivity – Grain Size Analysis

Name	Soil Sample Depth or Screened Interval (mBGS)	Soil Type	Analysis Method	Hydraulic Conductivity (m/sec)
BH 03	1.52-2.13	Clayey silt, some sand, trace gravel	Kaubisch	4.57×10^{-9}
BH 05	4.57-5.18	Clayey silt, some sand, trace gravel	Kaubisch	2.10×10^{-9}
BH 1	1.52-2.13	Clayey silt, some sand, trace gravel	Kaubisch	6.83×10^{-10}
BH 1	4.57-5.18	Clayey silt, some sand, trace gravel	Kaubisch	1.36×10^{-9}
BH 2	5.18-6.10	Clayey silt, some sand, trace gravel	Kaubisch	1.02×10^{-9}
BH 3	5.18-6.10	Clayey silt, some sand, trace gravel	Kaubisch	7.80×10^{-10}

mBGS - metres Below Ground Surface

m/sec - metres per second

The hydraulic conductivity values of $<1.0 \times 10^{-7}$ m/sec for the slug tests, and 6.83×10^{-10} to 4.57×10^{-9} m/sec for the grainsize analyses indicate a low hydraulic conductivity that correlates well with clayey silt (till) overburden.

The hydraulic conductivity estimates correlate reasonably well with published ranges for major soil/bedrock types (Freeze and Cherry, 1979).

4. PROPOSED WATER TAKING

As part of the proposed construction shown on the attached Master Site Plan (Q4A Architects, December 2025), temporary dewatering will be required for excavations to support construction of the proposed development. Building 1 includes a slab-on grade structure plus a partial one-level underground storage area. Buildings 2 and 3 include slab-on-grade structures. During construction the dewatering system will be operating 24 hours per day to maintain a dry working area.

It is noted development design changes have occurred since the 2021 and 2023 Scoped Hydrogeological Assessment reports were prepared for the individual properties that now make up the current Site.

The following construction dewatering calculations supersede the previous reports.

5. CONSTRUCTION DEWATERING CALCULATIONS

Based on excavation locations, dimensions, and depths provided for this report, construction of the proposed underground level associated with Building1 will require construction dewatering to lower the groundwater table within the excavation to maintain a dry excavation base and sidewalls.

Temporary dewatering requirements are dependent on factors such as excavation parameters (excavation dimensions, infrastructure invert elevations, the number of concurrent excavations, etc.), hydrogeological conditions at the site (groundwater levels, soil/bedrock hydrogeological parameters, etc.), construction and dewatering methodologies (open cuts, dewatering pits, sumps, wellpoints, etc.), and the amount of groundwater drawdown required to achieve and maintain dry working conditions and stable excavations.

Additionally, factors such as the use of shoring would be expected to influence the rate of groundwater inflow into the excavation. The calculations provided below assume an open excavation as a conservative factor of safety.

It is important to note that the dewatering contractor retained to perform construction dewatering is solely responsible for achieving and maintaining dry working conditions at the site at all times. The calculations and dewatering rates/volumes provided below are not directives for a dewatering contractor, and the dewatering contractor must review the information, calculations, and recommendations provided as part of their own assessment of dewatering requirements to determine appropriate methodologies and designs for their construction dewatering project.

5.1 Excavation Requirements and Temporary Construction Dewatering Assumptions

During the construction project dewatering operations are expected to take place twenty-four hours per day to maintain a dry excavation. Dewatering calculations include a number of variables such as the static groundwater level, soil hydraulic conductivity, aquifer thickness, confined aquifer conditions, etc. that can be adjusted to provide conservative buffers to account for conditions beyond those encountered in the available monitoring wells.

Based on the available information Table 4 below summarizes the preliminary excavation requirements for the proposed underground level.

Additionally, Table 4 includes the following buffers as factors of safety:

- A buffer of 2 m (assumed, although the exact buffer shall be determined during the construction design phases with the shoring engineer, and accounting for property limits) for all excavation widths and lengths to account for an excavation large enough to accommodate working around the perimeter;

- A buffer of 1 m for the excavation invert depth to ensure groundwater is drawn down 1 m below the base of the excavation to maintain a dry work surface. The excavation invert is taken as 3.6 mBGS which is understood to be the lowest Underside of Footing (USF) elevation across the building footprint.

- "Squared off" excavation shapes to account for excavation dimension adjustments during the construction process.

- A buffer of 0.23 m for the depth to groundwater (the highest measured groundwater elevation from the monitoring wells on site, increased by 0.23 m) to account for seasonal fluctuations.

It is noted based on available information the slab-on-grade structures for Building 2 and Building 3 are not expected to have footing elevations extending more than 1.75 mBGS; therefore, it is anticipated no construction dewatering will be required.

Table 4: Preliminary Excavation Requirements

Excavation	Excavation Length (m) (+2 m)	Excavation Width (m) (+2 m)	Excavation Depth (mBGS) (-1 m)	GW Depth (mBGS) (+0.23 m)
Building 1 - Underground Structure	30.9	25.5	4.6	0.50

It is important to note the dewatering calculations included in this report are based on the information provided to HCS as outlined above. In the event design parameters (e.g. excavation footprint, excavation depth, servicing trench depths and lengths, etc.) are modified the dewatering calculations provided will also need to be updated.

5.1.1 Concurrent Excavations

The following concurrent tasks are contemplated for construction dewatering:

- Concurrent excavation of the entire underground footprint.

5.1.2 Dewatering Assumptions

Dewatering calculations have been prepared based on the following assumptions to account for variability in soil, bedrock, and groundwater conditions:

- A soil hydraulic conductivity of 5.0 x 10^{-7} m/sec for the underground excavations (the highest hydraulic conductivity measured in the on-site well slug tests and grain size samples, increased as a conservative factor of safety).
- An initial unconfined saturated aquifer thickness of 8 m;

- An initial groundwater elevation corresponding to the highest measured/observed groundwater elevation from monitoring wells/boreholes across the combined property (0.73 mBGS), increased by 0.23 m to 0.50 mBGS to account for seasonal variation.

5.2 Dewatering Calculations

To estimate the steady-state dewatering flow rate needed to maintain dry conditions in the excavation for the underground structure, the following equation (for radial flow to an unconfined aquifer) from Powers (2007)[1] was used:

$$Q = \frac{\pi K\left(H^2 - {h_w}^2\right)}{\ln\left(\frac{R_o}{r_e}\right)}$$

Where:

Q = Flow Rate (m^3/sec)

H = Initial Saturated Thickness (Piezometric Head) of Aquifer (m)

h_w = Dewatered Saturated Thickness (Piezometric Head) of Aquifer (m)

K = Soil Hydraulic Conductivity (m/sec)

r_e = Effective radius, $r_e = \sqrt{(excavation\ area/\pi)}$ (m)

R_o = Radius of influence, $R_o = 3000*(H-h_w)*\sqrt{K}$ (m)

Where R_o is very close to r_e or less than r_e, to avoid $\ln\left(\frac{R_o}{r_e}\right)$ resulting in a very small or negative number R_o is replaced with ($R_o + r_e$) in the formula above, which gives a reasonable estimate of the dewatering requirements.

Using the assumptions listed in Section 5.1 and its subsections, the steady-state inflow rate and radius of influence listed in Table 5 below were estimated.

Table 5: Steady-State Dewatering Requirements

Excavation	Daily Dewatering Rate (L/day)	Radius of Influence (m)
Building 1 - Underground Structure	15,150	8.70

[1] Powers, P.J. et al. 2007. Construction Dewatering and Groundwater Control: New Methods and Applications. Wiley.

5.2.1 Calculated Dewatering Rates, With Factors of Safety

It is important to consider that dewatering requirements will be highest at the start of the dewatering process when the volume of water stored within the pore spaces of the soil and/or within the bedrock fracture matrix must be extracted. This storage must be accounted for to allow for rapid achievement of drawdown targets.

Initial drawdown of the overburden soils within a short period of time would be expected to require additional pumping capacity. An initial drawdown requirement has been calculated assuming a surcharge of 100% of the estimated steady state dewatering rate.

While it is important to consider that during and after precipitation events significantly higher dewatering flow rates may be required to account for direct precipitation and surficial runoff falling into an excavation; recent changes to Ontario Regulation 63/16 mandate that stormwater does not need to be counted as part of the daily dewatering limit (although measurements of the total water taking form the site each day must include both groundwater and stormwater).

Additionally, at the time of preparation of this assessment the extent of site servicing trenches is unknown. To account for additional dewatering requirements associated with servicing, an estimated water taking volume for servicing trenches has been included.

Table 6 below provides a summary of the calculated dewatering rates and factors of safety for the excavation.

Table 6 – Calculated Maximum Total Dewatering Rate including Factors of Safety

	Steady State Dewatering (L/day)	**Initial Drawdown Surcharge (100%) (L/day)**	**Potential Servicing Trench Dewatering Requirements (L/day)**	**Maximum Total Dewatering Requirement (L/day)**
Building 1 - Underground Structure	15,150	15,150	60,000	90,300

The totals shown in Table 6 indicate a potential maximum dewatering requirement of up to 90,300 L/day for dewatering of the excavation footprint. An Environmental Activity and Sector Registry (EASR) would be required to authorize pumping at this rate. Additionally, a Sewer Discharge Permit from the City of Bolton/the Region of Peel would be required to discharge to municipal sewers if pumped water is not collected for off-site disposal.

While the conservative assumptions and factors of safety discussed in the preceding sections combine to create conservative dewatering calculations, it is important to consider the variable nature of the overburden aquifer.

5.2.2 Management of Precipitation and/or Runoff

It is important to consider that during and after precipitation events significantly higher dewatering flow rates may be required to account for direct precipitation and surficial runoff falling into an excavation. As an example, based on excavation area footprints assumed above a 50 mm storm event pumped out within 24 hours has been assumed in Table 7 below.

Table 7 –Estimated Precipitation Dewatering Volume (50 mm storm event within 24 hours)

	Potential Precipitation Dewatering Volumes (L/day)
Building 1 - Underground Structure	39,400

The direct dewatering of precipitation inflow and runoff into an excavation is excluded from daily dewatering volumes as part of an EASR. While the total volume of water taken each day (including groundwater, surface water, precipitation, and runoff) must be measured and recorded as part of the dewatering monitoring program, only the volume of groundwater taken is “counted” towards the EASR-permitted daily water taking volume.

5.3 Dewatering Calculations - Discussion

The potential maximum dewatering requirements outlined above are reasonable based on the information available; however, a less-conservative assumption of total dewatering requirements (e.g. allowing a longer initial drawdown time for the excavation, using a less conservative hydraulic conductivity value, using a less conservative excavation depth and/or seasonally high groundwater elevation, assuming shorter servicing alignment dewatering sections, etc.) could reduce the estimated total dewatering requirement significantly.

The purpose of applying multiple conservative assumptions to the calculation variables is to attempt to consider “worst case scenario” conditions to provide enough buffer in the EASR maximum permitted daily pumping volume. The calculations above are not intended to accurately predict actual dewatering volumes, but rather to estimate potential maximum dewatering volumes.

Additionally, it is important to consider a factor of safety of 2.0 is applied to all dewatering calculations. This factor of safety is applied to account for uncertainties, unknown conditions, and other variables; however, under real-world conditions it is reasonable to anticipate dewatering at rates 2.0x the steady state calculated rates may not be required. The client, the construction

contractor, and the dewatering contractor shall review the dewatering calculations provided above and make their own determinations regarding expected typical daily dewatering requirements.

Further, performing one or several pumping tests in advance of designing and installing dewatering systems would provide empirical data that could be used to refine maximum daily pumping requirements. The client, the construction contractor, and the dewatering contractor shall review the dewatering calculations provided above and make their own determinations regarding the potential benefits of performing pumping tests, and the potential maximum daily dewatering requirements for the project, as part of their construction dewatering design strategy.

As noted previously, in the event construction parameters change beyond the assumptions included in these calculations, revised construction dewatering calculations will be necessary.

6. PERMIT REQUIREMENTS AND DEWATERING DISCHARGE

Ontario Regulation 387/04 requires authorization from the Ministry of the Environment, Conservation, and Parks (MECP) for all water takings over 50,000 L/day. Ontario Regulation 63/16 historically specified that for temporary construction dewatering at rates between 50,000 and 400,000 L/day an Environmental Activity and Sector Registry (EASR) could be obtained in lieu of a Permit to Take Water (PTTW).

However, as of July 2, 2025 changed to Ontario Regulation 63/16 have removed the upper limit for temporary construction dewatering. As a result, an EASR registration is sufficient to manage the calculated temporary dewatering rates provided in Section 5 and its subsections

Temporary discharge to a municipal sewer would require a Sewer Discharge Permit/Agreement from the City of Bolton/Region of Peel if pumped water is not contained for off-site disposal.

6.1 Dewatering Discharge

It is expected that dewatering discharge will be directed to municipal sewers; or, collected for off-site haulage and disposal.

As discussed in Section 2, groundwater chemistry samples exhibited exceedances of Region of Peel Storm Sewer Use By-Law criteria limits for TSS and multiple Total Metals; and exceedance of Region of Peel Sanitary Sewer Use By-Law criteria limits for TSS. Discharge treatment and mitigation measures will need to be developed and implemented to permit discharging to municipal sewers.

Section 7 below discusses mitigation measures that will need to be implemented to permit discharging to municipal sewers.

It is noted based on the relatively low calculated steady-state dewatering rates collection of discharge for disposal by a licensed hauler may be a possibility for the project. Disposal by a licensed hauler would eliminate the requirement for on-site treatment, and for a Sewer Discharge Permit. The client and their dewatering contractor should evaluate the potential benefits of haulage vs. discharge to municipal sewers as part of the overall construction dewatering strategy.

7. POTENTIAL IMPACTS OF CONSTRUCTION DEWATERING

7.1 Municipal Supply Wells and Surface Water Intakes

Ontario Source Protection Information Atlas (OSPIA) mapping shows the study area does not lie within a municipal Wellhead Protection Area (WHPA) or municipal surface water Intake Protection Zone (IPZ).

As all construction dewatering discharge would be required to meet the appropriate Sewer Use By-Law prior to discharge, and dewatering of the shallow subsurface soils will only occur during the construction period, it is anticipated that routing dewatering discharge to the municipal sewers would not result in negative impacts to surface water quality where municipal sewers discharge.

7.2 Sensitive Features

OSPIA mapping indicates that the subject property does not fall within a highly vulnerable aquifer (HVA) zone, or a significant groundwater recharge area (SGRA).

Natural Heritage Area maps from the Ministry of Natural Resources and Forestry (MNRF; 2023) reveal no Areas of Natural and Scientific Interest (ANSIs) within the subject property or surrounding area.

While no impacts to municipal supply wells, surface water intakes, or sensitive features are anticipated, minimization of the potential for discharge of contaminants to the ground surface where they could infiltrate into the subsurface along with minimization of erosion resulting from construction dewatering discharge shall be considered of prime importance during all on-site construction and dewatering activities.

7.3 Private Supply Wells

Well Records from the Ministry of the Environment, Conservation, and Parks (MECP) Water Well Record (WWR) Database (2020) were reviewed to determine the number of supply wells present. According to the MECP WWR Database nineteen wells are located within an approximate radius of 500 m from the subject property.

Of these wells, eight are identified as test holes or monitoring wells. Five well records pertain to abandoned wells, two well records have partial or no data, and one additional well is identified as not in use. These records have been excluded from further consideration.

The two remaining domestic use wells are completed in overburden soils at depths of 15.24 and 77.72 mBGS, respectively.

The Region of Peel Department of Public Works was consulted to determine where municipal watermains existed within a 500 m radius of the property. Watermains were identified along Colerain Drive, Harvest Moon Drive, King Street (Emil Kolb Parkway), and 6th Line. It is anticipated that MECP WWRs which may plot along these roadways could represent wells which have been previously decommissioned, or wells which are not used for drinking water supply.

Based on the calculated maximum radius of influence of 8.70 m, and the anticipated dewatering depth of up to 4.6 m in low-permeability soils that do not represent an aquifer, no impacts to private water supply wells from construction dewatering would be expected.

7.4 Surface Water Features

There are no surface water features on or adjacent to the property. A stormwater management pond is located south of Harvest Moon Drive to the south of the subject property. There is a tributary of Jaffary's Creek located east of the property leading to Jaffary's pond. TRCA mapping indicates that the creek and surrounding area are regulated by the TRCA; however, the subject property is not within a regulated area.

Based on the calculated maximum radius of influence of 8.70 m, no impacts to wetlands or surface water features from construction dewatering would be expected.

7.5 Groundwater Resources

As construction dewatering will temporarily withdraw water from the shallow overburden soils which are not expected to be utilized by private water supply wells within the estimated radius of influence of construction dewatering, and are not supporting surface water features, no material impacts to shallow groundwater resources are anticipated.

7.6 Confined Groundwater Conditions and Excavation Bottom Heave

While confined aquifer conditions were not identified in the boreholes drilled on the subject property, bottom heave occurring in excavations due to unweighting of the soils as a result of excavations removing soil/bedrock weight overlying pressurized aquifer conditions should still be considered a (relatively unlikely) possibility.

As discussed in Section 8.5 below, diligent observation of conditions in the excavation is recommended to monitor for potential bottom heaving. In the unlikely event bottom heaving or other issues due to pressurized aquifer conditions occur, the construction and dewatering strategies for the project would need to be revised.

7.7 Geotechnical Issues and Settlement

The conservatively calculated radius of influence of construction dewatering is up to 8.70 m. Some buildings may lie within the radius of influence, and roadways and services may be located within the radius of influence; therefore, a geotechnical engineer shall be consulted prior to commencement of any on-site dewatering to determine whether geotechnical issues or impacts due to settlement resulting from construction dewatering could be anticipated. A geotechnical engineer shall provide any applicable monitoring and/or mitigation recommendations to address any potential geotechnical issues or impacts that are identified.

PLEASE NOTE: The MECP expects an assessment of geotechnical issues and the potential impact of soil settlement; as well as a contingency plan to address any risks associated with land subsidence, to be included as part of an EASR application package. HCS understands and assumes this assessment of geotechnical issues and settlement will be prepared by a qualified geotechnical engineer and provided to the client prior to commencement of any dewatering activities.

The proponent is therefore advised of the need for a geotechnical engineer to complete an assessment of geotechnical issues/settlement potential prior to commencement of dewatering activities.

This scope of this report does not include detailed analysis of the potential for geotechnical issues or settlement, and it will be the responsibility of the construction contractor and dewatering contractor to retain a geotechnical engineer to complete an assessment of geotechnical issues and provide any appropriate monitoring and/or mitigation measures to support the EASR for the project.

8. MONITORING AND MITIGATION

The following monitoring and mitigation recommendations are provided to ensure construction dewatering does not impact surface water features or groundwater resources used by private or municipal water supply wells, and to ensure any impacts from construction dewatering are promptly and effectively resolved. These monitoring and mitigation recommendations shall be implemented during construction dewatering, along with any monitoring and mitigation recommendations that may be provided by a geotechnical engineer.

8.1 Discharge Volumes

During all construction dewatering operations, total pumping rates and discharge volumes from all excavations shall be measured using calibrated flow measurement devices (such as flow meters), with daily summation of total pumping rates and volumes and comparison to the permitted rates and volumes to ensure no exceedances occur.

As discussed previously in Section 5.2.2, while dewatering of direct precipitation and runoff does not count towards the EASR-permitted daily dewatering volume, all water taking (groundwater, surface, water, precipitation, and runoff) must be measured and recorded on a daily basis.

In the event daily water taking rates or volumes exceed permitted values, the construction methodology or dewatering methodology shall be modified immediately to bring the daily water taking back into compliance with the permitted values.

The dewatering contractor shall maintain records of all daily water taking rates and volumes, including dates and locations of all water takings. The recorded data shall be retained for a period of five years per MECP requirements, and uploaded to the MECP's Water Taking Reporting System (WTRS) by March 31 of the year following the water taking.

8.2 Dewatering Discharge Location, and Chemistry Monitoring

It is expected dewatering discharge will be routed to the municipal sewers. As discussed below, water chemistry samples shall be collected weekly from the discharge location(s) and analyzed for the appropriate Sewer Use By-Law criteria limits for discharge to municipal sewers.

If any exceedances are measured, water treatment and mitigation measures will need to be implemented immediately and the water shall be re-tested with a maximum 24-hour turnaround time (where possible based on lab analysis methods) to confirm compliance with the appropriate criteria limits prior to continued discharge.

All conditions specified in any Discharge Permit(s) that may be required must be also be adhered to during construction dewatering operations.

8.2.1 Collection of Dewatering Discharge for Off-Site Disposal

As noted previously, based on the relatively low calculated steady-state dewatering rates collection of discharge for disposal by a licensed hauler may be a possibility for the project, and would eliminate the requirement for treatment, and for a Sewer Discharge Permit. The client and their dewatering contractor should evaluate the potential benefits of haulage vs. discharge to municipal sewers as part of the overall construction dewatering strategy.

8.3 Discharge Water Chemistry and Treatment

As discussed in Section 2, the groundwater chemistry samples exhibited exceedances of Region of Peel Storm Sewer Use By-Law criteria limits for TSS and multiple Total Metals; and exceedance of Region of Peel Sanitary Sewer Use By-Law criteria limits for TSS. Mitigation measures that will need to be implemented to permit discharging to municipal sewers are described below.

The dewatering contractor must implement appropriate treatment methodologies for these exceedances as well as any exceedances that may occur during the construction dewatering program, and all required treatment equipment shall be set up on site prior to any construction dewatering.

8.3.1 Discharge to Municipal Sewers

Although field testing will be required to ensure the appropriate Region of Peel Sewer Use By-Law criteria are being met if discharge is directed to municipal sewers, a suggested initial treatment system could consist of the following (for each dewatering system):

- A Settling Tank sufficiently sized for the expected dewatering flow rate;
- Two filter vessels (appropriately sized for the dewatering flow rate) equipped with disposable 25-micron filter bags.

Field testing will be required to ensure the appropriate Sewer Use By-Law criteria are being met, along with any requirements mandated in additional permits that may need to be obtained to support discharge to municipal sewers.

It will be the responsibility of the dewatering contractor to design and implement an appropriate treatment methodology; and, to revise the methodology if regular sampling and analysis of the discharge (as discussed below) shows Sewer Use by-Law parameter exceedances.

8.3.2 Assessment and Monitoring

Once the treatment system(s) are set up, short-term trial dewatering should take place to allow representative water samples to be collected upstream (pre-treatment) and downstream (post-treatment) of the system(s), with sampling for appropriate Sewer Use By-Law parameters for discharge to municipal sewers. In the event post-treatment samples exhibit exceedances of any parameters, the treatment system(s) will need to be modified and chemistry re-testing completed until the post-treatment samples show no exceedances.

During all construction dewatering operations, samples from each dewatering system should be collected on a weekly basis and analyzed for the appropriate suite of parameters:

- Region of Peel Storm Sewer / Sanitary Sewer Use By-Law

If water chemistry testing shows an exceedance of applicable criteria limits, the dewatering contractor or a water treatment specialist shall be consulted immediately to determine the most effective method of mitigating the exceedance. Treatment should be implemented with follow-up water chemistry sampling to confirm that no further exceedances are measured.

Weekly water chemistry sampling can also include upstream (pre-treatment) sampling to assess whether continued use of treatment systems is required. If upstream sampling results demonstrate that the pumped water meets the appropriate criteria, the treatment system(s) can be taken offline. In the event exceedances are measured in future weekly samples, the treatment system(s) would need to be brought back online immediately.

8.4 Excavation Bottom Heave

All excavations shall be monitored daily for signs of bottom heave. In the unlikely event heaving is observed, all excavation work in the immediate area shall cease and soils shall be replaced in the excavation to restore overburden weight. If bottom heave occurs, alternate construction and/or dewatering methodologies will be required to address the issue, and coordination between the construction contractor, the dewatering contractor, and engineering consultants will be required to ensure the situation is effectively mitigated.

The scope of this report does not include detailed analysis of the potential for excavation bottom heave, and it will be the responsibility of the construction contractor and dewatering contractor to identify and mitigate bottom heave in the (relatively unlikely) event it occurs.

8.5 Geotechnical Issues for Adjacent Infrastructure

A geotechnical consulting engineer shall be retained to evaluate all infrastructure, (utility poles, light poles, above ground and underground services, building foundations, roadways, etc.) within the calculated radius of influence of dewatering at all dewatering locations. Infrastructure such as utility poles, light poles, underground services, etc. within the radius of influence of construction dewatering may need to be braced and supported, based on the geotechnical engineer's recommendations. Supported infrastructure shall be monitored regularly during construction dewatering activities to ensure no settlement or impacts are occurring. Any settlement or impacts that are noted by the geotechnical consulting engineer shall be assessed and mitigated promptly and effectively using appropriate methodology.

For building foundations and other structures that may be identified within the calculated radius of influence, a geotechnical consulting engineer shall perform a foundation assessment, install crack monitors as required, and monitor the foundations on a weekly basis for signs of settlement or other impact.

In the event settlement or other impact to foundations occurs, construction dewatering and/or excavation methodologies may need to be revised, dewatering may need to cease temporarily, and the geotechnical consulting engineer shall take all required steps to halt resolve the impact.

8.6 Water Supply Wells

As discussed previously, no impacts to private or municipal water supply wells from construction dewatering are anticipated due to the lack of any municipal wells or private supply wells screened within the overburden deposits that will be dewatered within the conservatively calculated maximum area of influence of construction dewatering.

9. REPORTING

Daily water taking volumes shall be summarized and submitted to the MECP at the end of each calendar year, by March 31 of the following year, using the Water Taking Reporting System (WTRS), or the Regulatory Self-Reporting System (RSRS) through the Public Secure Client Access Management System (CAMS). All monitoring data will be retained for five years.

10. EASR NOTIFICATION REQUIREMENTS

Once an EASR has been registered with the MECP, at least 48-hours prior to commencement of dewatering activities the local Ministry District Office (the Halton-Peel District Office) must be notified in writing of the upcoming water taking. The notification must include the following:

- Description of where the water taking will occur
- Dates on which the water taking will occur
- Approximate time and duration of the water takings
- The EASR registration number
- The name and phone number of a person who can be contacted to report any concerns about interference with another water supply.

As the project is being undertaken in the City of Bolton and the Region of Peel (the Tier 1 Municipality), the Region and the City must be notified in writing prior to any water taking under this EASR. Notification must include the following:

- The name of the persons/companies who will be taking water
- The start and end dates of construction dewatering
- The location of the construction dewatering, the method of discharge, and the location of discharge.

Additionally, in the event the water taking is proposed to continue (or does continue) for more than 365 days, the lower tier municipality(ies) and any conservation authority within whose jurisdiction the proposed water taking is located must receive the same written notification as the Tier 1 municipality.

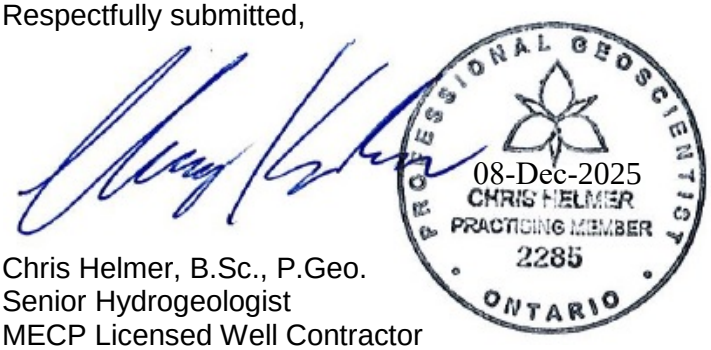
11. QUALIFICATIONS

Chris Helmer is a licensed Professional Geoscientist, registered with the Association of Professional Geoscientists of Ontario since 2013. Mr. Helmer has been employed in the field of hydrogeology for more than twenty years, and has worked on construction dewatering projects Environmental Activity and Sector Registry applications, and Permit to Take Water applications for more than fifteen years.

12. REPORTING

Daily water taking volumes shall be summarized and submitted to the MECP at the end of each calendar year, by March 31 of the following year, using the Water Taking Reporting System (WTRS), or the Regulatory Self-Reporting System (RSRS) through the Public Secure Client Access Management System (CAMS). All monitoring data will be retained for five years.

Respectfully submitted,



Chris Helmer, B.Sc., P.Geo.
Senior Hydrogeologist
MECP Licensed Well Contractor
www.hydrog.ca

encl: Master Site Plan (Q4A Architects, January 2025)
encl: Laboratory Certificates of Analysis L2597301 and WT2307652
encl: Slug Test Analyses
encl: Grain Size Analysis Graphs
encl: Borehole Logs
encl: MECP Well Records

13. LIMITATIONS AND USE

This report has been prepared for the exclusive use of the Client indicated in on the first page of this report. Chris F Helmer and HCS Inc. hereby disclaim any liability or responsibility to any person or party, other than the Client, for any loss, damage, expense, fines, or penalties which may arise from the use of any information or recommendations contained in this report by anyone other than the Client.

The conclusions and recommendations provided in this report are not intended as specifications or instructions to contractors. Any use contractors may make of this report, or decisions made based on it, are the responsibility of the contractors. Contractors must accept responsibility for means and methods of construction they select, seek additional information if required, and draw their own conclusions as to how the subsurface conditions may affect them.

In preparing this report Chris F Helmer and HCS Inc. have relied in good faith on information provided by individuals and companies noted in this report, and assumes that the information provided is factual and accurate. No responsibility is accepted for any deficiencies, misstatements, or inaccuracies contained in this report as a result of errors, omissions, misinterpretations, or fraudulent acts in the resources referenced, or of persons interviewed or consulted during the preparation of this report.

The report and its complete contents are based on data and information collected during investigations conducted by Chris F Helmer and HCS Inc., and pertains solely to the conditions of the site at the time of the investigation, supplemented by historical information and data as described in this report. It is important to note that the investigation involves sampling of the site at specific locations, and the conclusions in this report are based on the information gathered. Limitations of the data and information include the fact that conditions between and beyond the sampling locations may vary; that the assessment is dependent upon the accuracy of the analytical data generated through sample analysis; and that conditions or contaminants may exist for which no analyses have been conducted. Furthermore, no assurance is made regarding potential changes in site conditions and/or the regulatory regime (standards, guidelines, etc.), subsequent to the time of investigation.

The professional services provided for this project include only the hydrogeological aspects of the subsurface conditions at the site, unless otherwise stated specifically in the report. No other warranty or representation is either expressed or implied, as to the accuracy of the information or recommendations included or intended in this report.

PROJECT INFORMATION

PROJECT NAME	BOLTON VILLAGE - ARPEGGIO
LEGAL DESCRIPTION	PART OF LOT 9, CONCESSION 5 TOWN OF CALEDON REGIONAL MUNICIPALITY OF PEEL PIN# 14326-1856 (LT)
MUNICIPAL ADDRESS	13656 and 13668 EMIL KOLB PARKWAY, BOLTON, ON

SITE

SITE AREA	8,363.7 m² / 0.83 ha / 90,026.1 SqFt
TOTAL LANDSCAPE AREA	2,033.3 m² 24 %
SOFT LANDSCAPE AREA	1,378.9 m²
HARD LANDSCAPE AREA	602.0 m²
OUTDOOR PARKING AREA	4,245.7 m²
SITE COVERAGE	28%

BUILDING AREAS

TOTAL BUILDING AREA	2,303 m²
BLDG 1 AREA - HIGH BLDG	1,201 m² (INCLD. OPEN PARKING AREA)
BLDG 2 AREA - 12 UNITS	602 m² (BLDG 2a: 400 m² BLDG 2b: 202 m²)
BLDG 3 AREA - 10 UNITS	500 m²

UNIT BREAKDOWN

BLDG 1 - HIGH BLDG	
No OF STOREYS	8
No OF UNITS	102
ACCESSIBLE UNITS	15
BLDG 2a - TOWNHOUSES	
No OF STOREYS	3
No OF UNITS	8
BLDG 2b - TOWNHOUSES	
No OF STOREYS	3
No OF UNITS	4
BLDG 3 - TOWNHOUSES	
No OF STOREYS	3
No OF UNITS	10
TOTAL # OF RESIDENTIAL UNITS	124

GFA

BLDG 1 - HIGH BLDG RESIDENTIAL	8,158 m²
BLDG 2A - TOWNHOUSES	1,171 m²
BLDG 2B - TOWNHOUSES	592 m²
BLDG 3 - TOWNHOUSES	1,470m²
FSI = 1.36	

PARKING

	REQUIRED (RM)		PROPOSED (PROVIDED)	
TOTAL # OF PARKING SPACES	228		168	
AT GRADE PARKING				
HIGH-RISE (RESIDENTS)	(Ratio 1.5)	153	(Ratio 1:1)	102
STACKS (RESIDENTS)	(Ration 1:2)	44	(Ration 1:2)	44 (Incl. Tandem Spaces)
VISITOR PARKING	(Ration 1:0.25)	31	(Ration 1:0.17)	22
BARRIER-FREE PARKING (Incl.)	(3% of total parking)	6	(4% of total parking)	7 (incl.)

INFORMATION TAKEN FROM

PLAN OF SURVEY AND TOPOGRAPHY
PART OF LOT 9,
CONCESSION 5
(GEOGRAPHIC TOWNSHIP OF ALBION)
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL
SCALE: 1:250
R-PE SURVEYING LTD., O.L.S.
METRIC:
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

LEGEND

TRAVEL DISTANCE

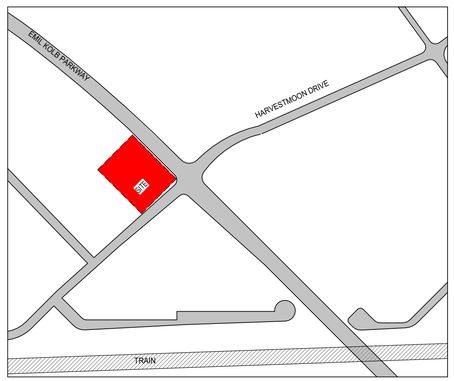
RESIDENTS PARKING — 2.75 | 2.75 | 2.75 — 6.00

ACCESSIBLE PARKING TYPE A — 3.40 — 6.00

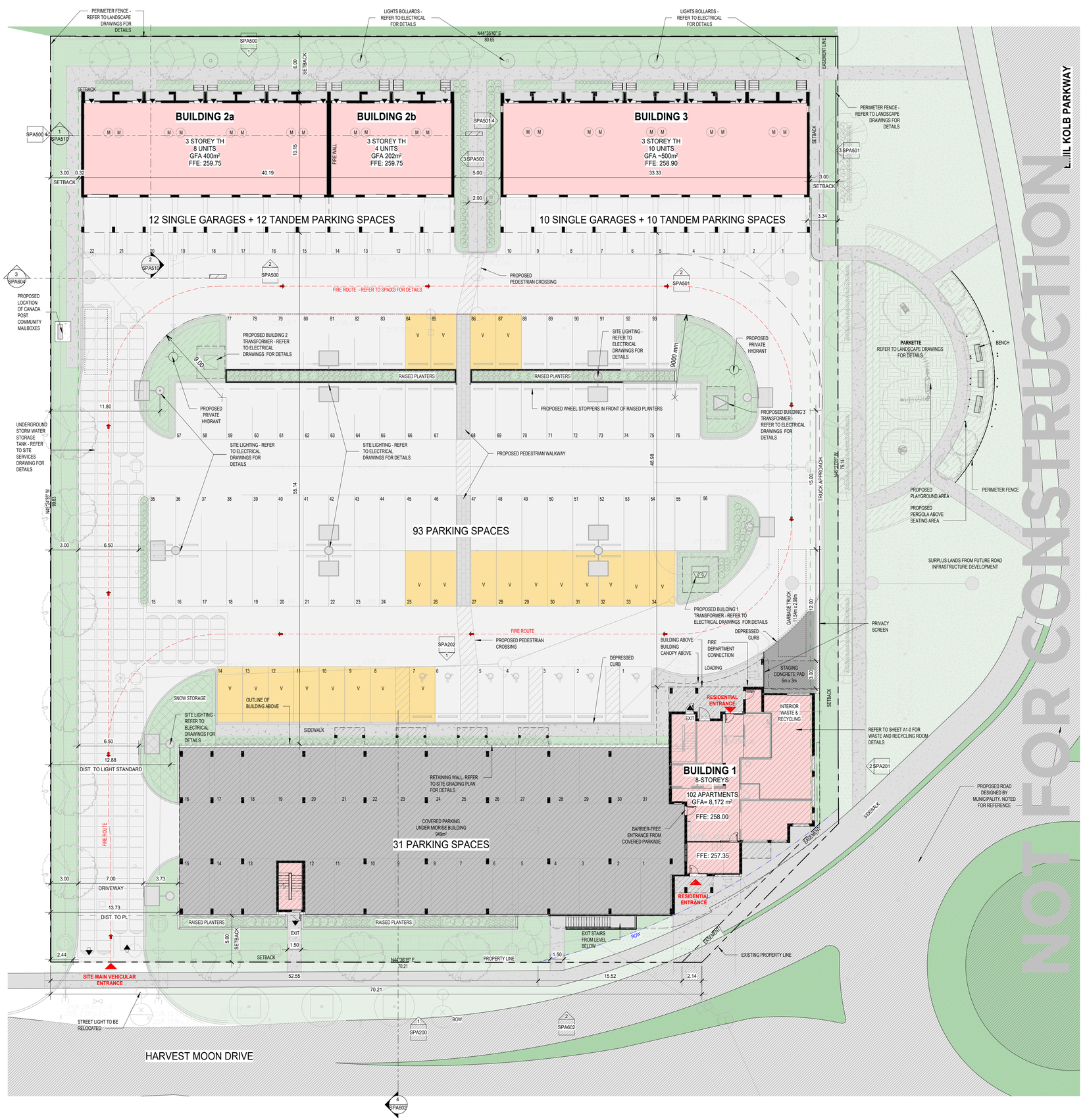
ACCESSIBLE PARKING TYPE B — 2.75 — 6.00

NO PARKING AREA

VISITOR PARKING



KEY PLAN N.T.S.



Q4A ARCHITECTS

Q4 ARCHITECTS INC.
4110 Yonge Street
Suite 602,Toronto,ON.
M2P 2B7
T. 416.322.6334
F. 416.322.7294
E. info@q4architects.com

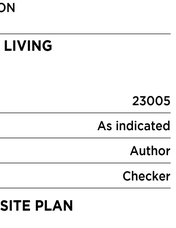
PN / TN

TN = TRUE NORTH
PN = PROJECT NORTH

The contractor / builder must verify all dimensions on the job and report any discrepancy to the designer before proceeding with the work.

Drawings are NOT to be scaled. All drawings and specifications are instruments of service and the copyright property of the designer and must be returned upon request.

KEYPLAN



Issued For:

01	Issue for SPA Coordination	2024-11-21
02	Issue for SPA Coordination #2	2025-01-07
03	Issued for Review - Stubbes	2025-01-22
04	Issued for Client Review	2025-01-23
06	Issued for SPA Coordination #3	2025-01-29
07	Issued for Client Review	2025-01-31
08	Issued for SPA Coordination #4	2025-02-20
09	Issued for Site Plan Application	2025-02-28
10	Issued for Rezoning Application	2025-02-28
11	Issued for SPA #2 Coordination	2025-09-24
12	Issued for SPA #2 Coord. #2	2025-10-21
13	Issued for SPA #2 Coord. #3	2025-10-23
14	Issued for SPA #2 Coord. #4	2025-11-13
15	Issued for SPA #2- CLIENT REVIEW	2025-11-18
16	Issued for SPA #2 Coord. #5	2025-11-26
17	Issued for Site Plan App. #2	2025-12-03
18	Issued for Rezoning App #2	2025-12-03

No	Description	Date

Revision Schedule

Project Title

Project Description

BOLTON VILLAGE (ARPEGGIO)

13656, 13668 EMIL KOLB PARKWAY
BOLTON, ON

CAMCOS LIVING

Project No.	23005
Scale	As indicated
Drawn By	Author
Checked By	Checker

MASTER SITE PLAN

BUILDING 1-2-3

SPA001 2

C:\Users\cgonzalez\Documents\Bolton_Site_cgonzalezA3TWL.rvt
2025-12-03 12:45:58 PM

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2307652**	Page	: 1 of 5
Client	: **Hydrogeology Consulting Services**	Laboratory	: Waterloo - Environmental
Contact	: Chris Helmer	Account Manager	: Emily Smith
Address	: 25 Water Street West Elora ON Canada N0B 1S0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 905 550 0969	Telephone	: +1 519 886 6910
Project	: Emil Kolb Parkway	Date Samples Received	: 28-Mar-2023 19:00
PO	: ----	Date Analysis Commenced	: 30-Mar-2023
C-O-C number	: ----	Issue Date	: 04-Apr-2023 17:20
Sampler	: Client		
Site	: ----		
Quote number	: Standing Offer 2022		
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
- Guideline Comparison

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*
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Katrina Zwambag	Business Manager - Environmental	LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	VOC, 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.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre
mg/L	milligrams per litre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit .

Qualifiers

Qualifier	*Description*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DLUI	*Detection Limit Raised: Unknown interference generated an apparent false positive test result.*
OWP	*Organic water sample contained visible sediment (must be included as part of analysis). Measured concentrations of organic substances in water can be biased high due to presence of sediment.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	Method	LOR	Unit	Client sample ID: A360497 Sampling date/time: 28-Mar-2023 11:00 WT2307652-001	RMPSUB SAN	RMPSUB STM				
Physical Tests										
pH	E108	0.10	pH units	8.01	5.5 - 10 pH units	6 - 9 pH units	--	--	--	--
Solids, total suspended [TSS]	E160	3.0	mg/L	132	350 mg/L	15 mg/L	--	--	--	--
Anions and Nutrients										
Fluoride	E235.F	0.020	mg/L	0.108	10 mg/L	--	--	--	--	--
Sulfate (as SO4)	E235.SO4	0.30	mg/L	26.5	1500 mg/L	--	--	--	--	--
Cyanides										
Cyanide, strong acid dissociable (Total)	E333	0.0020	mg/L	<0.0020	2 mg/L	0.02 mg/L	--	--	--	--
Total Metals										
Aluminum, total	E420	0.0030	mg/L	1.08 DLHC	50 mg/L	--	--	--	--	--
Antimony, total	E420	0.00010	mg/L	0.00101 DLHC	5 mg/L	--	--	--	--	--
Arsenic, total	E420	0.00010	mg/L	<0.00100 DLHC	1 mg/L	0.02 mg/L	--	--	--	--
Cadmium, total	E420	0.0000050	mg/L	<0.000130 DLHC DLM	0.7 mg/L	0.008 mg/L	--	--	--	--
Chromium, total	E420	0.00050	mg/L	0.0106 DLHC	5 mg/L	0.08 mg/L	--	--	--	--
Cobalt, total	E420	0.00010	mg/L	0.00145 DLHC	5 mg/L	--	--	--	--	--
Copper, total	E420	0.00050	mg/L	0.00778 DLHC	3 mg/L	0.05 mg/L	--	--	--	--
Lead, total	E420	0.000050	mg/L	0.00704 DLHC	3 mg/L	0.12 mg/L	--	--	--	--
Manganese, total	E420	0.00010	mg/L	0.115 DLHC	5 mg/L	0.05 mg/L	--	--	--	--
Mercury, total	E508	0.0000050	mg/L	<0.0000050	0.01 mg/L	0.0004 mg/L	--	--	--	--
Molybdenum, total	E420	0.000050	mg/L	0.0722 DLHC	5 mg/L	--	--	--	--	--
Nickel, total	E420	0.00050	mg/L	0.0161 DLHC	3 mg/L	0.08 mg/L	--	--	--	--
Selenium, total	E420	0.000050	mg/L	0.00252 DLHC	1 mg/L	0.02 mg/L	--	--	--	--
Silver, total	E420	0.000010	mg/L	<0.000100 DLHC	5 mg/L	0.12 mg/L	--	--	--	--
Tin, total	E420	0.00010	mg/L	0.00566 DLHC	5 mg/L	--	--	--	--	--
Titanium, total	E420	0.00030	mg/L	<0.0400 DLHC DLUI	5 mg/L	--	--	--	--	--
Zinc, total	E420	0.0030	mg/L	0.600 DLHC	3 mg/L	0.04 mg/L	--	--	--	--
Aggregate Organics										
Carbonaceous biochemical oxygen demand [CBOD]	E555	2.0	mg/L	3.0	300 mg/L	15 mg/L	--	--	--	--
Volatile Organic Compounds										
Benzene	E611D	0.50	µg/L	<0.50 OWP	10 µg/L	2 µg/L	--	--	--	--

Analyte	Method	LOR	Unit	WT2307652-001 (Continued)		RMPSUB SAN	RMPSUB STM				
Volatile Organic Compounds - Continued											
Chloroform	E611D	0.50	µg/L	<0.50	OWP	40 µg/L	2 µg/L	--	--	--	--
Dichlorobenzene, 1,2-	E611D	0.50	µg/L	<0.50	OWP	50 µg/L	5.6 µg/L	--	--	--	--
Dichlorobenzene, 1,4-	E611D	0.50	µg/L	<0.50	OWP	80 µg/L	6.8 µg/L	--	--	--	--
Dichloroethylene, cis-1,2-	E611D	0.50	µg/L	<0.50	OWP	4000 µg/L	5.6 µg/L	--	--	--	--
Dichloromethane	E611D	1.0	µg/L	<1.0	OWP	2000 µg/L	5.2 µg/L	--	--	--	--
Dichloropropylene, trans-1,3-	E611D	0.30	µg/L	<0.30	OWP	140 µg/L	5.6 µg/L	--	--	--	--
Ethylbenzene	E611D	0.50	µg/L	<0.50	OWP	160 µg/L	2 µg/L	--	--	--	--
Methyl ethyl ketone [MEK]	E611D	20	µg/L	<20	OWP	8000 µg/L	--	--	--	--	--
Styrene	E611D	0.50	µg/L	<0.50	OWP	200 µg/L	--	--	--	--	--
Tetrachloroethane, 1,1,2,2-	E611D	0.50	µg/L	<0.50	OWP	1400 µg/L	17 µg/L	--	--	--	--
Tetrachloroethylene	E611D	0.50	µg/L	<0.50	OWP	1000 µg/L	4.4 µg/L	--	--	--	--
Toluene	E611D	0.50	µg/L	<0.50	OWP	270 µg/L	2 µg/L	--	--	--	--
Trichloroethylene	E611D	0.50	µg/L	<0.50	OWP	400 µg/L	8 µg/L	--	--	--	--
Xylene, m+p-	E611D	0.40	µg/L	<0.40	OWP	--	--	--	--	--	--
Xylene, o-	E611D	0.30	µg/L	<0.30	OWP	--	--	--	--	--	--
Xylenes, total	E611D	0.50	µg/L	<0.50	OWP	1400 µg/L	4.4 µg/L	--	--	--	--
Volatile Organic Compounds Surrogates											
Bromofluorobenzene, 4-	E611D	1.0	%	94.1		--	--	--	--	--	--
Difluorobenzene, 1,4-	E611D	1.0	%	101		--	--	--	--	--	--
Nonylphenols											
Nonylphenol diethoxylates [NP2EO]	E749B	0.10	µg/L	<0.10		--	--	--	--	--	--
Nonylphenol ethoxylates, total	E749B	2.0	µg/L	<2.0		200 µg/L	--	--	--	--	--
Nonylphenol monoethoxylates [NP1EO]	E749B	2.0	µg/L	<2.0		--	--	--	--	--	--
Nonylphenols [NP]	E749A	1.0	µg/L	<1.0		20 µg/L	--	--	--	--	--
Polychlorinated Biphenyls											
Aroclor 1016	E687	0.020	µg/L	<0.020		--	--	--	--	--	--
Aroclor 1221	E687	0.020	µg/L	<0.020		--	--	--	--	--	--
Aroclor 1232	E687	0.020	µg/L	<0.020		--	--	--	--	--	--
Aroclor 1242	E687	0.020	µg/L	<0.020		--	--	--	--	--	--
Aroclor 1248	E687	0.020	µg/L	<0.020		--	--	--	--	--	--
Aroclor 1254	E687	0.020	µg/L	<0.020		--	--	--	--	--	--
Aroclor 1260	E687	0.020	µg/L	<0.020		--	--	--	--	--	--
Aroclor 1262	E687	0.020	µg/L	<0.020		--	--	--	--	--	--
Aroclor 1268	E687	0.020	µg/L	<0.020		--	--	--	--	--	--

Analyte	Method	LOR	Unit	WT2307652-001 (Continued)	RMPSUB SAN	RMPSUB STM				
Polychlorinated Biphenyls - Continued										
Polychlorinated biphenyls [PCBs], total	E687	0.060	µg/L	<0.060	1 µg/L	0.4 µg/L	--	--	--	--
Decachlorobiphenyl	E687	0.1	%	81.1	--	--	--	--	--	--
Tetrachloro-m-xylene	E687	0.1	%	90.2	--	--	--	--	--	--

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
A360497	Water	Solids, total suspended [TSS]		RMPSUB	STM	132 mg/L	15 mg/L
	Water	Manganese, total		RMPSUB	STM	0.115 mg/L	0.05 mg/L
	Water	Zinc, total		RMPSUB	STM	0.600 mg/L	0.04 mg/L

Key:

RMPSUB Ontario Reg.Mun. of Peel Sewer Bylaw #53-2010 (APR, 2019)

SAN Peel Sanitary Sewer (53-2010)

STM Peel Storm Sewer (53-2010)

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2307652**	Page	: 1 of 9
Client	: **Hydrogeology Consulting Services**	Laboratory	: Waterloo - Environmental
Contact	: Chris Helmer	Account Manager	: Emily Smith
Address	: 25 Water Street West Elora ON Canada N0B 1S0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 905 550 0969	Telephone	: +1 519 886 6910
Project	: Emil Kolb Parkway	Date Samples Received	: 28-Mar-2023 19:00
PO	: ----	Issue Date	: 04-Apr-2023 17:20
C-O-C number	: ----		
Sampler	: Client		
Site	: ----		
Quote number	: Standing Offer 2022		
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								
Nonylphenols	Anonymous	Anonymous	Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	154 % K	60.0-140%	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 / 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 (Carbonaceous) - 5 day										
HDPE [BOD HT-4d] A360497	E555	28-Mar-2023	----	----	----		30-Mar-2023	4 days	2 days	✓
Anions and Nutrients : Fluoride in Water by IC										
HDPE [ON MECP] A360497	E235.F	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	2 days	✓
Anions and Nutrients : Sulfate in Water by IC										
HDPE [ON MECP] A360497	E235.SO4	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	2 days	✓
Cyanides : Total Cyanide										
UV-inhibited HDPE - total (sodium hydroxide) A360497	E333	28-Mar-2023	31-Mar-2023	----	----		31-Mar-2023	14 days	3 days	✓
Nonylphenols : Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode										
Amber glass/Teflon lined cap - LCMS A360497	E749B	28-Mar-2023	31-Mar-2023	7 days	3 days	✓	31-Mar-2023	7 days	0 days	✓
Nonylphenols : Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode										
Amber glass/Teflon lined cap - LCMS A360497	E749A	28-Mar-2023	31-Mar-2023	7 days	3 days	✓	31-Mar-2023	7 days	0 days	✓
Physical Tests : pH by Meter										
HDPE [ON MECP] A360497	E108	28-Mar-2023	30-Mar-2023	----	----		02-Apr-2023	14 days	5 days	✓

Matrix: **Water**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / 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]										
A360497	E160	28-Mar-2023	----	----	----		31-Mar-2023	7 days	3 days	✓
Polychlorinated Biphenyls : PCB Aroclors by GC-MS										
Amber glass/Teflon lined cap [ON MECP]										
A360497	E687	28-Mar-2023	31-Mar-2023	14 days	3 days	✓	04-Apr-2023	40 days	4 days	✓
Total Metals : Total Mercury in Water by CVAAS										
Glass vial total (hydrochloric acid) [ON MECP]										
A360497	E508	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	28 days	2 days	✓
Total Metals : Total metals in Water by CRC ICPMS										
HDPE total (nitric acid)										
A360497	E420	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	180 days	2 days	✓
Volatile Organic Compounds : VOCs (Eastern Canada List) by Headspace GC-MS										
Glass vial (sodium bisulfate)										
A360497	E611D	28-Mar-2023	30-Mar-2023	----	----		30-Mar-2023	14 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)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	881353	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	881401	1	10	10.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	882641	1	19	5.2	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	882640	1	19	5.2	5.0	✓
pH by Meter	E108	881407	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	881405	1	10	10.0	5.0	✓
Total Cyanide	E333	883279	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	880982	1	10	10.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	880783	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	883185	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	882243	1	17	5.8	5.0	✓
Laboratory Control Samples (LCS)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	881353	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	881401	1	10	10.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	882641	1	19	5.2	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	882640	1	19	5.2	5.0	✓
PCB Aroclors by GC-MS	E687	882593	1	17	5.8	4.7	✓
pH by Meter	E108	881407	1	18	5.5	5.0	✓
Sulfate in Water by IC	E235.SO4	881405	1	10	10.0	5.0	✓
Total Cyanide	E333	883279	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	880982	1	10	10.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	880783	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	883185	1	19	5.2	4.7	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	882243	1	17	5.8	5.0	✓
Method Blanks (MB)							
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555	881353	1	20	5.0	5.0	✓
Fluoride in Water by IC	E235.F	881401	1	10	10.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	882641	1	19	5.2	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	882640	1	19	5.2	5.0	✓
PCB Aroclors by GC-MS	E687	882593	1	17	5.8	4.7	✓
Sulfate in Water by IC	E235.SO4	881405	1	10	10.0	5.0	✓
Total Cyanide	E333	883279	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	880982	1	10	10.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	880783	1	7	14.2	5.0	✓
TSS by Gravimetry	E160	883185	1	19	5.2	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*
Method Blanks (MB) - Continued							
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	882243	1	17	5.8	5.0	✓
Matrix Spikes (MS)							
Fluoride in Water by IC	E235.F	881401	1	10	10.0	5.0	✓
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B	882641	1	19	5.2	5.0	✓
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A	882640	1	19	5.2	5.0	✓
Sulfate in Water by IC	E235.SO4	881405	1	10	10.0	5.0	✓
Total Cyanide	E333	883279	1	20	5.0	5.0	✓
Total Mercury in Water by CVAAS	E508	880982	1	10	10.0	5.0	✓
Total metals in Water by CRC ICPMS	E420	880783	1	7	14.2	5.0	✓
VOCs (Eastern Canada List) by Headspace GC-MS	E611D	882243	1	17	5.8	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
pH by Meter	E108 Waterloo - Environmental	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 Waterloo - Environmental	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 Waterloo - Environmental	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 Waterloo - Environmental	Water	EPA 300.1 (mod)	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.
Total Cyanide	E333 Waterloo - Environmental	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 metals in Water by CRC ICPMS	E420 Waterloo - Environmental	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.
Total Mercury in Water by CVAAS	E508 Waterloo - Environmental	Water	EPA 1631E (mod)	Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS
Biochemical Oxygen Demand (Carbonaceous) - 5 day	E555 Waterloo - Environmental	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. Nitrification inhibitor is added to samples to prevent nitrogenous compounds from consuming oxygen resulting in only carbonaceous oxygen demand being reported by this method. Free chlorine is a negative interference in the BOD method; please advise ALS when free chlorine is present in samples.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs (Eastern Canada List) by Headspace GC-MS	E611D Waterloo - Environmental	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.
PCB Aroclors by GC-MS	E687 Waterloo - Environmental	Water	EPA 8270E (mod)	PCB Aroclors are analyzed by GC-MS
Nonylphenol, Octylphenol and BPA in Water by LC-MS-MS Negative Mode	E749A Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.
Nonylphenol Ethoxylates in Water by LC-MS-MS Positive Mode	E749B Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	Water samples are filtered and analyzed on LCMS/MS by direct injection.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
VOCs Preparation for Headspace Analysis	EP581 Waterloo - Environmental	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 the GC/MS-FID system.
Pesticides, PCB, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 Waterloo - Environmental	Water	EPA 3511 (mod)	Samples are extracted from aqueous sample using an organic solvent liquid-liquid extraction.
Preparation of Nonylphenol and Nonylphenol Ethoxylates	EP749 Waterloo - Environmental	Water	J. Chrom A849 (1999) p.467-482	An aliquot of 5.0 ± 0.10 mL of filtered sample is spiked with Nonylphenol-D4, Nonylphenol Diethoxylate 13C6, and Bisphenol A 13C12 internal standards and analyzed by LC-MS/MS.

QUALITY CONTROL REPORT

Work Order	: **WT2307652**	Page	: 1 of 11
Client	: Hydrogeology Consulting Services	Laboratory	: Waterloo - Environmental
Contact	: Chris Helmer	Account Manager	: Emily Smith
Address	: 25 Water Street West Elora ON Canada N0B 1S0	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: +1 519 886 6910
Project	: Emil Kolb Parkway	Date Samples Received	: 28-Mar-2023 19:00
PO	: ----	Date Analysis Commenced	: 30-Mar-2023
C-O-C number	: ----	Issue Date	: 04-Apr-2023 17:29
Sampler	: Client 905 550 0969		
Site	: ----		
Quote number	: Standing Offer 2022		
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*
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Katrina Zwambag	Business Manager - Environmental	Waterloo LCMS, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo VOC, 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: 881407)											
HA2300112-001	Anonymous	pH	----	E108	0.10	pH units	9.28	9.23	0.540%	4%	----
Physical Tests (QC Lot: 883185)											
WT2307669-001	Anonymous	Solids, total suspended [TSS]	----	E160	3.0	mg/L	14.6	13.2	1.4	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 881401)											
WT2307730-001	Anonymous	Fluoride	16984-48-8	E235.F	0.020	mg/L	0.092	0.090	0.002	Diff <2x LOR	----
Anions and Nutrients (QC Lot: 881405)											
WT2307730-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	0.30	mg/L	130	130	0.100%	20%	----
Cyanides (QC Lot: 883279)											
HA2300112-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.0020	mg/L	<0.0020	<0.0020	0	Diff <2x LOR	----
Total Metals (QC Lot: 880783)											
WT2307652-001	A360497	Aluminum, total	7429-90-5	E420	0.0300	mg/L	1.08	1.05	3.04%	20%	----
		Antimony, total	7440-36-0	E420	0.00100	mg/L	0.00101	<0.00100	0.00001	Diff <2x LOR	----
		Arsenic, total	7440-38-2	E420	0.00100	mg/L	<0.00100	<0.00100	0	Diff <2x LOR	----
		Cadmium, total	7440-43-9	E420	0.000130	mg/L	<0.000130	<0.000130	0	Diff <2x LOR	----
		Chromium, total	7440-47-3	E420	0.00500	mg/L	0.0106	0.0111	0.00045	Diff <2x LOR	----
		Cobalt, total	7440-48-4	E420	0.00100	mg/L	0.00145	0.00144	0.000006	Diff <2x LOR	----
		Copper, total	7440-50-8	E420	0.00500	mg/L	0.00778	0.00780	0.00002	Diff <2x LOR	----
		Lead, total	7439-92-1	E420	0.000500	mg/L	0.00704	0.00710	0.857%	20%	----
		Manganese, total	7439-96-5	E420	0.00100	mg/L	0.115	0.115	0.177%	20%	----
		Molybdenum, total	7439-98-7	E420	0.000500	mg/L	0.0722	0.0716	0.916%	20%	----
		Nickel, total	7440-02-0	E420	0.00500	mg/L	0.0161	0.0157	0.00040	Diff <2x LOR	----
		Selenium, total	7782-49-2	E420	0.000500	mg/L	0.00252	0.00260	0.000076	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	0.00566	0.00515	0.00051	Diff <2x LOR	----
		Titanium, total	7440-32-6	E420	0.00300	mg/L	<0.0400	0.0411	0.0411	Diff <2x LOR	----
		Zinc, total	7440-66-6	E420	0.0300	mg/L	0.600	0.613	2.08%	20%	----
Total Metals (QC Lot: 880982)											
WT2307652-001	A360497	Mercury, total	7439-97-6	E508	0.0000050	mg/L	<0.0000050	0.0000060	0.0000010	Diff <2x LOR	----
Aggregate Organics (QC Lot: 881353)											

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*
Aggregate Organics (QC Lot: 881353) - continued											
WT2307802-001	Anonymous	Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2.0	mg/L	31.0	31.2	0.4%	30%	----
Volatile Organic Compounds (QC Lot: 882243)											
WT2307767-001	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	<0.50	<0.50	0	Diff <2x LOR	----
		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	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	<20	0	Diff <2x LOR	----
		Styrene	100-42-5	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	<0.50	<0.50	0	Diff <2x LOR	----
		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: 882640)											
RG2300320-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	100	µg/L	<100	<100	0	Diff <2x LOR	----
Nonylphenols (QC Lot: 882641)											
RG2300320-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.10	µg/L	<0.10	<0.10	0	Diff <2x LOR	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2.0	µg/L	<2.0	<2.0	0	Diff <2x LOR	----

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: 883185)						
Solids, total suspended [TSS]	----	E160	3	mg/L	<3.0	----
Anions and Nutrients (QCLot: 881401)						
Fluoride	16984-48-8	E235.F	0.02	mg/L	<0.020	----
Anions and Nutrients (QCLot: 881405)						
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	<0.30	----
Cyanides (QCLot: 883279)						
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	<0.0020	----
Total Metals (QCLot: 880783)						
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	----
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	----
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	----
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: 880982)						
Mercury, total	7439-97-6	E508	0.000005	mg/L	<0.0000050	----
Aggregate Organics (QCLot: 881353)						
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	<2.0	----
Volatile Organic Compounds (QCLot: 882243)						
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	----

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 882243) - continued						
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	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	<20	----
Styrene	100-42-5	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	----
Nonylphenols (QCLot: 882640)						
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	<1.0	----
Nonylphenols (QCLot: 882641)						
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	<0.10	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	<2.0	----
Polychlorinated Biphenyls (QCLot: 882593)						
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	----

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	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 881407)									
pH	----	E108	----	pH units	7 pH units	101	98.0	102	----
Physical Tests (QCLot: 883185)									
Solids, total suspended [TSS]	----	E160	3	mg/L	150 mg/L	95.0	85.0	115	----
Anions and Nutrients (QCLot: 881401)									
Fluoride	16984-48-8	E235.F	0.02	mg/L	1 mg/L	102	90.0	110	----
Anions and Nutrients (QCLot: 881405)									
Sulfate (as SO4)	14808-79-8	E235.SO4	0.3	mg/L	100 mg/L	102	90.0	110	----
Cyanides (QCLot: 883279)									
Cyanide, strong acid dissociable (Total)	----	E333	0.002	mg/L	0.25 mg/L	94.4	80.0	120	----
Total Metals (QCLot: 880783)									
Aluminum, total	7429-90-5	E420	0.003	mg/L	0.1 mg/L	96.4	80.0	120	----
Antimony, total	7440-36-0	E420	0.0001	mg/L	0.05 mg/L	104	80.0	120	----
Arsenic, total	7440-38-2	E420	0.0001	mg/L	0.05 mg/L	107	80.0	120	----
Cadmium, total	7440-43-9	E420	0.000005	mg/L	0.005 mg/L	97.8	80.0	120	----
Chromium, total	7440-47-3	E420	0.0005	mg/L	0.0125 mg/L	102	80.0	120	----
Cobalt, total	7440-48-4	E420	0.0001	mg/L	0.0125 mg/L	102	80.0	120	----
Copper, total	7440-50-8	E420	0.0005	mg/L	0.0125 mg/L	100	80.0	120	----
Lead, total	7439-92-1	E420	0.00005	mg/L	0.025 mg/L	97.9	80.0	120	----
Manganese, total	7439-96-5	E420	0.0001	mg/L	0.0125 mg/L	101	80.0	120	----
Molybdenum, total	7439-98-7	E420	0.00005	mg/L	0.0125 mg/L	99.4	80.0	120	----
Nickel, total	7440-02-0	E420	0.0005	mg/L	0.025 mg/L	100	80.0	120	----
Selenium, total	7782-49-2	E420	0.00005	mg/L	0.05 mg/L	103	80.0	120	----
Silver, total	7440-22-4	E420	0.00001	mg/L	0.005 mg/L	93.6	80.0	120	----
Tin, total	7440-31-5	E420	0.0001	mg/L	0.025 mg/L	99.0	80.0	120	----
Titanium, total	7440-32-6	E420	0.0003	mg/L	0.0125 mg/L	100	80.0	120	----
Zinc, total	7440-66-6	E420	0.003	mg/L	0.025 mg/L	101	80.0	120	----
Total Metals (QCLot: 880982)									
Mercury, total	7439-97-6	E508	0.000005	mg/L	0.0001 mg/L	91.7	80.0	120	----
Aggregate Organics (QCLot: 881353)									

Sub-Matrix: **Water**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Aggregate Organics (QCLot: 881353) - continued									
Carbonaceous biochemical oxygen demand [CBOD]	----	E555	2	mg/L	198 mg/L	107	85.0	115	----
Volatile Organic Compounds (QCLot: 882243)									
Benzene	71-43-2	E611D	0.5	µg/L	100 µg/L	98.5	70.0	130	----
Chloroform	67-66-3	E611D	0.5	µg/L	100 µg/L	93.0	70.0	130	----
Dichlorobenzene, 1,2-	95-50-1	E611D	0.5	µg/L	100 µg/L	91.6	70.0	130	----
Dichlorobenzene, 1,4-	106-46-7	E611D	0.5	µg/L	100 µg/L	90.1	70.0	130	----
Dichloroethylene, cis-1,2-	156-59-2	E611D	0.5	µg/L	100 µg/L	97.5	70.0	130	----
Dichloromethane	75-09-2	E611D	1	µg/L	100 µg/L	99.6	70.0	130	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D	0.3	µg/L	100 µg/L	88.2	70.0	130	----
Ethylbenzene	100-41-4	E611D	0.5	µg/L	100 µg/L	91.4	70.0	130	----
Methyl ethyl ketone [MEK]	78-93-3	E611D	20	µg/L	100 µg/L	112	70.0	130	----
Styrene	100-42-5	E611D	0.5	µg/L	100 µg/L	91.2	70.0	130	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	0.5	µg/L	100 µg/L	96.4	70.0	130	----
Tetrachloroethylene	127-18-4	E611D	0.5	µg/L	100 µg/L	86.9	70.0	130	----
Toluene	108-88-3	E611D	0.5	µg/L	100 µg/L	90.7	70.0	130	----
Trichloroethylene	79-01-6	E611D	0.5	µg/L	100 µg/L	90.7	70.0	130	----
Xylene, m+p-	179601-23-1	E611D	0.4	µg/L	200 µg/L	91.3	70.0	130	----
Xylene, o-	95-47-6	E611D	0.3	µg/L	100 µg/L	90.7	70.0	130	----
Nonylphenols (QCLot: 882640)									
Nonylphenols [NP]	84852-15-3	E749A	1	µg/L	10 µg/L	93.2	75.0	125	----
Nonylphenols (QCLot: 882641)									
Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.1	µg/L	1 µg/L	97.8	75.0	125	----
Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	2	µg/L	20 µg/L	105	75.0	125	----
Polychlorinated Biphenyls (QCLot: 882593)									
Aroclor 1016	12674-11-2	E687	0.02	µg/L	0.2 µg/L	109	60.0	140	----
Aroclor 1221	11104-28-2	E687	0.02	µg/L	0.2 µg/L	109	60.0	140	----
Aroclor 1232	11141-16-5	E687	0.02	µg/L	0.2 µg/L	109	60.0	140	----
Aroclor 1242	53469-21-9	E687	0.02	µg/L	0.2 µg/L	109	60.0	140	----
Aroclor 1248	12672-29-6	E687	0.02	µg/L	0.2 µg/L	92.8	60.0	140	----
Aroclor 1254	11097-69-1	E687	0.02	µg/L	0.2 µg/L	102	60.0	140	----
Aroclor 1260	11096-82-5	E687	0.02	µg/L	0.2 µg/L	120	60.0	140	----
Aroclor 1262	37324-23-5	E687	0.02	µg/L	0.2 µg/L	120	60.0	140	----
Aroclor 1268	11100-14-4	E687	0.02	µg/L	0.2 µg/L	120	60.0	140	----

Sub-Matrix: **Water**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier

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: 881401)										
WT2307730-001	Anonymous	Fluoride	16984-48-8	E235.F	0.955 mg/L	1 mg/L	95.5	75.0	125	----
Anions and Nutrients (QCLot: 881405)										
WT2307730-001	Anonymous	Sulfate (as SO4)	14808-79-8	E235.SO4	ND mg/L	100 mg/L	ND	75.0	125	----
Cyanides (QCLot: 883279)										
HA2300112-001	Anonymous	Cyanide, strong acid dissociable (Total)	----	E333	0.242 mg/L	0.25 mg/L	96.6	75.0	125	----
Total Metals (QCLot: 880783)										
WT2307654-001	Anonymous	Aluminum, total	7429-90-5	E420	ND mg/L	0.1 mg/L	ND	70.0	130	----
		Antimony, total	7440-36-0	E420	0.0525 mg/L	0.05 mg/L	105	70.0	130	----
		Arsenic, total	7440-38-2	E420	0.0560 mg/L	0.05 mg/L	112	70.0	130	----
		Cadmium, total	7440-43-9	E420	0.00533 mg/L	0.005 mg/L	107	70.0	130	----
		Chromium, total	7440-47-3	E420	0.0131 mg/L	0.0125 mg/L	105	70.0	130	----
		Cobalt, total	7440-48-4	E420	0.0128 mg/L	0.0125 mg/L	102	70.0	130	----
		Copper, total	7440-50-8	E420	0.0126 mg/L	0.0125 mg/L	100	70.0	130	----
		Lead, total	7439-92-1	E420	0.0245 mg/L	0.025 mg/L	98.2	70.0	130	----
		Manganese, total	7439-96-5	E420	ND mg/L	0.0125 mg/L	ND	70.0	130	----
		Molybdenum, total	7439-98-7	E420	0.0129 mg/L	0.0125 mg/L	103	70.0	130	----
		Nickel, total	7440-02-0	E420	0.0250 mg/L	0.025 mg/L	100	70.0	130	----
		Selenium, total	7782-49-2	E420	0.0541 mg/L	0.05 mg/L	108	70.0	130	----
		Silver, total	7440-22-4	E420	0.00470 mg/L	0.005 mg/L	93.9	70.0	130	----
		Tin, total	7440-31-5	E420	0.0258 mg/L	0.025 mg/L	103	70.0	130	----
		Zinc, total	7440-66-6	E420	0.0257 mg/L	0.025 mg/L	103	70.0	130	----
Total Metals (QCLot: 880982)										
WT2307688-001	Anonymous	Mercury, total	7439-97-6	E508	0.0000949 mg/L	0.0001 mg/L	94.9	70.0	130	----
Volatile Organic Compounds (QCLot: 882243)										
WT2307767-001	Anonymous	Benzene	71-43-2	E611D	102 µg/L	100 µg/L	102	60.0	140	----
		Chloroform	67-66-3	E611D	97.3 µg/L	100 µg/L	97.3	60.0	140	----
		Dichlorobenzene, 1,2-	95-50-1	E611D	95.7 µg/L	100 µg/L	95.7	60.0	140	----
		Dichlorobenzene, 1,4-	106-46-7	E611D	94.3 µg/L	100 µg/L	94.3	60.0	140	----
		Dichloroethylene, cis-1,2-	156-59-2	E611D	102 µg/L	100 µg/L	102	60.0	140	----
		Dichloromethane	75-09-2	E611D	106 µg/L	100 µg/L	106	60.0	140	----

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: 882243) - continued										
WT2307767-001	Anonymous	Dichloropropylene, trans-1,3-	10061-02-6	E611D	89.4 µg/L	100 µg/L	89.4	60.0	140	----
		Ethylbenzene	100-41-4	E611D	93.3 µg/L	100 µg/L	93.3	60.0	140	----
		Methyl ethyl ketone [MEK]	78-93-3	E611D	121 µg/L	100 µg/L	121	60.0	140	----
		Styrene	100-42-5	E611D	94.2 µg/L	100 µg/L	94.2	60.0	140	----
		Tetrachloroethane, 1,1,2,2-	79-34-5	E611D	101 µg/L	100 µg/L	101	60.0	140	----
		Tetrachloroethylene	127-18-4	E611D	88.7 µg/L	100 µg/L	88.7	60.0	140	----
		Toluene	108-88-3	E611D	93.0 µg/L	100 µg/L	93.0	60.0	140	----
		Trichloroethylene	79-01-6	E611D	93.7 µg/L	100 µg/L	93.7	60.0	140	----
		Xylene, m+p-	179601-23-1	E611D	186 µg/L	200 µg/L	93.0	60.0	140	----
		Xylene, o-	95-47-6	E611D	92.8 µg/L	100 µg/L	92.8	60.0	140	----
Nonylphenols (QCLot: 882640)										
RG2300320-001	Anonymous	Nonylphenols [NP]	84852-15-3	E749A	10.0 µg/L	10 µg/L	100	60.0	140	----
Nonylphenols (QCLot: 882641)										
RG2300320-001	Anonymous	Nonylphenol diethoxylates [NP2EO]	n/a	E749B	0.91 µg/L	1 µg/L	91.3	60.0	140	----
		Nonylphenol monoethoxylates [NP1EO]	n/a	E749B	30.9 µg/L	20 µg/L	154	60.0	140	K

Qualifiers

Qualifier	Description
K	*Matrix Spike recovery outside ALS DQO due to sample matrix effects.*

Chain of Custody (COC) / Analytical Request Form

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Affix ALS barcode label here
(lab use only)

COC Number:

Pa

Environmental Division
Waterloo
Work Order Reference
WT2307652

Telephone : +1 519 886 6910

Report To	Contact and company name below will appear on the final report
Company:	Hydrogeology Consulting
Contact:	Chris Helmer
Phone:	905-550-0969
	Company address below will appear on the final report
Street:	25 Water Street West
City/Province:	Elora, ON
Postal Code:	N0B 1S0
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax chrishelmer@hydrog.ca
Email 2
Email 3

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax chrishelmer@hydrog.ca
Email 2

Select Service Level Below - Contact your AM to

Regular [R] ☒ Standard TAT if received by 3 p

PRIORITY (Business Days)
4 day [P4-20%] ☐
3 day [P3-25%] ☐
2 day [P2-50%] ☐

EMERGENCY
1 Business
Same Day, (Laboratory

Date and Time Required for all E&P TATs:

For tests that can not be performed according to the service level sel

Analysis R

Project Information

ALS Account # / Quote #: 2023 Price List
Job #: Emil Kolb Parkway
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): WT2307652 TS

ALS Contact: Emily Smith Sampler:

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	Peel Sanitary & Storm Pkg	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	A360497	28/03/23	11:00	Water	9				
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					
				Water					

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

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Peel Storm and Sanitary Sewer Use By-Law

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☑ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				-0.3			

SHIPMENT RELEASE (client use)

Released by:	Date:	Time:
Silvia Valentini	28/03/23	6:30 PM

INITIAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by:	Date:	Time:
CS	Mar 28/23	7pm

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NOV 2018 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**.

CN - 618

Hydrogeology Consulting Services
(Kitchener)
ATTN: Chris Helmer
28 Upper Mercer Street
Kitchener ON N2A 4M9

Date Received: 07-JUN-21
Report Date: 18-JUN-21 14:02 (MT)
Version: FINAL

Client Phone: 905-550-0969

Certificate of Analysis

Lab Work Order #: L2597301

Project P.O. #: NOT SUBMITTED
Job Reference: COLERAIN
C of C Numbers:
Legal Site Desc:

Emily Smith
Account Manager

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2597301-1 BH02-21 & BH03-21 Sampled By: CLIENT on 06-JUN-21 @ 17:38 Matrix: WATER							
Physical Tests							
pH	7.74		0.10	pH units	08-JUN-21	5.5-10	6-9
Total Suspended Solids	367		3.0	mg/L	10-JUN-21	*350	*15
Anions and Nutrients							
Fluoride (F)	0.161		0.020	mg/L	10-JUN-21	10	
Total Kjeldahl Nitrogen	0.320		0.050	mg/L	14-JUN-21	100	1
Phosphorus, Total	0.358		0.0030	mg/L	11-JUN-21	10	0.4
Cyanides							
Cyanide, Total	<0.010	DLM	0.010	mg/L	09-JUN-21	2	0.02
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	07-JUN-21		200
Total Metals							
Aluminum (Al)-Total	7.58	DLHC	0.050	mg/L	08-JUN-21	50	
Antimony (Sb)-Total	<0.0010	DLHC	0.0010	mg/L	08-JUN-21	5	
Arsenic (As)-Total	0.0036	DLHC	0.0010	mg/L	08-JUN-21	1	0.02
Cadmium (Cd)-Total	0.000085	DLHC	0.000050	mg/L	08-JUN-21	0.7	0.008
Chromium (Cr)-Total	0.0383	DLHC	0.0050	mg/L	08-JUN-21	5	0.08
Cobalt (Co)-Total	0.0058	DLHC	0.0010	mg/L	08-JUN-21	5	
Copper (Cu)-Total	0.0269	DLHC	0.0050	mg/L	08-JUN-21	3	0.05
Lead (Pb)-Total	0.0101	DLHC	0.00050	mg/L	08-JUN-21	3	0.120
Manganese (Mn)-Total	0.423	DLHC	0.0050	mg/L	08-JUN-21	5	*0.05
Mercury (Hg)-Total	<0.0000050		0.0000050	mg/L	09-JUN-21	0.01	0.0004
Molybdenum (Mo)-Total	0.0175	DLHC	0.00050	mg/L	08-JUN-21	5	
Nickel (Ni)-Total	0.0196	DLHC	0.0050	mg/L	08-JUN-21	3	0.08
Selenium (Se)-Total	0.00394	DLHC	0.00050	mg/L	08-JUN-21	1	0.02
Silver (Ag)-Total	<0.00050	DLHC	0.00050	mg/L	08-JUN-21	5	0.12
Tin (Sn)-Total	0.0059	DLHC	0.0010	mg/L	08-JUN-21	5	
Titanium (Ti)-Total	0.203	DLHC	0.0030	mg/L	08-JUN-21	5	
Zinc (Zn)-Total	0.095	DLHC	0.030	mg/L	08-JUN-21	3	*0.04
Speciated Metals							
Chromium, Hexavalent	<0.00050		0.00050	mg/L	08-JUN-21		
Aggregate Organics							
BOD	3.9		2.0	mg/L	08-JUN-21	300	
Oil and Grease, Total	<5.0		5.0	mg/L	17-JUN-21		
Animal/Veg Oil & Grease	<5.0		5.0	mg/L	18-JUN-21	150	
Mineral Oil and Grease	<2.5		2.5	mg/L	17-JUN-21	15	
Phenols (4AAP)	<0.0010		0.0010	mg/L	10-JUN-21	1	0.008
Volatile Organic Compounds							
Benzene	<0.50		0.50	ug/L	14-JUN-21	10	2
Chloroform	<1.0		1.0	ug/L	14-JUN-21	40	2
1,2-Dichlorobenzene	<0.50		0.50	ug/L	14-JUN-21	50	5.6
1,4-Dichlorobenzene	<0.50		0.50	ug/L	14-JUN-21	80	6.8
cis-1,2-Dichloroethylene	<0.50		0.50	ug/L	14-JUN-21	4000	5.6
Dichloromethane	<2.0		2.0	ug/L	14-JUN-21	2000	5.2

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Reg. Mun. of Peel Sanitary Bylaw #53-2010 (APR. 2011) = [Suite] - ON-SAN+STORM-PEEL

#1: Reg. Mun. of Peel Sanitary by-law #53-2010

#2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	Guideline Limits #2
L2597301-1 BH02-21 & BH03-21							
Sampled By: CLIENT on 06-JUN-21 @ 17:38							
Matrix: WATER							
Volatile Organic Compounds							
trans-1,3-Dichloropropene	<0.50		0.50	ug/L	14-JUN-21	140	5.6
Ethylbenzene	<0.50		0.50	ug/L	14-JUN-21	160	2
1,1,2,2-Tetrachloroethane	<0.50		0.50	ug/L	14-JUN-21	1400	17
Tetrachloroethylene	<0.50		0.50	ug/L	14-JUN-21	1000	4.4
Toluene	<0.50		0.50	ug/L	14-JUN-21	270	2
Trichloroethylene	<0.50		0.50	ug/L	14-JUN-21	400	8
o-Xylene	<0.50		0.50	ug/L	14-JUN-21		
m+p-Xylenes	<1.0		1.0	ug/L	14-JUN-21		
Xylenes (Total)	<1.1		1.1	ug/L	14-JUN-21	1400	4.4
Surrogate: 4-Bromofluorobenzene	93.2		70-130	%	14-JUN-21		
Surrogate: 1,4-Difluorobenzene	98.3		70-130	%	14-JUN-21		
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.010		0.010	ug/L	18-JUN-21		
Anthracene	<0.010		0.010	ug/L	18-JUN-21		
Benzo(a)anthracene	<0.010		0.010	ug/L	18-JUN-21		
Benzo(a)pyrene	<0.010		0.010	ug/L	18-JUN-21		
Benzo(b&j)fluoranthene	<0.010		0.010	ug/L	18-JUN-21		
Benzo(e)pyrene	<0.050		0.050	ug/L	18-JUN-21		
Benzo(ghi)perylene	<0.010		0.010	ug/L	18-JUN-21		
Benzo(k)fluoranthene	<0.010		0.010	ug/L	18-JUN-21		
Chrysene	0.033		0.010	ug/L	18-JUN-21		
Dibenz(a,h)acridine	<0.050		0.050	ug/L	18-JUN-21		
Dibenz(a,j)acridine	<0.050		0.050	ug/L	18-JUN-21		
Dibenz(a,h)anthracene	<0.010		0.010	ug/L	18-JUN-21		
Dibenzo(a,i)pyrene	<0.050		0.050	ug/L	18-JUN-21		
7H-Dibenzo(c,g)carbazole	<0.050		0.050	ug/L	18-JUN-21		
1,3-Dinitropyrene	<1.0		1.0	ug/L	18-JUN-21		
1,6-Dinitropyrene	<1.0		1.0	ug/L	18-JUN-21		
1,8-Dinitropyrene	<1.0		1.0	ug/L	18-JUN-21		
Fluoranthene	<0.010		0.010	ug/L	18-JUN-21		
Fluorene	<0.010		0.010	ug/L	18-JUN-21		
Indeno(1,2,3-cd)pyrene	<0.010		0.010	ug/L	18-JUN-21		
Naphthalene	0.032		0.010	ug/L	18-JUN-21		
Perylene	<0.010		0.010	ug/L	18-JUN-21		
Phenanthrene	0.037		0.010	ug/L	18-JUN-21		
Pyrene	0.019	R	0.010	ug/L	18-JUN-21		
Surrogate: 2-Fluorobiphenyl	87.8		40-130	%	18-JUN-21		
Surrogate: D14-Terphenyl	85.8		40-130	%	18-JUN-21		
Surrogate: d14-Terphenyl	83.5		40-130	%	18-JUN-21		
Total PAHs	<1.7		1.7	ug/L	18-JUN-21		
Semi-Volatile Organics							
3,3'-Dichlorobenzidine	<0.40		0.40	ug/L	18-JUN-21		
Di-n-butylphthalate	<1.0		1.0	ug/L	18-JUN-21	80	15
Bis(2-ethylhexyl)phthalate	<2.0		2.0	ug/L	18-JUN-21	12	8.8
Pentachlorophenol	<0.50		0.50	ug/L	18-JUN-21		
Surrogate: 2-Fluorobiphenyl	93.5		40-130	%	18-JUN-21		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Reg. Mun. of Peel Sanitary Bylaw #53-2010 (APR. 2011) = [Suite] - ON-SAN+STORM-PEEL

#1: Reg. Mun. of Peel Sanitary by-law #53-2010

#2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L2597301-1 BH02-21 & BH03-21									
Sampled By: CLIENT on 06-JUN-21 @ 17:38									
Matrix: WATER									
Semi-Volatile Organics									
Surrogate: p-Terphenyl d14	83.8		40-130	%	18-JUN-21				
Surrogate: 2,4,6-Tribromophenol	95.9		40-130	%	18-JUN-21				
Polychlorinated Biphenyls									
Aroclor 1242	<0.020		0.020	ug/L	09-JUN-21				
Aroclor 1248	<0.020		0.020	ug/L	09-JUN-21				
Aroclor 1254	<0.020		0.020	ug/L	09-JUN-21				
Aroclor 1260	<0.020		0.020	ug/L	09-JUN-21				
Surrogate: Decachlorobiphenyl	94.9		50-150	%	09-JUN-21				
Total PCBs	<0.040		0.040	ug/L	09-JUN-21	1	0.4		
Surrogate: Tetrachloro-m-xylene	108.3		50-150	%	09-JUN-21				
Organic Parameters									
Nonylphenol	<1.0		1.0	ug/L	10-JUN-21	20			
Nonylphenol Diethoxylates	<0.10		0.10	ug/L	10-JUN-21				
Total Nonylphenol Ethoxylates	<2.0		2.0	ug/L	10-JUN-21	200			
Nonylphenol Monoethoxylates	<2.0		2.0	ug/L	10-JUN-21				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario Reg. Mun. of Peel Sanitary Bylaw #53-2010 (APR. 2011) = [Suite] - ON-SAN+STORM-PEEL

#1: Reg. Mun. of Peel Sanitary by-law #53-2010

#2: Peel Storm Sewer By-Law #53-201- (APR. 2011)

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
R	The ion abundance ratio(s) did not meet the acceptance criteria. Value is an estimated maximum.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
625-PAH-LOW-WT	Water	EPA 8270 PAH (Low Level)	SW846 8270

Aqueous samples are extracted and extracts are analyzed on GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

625-SAN-WT	Water	Ontario Sanitary Sewer SVOC Target List	SW-846 8270

Samples are extracted with solvent and then analyzed by GC/MS.

BOD-WT	Water	BOD	APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

CN-TOT-WT	Water	Cyanide, Total	ISO 14403-2

Total cyanide is determined by the combination of UV digestion and distillation. Cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

When using this method, high levels of thiocyanate in samples can cause false positives at ~1-2% of the thiocyanate concentration. For samples with detectable cyanide analyzed by this method, ALS recommends analysis for thiocyanate to check for this potential interference

CR-CR6-IC-WT	Water	Chromium +6	EPA 7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution. Chromium (III) is calculated as the difference between the total chromium and the chromium (VI) results.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

EC-WW-MF-WT	Water	E. Coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h. Method ID: WT-TM-1200

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NP,NPE-LCMS-WT	Water	Nonylphenols and Ethoxylates by LC/MS-MS	J. Chrom A849 (1999) p.467-482

Water samples are filtered and analyzed on LCMS/MS by direct injection.

OGG-SPEC-CALC-WT	Water	Speciated Oil and Grease A/V Calc	CALCULATION

Sample is extracted with hexane, sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

OGG-SPEC-WT	Water	Speciated Oil and Grease-Gravimetric	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. Sample speciation into mineral and animal/vegetable fractions is achieved via silica gel separation and is then determined gravimetrically.

Reference Information

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-EXTRA-WT	Water	Sanitary Sewer Use By-Law Additional PAH	SW 846 8270
PAH-SUM-CALC-WT	Water	TOTAL PAH's	CALCULATION

Total PAH represents the sum of all PAH analytes reported for a given sample. Note that regulatory agencies and criteria differ in their definitions of Total PAH in terms of the individual PAH analytes to be included.

PCB-WT	Water	Polychlorinated Biphenyls	EPA 8082

PCBs are extracted from an aqueous sample at neutral pH with aliquots of dichloromethane using a modified separatory funnel technique. The extracts are analyzed by GC/MSD.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1°C for a minimum of four hours or until a constant weight is achieved.

TKN-F-WT	Water	TKN in Water by Fluorescence	J. ENVIRON. MONIT., 2005,7,37-42,RSC

Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection

VOC-ROU-HS-WT	Water	Volatile Organic Compounds	SW846 8260

Aqueous samples are analyzed by headspace-GC/MS.

XYLENES-SUM-CALC-WT	Water	Sum of Xylene Isomer Concentrations	CALCULATION

Total xylenes represents the sum of o-xylene and m&p-xylene.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: Hydrogeology Consulting Services (Kitchener)
28 Upper Mercer Street
Kitchener ON N2A 4M9
Contact: Chris Helmer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-PAH-LOW-WT	**Water**							
Batch R5493049								
WG3556907-2 LCS								
Acenaphthene			68.5		%		50-140	18-JUN-21
Anthracene			81.4		%		50-140	18-JUN-21
Benzo(a)anthracene			94.4		%		50-140	18-JUN-21
Benzo(a)pyrene			77.9		%		60-130	18-JUN-21
Benzo(b&j)fluoranthene			88.7		%		60-130	18-JUN-21
Benzo(ghi)perylene			89.5		%		50-140	18-JUN-21
Benzo(k)fluoranthene			85.3		%		50-140	18-JUN-21
Chrysene			94.1		%		50-140	18-JUN-21
Dibenz(a,h)anthracene			86.5		%		50-140	18-JUN-21
Fluoranthene			91.2		%		50-140	18-JUN-21
Fluorene			76.7		%		50-140	18-JUN-21
Indeno(1,2,3-cd)pyrene			77.9		%		50-140	18-JUN-21
Naphthalene			64.5		%		50-130	18-JUN-21
Perylene			82.9		%		50-140	18-JUN-21
Phenanthrene			87.4		%		50-140	18-JUN-21
Pyrene			89.5		%		50-140	18-JUN-21
WG3556907-1 MB								
Acenaphthene			<0.010		ug/L		0.01	18-JUN-21
Anthracene			<0.010		ug/L		0.01	18-JUN-21
Benzo(a)anthracene			<0.010		ug/L		0.01	18-JUN-21
Benzo(a)pyrene			<0.010		ug/L		0.01	18-JUN-21
Benzo(b&j)fluoranthene			<0.010		ug/L		0.01	18-JUN-21
Benzo(ghi)perylene			<0.010		ug/L		0.01	18-JUN-21
Benzo(k)fluoranthene			<0.010		ug/L		0.01	18-JUN-21
Chrysene			<0.010		ug/L		0.01	18-JUN-21
Dibenz(a,h)anthracene			<0.010		ug/L		0.01	18-JUN-21
Fluoranthene			<0.010		ug/L		0.01	18-JUN-21
Fluorene			<0.010		ug/L		0.01	18-JUN-21
Indeno(1,2,3-cd)pyrene			<0.010		ug/L		0.01	18-JUN-21
Naphthalene			<0.010		ug/L		0.01	18-JUN-21
Perylene			<0.010		ug/L		0.01	18-JUN-21
Phenanthrene			<0.010		ug/L		0.01	18-JUN-21
Pyrene			<0.010		ug/L		0.01	18-JUN-21
Surrogate: 2-Fluorobiphenyl			90.7		%		40-130	18-JUN-21

Quality Control Report

Client: Hydrogeology Consulting Services (Kitchener)
28 Upper Mercer Street
Kitchener ON N2A 4M9
Contact: Chris Helmer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
625-PAH-LOW-WT	**Water**							
Batch R5493049								
WG3556907-1 MB								
Surrogate: D14-Terphenyl			94.1		%		40-130	18-JUN-21
625-SAN-WT	**Water**							
Batch R5493271								
WG3556907-2 LCS								
3,3'-Dichlorobenzidine			53.7		%		50-140	18-JUN-21
Bis(2-ethylhexyl)phthalate			122.4		%		50-140	18-JUN-21
Di-n-butylphthalate			105.4		%		50-140	18-JUN-21
Pentachlorophenol			126.0		%		50-140	18-JUN-21
WG3556907-1 MB								
3,3'-Dichlorobenzidine			<0.40		ug/L		0.4	18-JUN-21
Bis(2-ethylhexyl)phthalate			<2.0		ug/L		2	18-JUN-21
Di-n-butylphthalate			<1.0		ug/L		1	18-JUN-21
Pentachlorophenol			<0.50		ug/L		0.5	18-JUN-21
Surrogate: 2-Fluorobiphenyl			93.5		%		40-130	18-JUN-21
Surrogate: 2,4,6-Tribromophenol			78.8		%		40-130	18-JUN-21
Surrogate: p-Terphenyl d14			117.3		%		40-130	18-JUN-21
BOD-WT	**Water**							
Batch R5490238								
WG3550551-2 DUP		**L2597448-1**						
BOD		<3.0	<3.0	RPD-NA	mg/L	N/A	30	08-JUN-21
WG3550551-3 LCS								
BOD			99.3		%		85-115	08-JUN-21
WG3550551-1 MB								
BOD			<2.0		mg/L		2	08-JUN-21
CN-TOT-WT	**Water**							
Batch R5482520								
WG3551152-8 DUP		**WG3551152-10**						
Cyanide, Total		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	09-JUN-21
WG3551152-7 LCS								
Cyanide, Total			92.2		%		80-120	09-JUN-21
WG3551152-6 MB								
Cyanide, Total			<0.0020		mg/L		0.002	09-JUN-21
WG3551152-9 MS		**WG3551152-10**						
Cyanide, Total			95.3		%		70-130	09-JUN-21

Quality Control Report

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Kitchener ON N2A 4M9
Contact: Chris Helmer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CR-CR6-IC-WT	**Water**							
Batch R5481741								
WG3550239-4 DUP		**WG3550239-3**						
Chromium, Hexavalent		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-JUN-21
WG3550239-2 LCS								
Chromium, Hexavalent			101.4		%		80-120	08-JUN-21
WG3550239-1 MB								
Chromium, Hexavalent			<0.00050		mg/L		0.0005	08-JUN-21
WG3550239-5 MS		**WG3550239-3**						
Chromium, Hexavalent			99.7		%		70-130	08-JUN-21
EC-WW-MF-WT	**Water**							
Batch R5480437								
WG3549571-3 DUP		**L2597425-2**						
E. Coli		0	<10	RPD-NA	CFU/100mL	N/A	65	07-JUN-21
WG3549571-1 MB								
E. Coli			0		CFU/100mL		1	07-JUN-21
F-IC-N-WT	**Water**							
Batch R5486076								
WG3552585-4 DUP		**WG3552585-3**						
Fluoride (F)		0.673	0.680		mg/L	1.1	20	10-JUN-21
WG3552585-2 LCS								
Fluoride (F)			102.9		%		90-110	10-JUN-21
WG3552585-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	10-JUN-21
WG3552585-5 MS		**WG3552585-3**						
Fluoride (F)			100.1		%		75-125	10-JUN-21
HG-T-CVAA-WT	**Water**							
Batch R5481137								
WG3550938-3 DUP		**L2597182-2**						
Mercury (Hg)-Total		0.0000083	0.0000083		mg/L	0.0	20	09-JUN-21
WG3550938-2 LCS								
Mercury (Hg)-Total			109.0		%		80-120	09-JUN-21
WG3550938-1 MB								
Mercury (Hg)-Total			<0.000005(		mg/L		0.000005	09-JUN-21
WG3550938-4 MS		**L2597182-3**						
Mercury (Hg)-Total			113.1		%		70-130	09-JUN-21
MET-T-CCMS-WT	**Water**							

Quality Control Report

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5480235								
WG3549806-4 DUP		**WG3549806-3**						
Aluminum (Al)-Total		0.0218	0.0234		mg/L	7.4	20	08-JUN-21
Antimony (Sb)-Total		0.00052	0.00048		mg/L	6.5	20	08-JUN-21
Arsenic (As)-Total		0.00066	0.00066		mg/L	0.4	20	08-JUN-21
Cadmium (Cd)-Total		<0.0000050	<0.000005C	RPD-NA	mg/L	N/A	20	08-JUN-21
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-JUN-21
Cobalt (Co)-Total		0.00056	0.00057		mg/L	1.7	20	08-JUN-21
Copper (Cu)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	08-JUN-21
Lead (Pb)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-JUN-21
Manganese (Mn)-Total		0.305	0.298		mg/L	2.2	20	08-JUN-21
Molybdenum (Mo)-Total		0.00293	0.00283		mg/L	3.3	20	08-JUN-21
Nickel (Ni)-Total		0.00217	0.00212		mg/L	2.3	20	08-JUN-21
Selenium (Se)-Total		0.000141	0.000161		mg/L	13	20	08-JUN-21
Silver (Ag)-Total		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	08-JUN-21
Tin (Sn)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	08-JUN-21
Titanium (Ti)-Total		0.00100	0.00076	J	mg/L	0.00023	0.0006	08-JUN-21
Zinc (Zn)-Total		0.0063	0.0060		mg/L	4.2	20	08-JUN-21
WG3549806-2 LCS								
Aluminum (Al)-Total			106.7		%		80-120	08-JUN-21
Antimony (Sb)-Total			106.6		%		80-120	08-JUN-21
Arsenic (As)-Total			106.8		%		80-120	08-JUN-21
Cadmium (Cd)-Total			103.3		%		80-120	08-JUN-21
Chromium (Cr)-Total			102.6		%		80-120	08-JUN-21
Cobalt (Co)-Total			104.9		%		80-120	08-JUN-21
Copper (Cu)-Total			103.9		%		80-120	08-JUN-21
Lead (Pb)-Total			106.7		%		80-120	08-JUN-21
Manganese (Mn)-Total			104.8		%		80-120	08-JUN-21
Molybdenum (Mo)-Total			103.6		%		80-120	08-JUN-21
Nickel (Ni)-Total			102.8		%		80-120	08-JUN-21
Selenium (Se)-Total			102.1		%		80-120	08-JUN-21
Silver (Ag)-Total			106.1		%		80-120	08-JUN-21
Tin (Sn)-Total			105.3		%		80-120	08-JUN-21
Titanium (Ti)-Total			101.4		%		80-120	08-JUN-21
Zinc (Zn)-Total			104.1		%		80-120	08-JUN-21

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	**Water**							
Batch R5480235								
WG3549806-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	08-JUN-21
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	08-JUN-21
Arsenic (As)-Total			<0.00010		mg/L		0.0001	08-JUN-21
Cadmium (Cd)-Total			<0.000005C		mg/L		0.000005	08-JUN-21
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	08-JUN-21
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	08-JUN-21
Copper (Cu)-Total			<0.00050		mg/L		0.0005	08-JUN-21
Lead (Pb)-Total			<0.000050		mg/L		0.00005	08-JUN-21
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	08-JUN-21
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	08-JUN-21
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	08-JUN-21
Selenium (Se)-Total			<0.000050		mg/L		0.00005	08-JUN-21
Silver (Ag)-Total			<0.000050		mg/L		0.00005	08-JUN-21
Tin (Sn)-Total			<0.00010		mg/L		0.0001	08-JUN-21
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	08-JUN-21
Zinc (Zn)-Total			<0.0030		mg/L		0.003	08-JUN-21
WG3549806-5 MS		**WG3549806-6**						
Aluminum (Al)-Total			106.9		%		70-130	08-JUN-21
Antimony (Sb)-Total			106.2		%		70-130	08-JUN-21
Arsenic (As)-Total			108.3		%		70-130	08-JUN-21
Cadmium (Cd)-Total			99.0		%		70-130	08-JUN-21
Chromium (Cr)-Total			105.7		%		70-130	08-JUN-21
Cobalt (Co)-Total			104.1		%		70-130	08-JUN-21
Copper (Cu)-Total			99.4		%		70-130	08-JUN-21
Lead (Pb)-Total			97.7		%		70-130	08-JUN-21
Manganese (Mn)-Total			N/A	MS-B	%		-	08-JUN-21
Molybdenum (Mo)-Total			102.8		%		70-130	08-JUN-21
Nickel (Ni)-Total			99.6		%		70-130	08-JUN-21
Selenium (Se)-Total			101.2		%		70-130	08-JUN-21
Silver (Ag)-Total			98.9		%		70-130	08-JUN-21
Tin (Sn)-Total			104.6		%		70-130	08-JUN-21
Titanium (Ti)-Total			103.3		%		70-130	08-JUN-21
Zinc (Zn)-Total			95.9		%		70-130	08-JUN-21
NP,NPE-LCMS-WT	**Water**							

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Kitchener ON N2A 4M9
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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NP,NPE-LCMS-WT	**Water**							
Batch R5486025								
WG3550841-3 DUP		**L2597174-1**						
Nonylphenol		<1.0	<1.0	RPD-NA	ug/L	N/A	30	10-JUN-21
Nonylphenol Monoethoxylates		<2.0	<2.0	RPD-NA	ug/L	N/A	30	10-JUN-21
Nonylphenol Diethoxylates		<0.10	<0.10	RPD-NA	ug/L	N/A	30	10-JUN-21
WG3550841-2 LCS								
Nonylphenol			88.2		%		75-125	10-JUN-21
Nonylphenol Monoethoxylates			104.9		%		75-125	10-JUN-21
Nonylphenol Diethoxylates			97.2		%		75-125	10-JUN-21
WG3550841-1 MB								
Nonylphenol			<1.0		ug/L		1	10-JUN-21
Nonylphenol Monoethoxylates			<2.0		ug/L		2	10-JUN-21
Nonylphenol Diethoxylates			<0.10		ug/L		0.1	10-JUN-21
WG3550841-4 MS		**L2597174-1**						
Nonylphenol			118.9		%		50-150	10-JUN-21
Nonylphenol Monoethoxylates			115.8		%		50-150	10-JUN-21
Nonylphenol Diethoxylates			99.6		%		50-150	10-JUN-21
OGG-SPEC-WT	**Water**							
Batch R5492828								
WG3556896-2 LCS								
Oil and Grease, Total			84.6		%		70-130	17-JUN-21
Mineral Oil and Grease			79.6		%		70-130	17-JUN-21
WG3556896-1 MB								
Oil and Grease, Total			<5.0		mg/L		5	17-JUN-21
Mineral Oil and Grease			<2.5		mg/L		2.5	17-JUN-21
P-T-COL-WT	**Water**							
Batch R5485778								
WG3552009-3 DUP		**L2597174-1**						
Phosphorus, Total		0.0301	0.0277		mg/L	8.2	20	11-JUN-21
WG3552009-2 LCS								
Phosphorus, Total			97.2		%		80-120	11-JUN-21
WG3552009-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	11-JUN-21
WG3552009-4 MS		**L2597174-1**						
Phosphorus, Total			99.1		%		70-130	11-JUN-21
PAH-EXTRA-WT	**Water**							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-EXTRA-WT	**Water**							
Batch R5493087								
WG3556907-2 LCS								
Benzo(e)pyrene			90.1		%		60-130	18-JUN-21
1,3-Dinitropyrene			301.5	RRQC	%		60-130	18-JUN-21
1,6-Dinitropyrene			378.2	RRQC	%		60-130	18-JUN-21
Dibenz(a,h)acridine			108.1		%		60-130	18-JUN-21
1,8-Dinitropyrene			264.5	RRQC	%		60-130	18-JUN-21
Dibenz(a,j)acridine			115.3		%		60-130	18-JUN-21
7H-Dibenzo(c,g)carbazole			110.2		%		60-130	18-JUN-21
Dibenzo(a,i)pyrene			106.8		%		60-130	18-JUN-21
COMMENTS: RRQC; Result is outside ALS control limits; associated non-detect results are considered reliable.								
WG3556907-1 MB								
Benzo(e)pyrene			<0.050		ug/L		0.05	18-JUN-21
1,3-Dinitropyrene			<1.0		ug/L		1	18-JUN-21
1,6-Dinitropyrene			<1.0		ug/L		1	18-JUN-21
Dibenz(a,h)acridine			<0.050		ug/L		0.05	18-JUN-21
1,8-Dinitropyrene			<1.0		ug/L		1	18-JUN-21
Dibenz(a,j)acridine			<0.050		ug/L		0.05	18-JUN-21
7H-Dibenzo(c,g)carbazole			<0.050		ug/L		0.05	18-JUN-21
Dibenzo(a,i)pyrene			<0.050		ug/L		0.05	18-JUN-21
Surrogate: d14-Terphenyl			99.0		%		40-130	18-JUN-21
PCB-WT	**Water**							
Batch R5481386								
WG3550836-2 LCS								
Aroclor 1242			105.3		%		65-130	09-JUN-21
Aroclor 1248			93.6		%		65-130	09-JUN-21
Aroclor 1254			102.3		%		65-130	09-JUN-21
Aroclor 1260			100.9		%		65-130	09-JUN-21
WG3550836-1 MB								
Aroclor 1242			<0.020		ug/L		0.02	09-JUN-21
Aroclor 1248			<0.020		ug/L		0.02	09-JUN-21
Aroclor 1254			<0.020		ug/L		0.02	09-JUN-21
Aroclor 1260			<0.020		ug/L		0.02	09-JUN-21
Surrogate: Decachlorobiphenyl			110.1		%		50-150	09-JUN-21
Surrogate: Tetrachloro-m-xylene			80.2		%		50-150	09-JUN-21
PH-WT	**Water**							

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	**Water**							
Batch R5480810								
WG3550346-4 DUP		**WG3550346-3**						
pH		7.63	7.63	J	pH units	0.00	0.2	08-JUN-21
WG3550346-2 LCS								
pH			7.00		pH units		6.9-7.1	08-JUN-21
PHENOLS-4AAP-WT	**Water**							
Batch R5483976								
WG3551671-3 DUP		**L2598423-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-JUN-21
WG3551671-2 LCS								
Phenols (4AAP)			98.8		%		85-115	10-JUN-21
WG3551671-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	10-JUN-21
WG3551671-4 MS		**L2598423-1**						
Phenols (4AAP)			98.2		%		75-125	10-JUN-21
SOLIDS-TSS-WT	**Water**							
Batch R5481758								
WG3550962-3 DUP		**L2597191-1**						
Total Suspended Solids		<3.0	<3.0	RPD-NA	mg/L	N/A	20	10-JUN-21
WG3550962-2 LCS								
Total Suspended Solids			91.2		%		85-115	10-JUN-21
WG3550962-1 MB								
Total Suspended Solids			<3.0		mg/L		3	10-JUN-21
TKN-F-WT	**Water**							
Batch R5490717								
WG3553533-3 DUP		**L2597448-1**						
Total Kjeldahl Nitrogen		1.99	1.90		mg/L	4.6	20	14-JUN-21
WG3553533-2 LCS								
Total Kjeldahl Nitrogen			103.8		%		75-125	14-JUN-21
WG3553533-1 MB								
Total Kjeldahl Nitrogen			<0.050		mg/L		0.05	14-JUN-21
WG3553533-4 MS		**L2597448-1**						
Total Kjeldahl Nitrogen			110.8		%		70-130	14-JUN-21
VOC-ROU-HS-WT	**Water**							
Batch R5490019								
WG3554064-4 DUP		**WG3554064-3**						
1,1,2,2-Tetrachloroethane		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-JUN-21
1,2-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-JUN-21

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5490019								
WG3554064-4 DUP		**WG3554064-3**						
1,4-Dichlorobenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-JUN-21
Benzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-JUN-21
Chloroform		<1.0	<1.0	RPD-NA	ug/L	N/A	30	14-JUN-21
cis-1,2-Dichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-JUN-21
Dichloromethane		<2.0	<2.0	RPD-NA	ug/L	N/A	30	14-JUN-21
Ethylbenzene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-JUN-21
m+p-Xylenes		<0.40	<0.40	RPD-NA	ug/L	N/A	30	14-JUN-21
o-Xylene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	14-JUN-21
Tetrachloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-JUN-21
Toluene		<0.40	<0.40	RPD-NA	ug/L	N/A	30	14-JUN-21
trans-1,3-Dichloropropene		<0.30	<0.30	RPD-NA	ug/L	N/A	30	14-JUN-21
Trichloroethylene		<0.50	<0.50	RPD-NA	ug/L	N/A	30	14-JUN-21
WG3554064-1 LCS								
1,1,2,2-Tetrachloroethane			96.7		%		70-130	14-JUN-21
1,2-Dichlorobenzene			99.5		%		70-130	14-JUN-21
1,4-Dichlorobenzene			101.2		%		70-130	14-JUN-21
Benzene			94.3		%		70-130	14-JUN-21
Chloroform			97.5		%		70-130	14-JUN-21
cis-1,2-Dichloroethylene			98.6		%		70-130	14-JUN-21
Dichloromethane			103.7		%		70-130	14-JUN-21
Ethylbenzene			98.0		%		70-130	14-JUN-21
m+p-Xylenes			101.7		%		70-130	14-JUN-21
o-Xylene			105.0		%		70-130	14-JUN-21
Tetrachloroethylene			101.7		%		70-130	14-JUN-21
Toluene			96.9		%		70-130	14-JUN-21
trans-1,3-Dichloropropene			99.4		%		70-130	14-JUN-21
Trichloroethylene			95.5		%		70-130	14-JUN-21
WG3554064-2 MB								
1,1,2,2-Tetrachloroethane			<0.50		ug/L		0.5	14-JUN-21
1,2-Dichlorobenzene			<0.50		ug/L		0.5	14-JUN-21
1,4-Dichlorobenzene			<0.50		ug/L		0.5	14-JUN-21
Benzene			<0.50		ug/L		0.5	14-JUN-21
Chloroform			<1.0		ug/L		1	14-JUN-21
cis-1,2-Dichloroethylene			<0.50				0.5	

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Kitchener ON N2A 4M9
Contact: Chris Helmer

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-ROU-HS-WT	**Water**							
Batch R5490019								
WG3554064-2 MB								
cis-1,2-Dichloroethylene			<0.50		ug/L		0.5	14-JUN-21
Dichloromethane			<2.0		ug/L		2	14-JUN-21
Ethylbenzene			<0.50		ug/L		0.5	14-JUN-21
m+p-Xylenes			<0.40		ug/L		0.4	14-JUN-21
o-Xylene			<0.30		ug/L		0.3	14-JUN-21
Tetrachloroethylene			<0.50		ug/L		0.5	14-JUN-21
Toluene			<0.40		ug/L		0.4	14-JUN-21
trans-1,3-Dichloropropene			<0.30		ug/L		0.3	14-JUN-21
Trichloroethylene			<0.50		ug/L		0.5	14-JUN-21
Surrogate: 1,4-Difluorobenzene			98.6		%		70-130	14-JUN-21
Surrogate: 4-Bromofluorobenzene			92.3		%		70-130	14-JUN-21

Quality Control Report

Workorder: L2597301 Report Date: 18-JUN-21

Client: Hydrogeology Consulting Services (Kitchener)
28 Upper Mercer Street
Kitchener ON N2A 4M9
Contact: Chris Helmer

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.
RRQC	Refer to report remarks for information regarding this QC result.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes 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 pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2597301-COFC

COC Number: 17 -

Page of

Report To	Contact and company name below will appear on the final report
Company:	Hydrogeology Consulting
Contact:	Chris Helmer
Phone:	905-550-0969
	Company address below will appear on the final report
Street:	6 Lynn Court
City/Province:	Kitchener, ON
Postal Code:	N2A 4H6
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☒ NO
Company:	
Contact:	

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report ☑ YES ☐ NO
☑ Compare Results to Criteria on Report - provide details below if box checked
Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax chrishelmer@hydrog.ca
Email 2
Email 3

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax chrishelmer@hydrog.ca
Email 2

Project Information

ALS Account # / Quote #: Q84156 (2021 Price List)
Job #: Colerain
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): L2597301

ALS Contact: Emily Smith Sampler:

...w - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☒ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E - 100%] ☐ | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

NUMBER OF CONTAINERS — Toronto Stm & San (ON-SAN+STORM-TO-W)

SAMPLES ON HOLD

SUSPECTED HAZARD (see Special Instructions)

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
		6-Jun-21	5:38pm	Water
				Water
				Water
				Water
				Water
				Water
				Water
				Water
				Water
				Water
				Water
				Water

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

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

Toronto Sanitary & Storm Sewer Use By-Law

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☑ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
				7.6			

SHIPMENT RELEASE (client use)

Released by: Date: 6-Jun-21 Time: 5:38pm

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: Date: Time:

FINAL SHIPMENT RECEPTION (lab use only)

Received by: Date: 06/07/21 Time: 9am

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

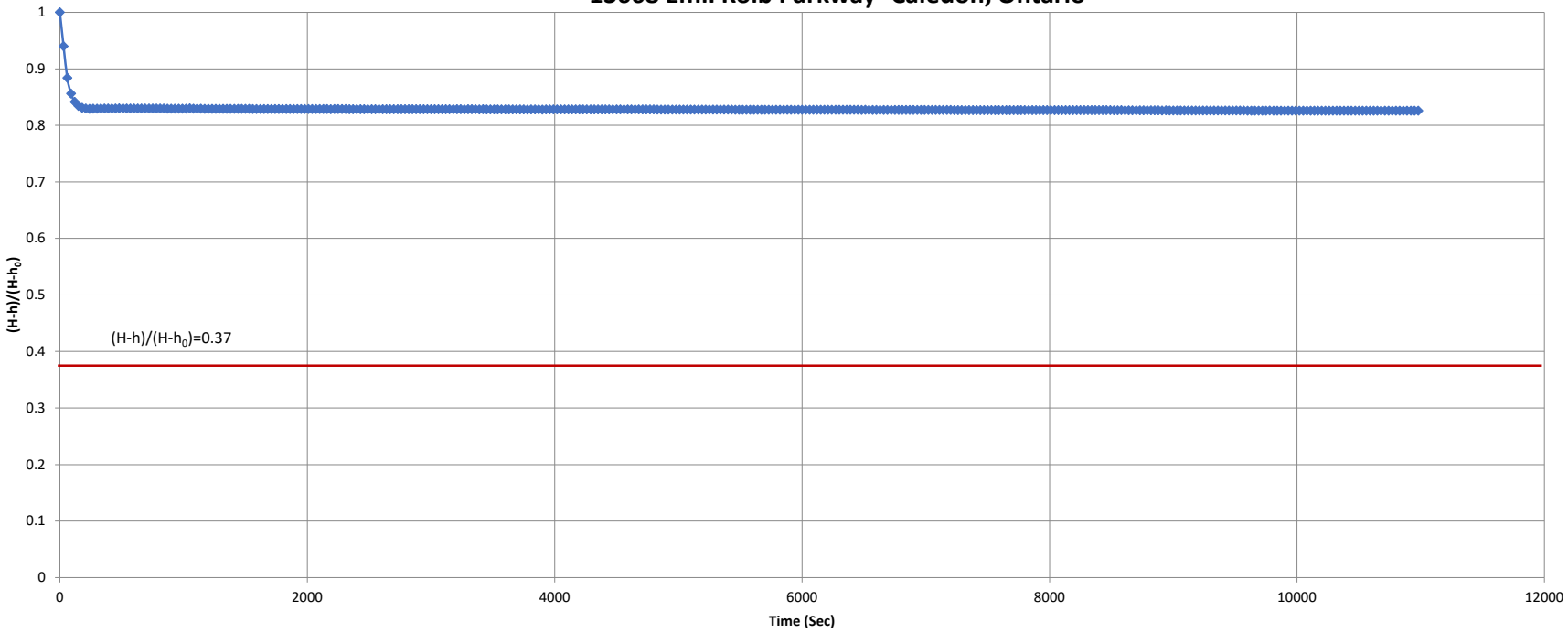
WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NOV 2018 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**.

Figure 1
BH2 Slug Test Analysis
13668 Emil Kolb Parkway- Caledon, Ontario



Hvorslev Method for Slug Test Analysis

stickup=	1.06	m	casing stickup from ground surface
SWL=	6.54	m	Static Water Level (mBTOP)
r =	0.019	m	casing radius
L =	3.05	m	screen length
R =	0.05	m	borehole radius (estimated)
$H-h_o$ =	6.40	m	Water level change at T=0
$T_{0.37}$ =	n/a	sec	T at $(H-h)/(H-h_0)=0.37$

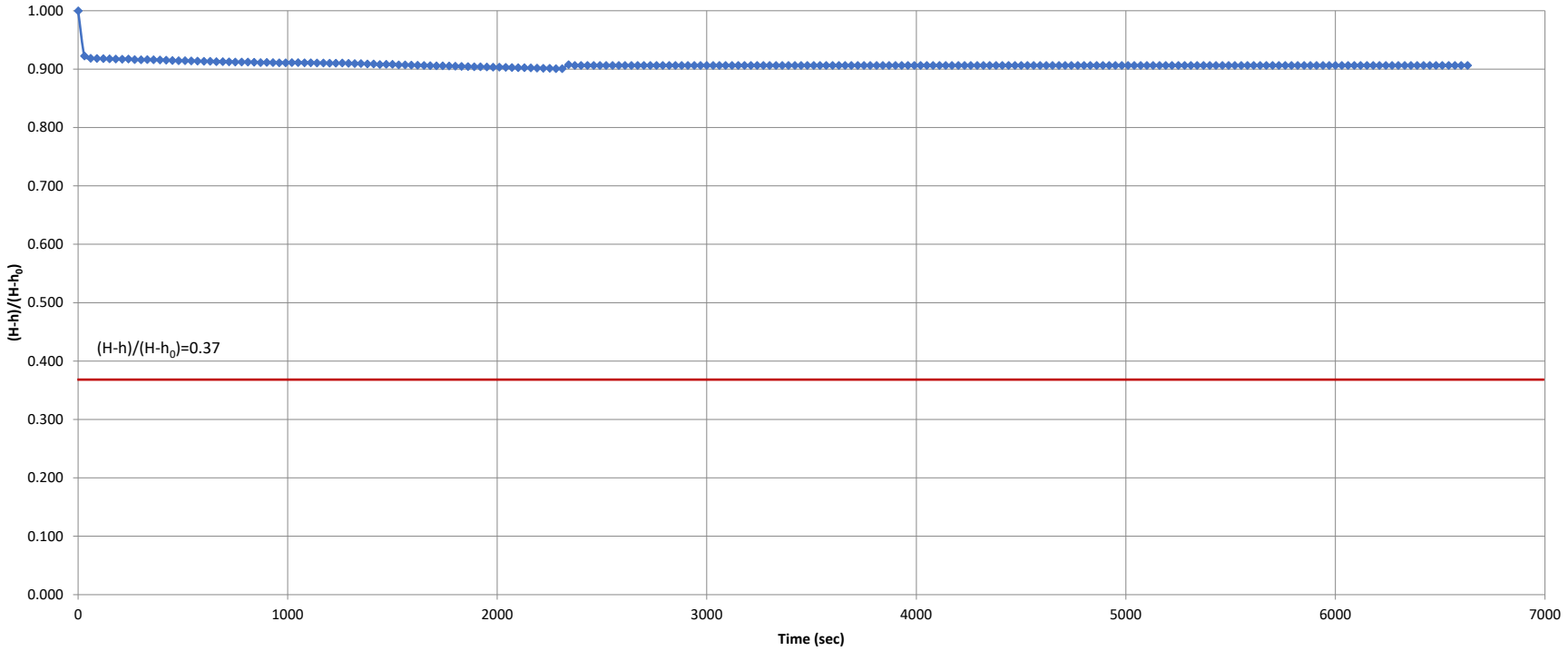
$$k = \frac{r^2 \ln(L/R)}{2LT_{0.37}}$$

k= <1 x 10^{-7} m/sec

HCS HYDROGEOLOGY CONSULTING SERVICES INC

28-03-2023

Figure 2
BH3 Slug Test Analysis
13668 Emil Kolb Parkway- Caledon, Ontario



Hvorslev Method for Slug Test Analysis

stickup=	1.01	m	casing stickup from ground surface
SWL=	5.66	m	Static Water Level (mBTOP)
r =	0.019	m	casing radius
L =	3.05	m	screen length
R =	0.05	m	borehole radius
$H-h_o$ =	0.87	m	Water level change at T=0
$T_{0.37}$ =	n/a	sec	T at (H-h)/(H-h$_0$)=0.37

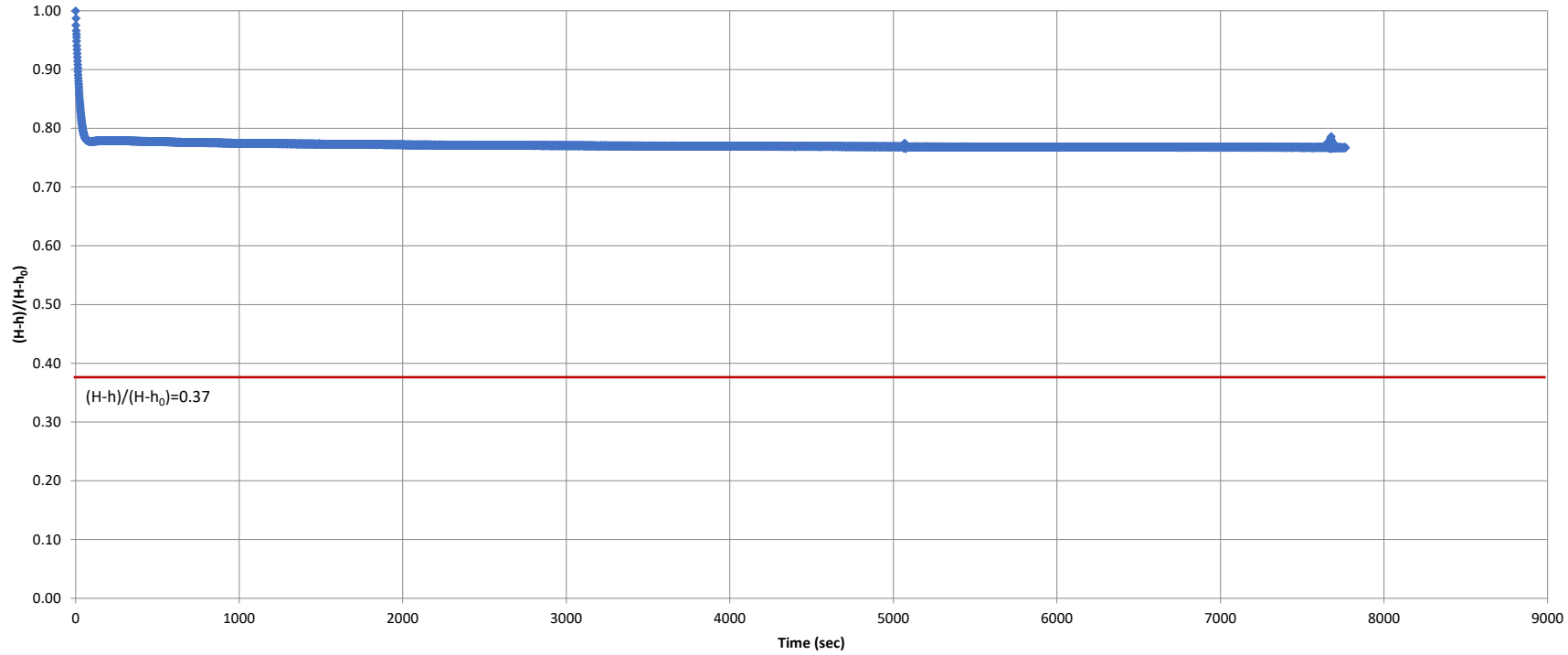
$$k=(r^2 \ln[\![(L/R)]\!])/2LT_{0.37}$$

k= <1 x 10^{-7} m/sec

HCS HYDROGEOLOGY CONSULTING SERVICES INC

28-03-2023

Figure 1
BH 01 Slug Test Analysis
Colerain & Harvest Moon



Hvorslev Method for Slug Test Analysis

stickup=	1.09	m	casing stickup from ground surface
SWL=	6.08	m	Static Water Level (mBTOP)
r =	0.019	m	casing radius
L =	3.05	m	screen length
R =	0.02	m	borehole radius
$H-h_o$ =	5.45	m	Water level change at T=0
$T_{0.37}$ =	n/a	sec	T at $(H-h)/(H-h_0)=0.37$

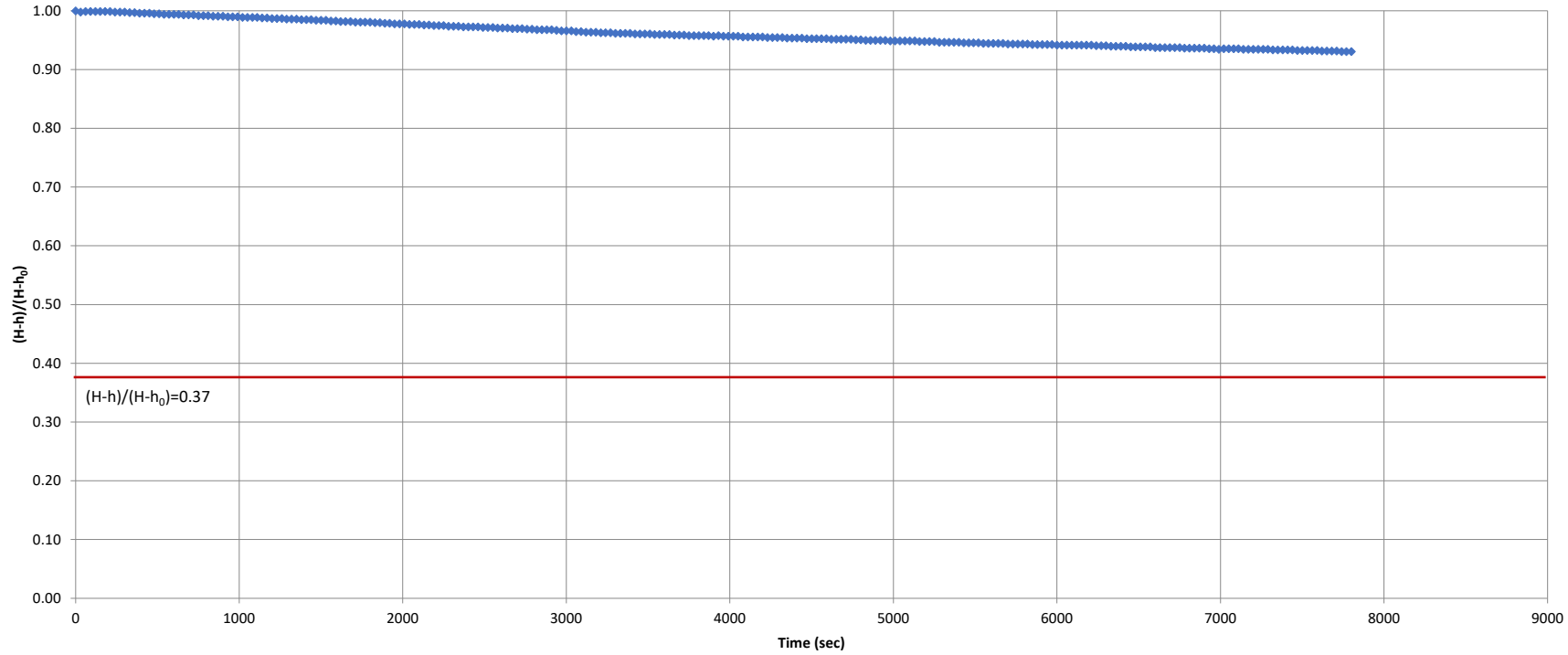
$$k=(r^2 \ln[\![(L/R)]\!])/2LT_{0.37}$$

k= < 1x10^{-7} m/sec

HCS HYDROGEOLOGY CONSULTING SERVICES

13/06/2021

Figure 2
BH 04 Slug Test Analysis
Colerain & Harvest Moon



Hvorslev Method for Slug Test Analysis

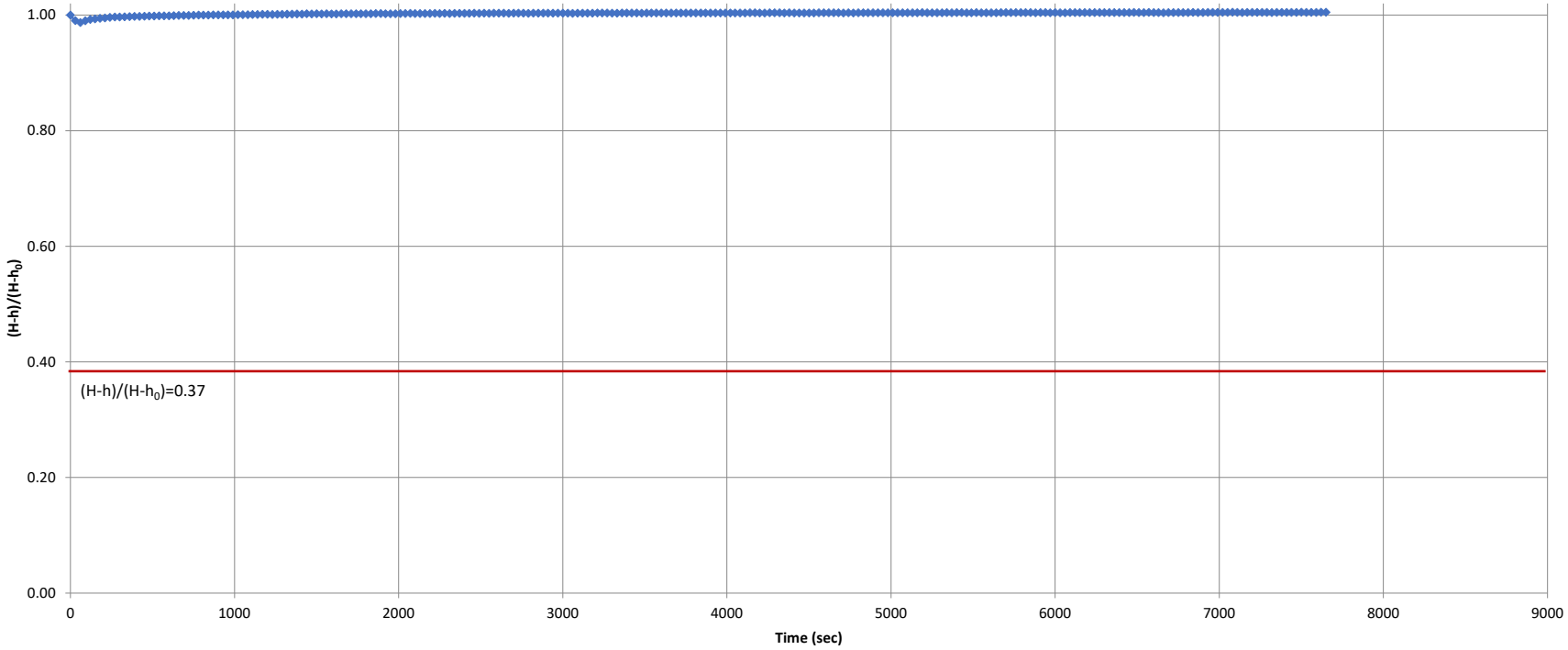
stickup=	1.12	m	casing stickup from ground surface
SWL=	3.95	m	Static Water Level (mBTOP)
r =	0.019	m	casing radius
L =	3.05	m	screen length
R =	0.02	m	borehole radius
$H-h_o$ =	2.98	m	Water level change at T=0
$T_{0.37}$ =	n/a	sec	T at $(H-h)/(H-h_0)=0.37$

$$k=(r^2 \ln[\![(L/R)]\!])/2LT_{0.37}$$

k= < 1x10^{-7} m/sec

13/06/2021

Figure 3
BH 05 Slug Test Analysis
Colerain & Harvest Moon



Hvorslev Method for Slug Test Analysis

stickup=	1.05	m	casing stickup from ground surface
SWL=	5.40	m	Static Water Level (mBTOP)
r =	0.019	m	casing radius
L =	3.05	m	screen length
R =	0.02	m	borehole radius
$H-h_o$ =	4.60	m	Water level change at T=0
$T_{0.37}$ =	n/a	sec	T at $(H-h)/(H-h_0)=0.37$

$$k=(r^2 \ln[\![(L/R)]\!])/2LT_{0.37}$$

k= < 1x10^{-7} m/sec

13/06/2021

Particle Size Distribution Report

	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.3	1.6	2.6	9.0	58.7	27.8

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH1	4	1.52-2.13m	clayey silt, some sand, trace gravel	ML
				Sampled by BL of CMT Engineering Inc. March 24, 2023	
				Tested by JM of CMT Engineering Inc. April 3, 2023	

CMT Engineering Inc.

St. Clements, ON

Client: Hydrogeology Consulting Services

Project: Proposed Development
13668 Emil Kolb Parkway, Bolton, Ontario

Project No.: 23-089 **Figure** 1

Particle Size Distribution Report

	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.8	2.4	3.8	11.3	50.7	29.0

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH1	7	4.57-5.18m	clayey silt, some sand, trace gravel	ML
				Sampled by BL of CMT Engineering Inc. March 24, 2023	
				Tested by JM of CMT Engineering Inc. April 3, 2023	

CMT Engineering Inc.

St. Clements, ON

Client: Hydrogeology Consulting Services

Project: Proposed Development
13668 Emil Kolb Parkway, Bolton, Ontario

Project No.: 23-089 **Figure** 2

Particle Size Distribution Report

	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.7	1.9	5.3	11.7	47.0	32.4

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH2	8	5.18-6.10m	clayey silt, some sand, trace gravel	ML
				Sampled by BL of CMT Engineering Inc. March 24, 2023	
				Tested by JM of CMT Engineering Inc. April 3, 2023	

CMT Engineering Inc.

St. Clements, ON

Client: Hydrogeology Consulting Services

Project: Proposed Development
13668 Emil Kolb Parkway, Bolton, Ontario

Project No.: 23-089 **Figure** 3

Particle Size Distribution Report

	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.3	1.9	3.8	9.8	53.6	29.6

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH3	8	5.18-6.10m	clayey silt, some sand, trace gravel	ML
				Sampled by BL of CMT Engineering Inc. March 24, 2023	
				Tested by JM of CMT Engineering Inc. April 3, 2023	

CMT Engineering Inc.

St. Clements, ON

Client: Hydrogeology Consulting Services

Project: Proposed Development
13668 Emil Kolb Parkway, Bolton, Ontario

Project No.: 23-089 **Figure** 4

Particle Size Distribution Report

	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	3.2	2.2	3.7	11.3	49.7	29.9

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH3	3	1.52-2.13m	clayey silt, some sand, trace gravel	ML
				Sampled by BB of CMT Engineering Inc., June 2, 2021	
				Tested by MS of CMT Engineering Inc., June 4, 2021	

CMT Engineering Inc.

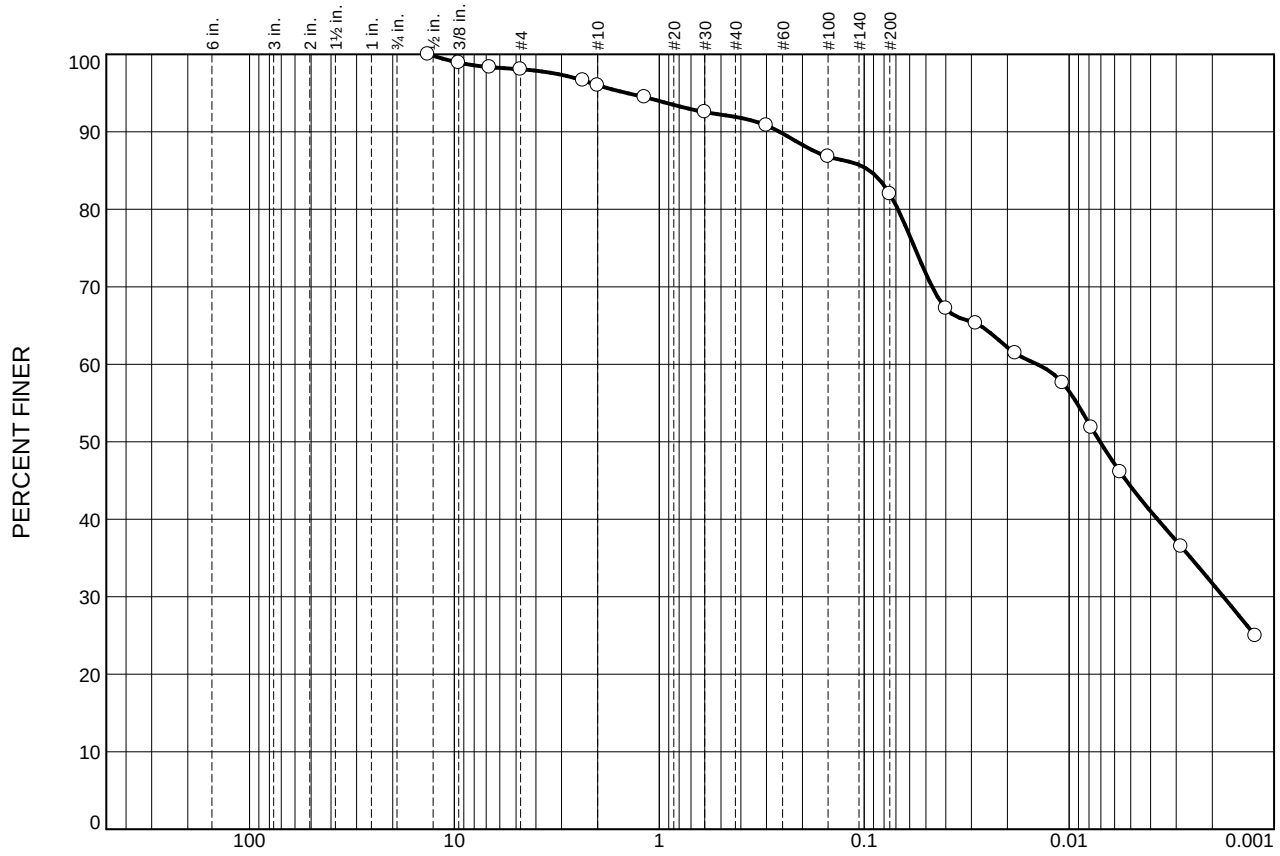
St. Clements, ON

Client: Hydrogeology Consulting Services (HCS)

Project: Stacked Townhouse Development
Harvest Moon Drive and Coleraine Drive, Bolton, Ontario

Project No.: 21-242 **Figure** 1

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.9	2.1	4.1	9.9	50.3	31.7

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH5	7	4.57-5.18m	clayey silt, some sand, trace gravel	ML
				Sampled by BB of CMT Engineering Inc., June 2, 2021	
				Tested by MS of CMT Engineering Inc., June 4, 2021	

CMT Engineering Inc.

St. Clements, ON

Client: Hydrogeology Consulting Services (HCS)

Project: Stacked Townhouse Development
Harvest Moon Drive and Coleraine Drive, Bolton, Ontario

Project No.: 21-242 **Figure** 2

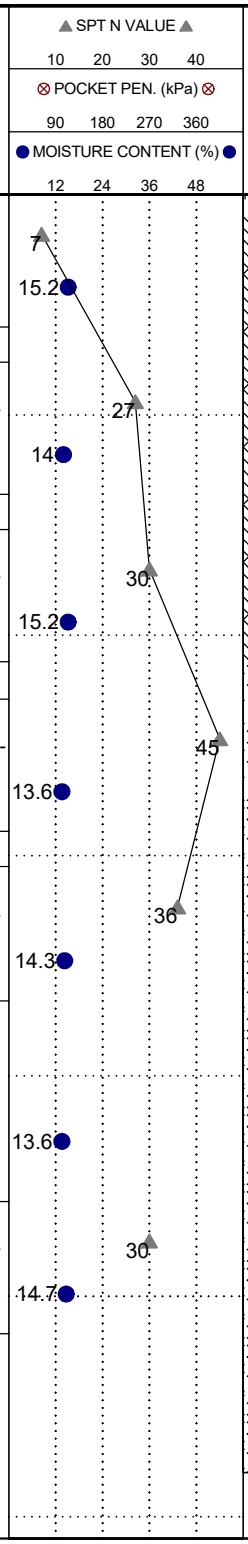
CMT Engineering Inc.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

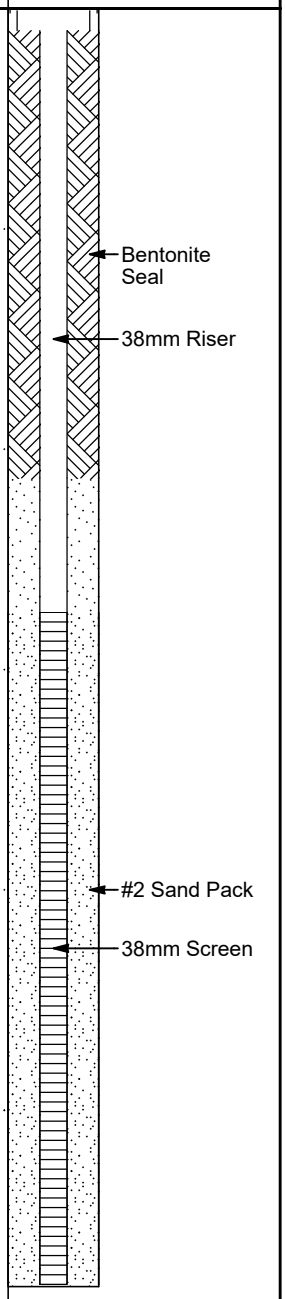
BOREHOLE NUMBER 1

PROJECT: Geotechnical Investigation for Townhouse Development
PROJECT ADDRESS: Harvest Moon Drive & Coleraine Drive
PROJECT NUMBER: 21-242
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 21-6-2
GROUND ELEVATION: 258.46 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BB
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
0	**TOPSOIL:** Loose, dark brown silty topsoil, moist (100 mm)	0.00, 258.46			
	CLAYEY SILT: Firm, mottled grey-brown clayey silt, some sand, trace gravel and rootlets, moist (drier than the plastic limit)	0.10, 258.36	SS 1	100	2-3-4-4 (7)
	becoming very stiff to hard, no rootlets	0.76, 257.70	SS 2	100	8-11-16-15 (27)
2			SS 3	100	7-14-16-27 (30)
			SS 4	100	14-24-21-23 (45)
			SS 5	100	9-15-21-19 (36)
	becoming grey	3.66, 254.80	MC5 6	100	
			SS 7	100	9-15-15-16 (30)
			MC5 8	100	

Bottom of borehole at 6.10 m, Elevation 252.36 m.





BOREHOLE LOG WITH WELL2 21-242.GPJ CMT_TEMPLATE_2020-05-15.GDT 21-6-18

CMT Engineering Inc.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER 2

PROJECT: Geotechnical Investigation for Townhouse Development
PROJECT ADDRESS: Harvest Moon Drive & Coleraine Drive
PROJECT NUMBER: 21-242
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 21-6-2
GROUND ELEVATION: 258.33 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BB
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
		TOPSOIL: Loose, dark brown silty topsoil, moist (100 mm)	0.00, 258.33					
			0.10, 258.23					
		CLAYEY SILT: Firm, mottled grey-brown clayey silt, some sand, trace gravel and rootlets, moist (drier than the plastic limit) becoming very stiff, no rootlets	0.46, 257.87	MC5 1	100		15.3	
1				SS 2	100	5-10-9-15 (19)	19 / 14.6	
2				MC5 3	100		14.5	
3				SS 4	100	14-15-18-17 (33)	33 / 15.1	

Bottom of borehole at 3.66 m, Elevation 254.67 m.

CMT Engineering Inc.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER 3

PROJECT: Geotechnical Investigation for Townhouse Development
PROJECT ADDRESS: Harvest Moon Drive & Coleraine Drive
PROJECT NUMBER: 21-242
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 21-6-2
GROUND ELEVATION: 258.91 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BB
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
0	**TOPSOIL:** Loose, dark brown silty topsoil, moist (150 mm)	0.00, 258.91					
		0.15, 258.76	SS 1	50	2-4-6-9 (10)	10 / 13.1	
	CLAYEY SILT: Firm, mottled grey-brown clayey silt, some sand, trace gravel and rootlets, moist (drier than the plastic limit)						
1	becoming very stiff to hard, no rootlets	0.91, 258.00	SS 2	100	4-6-10-12 (16)	16 / 16.7	
			SS 3	100	7-11-22-17 (33)	33 / 14.9	
2			SS 4	100	7-13-13-19 (26)	26 / 14.4	
3			SS 5	100	6-12-22-21 (34)	34 / 14.7	
4			MC5 6	100		14	
	becoming grey	4.62, 254.29	SS 7	100	9-17-16-19 (33)	33 / 13.5	
5	Bottom of borehole at 5.18 m, Elevation 253.73 m.						

SPT N VALUE: 10 20 30 40
POCKET PEN. (kPa): 90 180 270 360
MOISTURE CONTENT (%): 12 24 36 48

CMT Engineering Inc.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER 4

PROJECT: Geotechnical Investigation for Townhouse Development
PROJECT ADDRESS: Harvest Moon Drive & Coleraine Drive
PROJECT NUMBER: 21-242
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 21-6-2
GROUND ELEVATION: 258.51 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BB
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)
	TOPSOIL: Loose, dark brown silty topsoil, moist (150 mm)	0.00, 258.51				
	CLAYEY SILT: Firm, mottled grey-brown clayey silt, some sand, trace gravel and rootlets, moist (drier than the plastic limit)	0.15, 258.36	SS 1	50	2-3-4-4 (7)	7; 13.2
1	becoming very stiff to hard, no rootlets	0.76, 257.75	SS 2	100	7-12-15-16 (27)	27; 14.7
2			SS 3	100	7-11-17-19 (28)	28; 15.1
3			SS 4	100	10-20-27-24 (47)	47; 14.3
	becoming brown	3.05, 255.46	SS 5	100	9-20-23-30 (43)	43; 14.3
4			MC5 6	100		14.1
	becoming grey	4.37, 254.14				
5			SS 7	100	15-18-25-23 (43)	43; 15.3
6			MC5 8	100		

WELL DIAGRAM: Bentonite Seal; 38mm Riser; #2 Sand Pack; 38mm Screen

Bottom of borehole at 6.10 m, Elevation 252.41 m.

BOREHOLE LOG WITH WELL2 21-242.GPJ CMT_TEMPLATE_2020-05-15.GDT 21-6-18

CMT Engineering Inc.
1011 Industrial Crescent, Unit 1
St. Clements, Ontario N0B 2M0
Telephone: 519-699-5775
Fax: 519-699-4664

BOREHOLE NUMBER 5

PROJECT: Geotechnical Investigation for Townhouse Development
PROJECT ADDRESS: Harvest Moon Drive & Coleraine Drive
PROJECT NUMBER: 21-242
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 21-6-2
GROUND ELEVATION: 257.97 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BB
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
	TOPSOIL: Loose, dark brown silty topsoil, moist (300 mm)	0.00, 257.97	SS 1	50	2-3-3-4 (6)	6	
	CLAYEY SILT: Firm, mottled grey-brown clayey silt, some sand, trace gravel and rootlets, moist (drier than the plastic limit)	0.30, 257.67					
1	becoming no rootlets	0.76, 257.21	SS 2	100	2-4-5-8 (9)	9 20.8	Bentonite Seal
	becoming very stiff	1.68, 256.29	SS 3	100	7-10-15-15 (25)	25 14.1	38mm Riser
2			SS 4	100	7-7-15-15 (22)	22 15.7	
3			SS 5	100	10-11-14-16 (25)	25 14.7	
4			MC5 6	100		15.9	#2 Sand Pack 38mm Screen
	becoming grey	4.42, 253.55					
5			SS 7	100	9-14-17-17 (31)	31 13.9	
			MC5 8	202		13.9	

Bottom of borehole at 5.64 m, Elevation 252.33 m.

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BOREHOLE NUMBER 6

PROJECT: Geotechnical Investigation for Townhouse Development
PROJECT ADDRESS: Harvest Moon Drive & Coleraine Drive
PROJECT NUMBER: 21-242
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 21-6-2
GROUND ELEVATION: 257.60 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: BB
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
	TOPSOIL: Loose, dark brown silty topsoil, moist (510 mm)	0.00, 257.60	SS 1	75	2-2-3-4 (5)	5	
	CLAYEY SILT: Firm, mottled grey-brown clayey silt, some sand, trace gravel and rootlets, moist (drier than the plastic limit)	0.51, 257.09					
1	becoming very stiff to hard, no rootlets	0.76, 256.84	SS 2	100	3-5-8-13 (13)	13 15.6	
			SS 3	100	6-7-15-13 (22)	22 14.5	
2			SS 4	100	15-20-26-25 (46)	46 15	
3			SS 5	100	11-12-18-17 (30)	30 14.6	
4	becoming grey	4.27, 253.33	MC5 6	100		15	
			SS 7	100	10-14-24-20 (38)	38 15.4	
5	Bottom of borehole at 5.18 m, Elevation 252.42 m.						

SPT N VALUE: 10 20 30 40
POCKET PEN. (kPa): 90 180 270 360
MOISTURE CONTENT (%): 12 24 36 48

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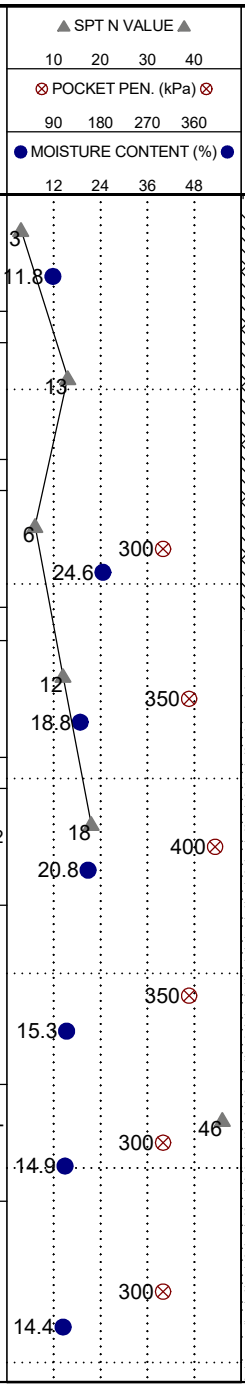
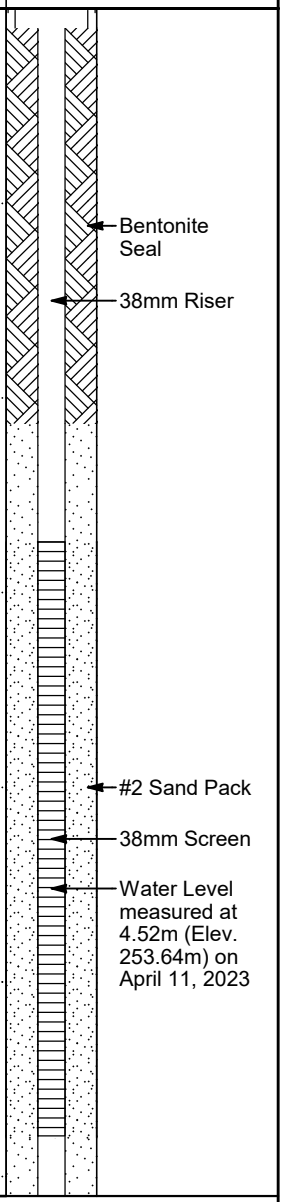
BOREHOLE NUMBER 1

PROJECT: Proposed Development
PROJECT ADDRESS: 13668 Emil Kolb Parkway
PROJECT NUMBER: 23-089
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 23-3-24
GROUND ELEVATION: 258.16 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)
0	**TOPSOIL:** Loose, dark brown silty topsoil, wet (330 mm)	0.00, 258.16	SPT 1	50	1-1-2-3 (3)
	FILL: Firm, grey-brown clayey silt fill, some sand, trace organics, deleterious materials (bricks), moist	0.33, 257.83			
1			SPT 2	100	5-7-6-7 (13)
	frequent organics encountered	1.07, 257.09			
	CLAYEY SILT: Firm, grey-brown clayey silt, some sand, trace gravel, moist (drier than the plastic limit)	1.52, 256.64	SPT 3	100	3-3-3-4 (6)
2					
	becoming stiff	2.44, 255.72	SPT 4	100	3-5-7-9 (12)
3			SPT 5	100	6-7-11-12 (18)
4			MC5 6	100	
	becoming very stiff, grey, trace sand	4.83, 253.33	SPT 7	100	13-21-25-18 (46)
5			MC5 8	100	
6					





Bottom of borehole at 6.10 m, Elevation 252.06 m.

Monitoring well installed at an elevation of approximately 252.37m on March 24, 2023.

Groundwater measured at approximately 5.42m below the ground surface (Elev. 253.64m) on April 11, 2023.

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BOREHOLE NUMBER 2

PROJECT: Proposed Development
PROJECT ADDRESS: 13668 Emil Kolb Parkway
PROJECT NUMBER: 23-089
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 23-3-24
GROUND ELEVATION: 258.22 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
0	**TOPSOIL:** Loose, dark brown silty topsoil, wet (200 mm)	0.00, 258.22	SPT 1	75	1-0-1-0 (1)	MC 15.9	
	CLAYEY SILT: Firm, grey-brown clayey silt, some sand, trace gravel, intermixed organics and rootlets, moist (drier than the plastic limit)	0.20, 258.02					
	no intermixed organics or rootlets	0.60, 257.62					
1			SPT 2	100	3-4-9-8 (13)	SPT 13; PP 300; MC 13.8	Bentonite Seal; 38mm Riser
	becoming stiff to very stiff	1.22, 257.00					
2			SPT 3	100	10-7-11-11 (18)	SPT 18; PP 400; MC 14.5	
			SPT 4	100	8-11-13-10 (24)	SPT 24; PP 450; MC 15.4	
3			SPT 5	100	9-11-15-16 (26)	SPT 26; PP 450; MC 14.5	
	becoming grey, trace sand	3.96, 254.26	MC5 6	100		PP 450; MC 15	#2 Sand Pack; 38mm Screen
4			SPT 7	100	8-14-18-16 (32)	SPT 32; PP 450; MC 14.6	
5			MC5 8	100		PP 350; MC 14.8	Water Level measured at 5.48m (Elev. 252.74m) on April 11, 2023
6							

Bottom of borehole at 6.10 m, Elevation 252.12 m.

Monitoring well installed at an elevation of approximately 252.12m on March 24, 2023.

Groundwater measured at approximately 5.48m below the ground surface (Elev. 252.74m) on April 11, 2023.

BOREHOLE LOG WITH WELL2 23-089 - BHS 1 TO 3 WITH MW.GPJ CMT_TEMPLATE_2020-05-15.GDT 23-4-18

CMT Engineering Inc.
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BOREHOLE NUMBER 3

PROJECT: Proposed Development
PROJECT ADDRESS: 13668 Emil Kolb Parkway
PROJECT NUMBER: 23-089
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 23-3-24
GROUND ELEVATION: 259.28 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
0	**TOPSOIL:** Loose, dark brown silty topsoil, wet (410 mm)	0.00, 259.28	SPT 1	75	1-1-1-1 (2)	2	
	CLAYEY SILT: Firm, grey-brown clayey silt, some sand, trace gravel, intermixed organics and rootlets, moist (drier than the plastic limit)	0.41, 258.87				21.6	
1	becoming stiff to very stiff, no intermixed organics or rootlets	1.07, 258.21	SPT 2	100	2-4-8-11 (12)	12 15.1	Bentonite Seal 38mm Riser
			SPT 3	100	8-10-18-11 (28)	28 350 15.8	
2			SPT 4	100	8-11-16-16 (27)	27 450 15.3	
3			SPT 5	100	8-8-15-19 (23)	23 450 15.2	
4	becoming grey, trace sand	4.11, 255.17	MC5 6	100		13.6	#2 Sand Pack
5			SPT 7	100	9-12-10-16 (22)	22 300 14	38mm Screen Water Level measured at 4.65m (Elev. 254.63m) on April 11, 2023
6			MC5 8	100		350 15.2	

Bottom of borehole at 6.10 m, Elevation 253.18 m.

Monitoring well installed at an elevation of approximately 253.18m on March 24, 2023.

Groundwater measured at approximately 4.65m below the ground surface (Elev. 254.63m) on April 11, 2023.

BOREHOLE LOG WITH WELL2 23-089 - BHS 1 TO 3 WITH MW.GPJ CMT_TEMPLATE_2020-05-15.GDT 23-4-18

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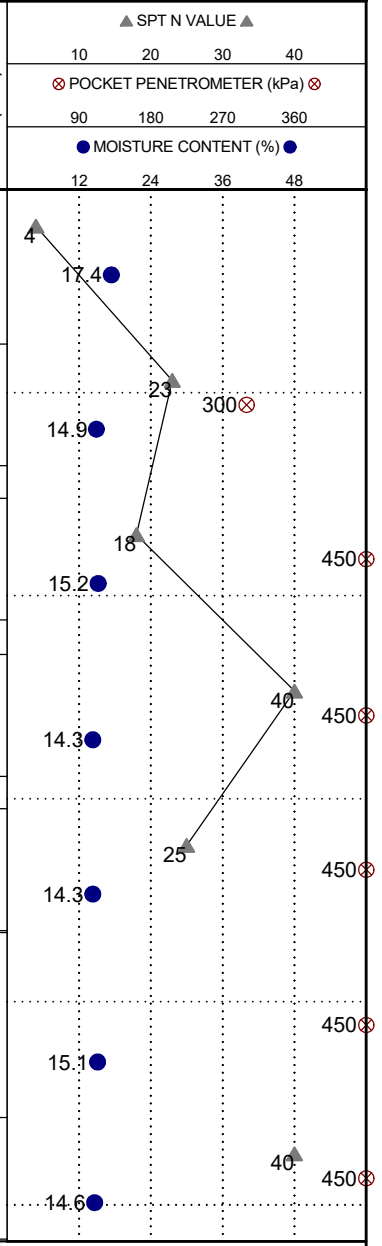
BOREHOLE NUMBER 4

PROJECT: Proposed Development
PROJECT ADDRESS: 13668 Emil Kolb Parkway
PROJECT NUMBER: 23-089
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 23-3-24
GROUND ELEVATION: 259.21 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	POCKET PEN. (kPa)
		TOPSOIL: Loose, dark brown silty topsoil, wet (200 mm)	0.00, 259.21					
			0.18, 259.03	SPT 1	50	1-2-2-2 (4)	17.4	
		CLAYEY SILT: Firm, grey-brown clayey silt, some sand, trace gravel, intermixed organics and rootlets, moist (drier than the plastic limit) becoming stiff to very stiff, no intermixed organics or rootlets	0.36, 258.85					
1				SPT 2	100	10-12-11-12 (23)	14.9	300
2				SPT 3	100	8-8-10-12 (18)	15.2	450
3				SPT 4	100	16-17-23-25 (40)	14.3	450
				SPT 5	100	12-8-17-21 (25)	14.3	450
4				MC5 6	100		15.1	450
5				SPT 7	100	30-19-21-22 (40)	14.6	450



Bottom of borehole at 5.18 m, Elevation 254.03 m.

Borehole open to termination.

No accumulated groundwater encountered upon completion.

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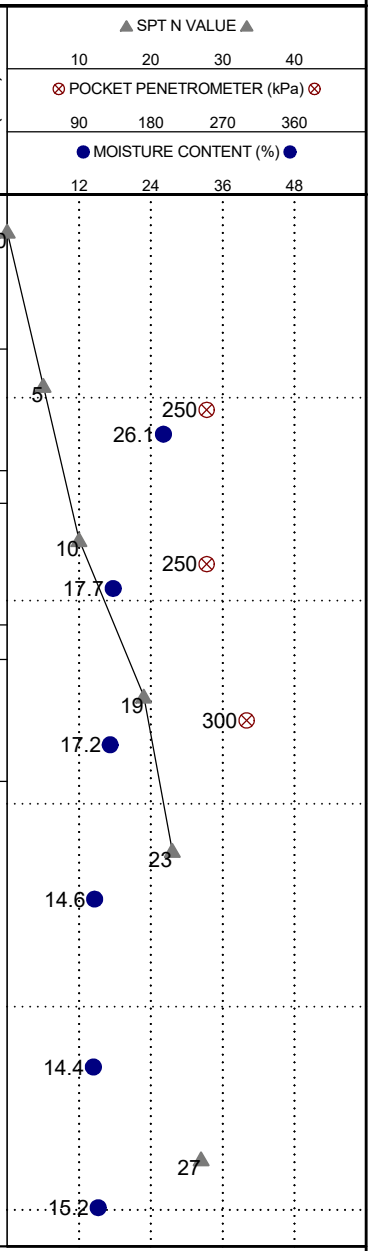
BOREHOLE NUMBER 5

PROJECT: Proposed Development
PROJECT ADDRESS: 13668 Emil Kolb Parkway
PROJECT NUMBER: 23-089
PROJECT LOCATION: Bolton, Ontario
DRILLING DATE: 23-3-24
GROUND ELEVATION: 259.14 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: BL
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: SPT/MC5

DEPTH (m)	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	MOISTURE CONTENT (%)	POCKET PEN. (kPa)
	TOPSOIL: Loose, dark brown silty topsoil, wet (410 mm)	0.00, 259.14	SPT 1	50	0-0-0-1 (0)		
	CLAYEY SILT: Firm, grey-brown clayey silt, some sand, trace gravel, intermixed organics and rootlets, moist (drier than the plastic limit)	0.41, 258.73					
1	no intermixed organics or rootlets	0.76, 258.38	SPT 2	100	2-2-3-4 (5)	26.1	250
	becoming stiff to very stiff	1.52, 257.62	SPT 3	100	6-5-5-5 (10)	17.7	250
2			SPT 4	100	8-10-9-10 (19)	17.2	300
3	becoming grey, trace sand	3.35, 255.79	SPT 5	100	9-11-12-14 (23)	14.6	
4			MC5 6	100		14.4	
5			SPT 7	100	11-13-14-15 (27)	15.2	



Bottom of borehole at 5.18 m, Elevation 253.96 m.

Borehole open to termination.

No accumulated groundwater encountered upon completion.

Water Well Records

Wednesday, April 26, 2023

12:36:10 PM

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
CALEDON TOWN (ALBION	17 600108 4858347 W	2014/02 7360	0.75			MO	0015 5	7217676 (Z174452) A161292	SILT 0015 CLAY 0020
CALEDON TOWN (ALBION	17 600485 4858450 W	2017/08 7147	1.25	UT 0008		MO	0010 5	7294294 (Z255072) A223378	BLCK LOAM 0001 BRWN SILT CLAY 0012 BRWN CLAY SILT TILL 0015
CALEDON TOWN (ALBION	17 600526 4858466 W	2017/08 7147	1.25	UT 0008		MO	0010 5	7294293 (Z255071) A223377	BLCK LOAM 0001 BRWN SILT CLAY 0012 BRWN CLAY SILT TILL 0015
CALEDON TOWN (ALBION	17 600458 4858270 W	2017/03 7464						7286282 (C37185) A208366 P	
CALEDON TOWN (ALBION	17 600585 4858004 W	2006/03 7230	1.97			NU	0010 10	4910244 (Z44332) A039816	BLCK SAND LOOS 0001 BRWN CLAY DNSE 0010 GREY CLAY DNSE 0020
CALEDON TOWN (ALBION CON 05 009	17 600243 4858381 W	2021/06 7366	1.59		///:	MO	0009 10	7394856 (963OGZUY) A333573	BRWN TILL SILT DNSE 0019
CALEDON TOWN (ALBION CON 05 009	17 600223 4858401 W	2021/06 7366	1.59		///:	MO	0010 10	7394855 (PCNGT2FQ) A333572	BRWN TILL SILT DNSE 0020
CALEDON TOWN (ALBION CON 05 009	17 600215 4858323 W	1982/11 3108	6	FR 0238	147/240/10/3:0	DO	0244 3	4905962 ()	LOAM 0002 BRWN CLAY GVLY 0017 GREY CLAY 0043 GREY CLAY SNDY 0072 GREY CLAY 0201 GREY CLAY SNDY 0235 GREY SAND 0247
CALEDON TOWN (ALBION CON 05 009	17 600277 4858412 W	2021/06 7366	1.59		///:	MO	0008 10	7394857 (62V3TLZY) A333574	BRWN TILL SILT DNSE 0018
CALEDON TOWN (ALBION CON 05 010	17 599905 4858789 W	1129						4907845 (149039)	
CALEDON TOWN (ALBION CON 05 010	17 600252 4858370 W	2004/05 1663				NU		4909422 (Z13072) A	
CALEDON TOWN (ALBION CON 05 010	17 599797 4858856 W	2016/05 7147	3.20 5				0037 2 0032 6	7263986 (Z228026) A	
CALEDON TOWN (ALBION CON 06 009	17 600329 4858432 W	2009/03 7147	35.4	FR 0023				7121185 (Z85214) A	
CALEDON TOWN (ALBION CON 06 009	17 600320 4858462 W	1957/07 1307	36	FR 0050	30///:	DO		4900319 ()	BRWN LOAM CLAY 0015 BLUE CLAY 0049 GRVL 0050

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
CALEDON TOWN (ALBION CON 06 009	17 600451 4858422 W	2017/08 7147	0.75	UT 0008		MO	0008 5	7294295 (Z255074) A223376	BLCK LOAM 0001 BRWN SILT CLAY 0012 BRWN CLAY SILT 0012
CALEDON TOWN (ALBION CON 06 009	17 600426 4858389 W	2017/08 7147	0.75	UT 0008		MO	0008 5	7294296 (Z255073) A223375	BLCK LOAM 0001 BRWN SILT CLAY 0012 GREN CLAY SILT TILL 0012
CALEDON TOWN (ALBION CON 06 010	17 600031 4858855 W	2003/04 1663				NU		4909128 (253125) A	
CALEDON TOWN (ALBION CON 06 010	17 600264 4858447 W	1985/09 4778	6 4	FR 0249	156/240/4/3:0	DO	0249 6	4906483 (NA)	BRWN CLAY STNS 0018 BLUE CLAY STNS 0074 BLUE CLAY 0180 BLUE CLAY SILT 0249 FSND 0255
CALEDON TOWN (ALBION CON 06 010	17 599937 4858893 W	2013/07 7147	35.4	FR 0007				7205856 (Z171558) A	

Notes:
UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completedand Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Fee. See Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag . A: Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPS	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Well Use

Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal		
PS	Public		
AC	Cooling And A/C		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur		
MN	Mineral		
UK	Unknown		