

Hydrogeological Investigation



839, 853 and 869 Hurontario Street & 7564 Poplar Sideroad
Collingwood, Ontario
G2S21366D

Charis Developments Ltd.
186 Hurontario Street, Suite 204
Collingwood, Ontario
L9Y 4T4

EXECUTIVE SUMMARY

G2S Consulting Inc. (G2S) was retained by Charis Developments Ltd. (the Client) to complete a Hydrogeological Investigation for the properties located at 839, 853 and 869 Hurontario Street & 7564 Poplar Sideroad in Collingwood, Ontario, Ontario. Authorization to proceed with the Hydrogeological Investigation was provided by Mr. Steve Assaff of Charis Developments Ltd.

The near-rectangular shaped Site is located on the northeast corner of the intersection of Hurontario Street and Poplar Sideroad. Pretty River tributary is located approximately 10 m north, Pretty River is located approximately 830 m east, and Nottawasaga Bay is located approximately 2.7 km north of the Site. The Site is in an area consisting of residential, commercial, and vacant or agricultural land use. The Site location is illustrated on Drawing 1 in Appendix A.

The Site is occupied by a single-story residential dwelling in the northwest portion and a former stormwater management pond is located south of the dwelling. A gravel fill pad is in the centre portion of the Site and was constructed of imported fill in December 2007/January 2008, the remainder is vacant, undeveloped land. The Site is approximately 3.9 hectares (9.6 acres) in size, and entrance to the Site is via Poplar Sideroad.

It is understood that current plans for the Site include three phases, as follows:

Phase 1 – Construction of slab on grade retail building (929 m²), two slab on grade restaurant buildings (226 and 411 m², respectively) with associated asphalt parking lot, and a parkette.

Phase 2 – Construction of a 4,406 m² slab on grade grocery store building and slab on grade 1,385 m² retail building in the east portion of the Site.

Phase 3 - Construction of a 12 storey mixed residential and commercial use building (footprint of about 1,656 m²) with two levels of underground parking, and a 600 m² slab on grade retail/office building.

The development plans are shown on a drawing provided by the Client and prepared by Richard Ziegler Architect Inc. (Drawing Number A101, 'The Gateway Centre, Charis Developments, Highway 124 & Poplar Sideroad, Collingwood, Ontario, Site Plan – Option C3 Branded dated August 23, 2024). Refer to Appendix A for a copy of the proposed development plan.

The purpose of this assignment was to prepare a hydrogeological investigation report for the proposed development at the Site and assess the stratigraphic and hydrogeological conditions for the purpose of evaluating short-term (temporary) dewatering requirements during Site development and long-term dewatering requirements after the Site has been developed. This report was prepared to present the study findings for supporting an application for a Permit to Take Water (PTTW) or Environmental Activity and Sector Registry (EASR). The report was also prepared to address the general requirements of the document titled "Hydrogeological Assessment Submissions, Conservation Authority Guidelines for Development Applications", June 2013.

This assignment was completed with a concurrent geotechnical investigation (issued under separate cover).

To meet the objectives of this assignment, the following tasks were undertaken:

1. Completion of groundwater level monitoring events on eight occasions from 2021 to 2024.
2. Completion of in-situ hydraulic conductivity testing in selected monitoring wells.
3. Collection of groundwater samples from one monitoring well and comparison of results to the criteria in the Town of Collingwood Sanitary and Storm Sewer Use By-Law.
4. Completion of a water balance analysis.
5. Completion of a water well search for properties located within 250 m of the Site.
6. Completion of a hydrogeologic analysis, including review of grain size analyses data.
7. Estimation of construction dewatering flow rates (short-term) and estimate postconstruction dewatering flow rates (long-term); and
8. Prepare a hydrogeological investigation report to summarize the background review information, field work and laboratory results, subsurface conditions, construction dewatering needs and assessment of the potential impacts of the dewatering, including conclusions and recommendations together with illustrative tables, figures, drawings, and back-up data in Appendices.

Based on the proposed development features and our findings of the Site setting, subsurface conditions, results of field work and laboratory analyses, the hydrogeological site assessment salient points for the construction dewatering needs are summarized in the following paragraphs.

Phase 1 and Phase 2

- The approximate finished floor elevations are 196 m ASL and the lowest elevation for the bulk excavation of the Site (Phase 1 and Phase 2) is taken as 193 m ASL (allowance for removal of fill to competent subgrade, ~ 3m).
- Groundwater levels ranged from a depth of 0 to 1.1 m bgs, during the most recent round of groundwater level measurements (July 19, 2024). Refer to Drawing 3 in Appendix A for the Groundwater Elevation Contours.
- The water-bearing units that will be exposed in the excavations during construction include fill materials (clayey silt, sand, gravel) and native soil (silt, clayey silt, and sandy silt to silty sand till) with K values ranging from 1.4×10^{-7} m/s to 9.5×10^{-8} m/s.
- The required groundwater lowering (drawdown) is recommended 1 m below the base of the excavation to maintain dry working conditions.
- For the purposes of this report, it is presumed that all structures below the water table will be waterproofed and designed to withstand the hydrostatic pressures/hydrostatic uplift.

Phase 3

- The approximate finished floor elevations are 196 m ASL and the lowest elevation for the bulk excavation for two levels of underground parking is taken as elevation 187.7 m ASL (7 to 7.5 m bgs); and 193 m ASL (3 m bgs) for the slab on grade building.
- Groundwater levels ranged from a depth of 0.4 to 0.7 m bgs, during the most recent round of groundwater level measurements (July 19, 2024) in the north part of the Site. Refer to Drawing 3 in Appendix A for the Groundwater Elevation Contours.
- The water-bearing units that will be exposed in the excavations during construction include fill materials (clayey silt) and native soil (clayey silt, sandy silt till). A 0.6 to 0.8 m thick gravel layer was contacted at approximate elevation 188.4 to 188.9 mASL. K values ranged from 1.8×10^{-8} m/s to 2.9×10^{-5} m/s.
- The required groundwater lowering (drawdown) is recommended 1 m below the base of the excavation to maintain dry working conditions.
- For the purposes of this report, it is presumed that all structures below the water table will be waterproofed and designed to withstand the hydrostatic pressures/hydrostatic uplift.

The discharge rates are summarized in the following table:

Calculated Maximum Total Dewatering Rate *Including Factors of Safety*

Excavation	Steady State Dewatering (L/day)	Initial Drawdown Surcharge (L/day)	Maximum Total Dewatering Requirement (L/day)
Phase 1 and Phase 2	19,804	9,902	334,240
Phase 3 – mixed use building with 2 levels of underground parking	1,050,562	525,281	2,428,968
Phase 3 – slab on grade retail/office building	6,253	3,126	37,694

- No long-term (permanent) dewatering requirement is expected at this time based on preliminary design.
- Phase 1 and Phase 2 construction dewatering will require maximum daily dewatering rates below 400,000 L/day but more than 50,000 L/day; therefore, an EASR would be required for the proposed temporary construction dewatering.
- Phase 3 construction dewatering will require maximum daily dewatering rates of more than 400,000 L/day based on current design details; therefore, a Category 3 Permit to Take Water (PTTW) would be required for the proposed temporary construction dewatering.

- Based on the groundwater chemical test results, it was found that, for discharge to Town of Collingwood storm and sanitary sewers, the groundwater quality in the unfiltered sample analyzed exhibited elevated total suspended solids (TSS). The results for a filtered sample indicated the TSS value met the criteria. Removal of suspended solids prior to discharge will be a key component of dewatering mitigation. Additional confirmatory sampling and analyses are to be undertaken to confirm compliance with the regulatory criteria of the receiving system to be used. The construction dewatering discharge receptor was not known at the time of the issuance of this report (i.e storm sewer, sanitary or combined sewer, surface water etc). Once the dewatering discharge location is known, G2S should be contacted to confirm the scope of groundwater testing required, if any for a discharge permit from the municipality.
- The pre-development water balance reflects 1% impervious surface area under existing conditions, as the Site is currently undeveloped and consists of a vacant lot with one residential dwelling. The precipitation falling on the Site would infiltrate the grass/vegetation or gravel covered Site, with a portion flowing to municipal storm sewers on Hurontario Street and Poplar Sideroad. Therefore, under pre-development conditions there is 9,749,723 m³/year of infiltration of precipitation.
- Under post-development conditions with no mitigation measures in place, redevelopment of the Site will result in approximately 66% impervious surface area. As a result, the post-development infiltration rate (3,337,985 m³/year) is less than the pre-development infiltration rate (9,749,723 m³/year). In this regard, Low Impact Development (LID) or other strategies will be required to mitigate the reduction.
- All monitoring wells and dewatering wells should be abandoned in accordance with the Ontario Regulation 903, as amended once no longer in use or being maintained for use. The Site owner is considered to be the well owner of the monitoring wells installed at the Site ("well owner" Section 1.0, Regulation 903). When the monitoring wells are no longer required, it is the owner's responsibility to arrange for abandonment in accordance with Ontario Water Resources Act—R.R.O. 1990, Regulation 903 – Amended to O. Reg. 128/03.

It is important to note that the design and installation of a construction dewatering system is the responsibility of the dewatering contractor. The contractor should verify the information presented in this report. This may be done by examining the hydrogeologic conditions in a test pit and a full-range pumping test by the dewatering subcontractor.

Construction dewatering discharges should follow best management practices, including sediment and erosion control measures, removal of suspended solids by decanting pond/tank or similar treatment system, as well as a water quality and quantity control monitoring programs.

A construction dewatering plan should be prepared by the contractor prior to commencement of construction and the construction dewatering activities. The extent and details of the dewatering scheme are left solely to the contractor's discretion to achieve the performance objectives for stable slopes and dry working conditions and will be based on his/her own interpretation and analysis of Site conditions, equipment, experience and plant efficiency.

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1. INTRODUCTION

G2S Consulting Inc. (G2S) was retained by Charis Developments Ltd. (the Client) to complete a Hydrogeological Investigation for the properties located at 839, 853 and 869 Hurontario Street & 7564 Poplar Sideroad in Collingwood, Ontario, Ontario. Authorization to proceed with the Hydrogeological Investigation was provided by Mr. Steve Assaff of Charis Developments Ltd.

1.1 Site Description

Table 1: General Site Details

Municipal Address	839, 853 and 869 Hurontario Street & 7564 Poplar Sideroad, Collingwood, Ontario
General Site Location	Northeast corner of the intersection of Hurontario Street and Poplar Sideroad. Pretty River tributary is located approximately 10 m north, Pretty River is located approximately 830 m east, and Nottawasaga Bay is located approximately 2.7 km north.
Approximate Site Area	3.9 hectares (9.6 acres)
Property Identification Number (PIN)	839 Hurontario Street: 58262-0078 (LT) 853 Hurontario Street: 58262-0076 (LT) 869 Hurontario Street: 58262-0787 (LT) 7564 Poplar Sideroad: 58262-0576 (LT)
Legal Description	839 Hurontario Street: PT S1/2 LT 40 CON 8 NOTTAWASAGA AS IN RO515907 (SECONDLY); COLLINGWOOD 853 Hurontario Street: PT S1/2 LT 40 CON 8 NOTTAWASAGA AS IN RO706547; COLLINGWOOD 869 Hurontario Street: PT S1/2 LT 40 CON 8 NOTTAWASAGA BEING PTS 1 & 2 51R32487 EXCEPT PTS 1 & 2 51R37017; TOWN OF COLLINGWOOD 7564 Poplar Sideroad: PT S1/2 LT 40 CON 8 NOTTAWASAGA PT 1 51R3533 EXCEPT PT 1 51R4531 & EXCEPT PT 4 51R37017; COLLINGWOOD
Current Site Owner	839 Hurontario Street: Assaff Investments Ltd. 853 Hurontario Street: Charis Developments Ltd. and Assaff Investments Ltd. 869 Hurontario Street and 7564 Poplar Sideroad: Charis Developments Ltd. 7564 Poplar Sideroad: Charis Developments Ltd.
Current Site Occupant	839 and 869 Hurontario Street and 7564 Poplar Sideroad: Vacant, undeveloped land.

	839 and 869 Hurontario Street have never been developed, and 7564 Poplar Sideroad was historically developed with a residential home from approximately 1900-2007, when the building was demolished. 853 Hurontario Street: A single story residential dwelling.
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The location of the Site is depicted the Drawings presented in Appendix A.

1.2 Proposed Site Development

It is understood that plans for the Site include three phases, as follows:

Phase 1 – Construction of slab on grade retail building (929 m²), two slab on grade restaurant buildings (226 and 411 m², respectively) with associated asphalt parking lot, and a parkette.

Phase 2 – Construction of a 4,406 m² slab on grade grocery store building and slab on grade 1,385 m² retail building in the east portion of the Site.

Phase 3 - Construction of a 12 storey mixed residential and commercial use building (footprint of about 1,656 m²) with two levels of underground parking, and a 600 m² slab on grade retail/office building.

The development plans are shown on a drawing provided by the Client and prepared by Richard Ziegler Architect Inc. (Drawing Number A101, 'The Gateway Centre, Charis Developments, Highway 124 & Poplar Sideroad, Collingwood, Ontario, Site Plan – Option C3 Branded dated August 23, 2024). Refer to Appendix A for a copy of the proposed development plan.

For the purpose of this report, the excavation area is assumed to be the building footprint and the approximate finished floor elevations are 196 m ASL. The lowest elevation for the bulk excavation of the Site (Phase 1 and Phase 2) is taken as 193 m ASL (allowance for removal of fill to competent subgrade, ~ 3m).

For Phase 3, the lowest elevation for the bulk excavation for two levels of underground parking is taken as elevation 187.7 m ASL (7 to 7.5 m bgs); and 193 m ASL (3 m bgs) for the slab on grade building.

2. TERMS OF REFERENCE

The purpose of this assignment was to prepare a hydrogeological investigation report for the proposed development at the Site and assess the stratigraphic and hydrogeological conditions for the purpose of evaluating short-term (temporary) dewatering requirements during Site development and long-term dewatering requirements after the Site has been developed. This report was prepared to present the study findings for supporting an application for a Permit to Take Water (PTTW) or Environmental Activity and Sector Registry (EASR). The report was also prepared to address the general requirements of the document titled “Hydrogeological Assessment Submissions, Conservation Authority Guidelines for Development Applications”, June 2013.

3. SCOPE OF WORK

To meet the objectives of this assignment, the following tasks were undertaken:

1. Completion of groundwater level monitoring events on eight occasions from 2021 to 2024.
2. Completion of in-situ hydraulic conductivity testing in selected monitoring wells.
3. Collection of groundwater samples from one monitoring well and comparison of results to the criteria in the Town of Collingwood Sanitary and Storm Sewer Use By-Law.
4. Completion of a water balance analysis.
5. Completion of a water well search for properties located within 250 m of the Site.
6. Completion of a hydrogeologic analysis, including review of grain size analyses data.
7. Estimation of construction dewatering flow rates (short-term) and estimate postconstruction dewatering flow rates (long-term); and
8. Prepare a hydrogeological investigation report to summarize the background review information, field work and laboratory results, subsurface conditions, construction dewatering needs and assessment of the potential impacts of the dewatering, including conclusions and recommendations together with illustrative tables, figures, drawings, and back-up data in Appendices.

4. PREVIOUS REPORTS

G2S previously completed the following reports for the Site.

1. Phase One Environmental Site Assessment Update, 839 and 869 Hurontario Street & 7564 Poplar Sideroad, Collingwood, Ontario, Reference G2S21366A, dated November 19, 2021.
2. Phase Two Environmental Site Assessment, 839 and 869 Hurontario Street & 7564 Poplar Sideroad, Collingwood, Ontario, Reference G2S21366B, dated November 19, 2021.
3. Geotechnical Investigation, Proposed Commercial Development, 839 and 869 Hurontario Street, Collingwood, Ontario, Reference G2S21366C, dated March 17, 2022.
4. Phase One Environmental Site Assessment Update, 839, 853 and 869 Hurontario Street & 7564 Poplar Sideroad, Collingwood, Ontario, Reference G2S21366A, dated July 31, 2024.
5. Phase Two Environmental Site Assessment Update, 839, 853 and 869 Hurontario Street & 7564 Poplar Sideroad, Collingwood, Ontario, Reference G2S21366B, dated July 31, 2024.
6. Geotechnical Investigation – Addendum, Proposed Mixed Use Development, 839, 853 and 869 Hurontario Street & 7564 Poplar Sideroad, Collingwood, Ontario, Reference G2S21366C, dated September 2024.

As part of the above assignments, twenty-five boreholes were advanced on-Site. Nine of the boreholes were completed as groundwater monitoring wells, which were utilized for the Hydrogeological Investigation. As well, grain size distribution testing for ten soil samples across the Site were undertaken and are included in Appendix E.

5. SITE SETTING AND WATER WELL SURVEY

5.1 Site Topography and Drainage

The Site is generally flat, sloping down to the north/northeast. A gravel fill pad is in the centre portion of the Site located at a higher grade than the remainder of the Site. The surface elevations measured on-Site range from 195.87 m in the south-central area of the Site to 194.39 m on the north side of the Site. A former stormwater retention pond is located near the northwest corner of the Site, south of the residential dwelling and a tributary to Pretty River is located approximately 10 m north of the Site. Surface water is inferred to infiltrate through the undeveloped Site and stormwater pond.

The nearest surface water bodies are Pretty River located approximately 830 m east, and Nottawasaga Bay located approximately 2.7 km north of the Site.

5.2 Site Physiographic, Geologic and Hydrogeologic Setting

Based on a review of geological mapping for the area, the near surface overburden soils at and in the vicinity of the Site are comprised of sandy loam underlain by grey shale with limestone interbeds of the Upper Ordovician, Georgian Bay (Carlsbad and Russell) Formation. Based on subsurface investigations completed at the Site, soil stratigraphy encountered generally consisted of fill materials overlying deposits of native silt/clayey silt and silty sand till/sandy silt till. A layer of gravel was contacted at depths of 6.1 and 6.9 m bgs in the north part of the Site, underlain by limestone bedrock at 6.9 to 7.5 m bgs.

Geodetic elevations at the Site range from approximately 195.87 m in the south-central area of the Site to 193.39 m on the north side of the Site. The hydrogeology of the Site is primarily controlled by topography, and the regional direction of shallow groundwater flow in the vicinity of the Site is likely north-northeast towards Nottawasaga Bay.

5.3 Surface Water Features

A former stormwater retention pond is located near the northwest corner of the Site, south of the residential dwelling with an elevation of 193.98 m ASL at the bottom of the pond. Nearby BH/MW101/A indicated a groundwater elevation of 193.4 m ASL.

A low-lying area/unevaluated wetland is located in the northeast portion of the Site with an elevation of about 194.0 m ASL at the bottom of the slope. Nearby monitoring wells indicated a groundwater elevation of 193.7 to 194.4 m ASL.

Additional information will be required to assess the significance of the wetland and its hydrogeologic connection.

5.4 MECP Water Well Records and Site Observations

The Site and properties within an approximate 250 m radius of the Site were searched within the current MECP Water Well Information System (WWIS) database. Twenty-five water well records were located within the search radius. The locations of the water well records are shown on Drawing 1 in Appendix A and a copy of the well record summary is included in Appendix B.

Of the 25 wells records listed:

- 6 did not have any details of well use
- 1 was for public (PS) use
- 6 were for monitoring (MT/MO) use
- 12 were for domestic (DO) use

Given the age of most of the wells (~1951 to 1975), with three from 1984, 1990 and 2015, it is likely the wells are no longer in use. Potable water for the Site will be supplied by the municipality, sourced from Georgian Bay. The water is supplied via a municipal network comprising a treatment plant, an elevated storage tank, and a series of reservoirs and booster stations.

A reconnaissance of the Site was conducted during the field work to identify existing structures, land uses, and potential sources of groundwater contamination, if any, which may be located within the potential dewatering zone of influence (approximately 3 m for the slab on grade buildings and 285 m for the mixed use building with 2 levels of underground parking).

The major features within the Study Area included:

- a) Major arterial roads, including Poplar Sideroad and Hurontario Street.
- b) Properties comprise primarily residential and commercial use.
- c) Pretty River is located approximately 830 m east and Nottawasaga Bay is located approximately 2.7 km north of the Site.

Potentially Contaminating Activities (PCAs) identified during a Phase One ESA Update completed by G2S in November 2021 and July 2024 (reported under separate cover) were the unknown chemical quality of fill materials on-Site, and the current use of the property located approximately 30 m west as a gasoline service station. However, the results of a Phase Two ESA conducted for the Site by G2S did not indicate any soil or groundwater impacts.

It is noted that the use of de-icing salt on adjacent roadways may result in elevated chloride and sodium in groundwater (electrical conductivity (EC) and sodium adsorption ratio (SAR) in soil).

6. FIELD WORK AND LABORATORY ANALYSIS

6.1 Borehole Drilling and Monitoring Well Installation

As part of the Phase Two ESA and Geotechnical Investigation completed for the Site, each reported under separate cover, twenty-five boreholes were advanced on-Site in September/October 2021, January 2022 and June 2024. Nine of the boreholes were completed as groundwater monitoring wells, identified as BH/MW101A, BH/MW103A, BH/MW105, BH/MW106A, BH/MW110, BH/MW115A, BH/MW122, BH/MW201 and BH/MW202.

Field work for this assignment included groundwater sampling and borehole permeability testing. The borehole and monitoring well locations are shown on Drawing 2 included in Appendix A. Ground surface elevations and UTM co-ordinates at the borehole locations were determined by G2S. A topographic survey completed by J.D. Barnes Limited on September 9, 2021, was provided to G2S for reference. The ground surface elevations were inferred by G2S from the topographic survey.

The details of the monitoring well construction is shown on the Borehole Logs in Appendix C.

6.2 Groundwater Monitoring, Sampling and Borehole Permeability Testing

6.2.1 Groundwater Monitoring

Free water was encountered in the boreholes during drilling between depths of 0.3 and 4.4 m below ground surface (bgs). Groundwater levels were measured in three monitoring wells on October 13 and November 3, 2021, in seven monitoring wells on January 21 and April 5, 2022, and up to nine wells in June and July 2024.

All readings were obtained using a Solinst™ groundwater level reader. The Solinst™ water level meter was cleaned between uses at each monitoring well location.

6.2.2 Groundwater Sampling

Development/purging of one monitoring well for sanitary and storm sewer analysis was completed on June 20, 2024 and involved removal of a minimum of three to five well volumes or until the well was dry, in accordance with fixed volume and well evacuation purging procedures as outlined in ASTM D6452-99 (2005).

In an effort to minimize potential cross-contamination, dedicated sampling equipment was used in the groundwater well. The equipment was used with new nitrile gloves.

Groundwater samples were collected from the monitoring well identified as MW201 (screened in sandy silt till/gravel), on June 20 and 26, 2024. The groundwater samples were field logged and placed in clean, laboratory provided bottles, stored in an insulated cooler on ice, and delivered directly to Paracel Laboratories Ltd. (Paracel). Particular attention was applied to visual and olfactory evidence of potential contamination such as odours and sheens during the course of the field work.

6.2.3 Borehole Permeability Testing

In situ borehole permeability was determined through rising head (slug) testing, performed in monitoring wells identified as BH/MW101A, BH/MW103A, BH/MW110, and BH/MW122 on January 21, 2022, and MW201 and MW202 on June 20, 2024. The rising head testing was completed according to ASTM procedure D4044 “Standard Test Method for (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers”.

Groundwater levels were monitored before and during rising head testing using both manual readings with a Solinst™ groundwater level reader and automatic readings with a Solinst™ water level loggers.

6.3 Laboratory Testing

6.3.1 Water Sample Chemical Analysis

To address the potential in-construction groundwater dewatering discharge quality issues, groundwater samples (collected from BH/MW201) were submitted to Paracel for chemical analyses. Paracel is accredited by The Standards Council of Canada (SCC) and The Canadian Association for Laboratory Accreditation (CALA).

The groundwater samples collected from BH/MW201 were analyzed for the parameters contained within the Town of Collingwood Sanitary and Storm Sewer Discharge By-Law, which includes selected organic, inorganic, and microbiological parameters.

The following is a summary of the groundwater samples submitted for analysis.

Table 2: Samples Submitted for Analytical Testing

Sample Location	Sample I.D.	Description	Type of Chemical Analysis
BH/MW201	MW201-UF	Clear, no odour or sheen	Town of Collingwood Sanitary and Storm Sewer By-law No. 2009-18 Discharge parameters
BH/MW201	MW201-F	Clear, no odour or sheen	Filtered sample for Metals and Total Suspended Solids (TSS)

UF – unfiltered sample; F – filtered sample

6.3.2 Soil Particle Size Distribution Analyses

Seven representative soil samples obtained from the Site were submitted for particle size distribution analyses:

- BH102 SS5 (silt)
- BH103 SS4 (silt)
- BH105 SS4 (silt)
- BH109 SS3 (clayey silt)
- BH113 SS5 (clayey silt)
- BH122 SS6 (clayey silt)
- BH201 S3 (clayey silt)
- BH201 S5 clayey silt)
- BH202 S5 clayey silt)

7. FINDINGS

7.1 Summarized Subsurface Conditions

Reference is made to Drawing 2 and the Borehole Logs in Appendix C for details of the field work including sampling locations, visual soil classification, standard penetration test N values (where applicable), inferred stratigraphy, groundwater observations, and monitoring well installation details.

The boundaries indicated on the borehole logs are intended to reflect transition zones for the purpose of hydrogeological assessment and should not be interpreted as exact planes of geological change.

The boreholes drilled by G2S generally consisted of fill materials (to depths of up to 1.6 m bgs) overlying deposits of native silt/clayey silt and silty sand till/sandy silt till. A description of the soil stratigraphy encountered on the Site, in order of depth, is summarized in the sections below.

7.1.1 Topsoil

A surficial veneer of topsoil and organic material with thicknesses ranging between approximately 75 and 360 mm, was encountered in BH101, BH103 to BH106, BH113, BH118, BH121, BH122 and BH202.

7.1.2 Fill Materials

Fill material was encountered below the topsoil in BH101, BH103, BH104, BH106 to BH108, BH115, BH118 and BH122, and extended to depths ranging from approximately 0.8 and 1.2 m bgs. This layer of fill consisted generally of clayey silt and contained traces to interbedded layers of sand.

Granular fill material (sand and gravel) was contacted at the surface in BH102, BH109 to BH112, BH116, BH119, BH120, BH123 and BH201. The granular fill extended to depths ranged between 0.9 and 1.6 m bgs. The granular fill was generally brown in color and contained some cobble and boulder size particles. The lower portion of the granular fill was mixed with clayey silt in BH102 and BH109.

7.1.3 Silt/Clayey Silt

Native silt or clayey silt was encountered beneath the topsoil or fill materials in each of the boreholes to depths of up to 6.1 m bgs. The silt/clayey silt became grey and very moist to wet with depth.

7.1.4 Silty Sand/Sandy Silt Till

Native silty sand/sandy silt till was encountered in all boreholes except BH116 to BH121 and BH123, to the termination depth of 8.2 m bgs. The till was grey and wet.

7.1.5 Gravel

A gravel deposit was encountered beneath the sandy silt till in BH201 and BH202 and extended to the termination of auguring due to refusal on probable bedrock. The gravel layer extended to depths of 7.6 and 6.9 mbeg in BH201 and BH202, respectively. The gravel deposit was generally grey in color, containing some sand, and trace to some silt.

1.2 Limestone/Dolostone Bedrock/Possible Bedrock

Beneath the gravel in BH201 and BH202, Limestone/Dolostone bedrock was encountered at depths of approximately 7.6 and 6.9 mbeg, respectively. Bedrock was proven by coring in Borehole BH201 between 7.6 and 11.1 m bgs

7.2 Groundwater Conditions

Free water was encountered in the boreholes during drilling between depths of 1.2 and 4.4 m below ground surface (bgs). The measured hydrostatic groundwater levels in eight of the monitoring wells varied from ground surface to 1.3 m bgs during the most recent round of groundwater level measurements on July 19, 2024 (elevation 194.8 to 193.4 m (geodetic)).

Groundwater levels are subject to seasonal fluctuations and variations in precipitation. A summary of groundwater data is included in the following table.

Table 3: Summary of Groundwater Levels

Sample Location	Ground Surface Elevation	Well Depth from Ground Surface (m)	Screened Interval Elevation (m) and Depth (m bgs)	Groundwater Elevation and Depth (m bgs)							
				Oct. 13, 2021	Nov. 3, 2021	Jan. 21, 2022	Apr. 5, 2022	June 5, 2024	June 20, 2024	June 26, 2024	July 19, 2024
MW101A	194.50	4.84	191.4 - 189.9 (3.1 - 4.6)	--	--	193.4 (1.1)	193.5 (1.1)	193.4 (1.1)	--	193.3 (1.2)	193.4 (1.1)
MW103A	194.39	3.61	191.3 - 189.8 (3.1 - 4.6)	--	--	193.7 (0.7)	193.8 (0.6)	193.6 (0.8)	--	193.5 (0.9)	193.7 (0.7)
BH/MW105	194.63	4.65	191.0 - 190.0 (1.7 - 4.7)	194.7 (-0.1)	194.9 (-0.3)	Frozen	194.8 (-0.1)	194.6 (0)	194.2 (0.4)	194.5 (0.1)	194.6 (0)
MW106A	194.54	4.56	191.5 - 190.0 (3.1 - 4.6)	--	--	Frozen	194.7 (-0.2)	194.5 (0)	--	194.4 (0.1)	194.4 (0.1)
BH/MW110	195.87	5.32	190.6 - 193.6 (2.3 - 5.3)	193.9 (2.0)	195.0 (0.9)	194.4 (1.4)	194.5 (1.3)	194.6 (1.3)	194.4 (1.5)	194.6 (1.3)	194.6 (1.3)
MW115A	195.28	4.6	192.2 - 190.7 (3.1 - 4.6)	--	--	--	--	--	--	194.3 (1.0)	--
BH/MW122	195.09	4.83	190.3 - 193.3 (1.8 - 4.8)	194.7 (0.4)	195.0 (0.1)	195.6 (-0.6)	194.7 (0.4)	194.7 (0.4)	194.1 (1.0)	194.5 (0.6)	194.6 (0.5)
MW201	195.3	7.7	189.1 - 187.6 (4.7 - 7.7)	--	--	--	--	--	194.2 (1.1)	194.7 (0.6)	194.8 (0.5)
MW202	195.0	6.8	193.2 - 190.2 (1.8 - 4.8)	--	--	--	--	--	194.3 (0.7)	194.6 (0.4)	194.6 (0.4)

Bolded value indicates water level is above the ground surface and may be due to an unstable groundwater level and/or upward hydrogeologic gradient.

Groundwater level contours for the monitoring wells on-Site for July 2024 are shown on Drawing 3 in Appendix A, which also shows the monitoring well locations and measured water levels.

Based on G2S' Site observations and short-term water level measurements, the groundwater table in the overburden aquifer underlying the Site has a horizontal gradient of about 0.0112 (0.1%) toward the north/northwest. General groundwater elevation underlying the Site is 194.6 with a groundwater depression around the former SWMP at elevation 193.4.

7.3 Estimated Hydraulic Conductivity

7.3.1 In-Situ Hydraulic Conductivity Testing

Rising head tests were carried out in monitoring wells BH/MW101, BH/MW103, BH/MW110, BH/MW122, BH/MW201 and BH/MW202 at the Site.

The hydraulic conductivity of the subsurface strata at the Site were determined based on the results of rising head testing carried out at selected monitoring well locations on January 21, 2022 and June 20, 2024. Prior to conducting the tests, the monitoring wells were developed to remove any fines introduced into the screen following construction. The wells were then left to recharge to static water level. The test was carried out by inserting a data logger into the bottom of the well, then purging the monitoring well with water until dry. The loggers were then used to record the change in head over time. Once the well had returned to 63% of its static water level or the logger had recorded a sufficient amount of data, the logger was removed. The results were then calculated using the Hvorslev Method. The results of the analyses are presented in Appendix D.

The hydraulic conductivities of the subsurface strata at the Site are as shown in the following table.

Table 4: Hydraulic Conductivity Estimates – Slug Testing

Monitoring Well I.D.	Ground Surface Elevation (mASL)	Elevation of Well Screen (mASL)	Stratum Captured by Well Screen	Hydraulic Conductivity (Rising Head Test, m/s)
BH/MW101/A	194.50	192.7 - 189.7	Silt/sandy silt till	$<1 \times 10^{-7}$ m/s
BH/MW103/A	194.39	192.8 - 189.8	Silt/sandy silt till	$<1 \times 10^{-7}$ m/s
BH/MW110	195.87	193.6 - 190.6	Clayey silt/silt	9.5×10^{-8} m/s
BH/MW122	195.09	193.2 - 190.2	Clayey silt/silt	1.4×10^{-7} m/s
BH/MW201	195.3	190.8 - 187.8	Sandy silt till/gravel	1.8×10^{-8} m/s
BH/MW202	195.0	191.1 - 188.1	Clayey silt/sandy silt till/gravel	2.9×10^{-5} m/s

Typical rates of hydraulic conductivity for the soils found at this Site during the investigation are as follows (Freeze and Cherry, 1979):

- Sandy silt till – 10^{-12} to 10^{-6}
- Clayey Silt – 10^{-7} m/s to 10^{-12} m/s
- Silt – 10^{-5} m/s to 10^{-9} m/s
- Gravel – 10^{-5} m/s to 10^{-3} m/s

The grain size analysis curves confirming the soil classifications and hydraulic conductivity ranges are presented in Appendix E.

7.4 Groundwater Quality

The laboratory certificate of analysis, including chain-of-custody record, compared to the Town of Collingwood Sanitary and Storm Sewer By-Law 2009-118 discharge parameters criteria are included in Appendix F.

Based on the results of chemical analysis on samples tested, the quality of the groundwater samples complied with the applicable guidelines with the following exception below.

Table 5: Summary of Results of Analytical Testing

Sample Location	Parameter	Town of Collingwood Sanitary/ Combined Sewer Discharge Criteria (mg/L)	Town of Collingwood Storm Sewer Discharge Criteria (mg/L)	Concentration (mg/L)
				BH/MW201
BH/MW201 - UF	Total Suspended Solids	300	15	449
BH/MW201 - F	Total Suspended Solids	300	15	<2

Italics – Concentration exceeds Town of Collingwood Sanitary / Combined Sewer Discharge Criteria

Bold – Concentration exceeds Town of Collingwood Storm Sewer Discharge Criteria

UF – unfiltered sample; F – filtered sample

7.5 Water Balance

A Site water balance is an empirical calculation and accounting of water in the hydrologic cycle. Precipitation (P) falls as rain and snow. Precipitation can evapotranspire (ET) from the ground surface, impermeable surfaces (such as buildings, pavements and roads) and through vegetation; infiltrate (I) into the soil and percolate downwards towards the shallow groundwater table; or run-off (R) across the ground surface or impermeable surfaces towards surface water features, stormwater collection systems, and topographic low points. When assessed over a long-term period, there is minimal or no net change to groundwater storage (ΔS).

The water balance equation (Thornthwaite and Mather, 1957) can be written as:

$$P = ET + I + R + \Delta S$$

Pre-development and post-development annual water balance calculations have been prepared based on the Thornthwaite and Mather (1957). The water balance calculation spreadsheets are included in Appendix G for reference.

The Thornthwaite and Mather methodology assesses monthly averages of precipitation and temperature and uses this information in conjunction with Site soil data, and climatological and soils variables, to calculate a variety of parameters. This information is then assessed using methodology and variables from the MECP Stormwater Management Planning and Design Manual (2003) to calculate infiltration, evapotranspiration, and runoff rates and volumes from both pervious and impervious portions of the Site.

Pre-Development Water Balance

The pre-development water balance reflects 1% impervious surface area under existing conditions, as the Site is currently undeveloped and consists of a vacant lot with one residential dwelling. The precipitation falling on the Site would infiltrate the grass/vegetation or gravel covered Site, with a portion flowing to municipal storm sewers on Hurontario Street and Poplar Sideroad. Therefore, under pre-development conditions there is 9,749,723 m³/year of infiltration of precipitation.

Post-Development Water Balance, no Mitigation

Under post-development conditions with no mitigation measures in place, redevelopment of the Site will result in approximately 66% impervious surface area. As a result, the post-development infiltration rate (3,337,985 m³/year) is less than the pre-development infiltration rate (9,749,723 m³/year). In this regard, Low Impact Development (LID) or other strategies will be required to mitigate the reduction.

8. CONSTRUCTION DEWATERING ANALYSIS

Based on excavation locations, dimensions, and depths provided for this report, the soil excavations and subsequent construction of the slab and grade buildings and 2 levels of underground parking structure will require dewatering to lower the groundwater table within the excavations 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 open excavations 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.

8.1 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.

Table 6 below summarizes the preliminary excavation requirements for the proposed bulk excavation of the buildings in Phase 1 and Phase 2. Additionally, the table below includes the following buffers as factors of safety:

- Simultaneous dewatering of the excavations to permit concurrent excavation work at multiple locations within the property area;
- A buffer of 1 m for the excavation elevation 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 192 m ASL or 4 m bgs, which is provided for removal of fill to expected competent subgrade.
- Groundwater elevation assumed to be 0.0 m bgs across the Site to account for seasonal fluctuations and variation in groundwater levels measured in the on-Site monitoring wells.

Table 6: Preliminary Excavation Requirements – Phase 1 and Phase 2

Excavation	Excavation Area (m ²) (includes 5% buffer)	Excavation Depth (m ASL / m bgs) (includes 1 m buffer)	GW Depth (m bgs) (includes 0.5 m buffer)
Phase 1 and Phase 2 (5 buildings)	7,725	192 / 4.0	0.0

Table 7 below summarizes the preliminary excavation requirements for the proposed bulk excavation of the building with 2 levels of underground in Phase 3 and the slab on grade building in Phase 3. Additionally, the table below includes the following buffers as factors of safety:

- Simultaneous dewatering of the excavations to permit concurrent excavation work in Phase 3;
- A buffer of 1 m for the excavation elevation 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 192 m ASL or 4 m bgs for the slab on grade building; and 186.7 m ASL or 8 to 8.5 m bgs for the 2 levels of underground.
- Groundwater elevation assumed to be 0.0 m bgs across the Site to account for seasonal fluctuations and variation in groundwater levels measured in the on-Site monitoring wells.

Table 7: Preliminary Excavation Requirements – Phase 3

Excavation	Excavation Area (m ²) (includes 5% buffer)	Excavation Depth (m ASL / m bgs) (includes 1 m buffer)	GW Depth (m bgs) (includes 0.5 m buffer)
Phase 3 – 2 levels of underground	1,739	186.7 / 8 to 8.5	0.0
Phase 3 – slab on grade retail/offices	630	192 / 4.0	0.0

It is very important to consider that all construction dewatering calculations provided in this report are based on the preliminary excavation requirements and dimensions provided by Tatham Engineering (February 2022 preliminary grading). If design changes or other site plan modifications result in changes to the information listed above, the dewatering calculations below will need to be revised accordingly.

8.1.1 Dewatering Assumptions

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

Slab on Grade Buildings

- Aquifer hydraulic conductivity of 1.1×10^{-7} m/sec (average estimated hydraulic conductivity from grain size analyses and slug test analyses completed by G2S;
- An initial saturated aquifer thickness of 8 m.
- An initial groundwater elevation corresponding to the highest measured groundwater level from the on-Site monitoring wells installed by G2S, assumed to be 0.0 m bgs across the Site to account for seasonal fluctuations and variation in groundwater levels measured in the on-Site monitoring wells.

2 Levels of Underground

- Aquifer hydraulic conductivity of 1.45×10^{-4} m/sec (average estimated hydraulic conductivity from grain size analyses and slug test analyses completed by G2S;
- An initial saturated aquifer thickness of 8.3 m.
- An initial groundwater elevation corresponding to the highest measured groundwater level from the on-Site monitoring wells installed by G2S, assumed to be 0.0 m bgs across the Site to account for seasonal fluctuations and variation in groundwater levels measured in the on-Site monitoring wells.

8.2 Dewatering Calculations

To estimate the steady-state dewatering flow rate needed to maintain dry conditions for the excavations at the Site, the following equation (for radial flow to an unconfined aquifer) from Powers (2007) was used:

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

Where:

Q = Flow Rate (m³/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)

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

For some of these dewatering calculations, R_o is very close to r_e ; therefore, 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 8.1 and its subsections, the steady-state inflow rates and radii of influence listed in the table below were estimated.

Table 8: Steady-State Dewatering Requirements

Excavation	Daily Dewatering Rate (L/day)	Radius of Influence (m)
Phase 1 and Phase 2	19,804	3 m
Phase 3 – mixed use building with 2 levels of underground parking	1,050,562	285 m
Phase 3 – slab on grade retail/office building	6,253	3.3 m

8.2.1 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 overburden deposits 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 50% of the estimated steady state dewatering rate.

Additionally, 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; however, recent changes to the Environmental Activity and Sector Registry (EASR) allow pumping of direct precipitation/runoff to be excluded from dewatering calculations.

The table below provides a summary of the calculated dewatering rates and factors of safety for the bulk excavation of the Site.

Table 9: Calculated Maximum Total Dewatering Rate *Including Factor of Safety*

Excavation	Steady State Dewatering (L/day)	Initial Drawdown Surcharge (L/day)	Maximum Total Dewatering Requirement (L/day)
Phase 1 and Phase 2	19,804	9,902	334,240
Phase 3 – mixed use building with 2 levels of underground parking	1,050,562	525,281	2,428,968
Phase 3 – slab on grade retail/office building	6,253	3,126	37,694

The totals shown in the table above indicate a potential maximum dewatering requirement of up to 334,240 L/day for simultaneous dewatering of Phase 1 and Phase 2. An Environmental Activity and Sector Registry (EASR) would be required to authorize the maximum daily water taking rate for the proposed temporary construction dewatering.

For Phase 3, a potential maximum dewatering requirement of up to 2,428,968 L/day for the 2 levels of underground and 37,694 L/day for the slab on grade building is estimated, therefore, a Category 3 Permit to Take Water (PTTW) would be required for the proposed temporary construction dewatering.

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

The potential maximum dewatering requirements outlined above are reasonable based on the information available; however, it is important to note that a less-conservative assumption of total dewatering requirements (e.g., allowing a longer initial drawdown time for the excavation, completion of a pump test for the 2 levels of underground to determine the effect the gravel layer will have on dewatering, and/or assuming a smaller dewatering area) could reduce the total dewatering 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 maximum daily dewatering requirements for the project.

9. 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 specifies that for temporary construction dewatering at rates between 50,000 and 400,000 L/day an Environmental Activity and Sector Registry (EASR) may be obtained in lieu of a Permit to Take Water (PTTW). Dewatering at rates of more than 400,000 L/day require a PTTW to authorize groundwater withdrawal.

As shown in Section 8.2.1, construction dewatering will require maximum daily dewatering rates below 400,000 L/day for Phase 1 and Phase 2; therefore, an EASR would be required for the proposed temporary construction dewatering based on the assumptions discussed above.

Construction dewatering for Phase 3 will require maximum daily dewatering rates above 400,000 L/day, therefore, a Category 3 Permit to Take Water (PTTW) would be required for the proposed temporary construction dewatering based on the assumptions discussed above.

9.1 Dewatering Discharge

On June 20 and 26, 2024, water chemistry samples were obtained from one overburden monitoring well (BH/MW201) identified as Sample MW201. Filtered and unfiltered water samples were collected from the monitoring well. The laboratory Certificates of Analysis are included in Appendix F for reference.

It is important to consider the water chemistry samples were obtained using low flow pumps, helping to minimize the inclusion of sediments into the water samples.

Water chemistry analysis results were compared to the Town of Collingwood Sanitary Sewer Use By-Law parameters for discharge to municipal sanitary sewers, and to the Town of Collingwood Storm Sewer Use By-Law parameters for discharge to municipal storm sewers.

9.1.1 Town of Collingwood Sewer Use By-Law

Sanitary Sewer

Groundwater chemistry samples exhibited exceedances of the following criteria limits:

- Total Suspended Solids (TSS) in the unfiltered groundwater sample collected from monitoring well BH/MW201 (449 mg/L versus criteria of 300 mg/L). It is noted that the filtered sample collected from monitoring well BH/MW201 met the criteria for TSS.

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

Storm Sewer

Groundwater chemistry samples exhibited exceedances of the following criteria limits:

- Total Suspended Solids (TSS) in the unfiltered groundwater sample collected from monitoring well BH/MW201 (449 mg/L versus criteria of 15 mg/L). It is noted that the filtered sample collected from monitoring well BH/MW201 met the criteria for TSS.

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

During construction dewatering operations, regular sampling and analysis of discharge would be required to confirm continued compliance with the Halton Sewer Use By-Law.

Once the dewatering discharge location is known, G2S should be contacted to confirm the scope of groundwater testing required, if any.

9.2 Evaluation of Potential Impacts

9.2.1 Local Groundwater Sources

The Site and properties within an approximate 250 m radius of the Site were searched within the current MECP Water Well Information System (WWIS) database. Twenty-five water well records were located within the search radius. The locations of the water well records are shown on Drawing 1 in Appendix A and a copy of the well record summary is included in Appendix B.

The wells were identified as public, domestic, and monitoring use. The completed well record search indicates that the properties within 250 m of the Site are supplied with potable water which is sourced from Georgian Bay. The water is supplied via a municipal network comprising a treatment plant, an elevated storage tank, a series of reservoirs and booster stations.

Four domestic well records are located within the dewatering zone of influence (approximately 3.3 m for the slab on grade buildings); two on-Site from 1964 and 1990 which were not observed during this investigation, and two off-Site from 1960 and 1975.

Several wells were located within the dewatering zone of influence (approximately 285 m for the 2 levels of underground); ranging from 1950s to 1970s. Three wells were also installed in 1984, 1990 and 2015.

Based on the current supply of drinking water in the Study Area being supplied via Georgian Bay, it is unlikely that there are any wells used for drinking water purposes that will be affected during construction dewatering. However, once the final design details are known and the dewatering zone of influence for the 2 levels of underground is confirmed, a house to house well survey may be required to confirm the wells are present and in use.

9.2.2 Baseflow Reduction in Waterbodies

Pretty River Tributary, Pretty River, and Nottawasaga Bay are the nearest waterbodies to the Site, located approximately 10 m north, 830 m east and 2.7 km north of the Site, respectively. The water bodies are outside the radius of influence for the slab on grade buildings and as such no significant reduction in baseflow is anticipated.

With respect to Pretty River Tributary, the effects of dewatering for the 2 levels of underground are not anticipated to affect the levels since the high permeability gravel layer is unlikely to be hydraulically connected to the tributary based on the presence of thick, lower permeability clayey silt/sandy silt till layer.

9.2.3 Induced Movement of Contaminant Plumes

No contaminant plumes are known to exist within the radius of influence and based on the previous Phase Two ESA, no groundwater contamination is present on-Site.

9.2.4 Confined Groundwater Conditions and Excavation Bottom Heave

While confined aquifer conditions were not observed in the monitoring wells installed on-Site, bottom heave occurring in excavations due to unweighting of the soil/bedrock as a result of excavations removing soil/bedrock weight overlying pressurized aquifer conditions should still be considered a possibility as a conservative factor of safety. 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.

9.2.5 Dewatering Discharge Quantity and Quality

The construction dewatering discharge receptor was not known at the time of the issuance of this report.

Based on the limited chemical testing results of the unfiltered groundwater samples analyzed, the quality of the water complied with the Town of Collingwood storm and sanitary discharge by-law criteria, except for TSS.

It is important to note that the elevated levels were measured in an unfiltered sample which is not representative of the dewatering discharge from a decantation tank or equivalent treatment system to remove the suspended solids. Treatment and/or removal of suspended solids prior to discharge will be a key component of dewatering mitigation. It is noted that testing of a filtered sample met the sewer use by-law. Additional confirmatory sampling and analyses of the construction dewatering discharge are recommended to confirm compliance with the criteria of the receiving system to be used.

Discharge permits are required from the Town of Collingwood for short-term and/or long-term groundwater discharge to the municipal sewers.

10. SUMMARY AND CONCLUSIONS

The purpose of this assignment was to prepare a hydrogeological investigation report for the proposed development at the Site and assess the stratigraphic and hydrogeological conditions for the purpose of evaluating short-term (temporary) dewatering requirements during Site development and long-term dewatering requirements after the Site has been developed. This report was prepared to present the study findings for supporting an application for a Permit to Take Water (PTTW) or Environmental Activity and Sector Registry (EASR). The report was also prepared to address the general requirements of the document titled “Hydrogeological Assessment Submissions, Conservation Authority Guidelines for Development Applications”, June 2013.

Based on the proposed development features and our findings of the Site setting, subsurface conditions, results of field work and laboratory analyses, the hydrogeological site assessment salient points for the construction dewatering needs are summarized in the following paragraphs.

Phase 1 and Phase 2

- The approximate finished floor elevations are 196 m ASL and the lowest elevation for the bulk excavation of the Site (Phase 1 and Phase 2) is taken as 193 m ASL (allowance for removal of fill to competent subgrade, ~ 3m).
- Groundwater levels ranged from a depth of 0 to 1.1 m bgs, during the most recent round of groundwater level measurements (July 19, 2024). Refer to Drawing 3 in Appendix A for the Groundwater Elevation Contours.
- The water-bearing units that will be exposed in the excavations during construction include fill materials (clayey silt, sand, gravel) and native soil (silt, clayey silt, and sandy silt to silty sand till) with K values ranging from 1.4×10^{-7} m/s to 9.5×10^{-8} m/s.
- The required groundwater lowering (drawdown) is recommended 1 m below the base of the excavation to maintain dry working conditions.
- For the purposes of this report, it is presumed that all structures below the water table will be waterproofed and designed to withstand the hydrostatic pressures/hydrostatic uplift.

Phase 3

- The approximate finished floor elevations are 196 m ASL and the lowest elevation for the bulk excavation for two levels of underground parking is taken as elevation 187.7 m ASL (7 to 7.5 m bgs); and 193 m ASL (3 m bgs) for the slab on grade building.
- Groundwater levels ranged from a depth of 0.4 to 0.7 m bgs, during the most recent round of groundwater level measurements (July 19, 2024) in the north part of the Site. Refer to Drawing 3 in Appendix A for the Groundwater Elevation Contours.
- The water-bearing units that will be exposed in the excavations during construction include fill materials (clayey silt) and native soil (clayey silt, sandy silt till). A 0.6 to 0.8 m thick gravel layer was contacted at approximate elevation 188.4 to 188.9 mASL. K values ranged from 1.8×10^{-8} m/s to 2.9×10^{-5} m/s.

- The required groundwater lowering (drawdown) is recommended 1 m below the base of the excavation to maintain dry working conditions.
- For the purposes of this report, it is presumed that all structures below the water table will be waterproofed and designed to withstand the hydrostatic pressures/hydrostatic uplift.

The discharge rates are summarized in the following table:

Calculated Maximum Total Dewatering Rate *Including Factors of Safety*

Excavation	Steady State Dewatering (L/day)	Initial Drawdown Surcharge (L/day)	Maximum Total Dewatering Requirement (L/day)
Phase 1 and Phase 2	19,804	9,902	334,240
Phase 3 – mixed use building with 2 levels of underground parking	1,050,562	525,281	2,428,968
Phase 3 – slab on grade retail/office building	6,253	3,126	37,694

- No long-term (permanent) dewatering requirement is expected at this time based on preliminary design.
- Phase 1 and Phase 2 construction dewatering will require maximum daily dewatering rates below 400,000 L/day but more than 50,000 L/day; therefore, an EASR would be required for the proposed temporary construction dewatering.
- Phase 3 construction dewatering will require maximum daily dewatering rates of more than 400,000 L/day based on current design details; therefore, a Category 3 Permit to Take Water (PTTW) would be required for the proposed temporary construction dewatering.
- Based on the groundwater chemical test results, it was found that, for discharge to Town of Collingwood storm and sanitary sewers, the groundwater quality in the unfiltered sample analyzed exhibited elevated total suspended solids (TSS). The results for a filtered sample indicated the TSS value met the criteria. Removal of suspended solids prior to discharge will be a key component of dewatering mitigation. Additional confirmatory sampling and analyses are to be undertaken to confirm compliance with the regulatory criteria of the receiving system to be used. The construction dewatering discharge receptor was not known at the time of the issuance of this report (i.e storm sewer, sanitary or combined sewer, surface water etc). Once the dewatering discharge location is known, G2S should be contacted to confirm the scope of groundwater testing required, if any for a discharge permit from the municipality.
- The pre-development water balance reflects 1% impervious surface area under existing conditions, as the Site is currently undeveloped and consists of a vacant lot with one residential dwelling. The precipitation falling on the Site would infiltrate the

grass/vegetation or gravel covered Site, with a portion flowing to municipal storm sewers on Hurontario Street and Poplar Sideroad. Therefore, under pre-development conditions there is 9,749,723 m³/year of infiltration of precipitation.

- Under post-development conditions with no mitigation measures in place, redevelopment of the Site will result in approximately 66% impervious surface area. As a result, the post-development infiltration rate (3,337,985 m³/year) is less than the pre-development infiltration rate (9,749,723 m³/year). In this regard, Low Impact Development (LID) or other strategies will be required to mitigate the reduction.
- All monitoring wells and dewatering wells should be abandoned in accordance with the Ontario Regulation 903, as amended once no longer in use or being maintained for use. The Site owner is considered to be the well owner of the monitoring wells installed at the Site ("well owner" Section 1.0, Regulation 903). When the monitoring wells are no longer required, it is the owner's responsibility to arrange for abandonment in accordance with Ontario Water Resources Act–R.R.O. 1990, Regulation 903 – Amended to O. Reg. 128/03.

It is important to note that the design and installation of a construction dewatering system is the responsibility of the construction contractor. The contractor should verify the information presented in this report. This may be done by examining the hydrogeologic conditions in a test pit and a full-range pumping test by the dewatering subcontractor.

The potential maximum dewatering requirements outlined above are reasonable based on the information available; however, it is important to note that a less-conservative assumption of total dewatering requirements (e.g., allowing a longer initial drawdown time for the excavation, completion of a pump test for the 2 levels of underground to determine the effect the gravel layer will have on dewatering, and/or assuming a smaller dewatering area) could reduce the total dewatering 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 maximum daily dewatering requirements for the project

Construction dewatering discharges should follow best management practices, including sediment and erosion control measures, removal of suspended solids by decanting pond/tank or similar treatment system, as well as a water quality and quantity control monitoring programs.

A construction dewatering plan should be prepared by the contractor prior to commencement of construction and the construction dewatering activities. The extent and details of the dewatering scheme are left solely to the contractor's discretion to achieve the performance objectives for stable slopes and dry working conditions and will be based on his/her own interpretation and analysis of Site conditions, equipment, experience and plant efficiency.

11. LIMITATIONS

The hydrogeological advice and recommendations provided in this report are based on the factual information obtained during this investigation. It may be possible that the subsurface conditions vary between and beyond the investigated borehole and monitoring well locations. For the purpose of this report, it is assumed that the conditions outside of and between the exact borehole locations are similar to the conditions observed in the boreholes. The change in subsurface stratigraphy reported on the borehole logs has also been interpreted based on non-continuous sampling, therefore, changes in stratigraphy as shown on the borehole logs and as discussed in this report should not be regarded as exact lines of geological change. The subsurface conditions at the Site may change with the passage of time and/or by human intervention.

The findings along with the hydrogeological advice and recommendations provided in this report are limited to the conditions at the Site at the time of this investigation as described herein. Conclusions presented in this report should not be construed as legal advice. If Site conditions or applicable standards change or if any additional information becomes available at a future date, changes to the findings, conclusions and recommendations in this report may be necessary.

Through any subsurface investigation by boreholes and/or monitoring wells, it may not be possible to identify all aspects of the subsurface conditions at the Site that could affect construction costs, techniques, equipment, and scheduling. Contractors bidding on or undertaking work on the project must be directed to draw their own conclusions as to how the subsurface conditions may affect them, based on their interpretation of the subsurface conditions and/or their own investigations.

This report has been prepared for the sole benefit of Charis Developments Ltd. (Charis) and is intended to provide hydrogeological advice and recommendations based on the subsurface conditions investigated in the monitoring wells on-Site. This report is the copyright of G2S Consulting Inc. (G2S) and may not be used by any other person or entity without the expressed written consent of Charis and G2S. Any use which a third party makes of this report, or any reliance on decisions made based on it, is the responsibility of such third parties. G2S accepts no responsibility for damages, if any suffered by any third party as a result of decisions made or actions based on this report. It is recognized that Town of Collingwood in their capacity as the planning and building authority under Provincial statutes, may make use of and rely upon this report cognizant of the limitations thereof, both as are expressed and implied.

12. CLOSING REMARKS

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

G2S Consulting Inc.

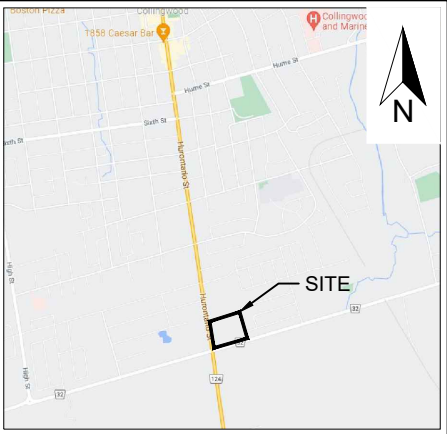
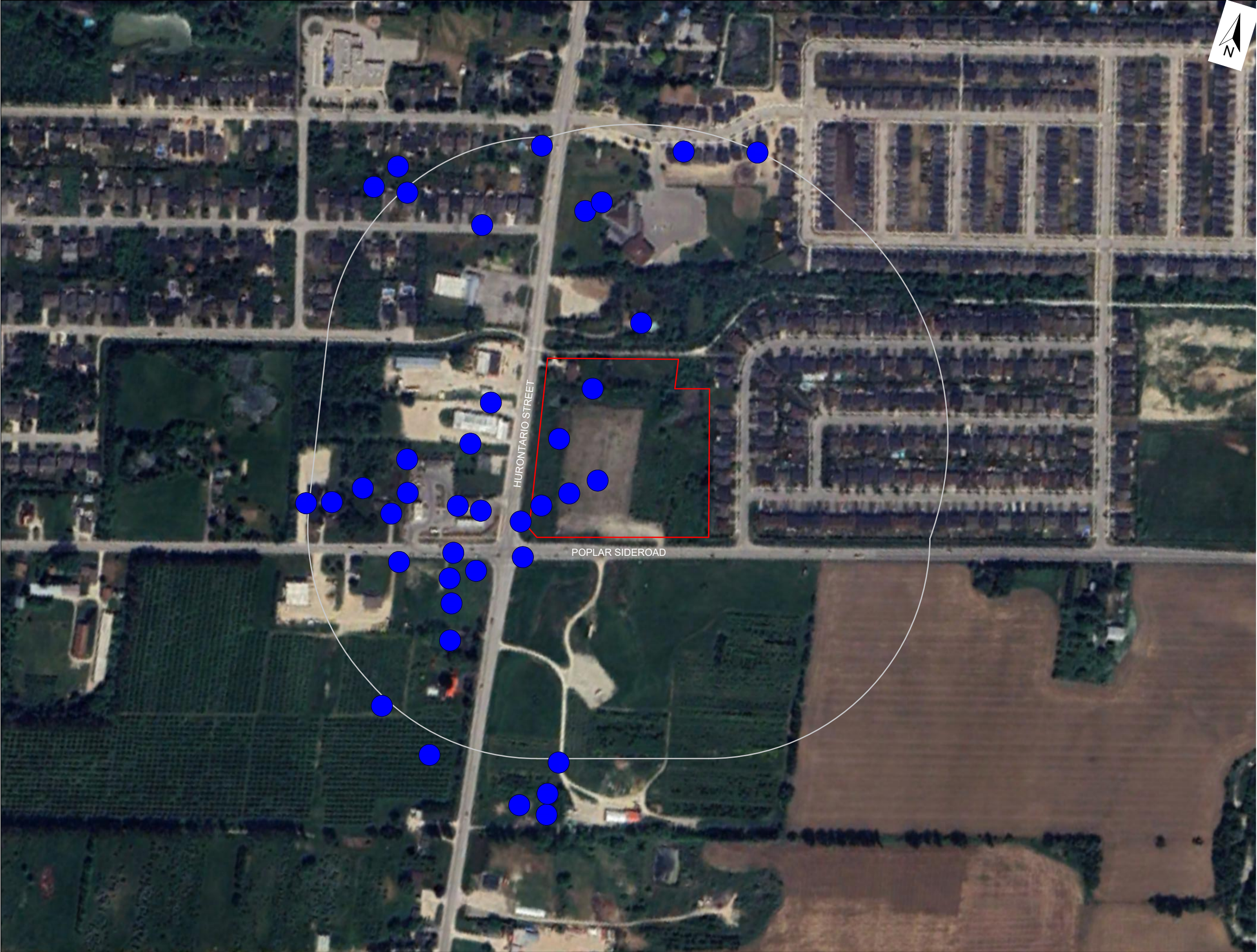


Dana Haslett, B.A.
Senior Project Manager



Melissa King, P.Geo., QP_{ESA}
Head of Environmental Services

Appendix A: Drawings



LEGEND

-  APPROXIMATE SITE BOUNDARY
-  APPROXIMATE 250 m STUDY AREA RADIUS
-  APPROXIMATE WATER WELL LOCATION

REFERENCE:

PLAN REPRODUCED FROM TOPOGRAPHIC SURVEY COMPLETED BY J.D.BARNES, DATED 2021-09-22, AND PLOTTED 2023-09-13

TITLE:

MECP WATER WELL RECORD LOCATION PLAN

CLIENT:

CHARIS DEVELOPMENTS LTD.

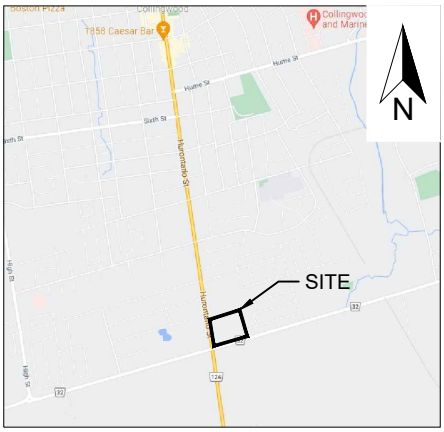
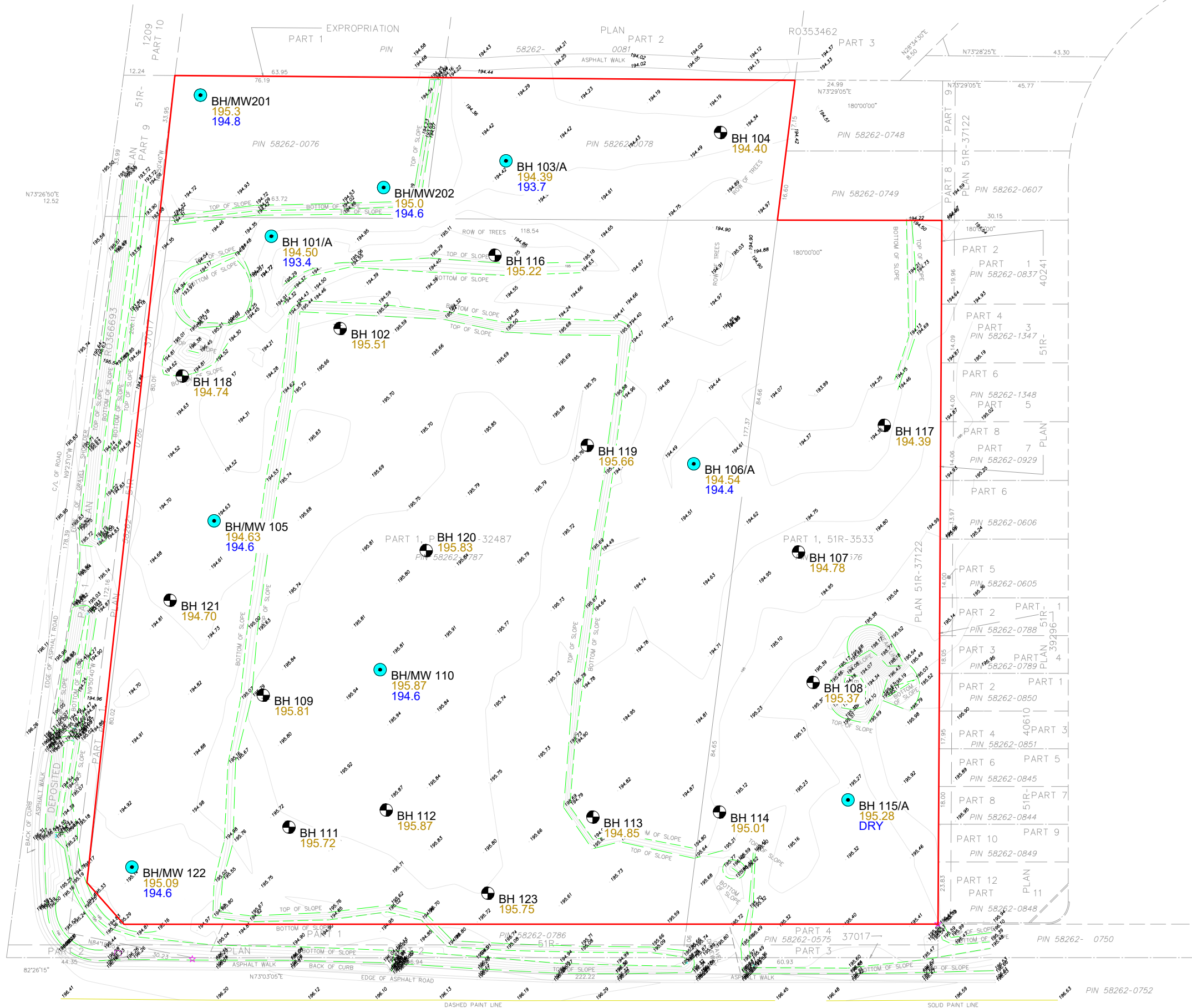
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839, 853 and 869 HURONTARIO STREET & 7564 POPLAR SIDE ROAD COLLINGWOOD, ONTARIO

PROJECT NO.: G2S21366

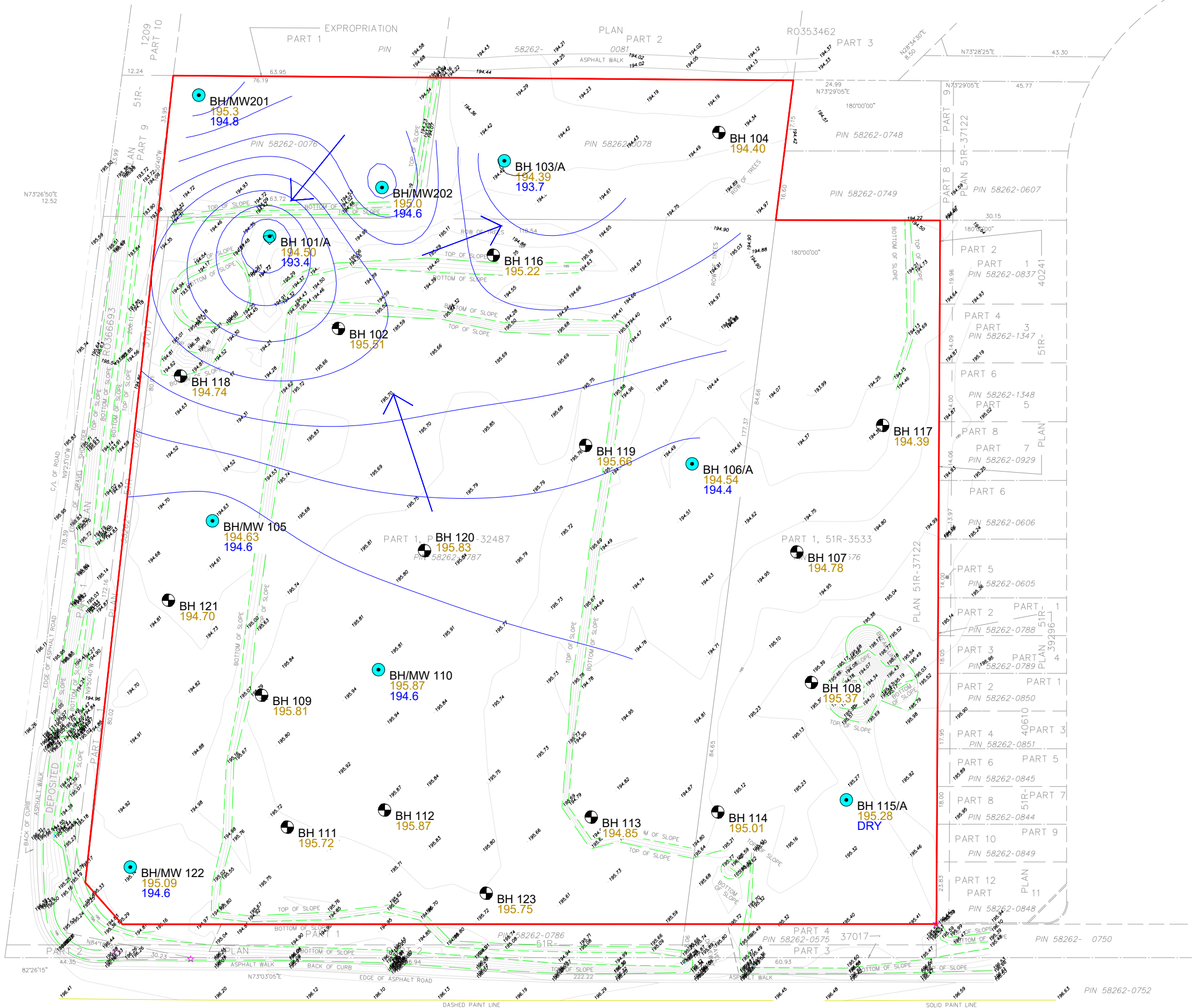
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SCALE:	AS SHOWN
DATE:	SEPTEMBER 2024
DRAWN BY:	DB/SN
FILE NAME:	G2S21366.dwg





LEGEND	
	APPROXIMATE SITE BOUNDARY
	MONITORING WELL / BOREHOLE LOCATION
	BOREHOLE LOCATION
195.0	GROUND SURFACE ELEVATION (m)
194.6	GROUNDWATER ELEVATION (JULY 19, 2024)
REFERENCE:	
PLAN REPRODUCED FROM TOPOGRAPHIC SURVEY COMPLETED BY J.D.BARNES, DATED 2021-09-22, AND PLOTTED 2023-09-13	
TITLE:	
BOREHOLE AND MONITORING WELL LOCATION PLAN	
CLIENT:	
CHARIS DEVELOPMENTS LTD.	
LOCATION:	
839, 853 and 869 HURONTARIO STREET & 7564 POPLAR SIDE ROAD COLLINGWOOD, ONTARIO	
PROJECT NO.:	
G2S21366	
DRAWING:	
2	
SCALE:	
AS SHOWN	
DATE:	
SEPTEMBER 2024	
DRAWN BY:	
DB/SN	
FILE NAME:	
G2S21366.dwg	





- LEGEND**
- APPROXIMATE SITE BOUNDARY
 - MONITORING WELL / BOREHOLE LOCATION
 - BOREHOLE LOCATION
 - 195.0 GROUND SURFACE ELEVATION (m)
 - 194.6 GROUNDWATER ELEVATION (JULY 19, 2024)
 - INFERRED DIRECTION OF GROUNDWATER FLOW

REFERENCE:
PLAN REPRODUCED FROM TOPOGRAPHIC SURVEY COMPLETED BY J.D.BARNES, DATED 2021-09-22, AND PLOTTED 2023-09-13

TITLE:
GROUNDWATER CONTOUR PLAN - JULY 19, 2024

CLIENT:
CHARIS DEVELOPMENTS LTD.

LOCATION:
839, 853 and 869 HURONTARIO STREET & 7564 POPLAR SIDE ROAD
COLLINGWOOD, ONTARIO

PROJECT NO.: G2S21366

DRAWING:	3
SCALE:	AS SHOWN
DATE:	SEPTEMBER 2024
DRAWN BY:	DB/SN
FILE NAME:	G2S21366.dwg



PARKING - COMMERCIAL

Parking aisle minimum width of 6.0 metres
Parking space minimum dimensions of 2.8 m x 6.0 m
Accessible parking space minimum dimensions 4.5 m x 6.0 m
Dual accessible parking spaces at 3.4 m x 6.0 m with 1.5 m shared aisle

Commercial							
Building	Rate	Gross Area	Gross Floor Area*	Parking Req'd	Parking Provided	Accessible Parking Req'd	Accessible Parking Prov'd
01 Restaurant	8/100 m2	225.5 m2	157.0 m2	13			
02 Commercial	3/100 m2	929.0 m2	836.1 m2	26			
03 Commercial	3/100 m2	847.8 m2	727.0 m2	22			
04 Commercial	3/100 m2	1,799.4 m2	1,619.5 m2	49			
Grocery Store	3/100 m2	4,576.0 m2	3,204.0 m2	97			
06 Commercial	3/100 m2	1,384.8 m2	1,246.3 m2	38			
07 Restaurant	8/100 m2	410.9 m2	287.0 m2	23			
Total				268	286	6	12

*Gross Floor Area as defined by the Town of Collingwood Zoning By-law and is based on Gross Area –10% for general commercial uses and -30% for grocery store and restaurant uses.

DELIVERY / LOADING SPACES

1 Delivery Space for GFA between 460.0 m2 and 2,500.0 m2
1 Loading Space for GFA between 2,501.0 m2 and 7,000.0 m2
Delivery Spaces at 3.5 m (w) x 7.5 m (l) x 3.0 (v)
Loading Spaces at 3.5 m (w) x 20.0 m (l) x 4.5 m (v)

Building	Use	Gross Area	Gross Floor Area	Type Required	Type Provided
Building 01	Restaurant	225.5 m2	157.0 m2	N/A	1 Delivery Space
Building 02	Commercial	929.0 m2	790.0 m2	1 Delivery Space	1 Delivery Space
Building 03	Mixed-Use	727.0 m2	618.0 m2	1 Delivery Space	1 Delivery Space
Building 04	Commercial	1,799.4 m2	1,619.5 m2	1 Delivery Space	1 Delivery Space
Grocery Store	Commercial	4,576.0 m2	3,204.0 m2	1 Loading Space	2 Loading Spaces
Building 06	Commercial	1,246.3 m2	1,060.0 m2	1 Delivery Space	1 Delivery Space
Building 07	Restaurant	410.0 m2	287.0 m2	N/A	1 Delivery Space

*Gross Floor Area as defined by the Town of Collingwood Zoning By-law and is based on Gross Area –10% for general commercial uses and -30% for grocery store and restaurant uses.

QUEUING AISLES

Parking space minimum dimensions of 2.8 m x 6.0 m

Building	Use	# of Spaces Required	# of Spaces Provided	Comments
Building 01	Restaurant	10	12	Addn'l Spaces Beyond Pick-up Window
Building 07	Restaurant	10	14	Addn'l Spaces Beyond Pick-up Window

BICYCLE SPACES

Mixed-Use Building: 0.7 spaces per dwelling unit to a total maximum of 15 bicycle spaces
Non-Residential Buildings: 10% of the required parking spaces for motor vehicles but in no case shall shall the required bicycle spaces be less than 4

Building	Use	Parking Req'd	Bicycle Spaces Req'd	Bicycle Spaces Prov'd
Building 01	Restaurant	13	4	4
Building 02	Commercial	26	4	4
Building 03	Mixed-Use Comm.	20	4	16
Building 04	Mixed-Use Res.	207	15	15 (U/G)
Building 06	Commercial	49	5	4
Grocery Store	Commercial	97	10	8
Building 07	Commercial	34	4	4
Building 07	Restaurant	23	4	4
Total			49	59

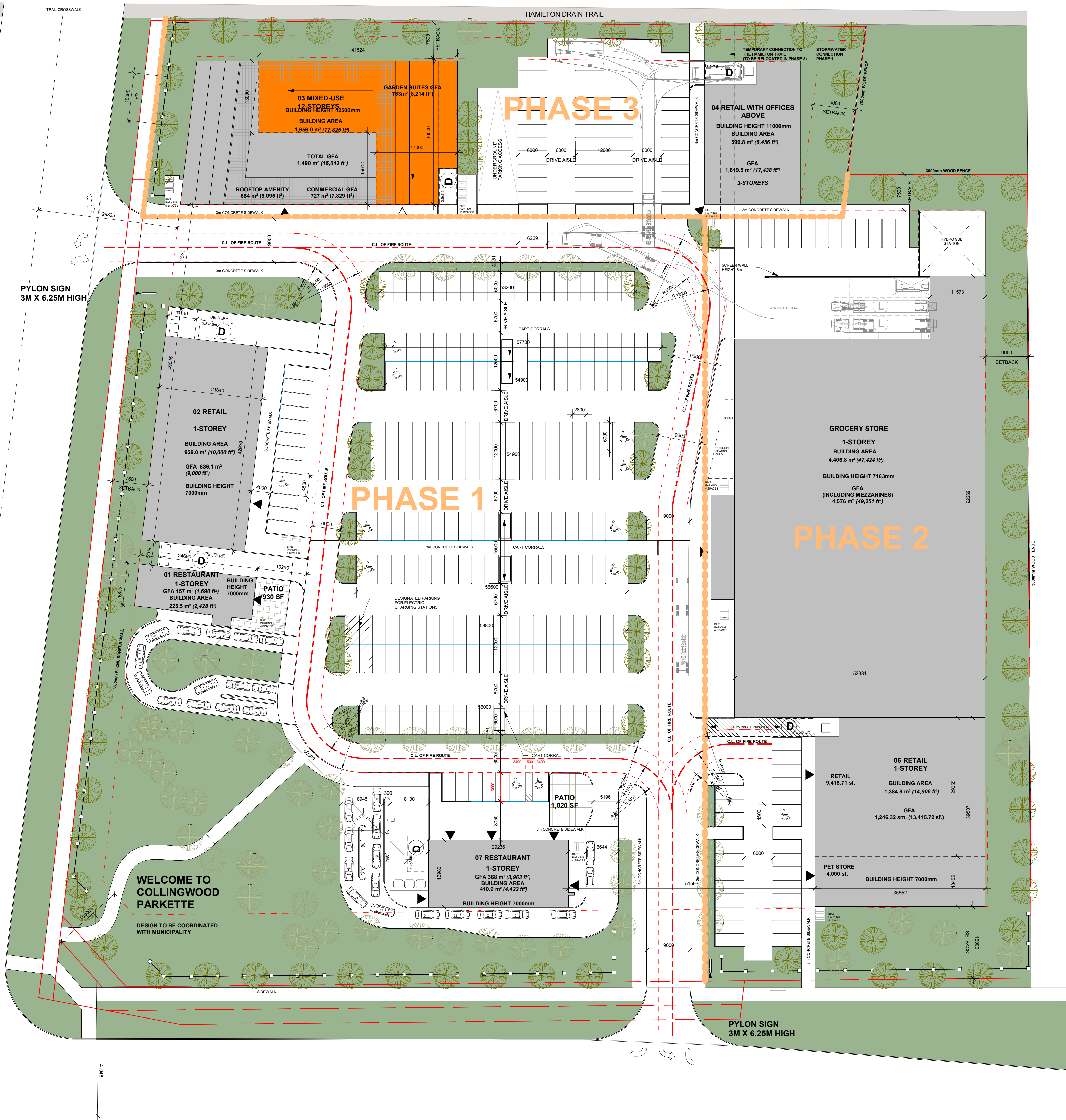
THE GATEWAY CENTRE - ZONE PROVISIONS

Provision	C4 Zone Requirement	Proposed
Minimum Lot Area	1,000.0 m2	37,604.1 m2
Minimum Lot Frontage (Huronario Street)	30.0 m	194.0 m
Minimum Front Yard (Huronario Street)	6.0 m	7.5 m
Minimum Exterior Side Yard (Poplar Sideroad)	9.0 m	15.0 m
Minimum County Setback @ Poplar Sideroad	15.0 m	15.0 m
Minimum Interior Side Lot Line (East Lot Line)	9.0 m	9.0 m
Minimum Rear Yard (North Lot Line)	7.5 m	7.5 m
Maximum Height	15.0 m	42.5 m
Maximum Lot Coverage	40%	26%
Minimum Landscape Open Space	10%	34%
Minimum Hurontario Street CL Setback	15.0 m	29.3 m
Minimum Poplar Sideroad CL Setback	18.0 m	41.9 m
Minimum Parking Space Setback	6.0 metres	6.0 metres
Entrance Width	7.5 m to 15.0 m	9.0 m
Maximum Number of Dwelling Units	N/A	165 units

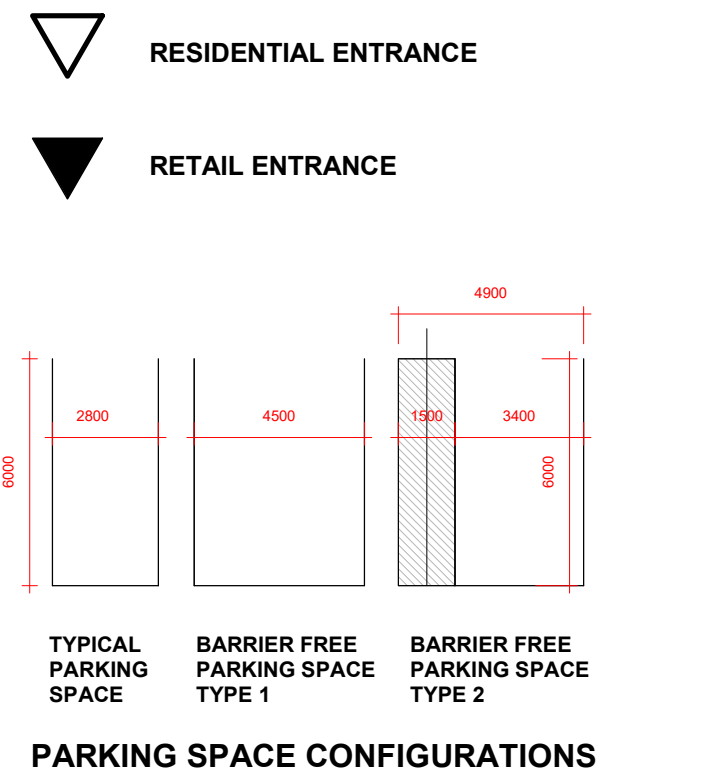
PARKING - RESIDENTIAL

Parking aisle minimum width of 6.0 metres
Parking space minimum dimensions of 2.8 m x 6.0 m
Accessible parking space minimum dimensions 4.5 m x 6.0 m
Dual accessible parking spaces at 3.4 m x 6.0 m with 1.5 m shared aisle

Residential	Rate	# of Units	Resident Parking Required	Visitor Parking Required	Total Required	Total Provided
Building 03	1/unit + 0.25/unit for Visitors	165	165	42	207	297

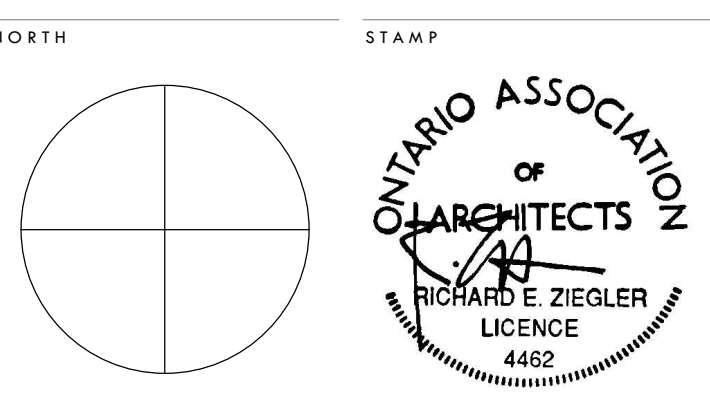


ISSUED FOR DISCUSSION
2024-08-23 9:47:07 AM



NO. ISSUANCE DATE

THE GENERAL CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND REPORT ALL ERRORS AND OMISSIONS TO THE ARCHITECT. DO NOT SCALE THE DRAWINGS. DO NOT USE THIS DRAWING FOR CONSTRUCTION UNLESS SIGNED AND SEALED BY THE ARCHITECT.



THE GATEWAY CENTRE

CHARIS DEVELOPMENTS
HIGHWAY 124 & POPLAR SIDE ROAD
COLLINGWOOD, ONTARIO

SITE PLAN - OPTION C3
BRANDED

SCALE	As indicated	PROJECT NUMBER
DATE	2024-08-23 9:47:07 AM	202022
DRAWN	SO	
CHECKED	REZ	
SHEET		REVISION

Appendix B:
Summary of Water Well Records

Water Well Records

September 9, 2024

11:48:29 AM

TOWNSHIP CON L	UTM	DATE CN	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
COLLINGWOOD TOWN	17 562585 4925404 W	2015-08 1565						7247335 (Z197414) A172786 A	
COLLINGWOOD TOWN	17 562491 4925435 W	2022-08 7725						7436330 (Z375549) A356205 P	
COLLINGWOOD TOWN	17 562494 4925372 W	2022-08 7725						7436329 (Z375546) A356207 P	
COLLINGWOOD TOWN	17 562503 4925398 W	2022-08 7725						7436327 (Z375548) A356206 P	
COLLINGWOOD TOWN CON 08 040	17 562649 4925507 W	2021-10 7472	2		///:	MO	0005 10	7405118 (MZKLAOL3) A320007	0015
COLLINGWOOD TOWN CON 08 040	17 562701 4925476 W	2021-10 7472	2		///:	MO	0008 10	7405117 (4FZA2ZPJ) A320006	0018
COLLINGWOOD TOWN CON 08 040	17 562655 4925431 W	2021-10 7472	2		///:	MO	0010 10	7405116 (544AUUBT) A320012	0020
COLLINGWOOD TOWN CON 08 040	17 562699 4925660 W	2023-03 7834						7447170 (Z390675) A355640 P	
NOTTAWASAGA TOWNSHIP	17 562602 4925341 W	2020-03 7241	2		///:	MT	0013 10	7359138 (Z330436) A288902	BRWN CLAY 0009 BRWN CLAY 0018 GREY SILT CLAY 0023
NOTTAWASAGA TOWNSHIP	17 562588 4925295 W	2020-03 7241	2		///:	MT	0011 10	7359137 (Z330437) A288901	BRWN CLAY 0011 BRWN CLAY 0016 GREY SILT CLAY 0021
NOTTAWASAGA TOWNSHIP	17 562518 4925322 W	2020-03 7241	2		///:	MT	0011 10	7359136 (Z330438) A288900	BRWN CLAY 0010 BRWN CLAY 0018 GREY SILT CLAY 0021
NOTTAWASAGA TOWNSHIP	17 562574 4925349 W	2015-08 1565						7247337 (Z197415) A172787 A	
NOTTAWASAGA TOWNSHIP CON 08 039	17 562648 4925372 W	1960-08 5510	4 4	FR 0040	14/32/3/2:0	DO		5702523 ()	PRDG 0014 CLAY STNS 0023 SHLE CLAY 0029 GREY LMSN 0040
NOTTAWASAGA TOWNSHIP CON 08 040	17 562599 4925764 W	1955-04 1319	4 4	FR 0024	8/12/3/1:0	DO		5702525 ()	BLCK LOAM 0001 YLLW CLAY 0017 BLUE CLAY 0020 WHIT LMSN 0024

TOWNSHIP CON L	UTM	DATE CN	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
NOTTAWASAGA TOWNSHIP CON 08 040	17 562677 4925453 W	1964-08 5510	4 4	SU 0032	14/21/2/2:0	DO		5702526 ()	LOAM 0001 CLAY MSND STNS 0014 MSND CLAY SHLE 0019 LMSN 0032
NOTTAWASAGA TOWNSHIP CON 08 040	17 562664 4925574 W	1975-07 3741	6	FR 0018	6/14/10/2:0	DO		5712338 ()	LOAM 0001 GREY CLAY 0013 GREY LMSN 0016 GRVL BLDR SAND 0021
NOTTAWASAGA TOWNSHIP CON 08 040	17 562636 4925409 W	1990-06 6443	6	SU 0030	8/17/8/20:0	DO	0027 4	5726973 (75363)	BRWN SAND CLAY STNS 0018 BRWN CSND STNS CMTD 0025 GREY LMSN HARD 0028 GREY FSND 0031
NOTTAWASAGA TOWNSHIP CON 08 040	17 562614 4925774 W	1984-10 3429	6	SU 0019	8//19/1:15	PS		5719512 ()	BLCK LOAM 0001 FILL 0004 GREY CLAY 0012 BRWN CLAY 0018 GREY SHLE HARD 0022
NOTTAWASAGA TOWNSHIP CON 09 039	17 562579 4925323 W	1957-09 3807	4 4	FR 0040	16/20/3/1:0	DO		5702544 ()	GREY CLAY STNS 0025 LMSN 0041
NOTTAWASAGA TOWNSHIP CON 09 040	17 562564 4925404 W	1972-09 4716	5	FR 0032 FR 0046	12/40/5/2:0	DO		5709036 ()	BRWN SAND FILL 0001 BLCK CLAY SAND 0002 BRWN SAND CLAY 0017 GREY CLAY STNS 0028 BRWN SHLE 0046
NOTTAWASAGA TOWNSHIP CON 09 040	17 562554 4925474 W	1968-12 5510	4	SU 0023	4/13/5/0:30	DO		5706155 ()	STNS 0005 RED CLAY 0014 BLUE CLAY 0019 BLUE CLAY SHLE 0023
NOTTAWASAGA TOWNSHIP CON 09 040	17 562496 4925372 W	1961-07 3807	4 4	SU 0038	10/25/3/1:0	DO		5702553 ()	LOAM 0002 BRWN CLAY 0020 BLDR 0021 GREY LMSN 0041
NOTTAWASAGA TOWNSHIP CON 09 040	17 562578 4925401 W	1960-01 1319	4 4	FR 0048	7/10/4/1:0	DO		5702552 ()	FSND 0010 BLUE CLAY 0025 BRWN SHLE 0055
NOTTAWASAGA TOWNSHIP CON 09 040	17 562563 4925524 W	1954-06 1319	4 4	FR 0033	12/19/4/1:0	DO		5702548 ()	LOAM 0002 YLLW CLAY 0006 YLLW CLAY 0015 LMSN 0033
NOTTAWASAGA TOWNSHIP CON 09 040	17 562494 4925712 W	1953-06 5510	4	FR 0032	8/10/5/1:0	DO		5702547 ()	LOAM 0002 SHLE 0012 LMSN SHLE 0032

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

1. Core Material and Descriptive te

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		

Appendix C: Borehole Logs

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-22 **COMPLETED** 21-10-22 **GROUND ELEVATION** 194.50 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer X					
							Vane +					
							40	80	120	160		
									PL	MC	LL	
									10	20	30	
0.36	TOPSOIL: ~360 mm	194.14		SS1	SPT	5	▲					
1	FILL: Sand, brown to dark brown, some silt, some clay, moist, debris											
1.2		193.28		SS2	SPT	11	▲					
2	CLAYEY SILT: Brown to grey, occasional sand seams, some clay, moist to very moist, stiff											
				SS3	SPT	14	▲					
				SS4	SPT	10	▲					
3		191.45										
	SILT: Grey, some gravel, very moist, very loose to loose			SS5	SPT	3	▲					
4												
				SS6	SPT	8	▲					
4.6		189.90										
5	SANDY SILT TILL: Grey, some gravel, moist, dense			SS7	SPT	55		>>▲				
5.2		189.32										

Borehole terminated at 5.2 m.

Upon completion of augering
 No cave
 Free water at 3.9 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 22-1-7 **COMPLETED** 22-1-7 **GROUND ELEVATION** 194.50 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values	CPT values				
							▲	△				
							10 20 30 40					
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							40 80 120 160		PL MC LL			
									10 20 30			
1	Straight auger to 3.05 m for sampling and 4.57 m for monitoring well installation. Refer to Borehole Log 101 for subsurface conditions.											Stickup
2												Bentonite seal
3												Filter sand
4												3.1
4.6		189.93		1	ST							Slotted screen

Borehole terminated at 4.6 m.

Water Level Readings:		
Date	Depth (m)	Elev. (m)
2022-01-21	1.10	193.40
2022-04-05	1.05	193.45
2024-06-05	1.10	193.40
2024-06-26	1.20	193.30
2024-07-19	1.10	193.40

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-21 **COMPLETED** 21-10-21 **GROUND ELEVATION** 195.51 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
0.65	FILL: Sand and gravel, brown, some silt, cobble and boulder size material on the surface, moist	194.86		SS1	SPT	3	▲		●	20/0		
1	becoming clayey silt, brown, some gravel, some silt, moist			SS2	SPT	22		▲	●	30/0		
1.5		193.99										
2	CLAYEY SILT: Brown to grey, some sand, stiff			SS3	SPT	10	▲		●	25/0		
2.3		193.22										
3	SILT: Grey, layered, trace sand, trace gravel, some clay, very moist to wet, loose to compact			SS4	SPT	16		▲	●	10/0		
				SS5	SPT	12		▲	●	15/0		2 6 77 15
4				SS6	SPT	4	▲		●	0/0		
5					VANE							
5.2		190.33						7:0 80				
5.8	SANDY SILT TILL: Grey, some gravel, trace clay, moist, compact	189.72		SS7	SPT	19	▲		●	5/0		

Borehole terminated at 5.8 m.

Upon completion of augering
 Wet cave at 4.6 m
 Free water at 0.65 m after 24 hours

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-22 **COMPLETED** 21-10-22 **GROUND ELEVATION** 194.39 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values	CPT values				
							10 20 30 40	10 20 30 40				
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							40 80 120 160	10 20 30 40				
									PL MC LL			
									10 20 30			
0.13	TOPSOIL: ~125 mm	194.27		SS1	SPT	7	▲		●			
	FILL: Clayey silt, brown to grey, some sand, moist											
1.00		193.39		SS2	SPT	12	▲		●			
	CLAYEY SILT: Brown, trace sand, rootlets, moist, stiff, reworked appearance at the upper section	192.89										
1.5				SS3	SPT	6	▲		●			
	SILT: Grey, layered, trace sand, trace gravel, some clay, very moist to wet, very loose to compact											
2				SS4	SPT	2	▲		●			
3				SS5	SPT	16	▲		●			
4.0		190.39		SS6	SPT	20	▲		●			
	SANDY SILT TILL: Grey, some gravel, moist, compact											
5				SS7	SPT	27	▲		●			
5.2		189.21										

Borehole terminated at 5.2 m.

Upon completion of augering
 Cave at 4.3m
 Free water at 4.1 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 22-1-7 **COMPLETED** 22-1-7 **GROUND ELEVATION** 194.39 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES	MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL	
							N values					CPT values
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							4080120160 PLMCLL 102030					
1	Straight auger to 2.29 m for sampling and 4.57 m for monitoring well installation. Refer to Borehole Log 103 for subsurface conditions.			1	ST					<		

Borehole terminated at 4.6 m.

Water Level Readings:		
Date	Depth (m)	Elev. (m)
2022-01-21	0.65	193.74
2022-04-05	0.59	193.80
2024-06-05	0.80	193.59
2024-06-26	0.90	193.49
2024-07-19	0.70	193.69

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-22 **COMPLETED** 21-10-22 **GROUND ELEVATION** 194.40 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
0.10	TOPSOIL: ~100 mm	194.30										
	FILL: Clayey silt, brown and grey mottled, some sand, moist			SS1	SPT	11	▲			0/0		
0.78		193.62										
	CLAYEY SILT: Brown to grey, some sand, reworked appearance at top, moist, stiff			SS2	SPT	8	▲			0/0		
1.5		192.90										
	SILT: Grey, layered, trace sand, trace gravel, some clay, very moist to wet, compact			SS3	SPT	10	▲			0/0		
				SS4	SPT	13	▲			0/0		
				SS5	SPT	10	▲			0/0		
3.8		190.59										
	SANDY SILT TILL: Grey, some gravel, moist, dense			SS6	SPT	33	▲			0/0		
				SS7	SPT	43	▲			0/0		
5.2		189.22										

Borehole terminated at 5.2 m.

Upon completion of augering
 No cave
 Free water at 4.4 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-1 **COMPLETED** 21-10-1 **GROUND ELEVATION** 194.63 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values	CPT values				
							10 20 30 40	10 20 30 40				
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							40 80 120 160	10 20 30				
0.20	TOPSOIL: ~200 mm	194.43										
1	CLAYEY SILT: Brown, trace sand, stiff, very moist, occasional sand seams, moist, firm to stiff, reworked appearance at the top portion			SS1	SPT	1	▲	×	●	25/0		
1.5	becoming greyish, layered, numerous sand seams, very moist	193.11		SS2	SPT	11	▲	×	●	25/0		
2				SS3	SPT	8	▲	×	●	20/0		1.7
2.3	SILT: Grey, layered, trace sand, some clay, very moist to wet, very loose to loose	192.34		SS4	SPT	6	▲	×	H ●	20/0		0 9 72 19
3				SS5	SPT	0	WH		●	30/0		
4				VA								
4.6	SILTY SAND TILL: Grey, some gravel, trace clay, compact, wet	190.06					3.0	50				4.7
5				SS6	SPT	14	▲		●	10/0		
5.2		189.45										

Borehole terminated at 5.2 m.

Refer to report for groundwater elevation data

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-22 **COMPLETED** 21-10-22 **GROUND ELEVATION** 194.54 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer X					
							Vane +					
							40	80	120	160		
									PL	MC	LL	
									10	20	30	
0.08	TOPSOIL: ~75 mm	194.47		SS1	SPT	4	▲					
0.76	FILL: Clayey silt, brown and grey mottled, some sand, very moist, reworked native	193.78		SS2	SPT	10	▲					
	CLAYEY SILT: Brown, occasional sand seams, moist, stiff			SS3	SPT	13	▲					
2.3	SILT: Grey, layered, trace sand, trace gravel, some clay, very moist to wet, very loose to loose	192.25		SS4	SPT	5	▲					
3.1	trace gravel, occasional sand seams	191.49		SS5	SPT	3	▲					
4.6		189.97		SS6	SPT	6	▲					
5.2	SILTY SAND TILL: Grey, some gravel, very moist, compact	189.36		SS7	SPT	26	▲					

Borehole terminated at 5.2 m.

Upon completion of augering
 Cave at 4.3 m
 Free water at 2.1 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 22-1-7 **COMPLETED** 22-1-7 **GROUND ELEVATION** 194.54 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
							10 20 30 40					
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer X Vane +					
							40 80 120 160		PL MC LL			
									10 20 30			
1	Straight auger to 3.05 m for sampling and 4.57 m for monitoring well installation. Refer to Borehole Log 106 for subsurface conditions.											Stickup
2												Bentonite seal
3		191.49										Filter sand
3.1	SILT: Grey, some sand, some clay, trace gravel, wet, loose			SS1	SPT	6	▲					3.1
4												Slotted screen
4.4		190.12		SS2	SPT	6	▲					
4.6	Borehole terminated at 4.6 m.											4.6

Refer to report for groundwater elevation data

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-21 **COMPLETED** 21-10-21 **GROUND ELEVATION** 194.78 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
0.25	TOPSOIL: ~250 mm	194.53										
0.76	FILL: Sand, brown, some silt, very moist	194.02		SS1	SPT	2	▲					
1	CLAYEY SILT: Brown, some sand, moist, very stiff			SS2	SPT	16	▲					
2				SS3	SPT	14	▲					
2.3		192.49										
3	SILTY SAND TILL/SANDY SILT TILL: Grey, some gravel, some clay, moist to very moist, very loose to compact			SS4	SPT	7	▲					
4				SS5	SPT	3	▲					
5				SS6	SPT	15	▲					
5.2		189.60										

Borehole terminated at 5.2 m.

Upon completion of augering
 No cave
 Free water at 3.0 m
 Free water at 0.3 m after 24 hours

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-21 **COMPLETED** 21-10-21 **GROUND ELEVATION** 195.37 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
0.10	TOPSOIL: ~100 mm	195.27										
	FILL: Clayey silt, brown to dark brown, some sand, very moist			SS1	SPT	4	▲			10/0		
0.76		194.61										
1	CLAYEY SILT: Brown and grey mottled, some sand seams, moist, very stiff			SS2	SPT	16	▲			0/0		
1.5		193.87										
2	SILT: Grey, layered, trace sand, trace gravel, some clay, very moist to very moist, compact			SS3	SPT	17	▲			0/0		
				SS4	SPT	11	▲			10/0		
3												
				SS5	SPT	11	▲			5/0		
3.8		191.56										
4	SANDY SILT TILL: Grey, some gravel, moist, compact,			SS6	SPT	11	▲			0/0		
5				SS7	SPT	21	▲			0/0		
5.2		190.19										

Borehole terminated at 5.2 m.

Upon completion of augering
 Cave at 4.4 m
 Free water at 3.4 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-21 **COMPLETED** 21-10-21 **GROUND ELEVATION** 195.81 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values	CPT values				
							10 20 30 40	10 20 30 40				
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							40 80 120 160	10 20 30				
									PL MC LL			
									10 20 30			
1	FILL: Sand and gravel, brown, some silt to silty, possible cobble and boulder size material at the surface, moist	194.86		SS1	SPT	8	▲		●	25/0		
1.5	becoming clayey silt, brown and grey, some sand, some gravel, moist	194.29		SS2	SPT	11	▲		●	25/0		
2	CLAYEY SILT: Brown to grey mottled, trace sand, moist, stiff to very stiff			SS3	SPT	14	▲		●	30/0		0 2 64 34
3				SS4	SPT	16	▲		●	35/0		
3.1	becoming layered with trace gravel	192.76		SS5	SPT	15	▲		●	20/0		
3.8		192.00		SS6	SPT	15	▲		●	15/0		
4	SILT: Grey, layered, trace sand, trace gravel, some clay, very moist, compact	191.24		SS7	SPT	9	▲		●	15/0		
4.6												
5	SANDY SILT TILL: Grey, some gravel, wet, loose	190.63										
5.2												

Borehole terminated at 5.2 m.

Upon completion of augering
No cave
No free water

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-1 **COMPLETED** 21-10-1 **GROUND ELEVATION** 195.87 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
							10 20 30 40	10 20 30 40				
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer X Vane +					
							40 80 120 160		PL MC LL			
									10 20 30			
1	FILL: Sand and gravel, brown, trace to some silt, possible cobble and boulder size material at the surface, moist			SS1	AU					25/0		
1.6		194.24		SS2	SPT	52		>>▲		25/0		
2	SILT: Brown to grey, trace sand, some gravel, very moist, compact, reworked appearance at top portion	193.58		SS3	SPT	11	▲		●	25/0		
2.3	CLAYEY SILT: Brown to grey mottled, trace sand, trace gravel, moist, stiff			SS4	SPT	14	▲	225X	●	45/0		2.3
3				SS5	SPT	11	▲	X	●	25/0		
4												
4.6		191.30										
5	SILT: Grey, occasional sand pockets, some clay, moist, loose			SS6	SPT	6	▲		●	30/0		
5.3		190.54										
5.9	SANDY SILT TILL: Grey, some gravel, trace clay, very moist, compact	189.93		SS7	SPT	19	▲	225X	●	30/0		5.3

Borehole terminated at 5.9 m.

Water Level Readings:

Date	Depth (m)	Elev. (m)
2021-10-13	2.00	193.87
2021-11-03	0.90	194.97
2022-01-21	1.44	194.43
2022-04-05	1.33	194.54
2024-06-05	1.30	194.57
2024-06-20	1.50	194.37
2024-06-26	1.30	194.57
2024-07-19	1.30	194.57

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-9-30 **COMPLETED** 21-9-30 **GROUND ELEVATION** 195.72 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values	CPT values				
							▲	△				
							10 20 30 40					
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							40 80 120 160		PL MC LL			
									10 20 30			
1	FILL: Sand and gravel, brown, some silt, cobble and boulder size material at the surface, moist			SS1	SPT	32		▲	●			
1.5		194.22		SS2	SPT	36		▲	●			
2	CLAYEY SILT: Brown to grey, trace sand, some gravel, moist to very moist, stiff to very stiff, reworked appearance at top portion			SS3	SPT	16		▲	●			
3		192.67		SS4	SPT	12		▲	●			
4	SILT: Grey, layered, trace sand, trace gravel, some clay, wet, very loose			SS5	SPT	4		▲	●			
5					VANE			2.8 80				
6		189.62		SS6	SPT	1		▲	●			
6.1					VANE							
6.6	SILTY SAND TILL: Grey, some gravel, trace clay, compact, wet	189.17		SS7	SPT	25		▲	●			

Borehole terminated at 6.6 m.

Upon completion of augering
 Cave at 5.8 m
 Free water at 1.2 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-9-30 **COMPLETED** 21-10-1 **GROUND ELEVATION** 195.87 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
							10 20 30 40	10 20 30 40				
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer X Vane +					
							40 80 120 160		PL MC LL			
									10 20 30			
1	FILL: Sand and gravel, brown, some silt, possible cobble and boulder sized material at surface, moist			SS1	AU					15/0		
1.5		194.37		SS2	SPT	23	▲		●	20/0		
2	SILT: Greyish brown, layered, trace sand, trace gravel, some clay moist to wet, very loose to loose			SS3	SPT	7	▲		●	10/0		
3				SS4	SPT	10	▲	X	●	20/0		
4				SS5	SPT	4	▲ X		●	15/0		
5				SS6	SPT	2	▲ X		●	20/0		
5.3		190.54		SS7	SPT	6	▲		●	20/0		
5.9	SANDY SILT TILL: Grey, some gravel, very moist, compact	189.93		SS8	SPT	12	▲		●	15/0		

Borehole terminated at 5.9 m.

Upon completion of augering
 Cave at 3.0 m
 Free water at 3.1 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-9-30 **COMPLETED** 21-9-30 **GROUND ELEVATION** 194.85 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
							Undrained Shear Strength (kPa) Pocket Penetrometer X Vane + 40 80 120 160		PL MC LL 10 20 30			
0.20	TOPSOIL: ~200 mm	194.65										
1	CLAYEY SILT: Brown to grey, trace sand, trace organics, moist, firm to very stiff, reworked appearance at the top portion			SS1	SPT	6	▲		●			
				SS2	SPT	17	▲		●			
2				SS3	SPT	12	▲		●			
2.3		192.56										
	SILT: Greyish brown, layered, trace sand, trace gravel, some clay moist to wet, very loose to loose			SS4	SPT	6	▲		●			
3.1		191.80										
	CLAYEY SILT: Brown to grey, trace sand, trace gravel, moist, very soft			SS5	SPT	0	▲		●			1 3 68 28
4					VANE							
4.6		190.28					20					
5	SILTY SAND TILL/SANDY SILT TILL: Grey, some gravel, some clay, very moist, loose to very dense			SS6	SPT	4	▲		●			16 38 28 18
6				SS7	SPT	34		▲	●			
6.7		188.14		SS8	SPT	50		▲	●			

Borehole terminated at 6.7 m.

Upon completion of augering
 No cave
 Free water at 2.3 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-9-30 **COMPLETED** 21-9-30 **GROUND ELEVATION** 195.01 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
0.10	TOPSOIL: ~100 mm	194.91		SS1	SPT	5	▲					
1	CLAYEY SILT: Brown to grey, some sand, trace organics, occasional sand seams, moist, firm to very stiff, reworked appearance at the top portion			SS2	SPT	18		▲				
2				SS3	SPT	6	▲					
2.3		192.72										
3	SILT: Grey, layered, trace sand, trace gravel, some clay, moist, soft			SS4	SPT	4	▲					
3.1		191.96										
4	SANDY SILT TILL: Grey, trace to some gravel, trace clay, compact, wet			SS5	SPT	11	▲					
5												
5.2		189.83		SS6	SPT	11	▲					

Borehole terminated at 5.2 m.

Upon completion of augering
 No cave
 Free water at 3.7 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-1 **COMPLETED** 21-10-1 **GROUND ELEVATION** 195.28 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values	CPT values				
							10 20 30 40	40 80 120 160	PL MC LL			
0.25	TOPSOIL: ~250 mm	195.03										
0.76	FILL: Clayey silt, brown, some sand, trace gravel, moist	194.52		SS1	SPT	2	▲					
1	CLAYEY SILT: Brown to grey, trace sand, trace organics, very moist, stiff, reworked appearance at the top portion			SS2	SPT	12	▲					
2				SS3	SPT	11	▲					
2.3		192.99										
3	SILT: Greyish brown, layered, trace sand, trace gravel, some clay, very moist to wet, very loose to loose			SS4	SPT	7	▲					
4				SS5	SPT	1	▲					
4.6		190.71			VANE							
5	SANDY SILT TILL: Grey, some gravel, trace clay, very dense, wet			SS6	SPT	50						
5.2		190.10										

Borehole terminated at 5.2 m.

Upon completion of augering
 Cave at 3.9 m
 Free water at 4.0 m

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 22-1-7 **COMPLETED** 22-1-7 **GROUND ELEVATION** 195.28 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES	MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA Si & CL	
							N values					CPT values
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							40 80 120 160	PL MC LL				
1	Straight auger to 3.05 m for sampling and 4.57 m for monitoring well installation	192.23									Stickup	
2											Bentonite seal	
3											Filter sand	
3.1	SILT: Grey, some sand, some clay, wet, loose			SS1	SPT	4	▲				3.1	
4												
4.3	GRAVELLY SILT TILL: Grey, some	190.98		SS2	SPT	0	▲				4.6	
4.4		190.88										

Borehole terminated at 4.6 m.

Water Level Readings:		
Date	Depth (m)	Elev. (m)
2022-01-21	0.62	194.66
2022-04-05	0.38	194.90
2024-06-26	1.00	194.28

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-22 **COMPLETED** 21-10-22 **GROUND ELEVATION** 195.22 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
							Undrained Shear Strength (kPa) Pocket Penetrometer X Vane + 40 80 120 160					
1	FILL: Sandy silt, dark brown to brown, trace clay, trace gravel, trace organics, moist			SS1	SPT	5	▲		●			
1.1		194.15		SS2	SPT	7	▲		●			
2	CLAYEY SILT: Brown, some sand, reworked appearance at top portion, moist, stiff			SS3	SPT	11	▲		●			
2.1		193.09										

Borehole terminated at 2.1 m.

Upon completion of augering
 No cave
 No free water

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-22 **COMPLETED** 21-10-22 **GROUND ELEVATION** 194.39 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer X					
							Vane +					
							40 80 120 160		PL MC LL	10 20 30		
0.08	TOPSOIL: ~75 mm	194.32		SS1	SPT	5	▲	X				
1	CLAYEY SILT: Brown to grey, occasional sand seams, moist to very moist, firm to stiff, reworked appearance at top portion			SS2	SPT	9	▲	X				
2				SS3	SPT	9	▲	X				
2.1		192.26										

Borehole terminated at 2.1 m.

Upon completion of augering
No cave
No free water

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-1 **COMPLETED** 21-10-1 **GROUND ELEVATION** 194.74 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer X Vane +					
							40 80 120 160		PL MC LL			
									10 20 30			
0.20	TOPSOIL: ~200 mm	194.54										
	FILL: Silty sand, brown, trace gravel, moist, contains brick debris			SS1	SPT	3	▲					
0.76		193.98										
1	CLAYEY SILT: Brown to grey mottled, trace sand, moist to very moist stiff to very stiff			SS2	SPT	16	▲					
2				SS3	SPT	13	▲					
2.1		192.61										

Borehole terminated at 2.1 m.

Upon completion of augering
 No cave
 No free water

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-21 **COMPLETED** 21-10-21 **GROUND ELEVATION** 195.66 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values	CPT values				
							▲	△				
							10 20 30 40					
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							X +					
							40 80 120 160					
									PL MC LL			
									10 20 30			
1	FILL: Sand and gravel, brown, some silt, cobble and boulder size material on the surface, moist			SS1	SPT	28		▲	●			
1.2		194.46		SS2	SPT	16	▲		●			
2	CLAYEY SILT: Brown to grey mottled, trace sand, moist to very moist, very stiff			SS3	SPT	17	▲		●			
2.1		193.53										

Borehole terminated at 2.1 m.

Upon completion of augering
 No cave
 No free water

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-21 **COMPLETED** 21-10-21 **GROUND ELEVATION** 195.83 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values	CPT values				
							▲	△				
							10 20 30 40					
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							X +					
							40 80 120 160					
									PL MC LL			
									10 20 30			
1	FILL: Sand and gravel, brown, some silt, cobble and boulder size material on the surface, moist			SS1	SPT	22						
1.4		194.48		SS2	SPT	29						
2	CLAYEY SILT: Brown to grey mottled, trace sand, moist to very moist, very stiff	193.70		SS3	SPT	18						
2.1												

Borehole terminated at 2.1 m.

Upon completion of augering
No cave
No free water

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-1 **COMPLETED** 21-10-1 **GROUND ELEVATION** 194.70 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
0.15	TOPSOIL: ~150 mm	194.55										
1	CLAYEY SILT: Brown to grey mottled, trace sand, moist to very moist, stiff to very stiff			SS1	SPT	3	▲					
				SS2	SPT	15	▲					
2				SS3	SPT	16	▲					
2.1		192.57										

Borehole terminated at 2.1 m.

Upon completion of augering
 No cave
 No free water

CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-9-30 **COMPLETED** 21-9-30 **GROUND ELEVATION** 195.09 m
DRILLING CONTRACTOR Davis **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 45 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values ▲	CPT values △				
0.25	TOPSOIL: ~250 mm	194.84										
0.76	FILL: Clayey silt, brown to dark brown, mixed with organics, some sand, some gravel, moist	194.33		SS1	SPT	3	▲					
1	CLAYEY SILT: Brown to grey, occasional sand seams, trace gravel, moist to very moist, stiff to very stiff			SS2	SPT	16	▲					
2				SS3	SPT	11	▲					1.8
2.3		192.80										
3	SILT: Greyish brown, layered, trace sand, trace gravel, some clay, very moist to wet, very loose to loose			SS4	SPT	7	▲					
4				SS5	SPT	0	WH					
4.6		190.52			VANE			3.0 50				
5	CLAYEY SILT: Brown to grey, trace sand, trace gravel, moist, very soft			SS6	SPT	0	WH					4.8
6												5 3 60 32
6.1		188.99										
7	SAND TILL: Grey, medium to coarse, mixed with gravel, trace silt, wet, compact to very dense			SS7	SPT	17	▲					33 60 7 0
8				SS8	SPT	64		>>▲				
8.2		186.86										

Borehole terminated at 8.2 m.

Refer to report for groundwater elevation data

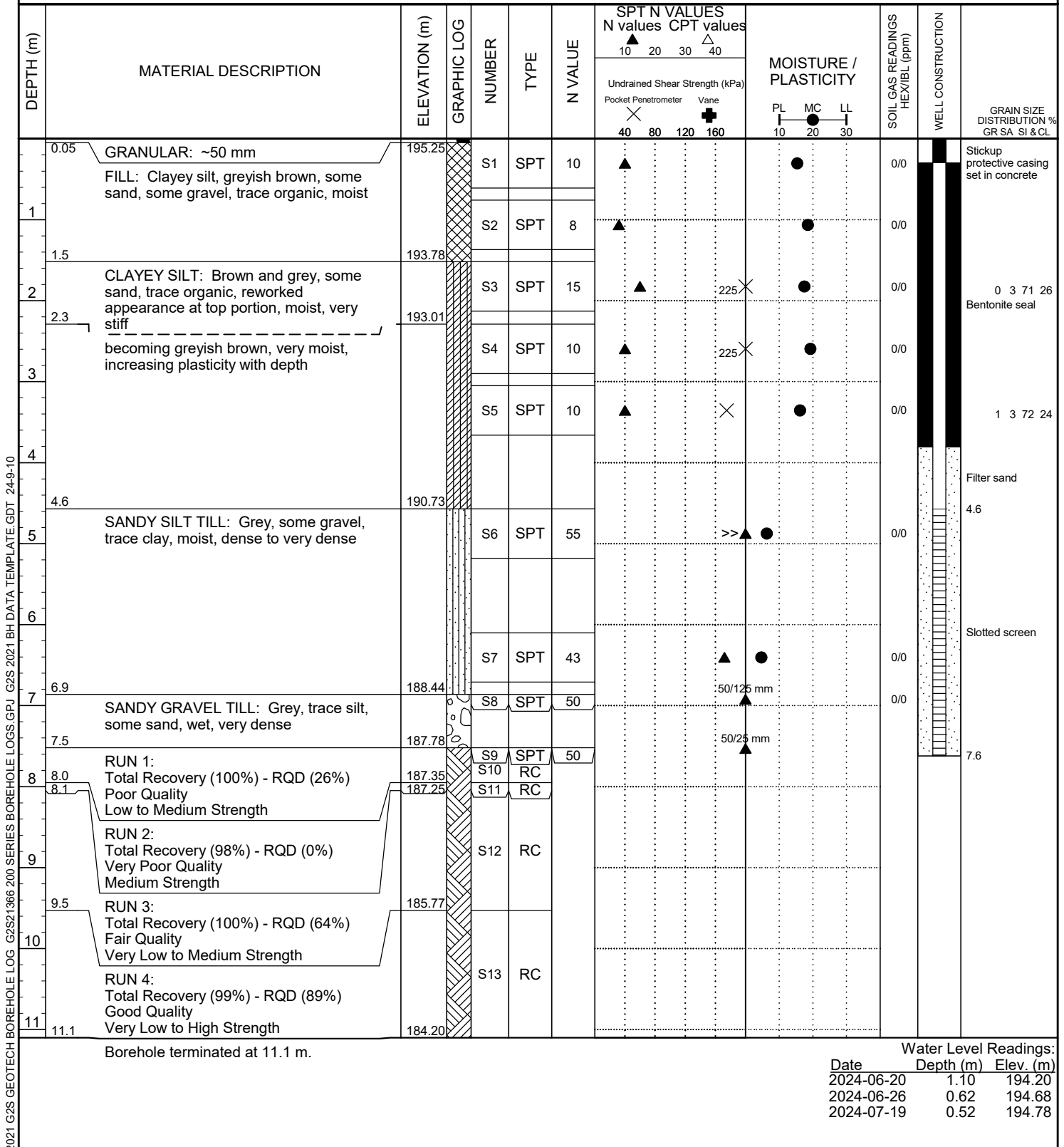
CLIENT Charis Developments Ltd. **PROJECT NAME** 839 & 869 Hurontario St & 7564 Poplar Side Rd
PROJECT NUMBER G2S21366B **PROJECT LOCATION** Collingwood, Ontario
DATE STARTED 21-10-21 **COMPLETED** 21-10-21 **GROUND ELEVATION** 195.75 m
DRILLING CONTRACTOR LST **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD Diedrich D50 Track **NOTES** _____

DEPTH (m)	MATERIAL DESCRIPTION	ELEVATION (m)	GRAPHIC LOG	NUMBER	TYPE	N VALUE	SPT N VALUES		MOISTURE / PLASTICITY	SOIL GAS READINGS HEX/IBL (ppm)	WELL CONSTRUCTION	GRAIN SIZE DISTRIBUTION % GR SA SI & CL
							N values	CPT values				
							▲	△				
							10 20 30 40					
							Undrained Shear Strength (kPa)					
							Pocket Penetrometer Vane					
							40 80 120 160					
									PL MC LL			
									10 20 30			
1	FILL: Sand and gravel, brown, some silt, cobble and boulder size material on the surface, moist	194.83		SS1	SPT	25						
0.93												
2	CLAYEY SILT: Greyish brown, mottled, trace sand, trace gravel, moist, stiff to very stiff	193.62		SS2	SPT	14						
				SS3	SPT	15						
2.1												

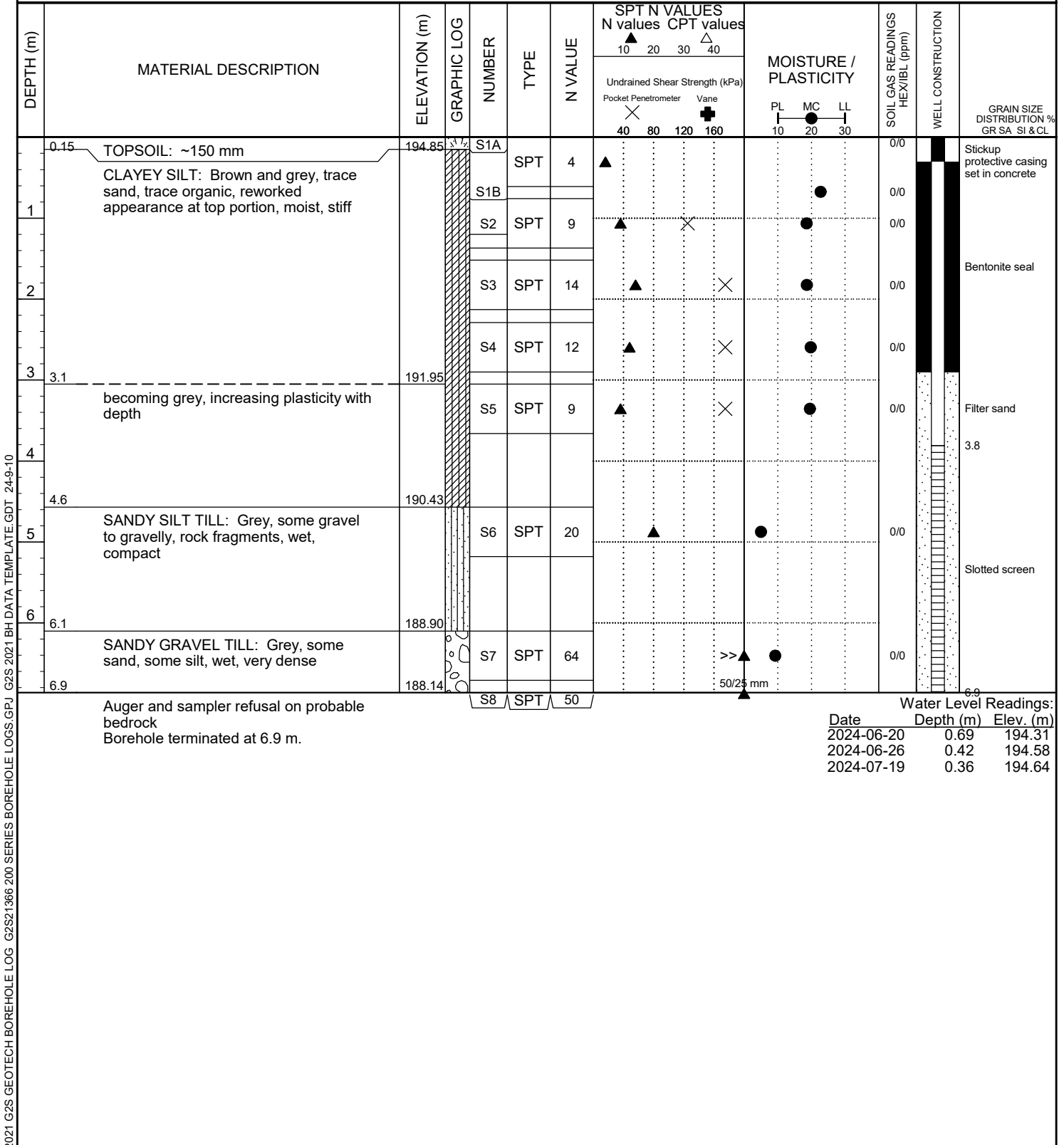
Borehole terminated at 2.1 m.

Upon completion of augering
 No cave
 No free water

CLIENT Charis Developments Ltd. **PROJECT NAME** Geotechnical Investigation for The Gateway Centre
PROJECT NUMBER G2S21366 **PROJECT LOCATION** 853 Hurontario St, Collingwood, ON
DATE STARTED 24-6-4 **COMPLETED** 24-6-5 **GROUND ELEVATION** 195.3 m
DRILLING CONTRACTOR Davis Drilling Ltd. **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 55 Track **NOTES**

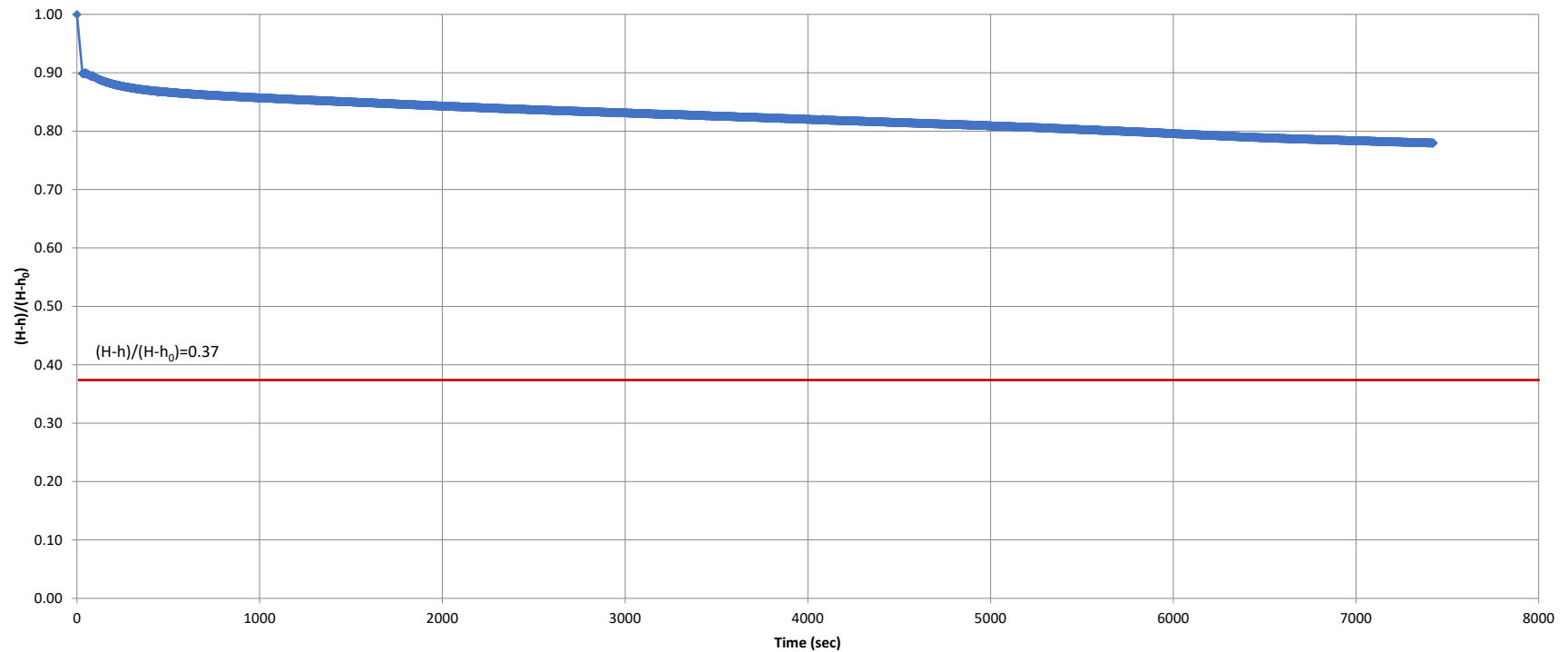


CLIENT Charis Developments Ltd. **PROJECT NAME** Geotechnical Investigation for The Gateway Centre
PROJECT NUMBER G2S21366 **PROJECT LOCATION** 853 Hurontario St, Collingwood, ON
DATE STARTED 24-6-4 **COMPLETED** 24-6-4 **GROUND ELEVATION** 195.0 m
DRILLING CONTRACTOR Davis Drilling Ltd. **LOGGED BY** DB **CHECKED BY** AA
DRILLING METHOD CME 55 Track **NOTES** _____



Appendix D: Hydraulic Testing

Figure 1
BH 101 Slug Test Analysis
 869 Hurontario Street, Collingwood



Hvorslev Method for Slug Test Analysis

stickup=	1.02 m	casing stickup from ground surface
SWL=	2.10 m	Static Water Level (mBTOP)
r =	0.025 m	casing radius
L =	1.52 m	screen length
R =	0.05 m	borehole radius
H-h ₀ =	3.68 m	Water level change at T=0
T _{0.37} =	n/a sec	T at (H-h)/(H-h ₀)=0.37

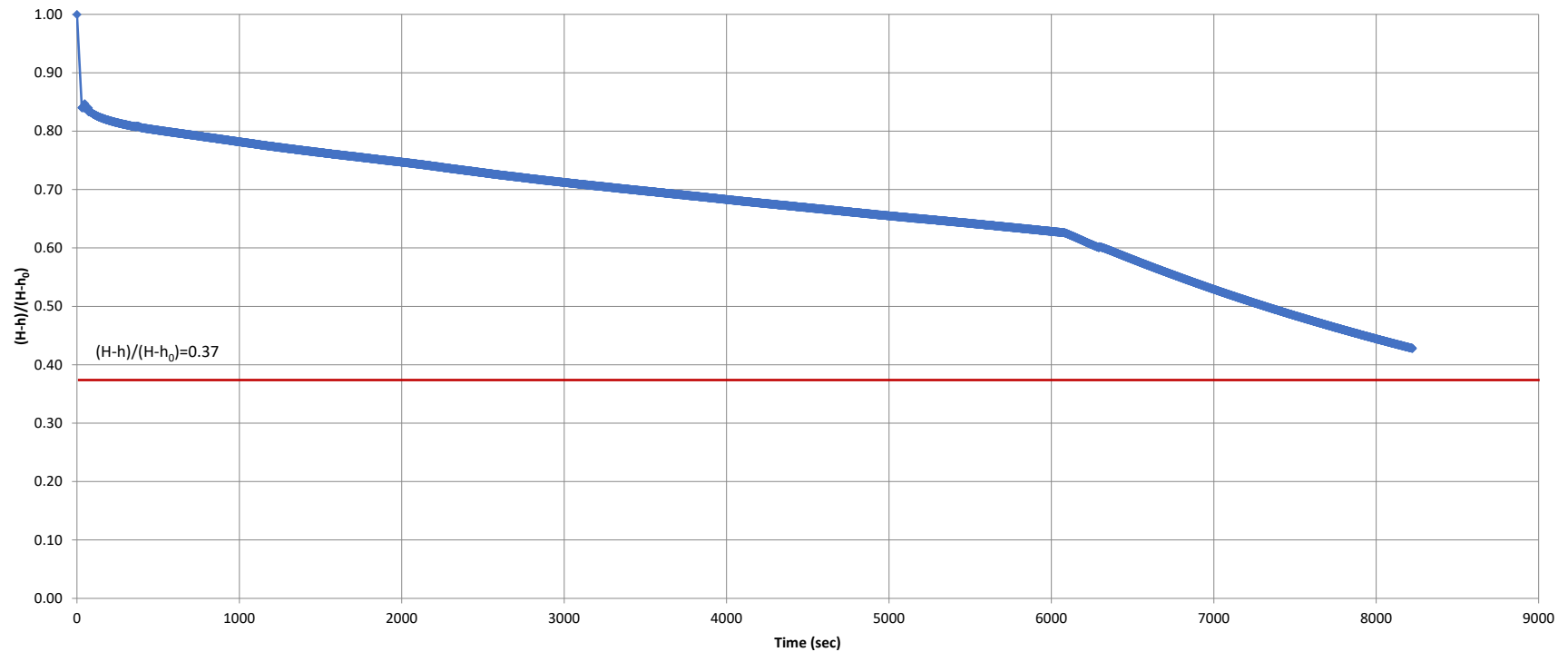
$$k = (r^2 \ln[(L/R)]) / 2LT_{0.37}$$

$$k = < 1 \times 10^{-7} \text{ m/sec}$$



02-02-2022

Figure 2
BH 103 Slug Test Analysis
 869 Hurontario Street, Collingwood



Hvorslev Method for Slug Test Analysis

stickup=	1.08 m	casing stickup from ground surface
SWL=	1.73 m	Static Water Level (mBTOP)
r =	0.025 m	casing radius
L =	1.52 m	screen length
R =	0.05 m	borehole radius
H-h ₀ =	3.97 m	Water level change at T=0
T _{0.37} =	n/a sec	T at (H-h)/(H-h ₀)=0.37

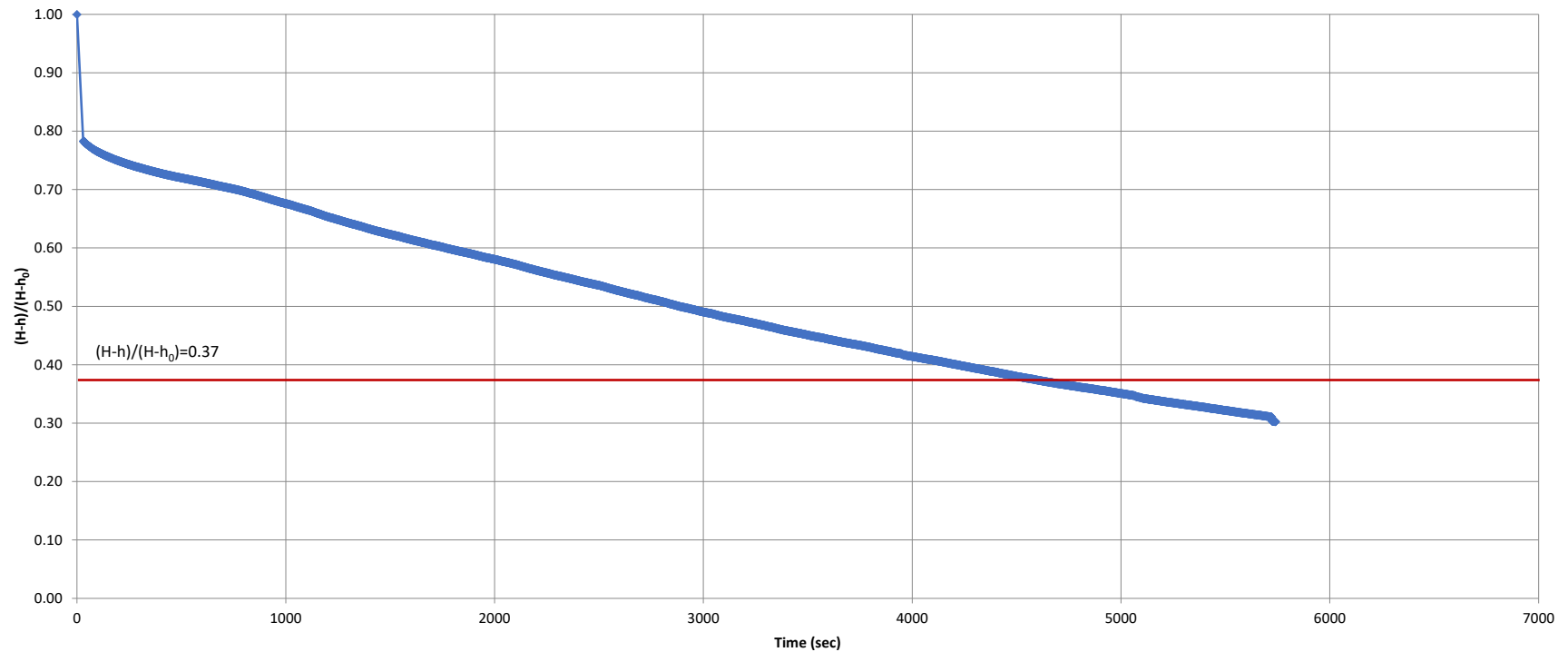
$$k = (r^2 \ln[(L/R)]) / 2LT_{0.37}$$

$$k = < 1 \times 10^{-7} \text{ m/sec}$$



02-02-2022

Figure 3
BH 110 Slug Test Analysis
 869 Hurontario Street, Collingwood



Hvorslev Method for Slug Test Analysis

stickup=	0.65 m	casing stickup from ground surface
SWL=	2.09 m	Static Water Level (mBTOP)
r =	0.025 m	casing radius
L =	3.05 m	screen length
R =	0.05 m	borehole radius
H-h ₀ =	3.87 m	Water level change at T=0
T _{0.37} =	4585 sec	T at (H-h)/(H-h ₀)=0.37

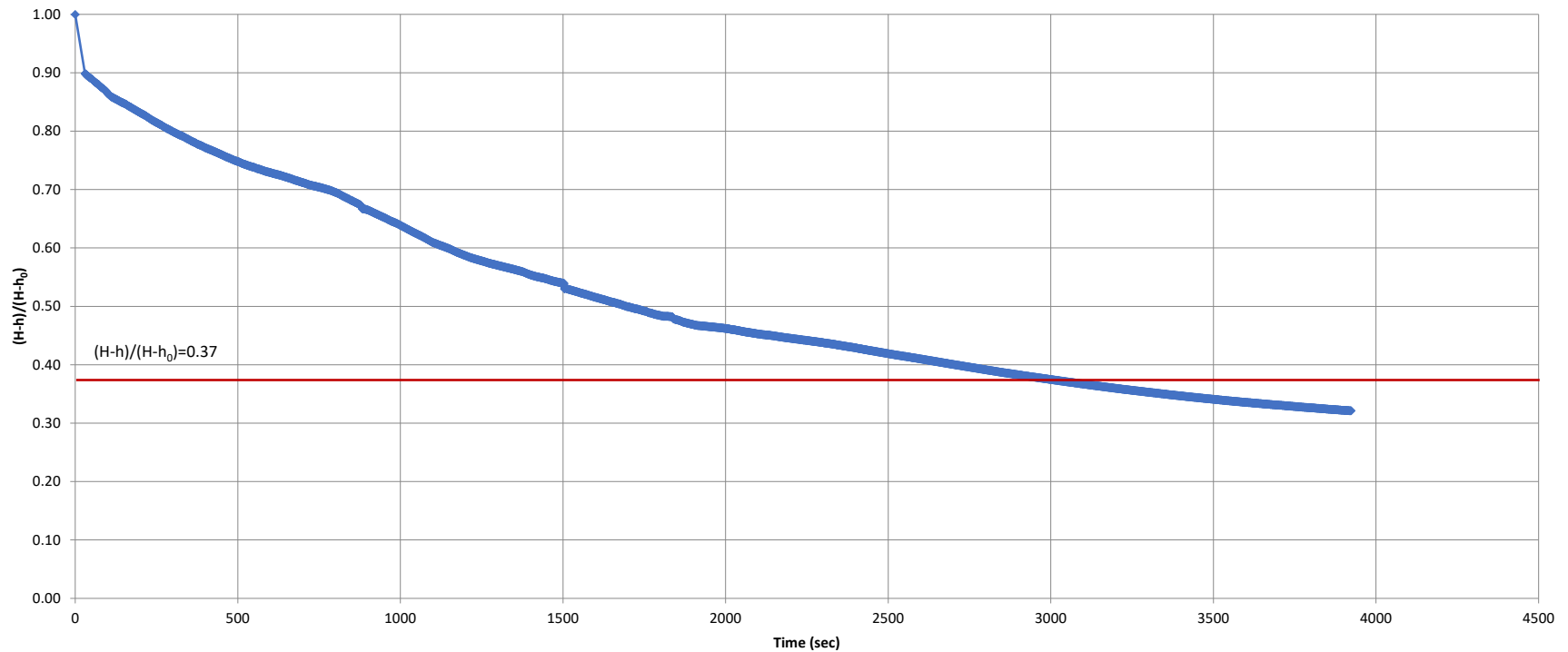
$$k = (r^2 \ln[(L/R)]) / 2LT_{0.37}$$

k= 9.5E-08 m/sec



02-02-2022

Figure 4
BH 122 Slug Test Analysis
 839 & 869 Hurontario Street, Collingwood



Hvorslev Method for Slug Test Analysis

stickup=	0.78 m	casing stickup from ground surface
SWL=	0.31 m	Static Water Level (mBTOP)
r =	0.025 m	casing radius
L =	3.05 m	screen length
R =	0.05 m	borehole radius
H-h ₀ =	5.51 m	Water level change at T=0
T _{0.37} =	3000 sec	T at (H-h)/(H-h ₀)=0.37

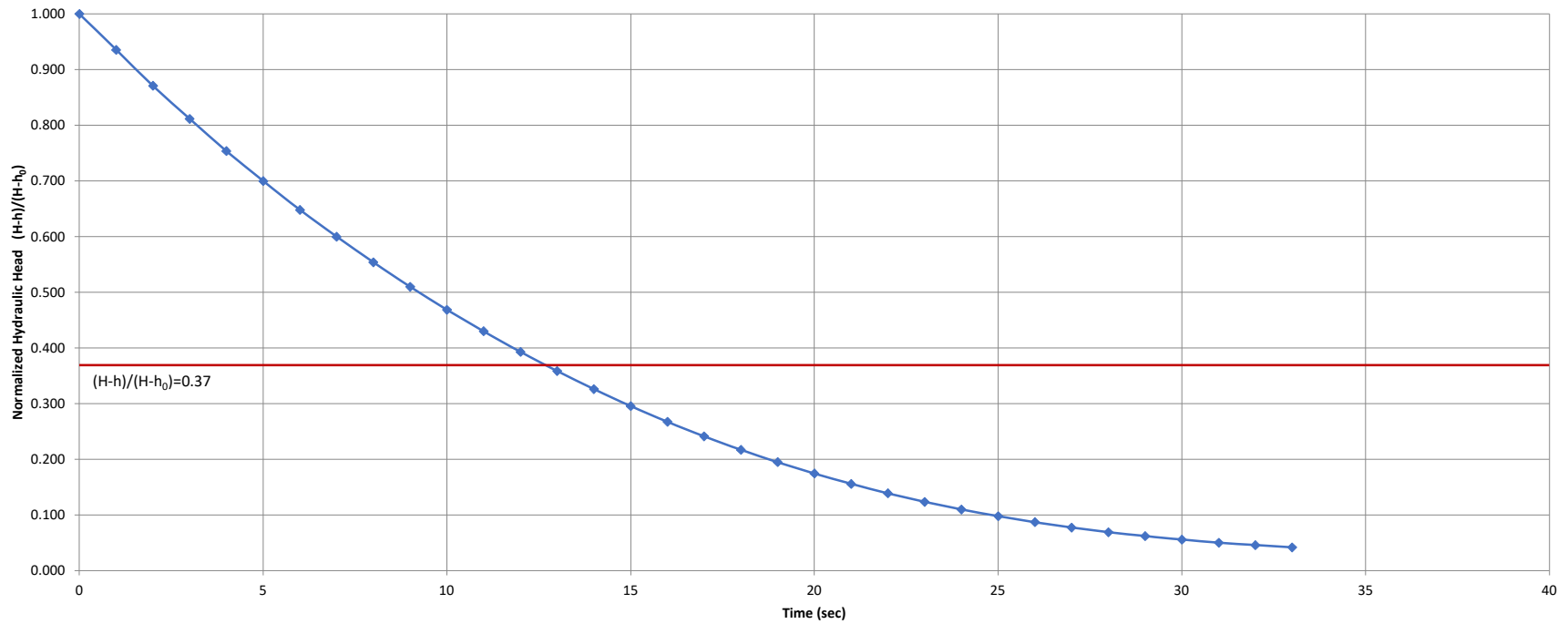
$$k = (r^2 \ln[(L/R)]) / 2LT_{0.37}$$

k= 1.4E-07 m/sec



02-02-2022

MW201
Slug Test Analysis
 853 Hurontario Street, Collingwood



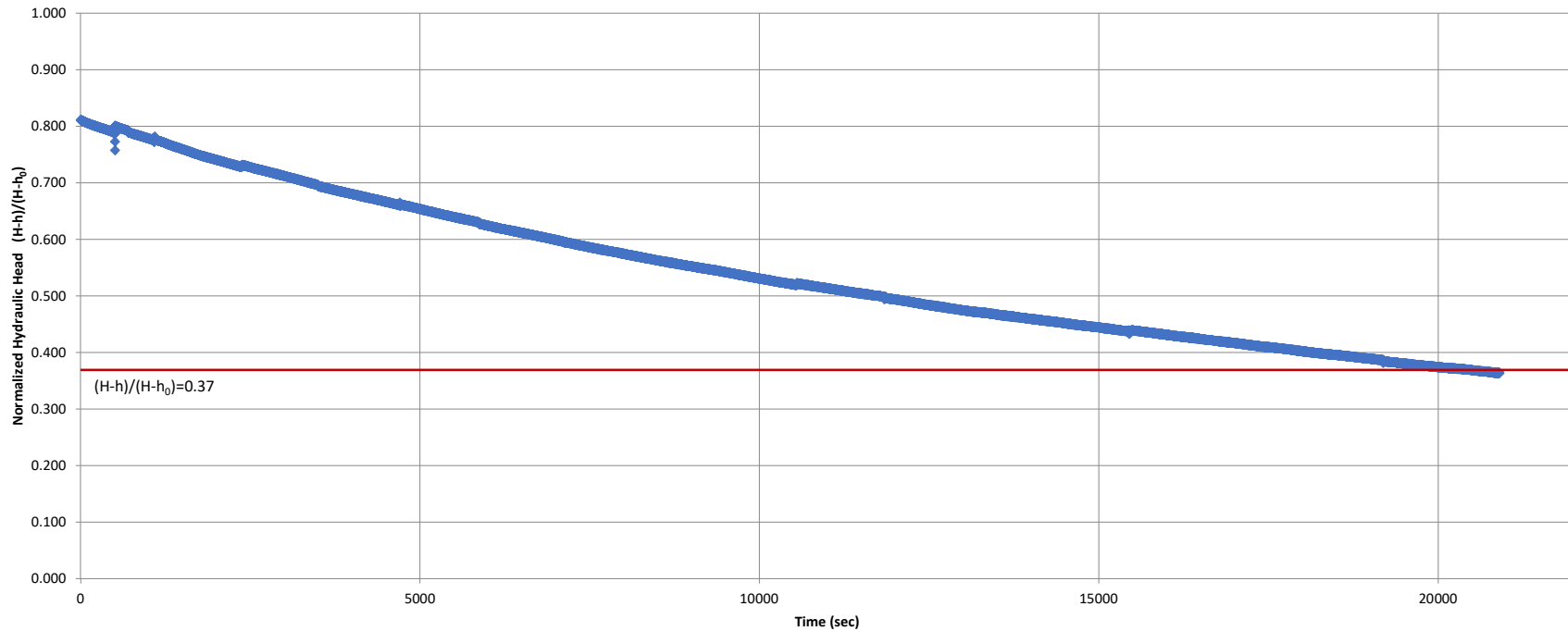
Hvorslev Method for Slug Test Analysis

stickup=	0.9 m	casing stickup from ground surface
SWL=	1.89 m	Static Water Level (mBTOP)
r =	0.025 m	casing radius
L =	3.1 m	screen length
R =	0.076 m	borehole radius
H-h ₀ =	1.84 m	Water level change at T=0
T _{0.37} =	12.75 sec	T at (H-h)/(H-h ₀)=0.37

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

k= 2.9E-05 m/sec

MW202
Slug Test Analysis
 853 Hurontario Street, Collingwood



Hvorslev Method for Slug Test Analysis

stickup=	0.83 m	casing stickup from ground surface
SWL=	1.52 m	Static Water Level (mBTOP)
r =	0.025 m	casing radius
L =	3.1 m	screen length
R =	0.076 m	borehole radius
H-h ₀ =	3.10 m	Water level change at T=0
T _{0.37} =	20898 sec	T at (H-h)/(H-h ₀)=0.37

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

k= 1.8E-08 m/sec

20-Jun-24

Appendix E: Grain Size Analyses



4361 Harvester Rd., Unit 12, Burlington, ON L7L 5M4
P 905.331.3735 F 905.642.5999
G2Sconsulting.com

Project No.: G2S21366B
Project Name: 839 & 869 Hurontario St. & 7564 Poplar St.

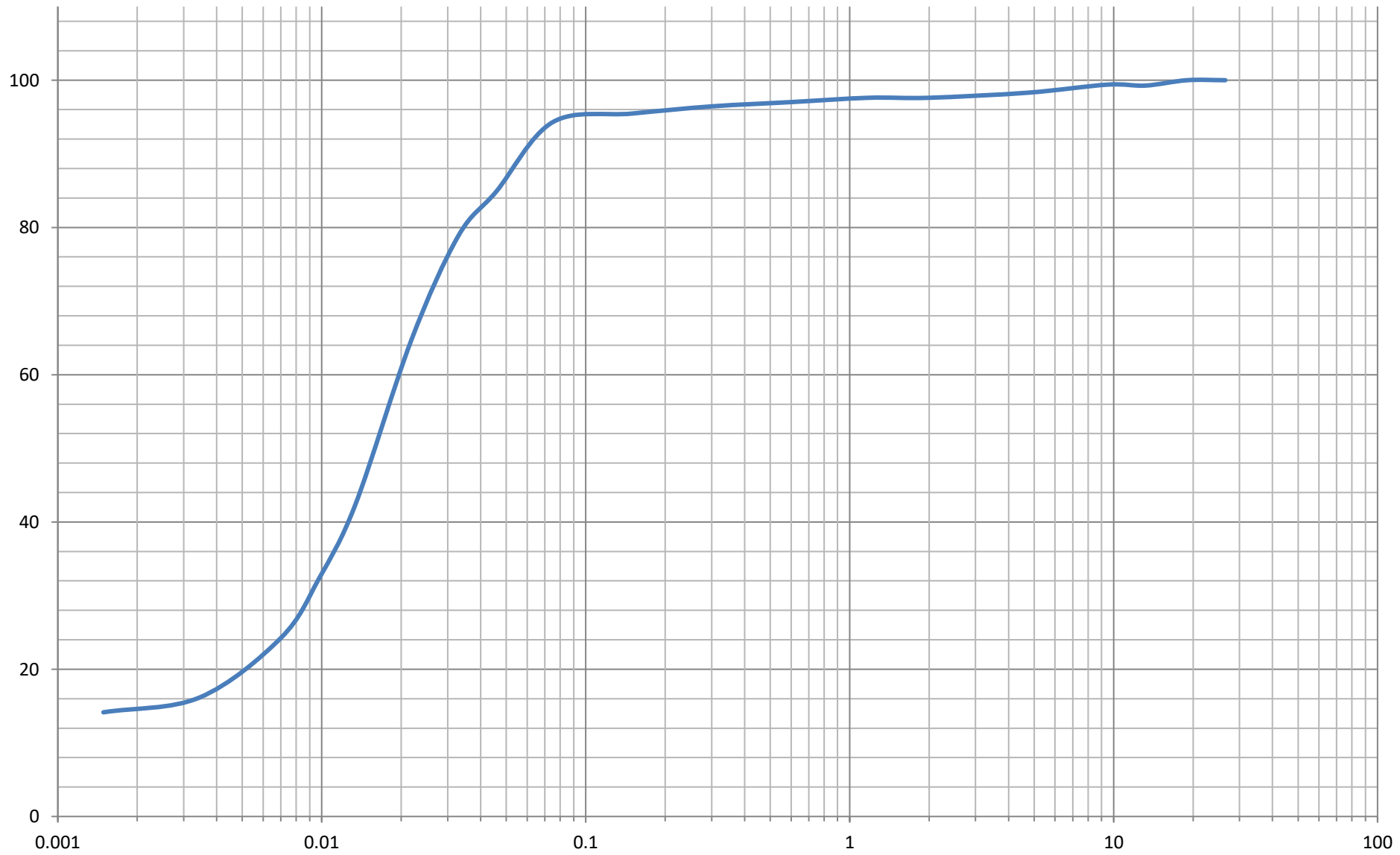
Lab No.: # 21031A
Borehole/Sample No.: BH102-SS5

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL		
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse

1 2 6 20 60 #200 #100 #50 #16 #4 3/8" 1/2" 3/4" 1" 3"

Percentage Passing %



Particle Size (mm)



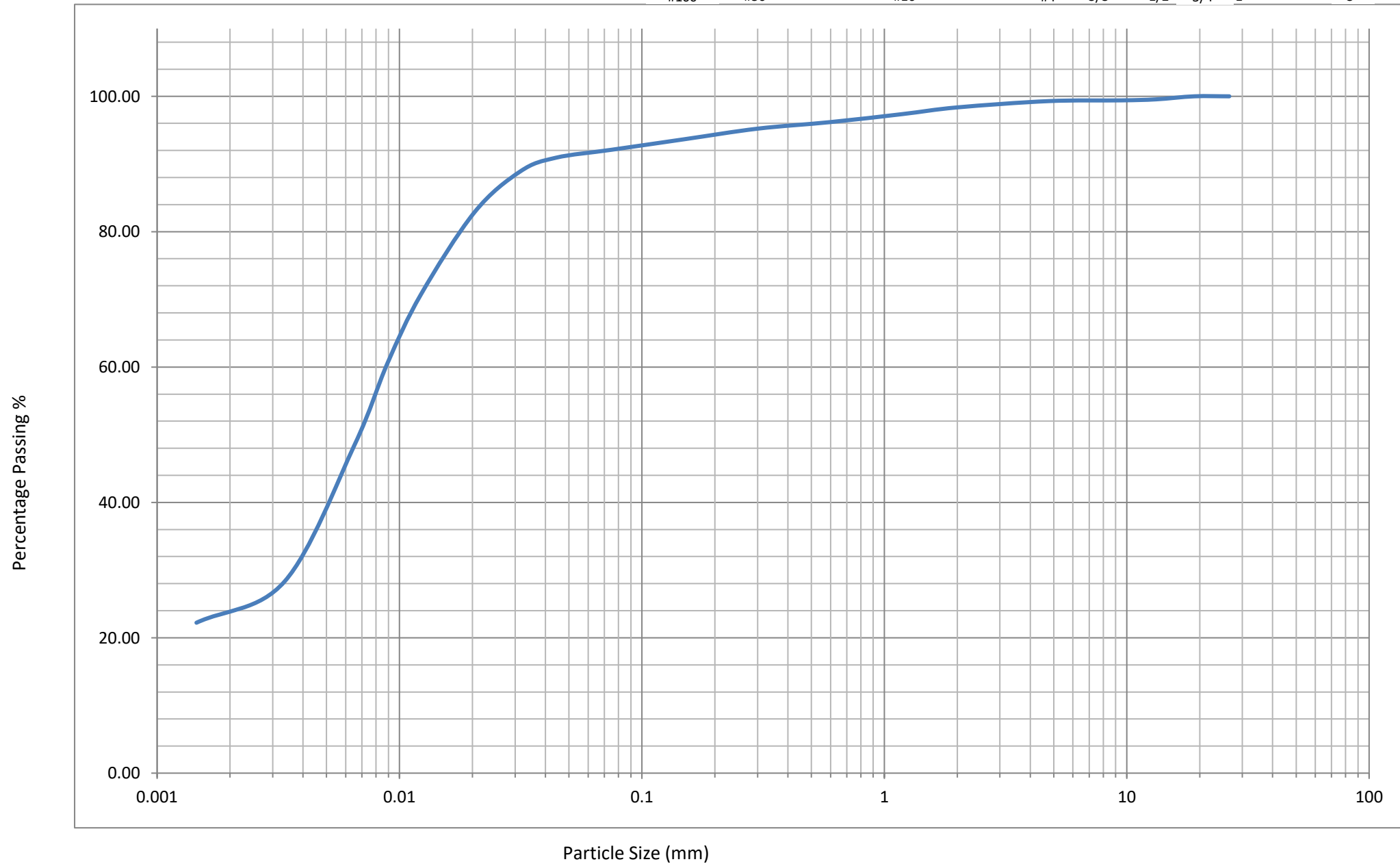
4361 Harvester Rd., Unit 12, Burlington, ON L7L 5M4
P 905.331.3735 F 905.642.5999
G2Sconsulting.com

Project No.: G2S21366B
Project Name: 839 & 869 Hurontario St. & 7564 Poplar St.

Lab No.: # 21031B
Borehole/Sample No.: BH103-SS4

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL							
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse					
1	2	6	20	60	#200	#100	#50	#16	#4	3/8"	1/2"	3/4"	1"	3"





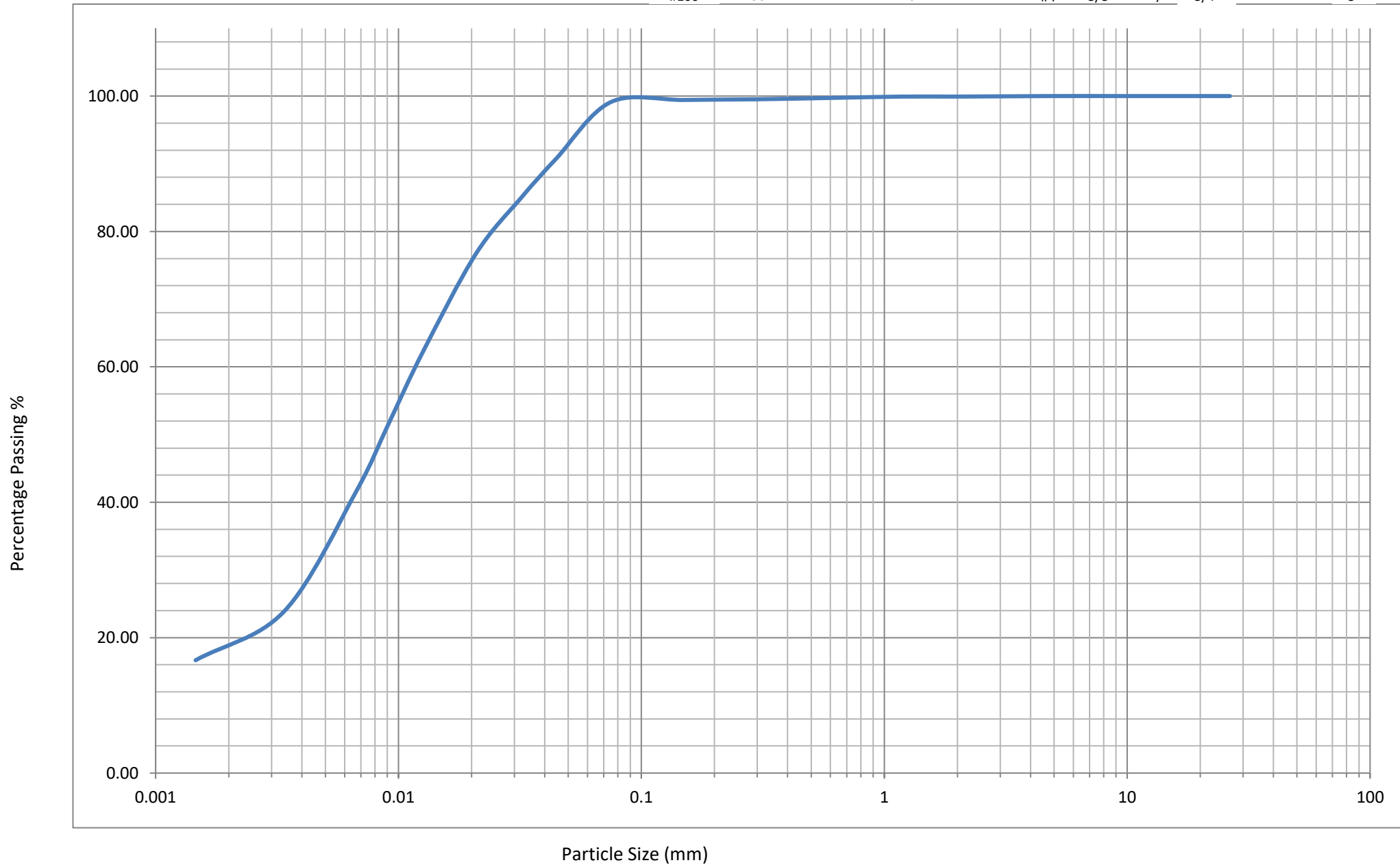
4361 Harvester Rd., Unit 12, Burlington, ON L7L 5M4
 P 905.331.3735 F 905.642.5999
 G2Sconsulting.com

Project No.: G2S21366B
Project Name: 839 & 869 Hurontario St. & 7564 Poplar St.

Lab No.: # 21031C
Borehole/Sample No.: BH105-SS4

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL						
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse				
1	2	6	20	60	#200	#100	#50	#16	#4	3/8"	1/2"	3/4"	1"





4361 Harvester Rd., Unit 12, Burlington, ON L7L 5M4
 P 905.331.3735 F 905.642.5999
 G2Sconsulting.com

Project No.: G2S21366B
Project Name: 839 & 869 Hurontario St. & 7564 Poplar St.

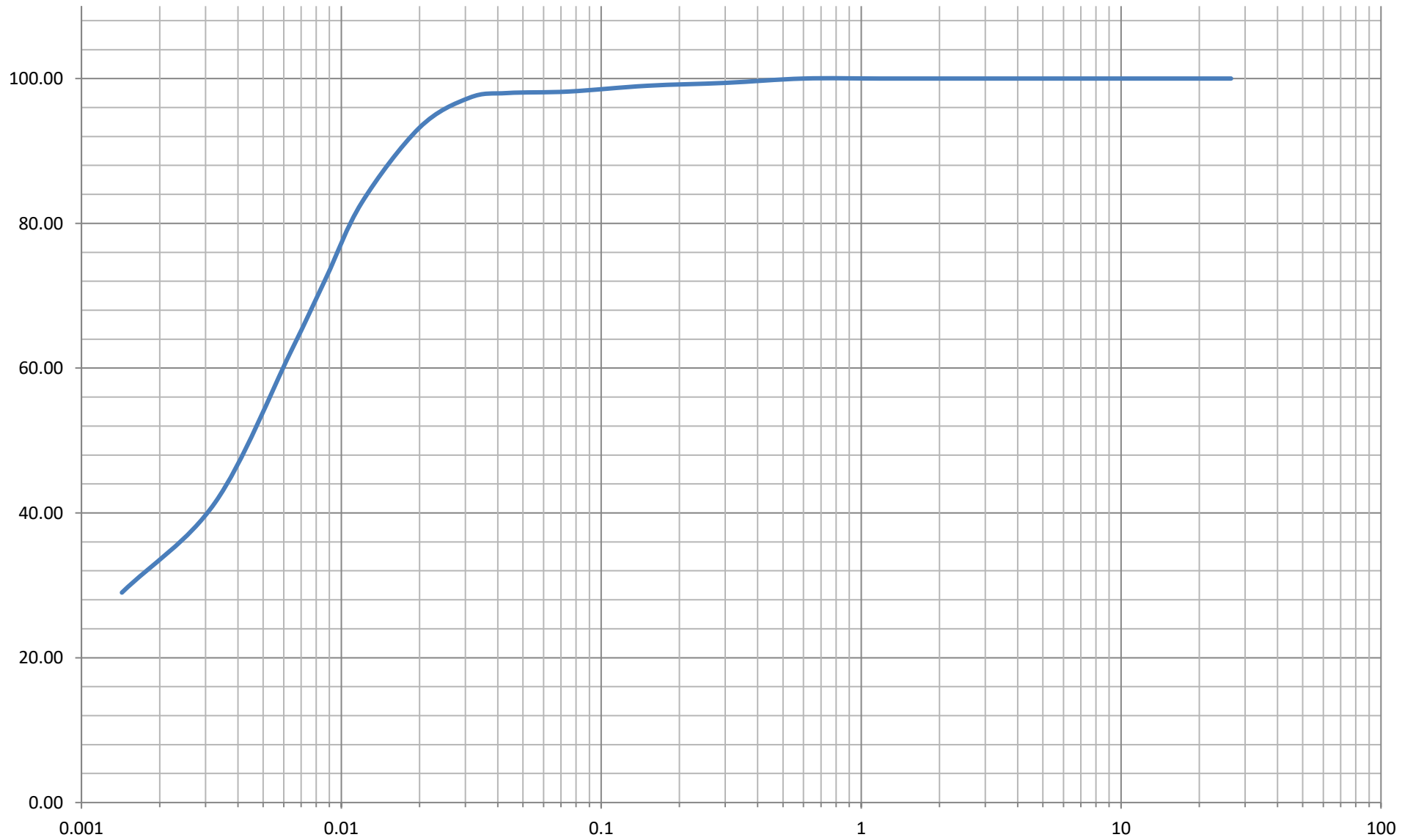
Lab No.: # 21031E
Borehole/Sample No.: BH109-SS3

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL		
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse

1 2 6 20 60 #200 #100 #50 #16 #4 3/8" 1/2" 3/4" 1" 3"

Percentage Passing %



Particle Size (mm)



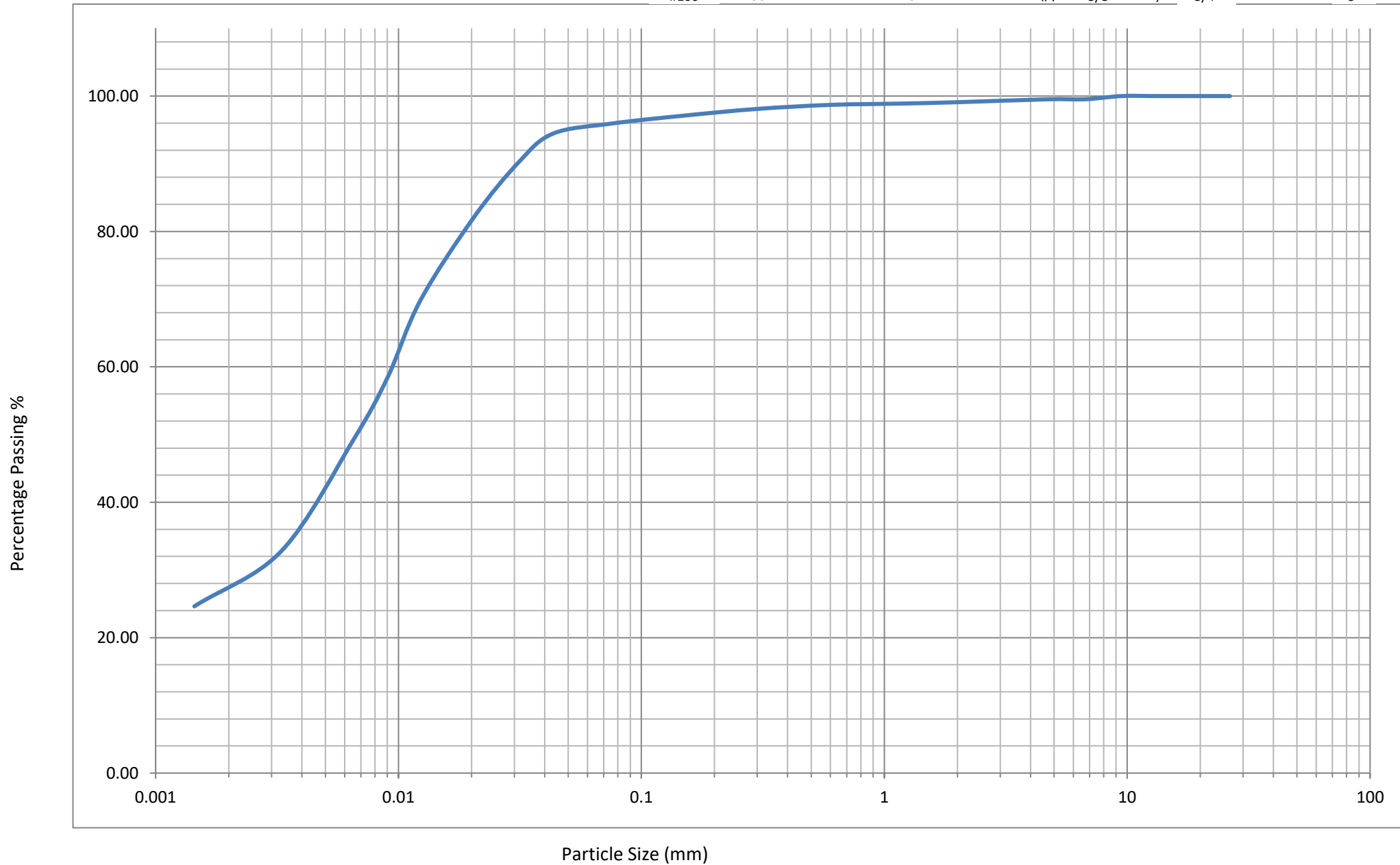
4361 Harvester Rd., Unit 12, Burlington, ON L7L 5M4
 P 905.331.3735 F 905.642.5999
 G2Sconsulting.com

Project No.: G2S21366B
Project Name: 839 & 869 Hurontario St. & 7564 Poplar St.

Lab No.: # 21031G
Borehole/Sample No.: BH113-SS5

ISSMFE SOIL CLASSIFICATION

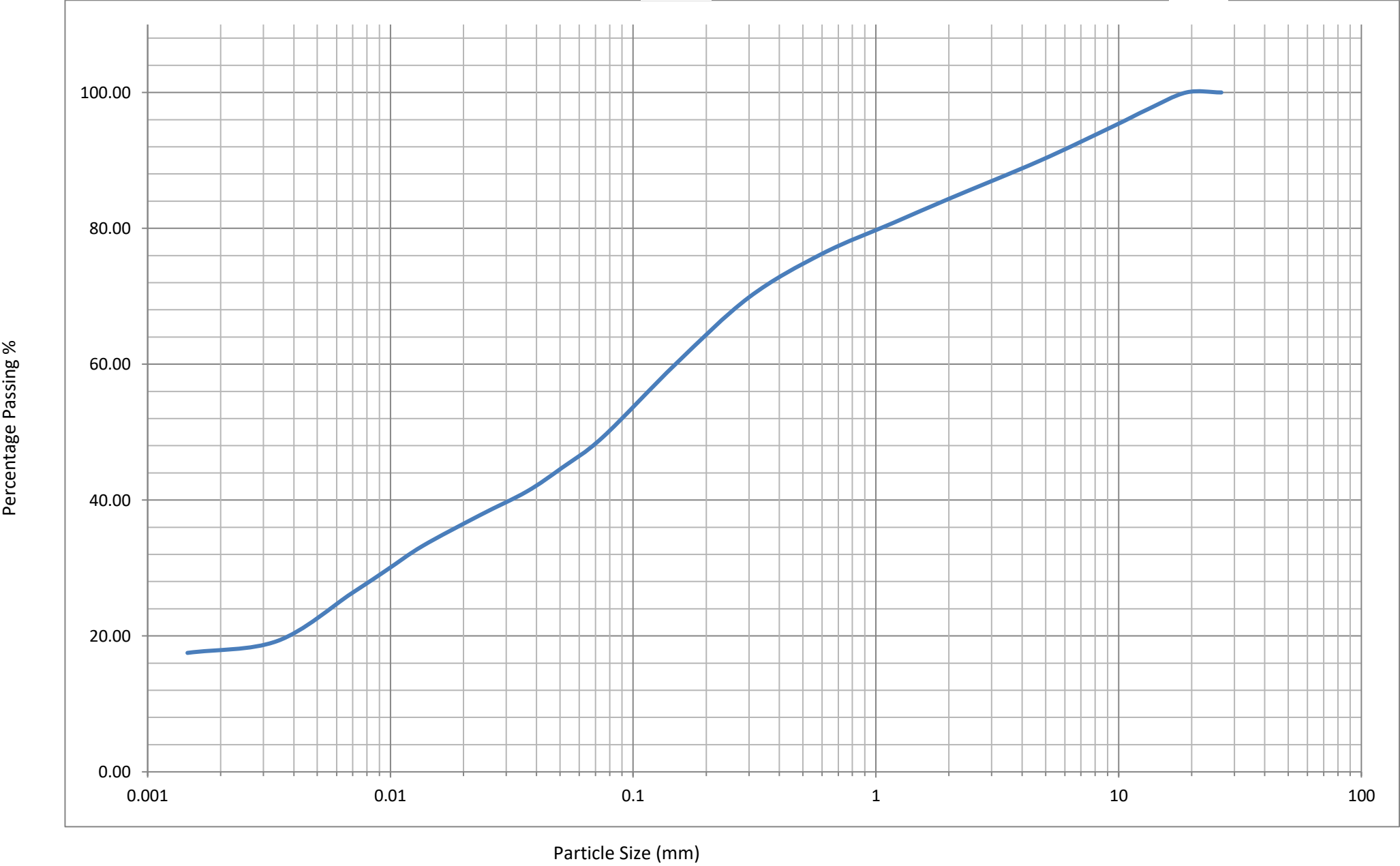
CLAY	SILT			SAND			GRAVEL						
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse				
1	2	6	20	60	.200	#100	#50	#16	#4	3/8"	1/2"	3/4"	1"



ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL		
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse

12602060#200#100#50#16#43/8"1/2"3/4"1"3"





4361 Harvester Rd., Unit 12, Burlington, ON L7L 5M4
P 905.331.3735 F 905.642.5999
G2Sconsulting.com

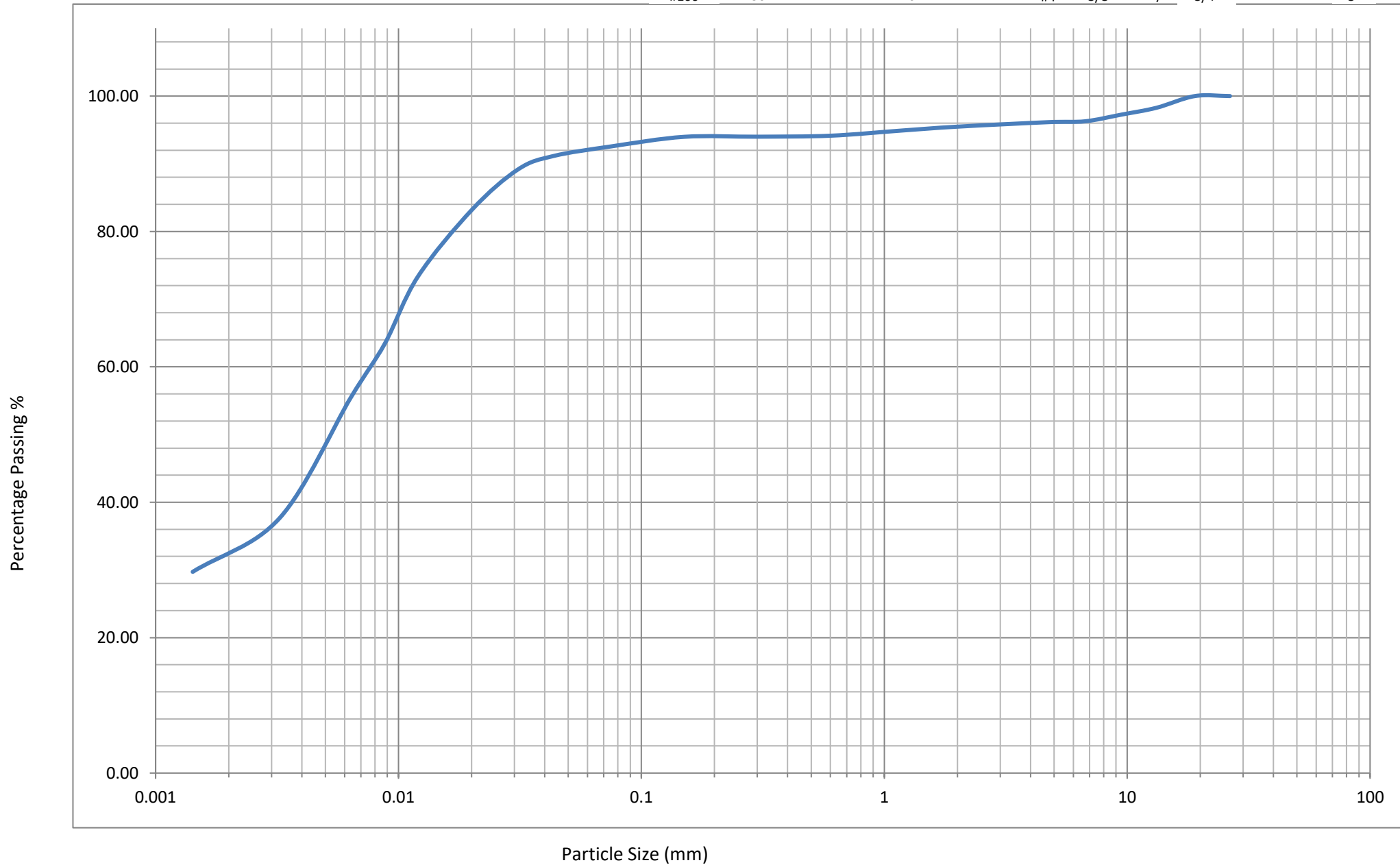
Project No.: G2S21366B
Project Name: 839 & 869 Hurontario St. & 7564 Poplar St.

Lab No.: # 21031H
Borehole/Sample No.: BH122-SS6

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL		
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse

1 2 6 20 60 #200 #100 #50 #16 #4 3/8" 1/2" 3/4" 1" 3"



Project No.: G2S21366D

Lab No.: 24132A

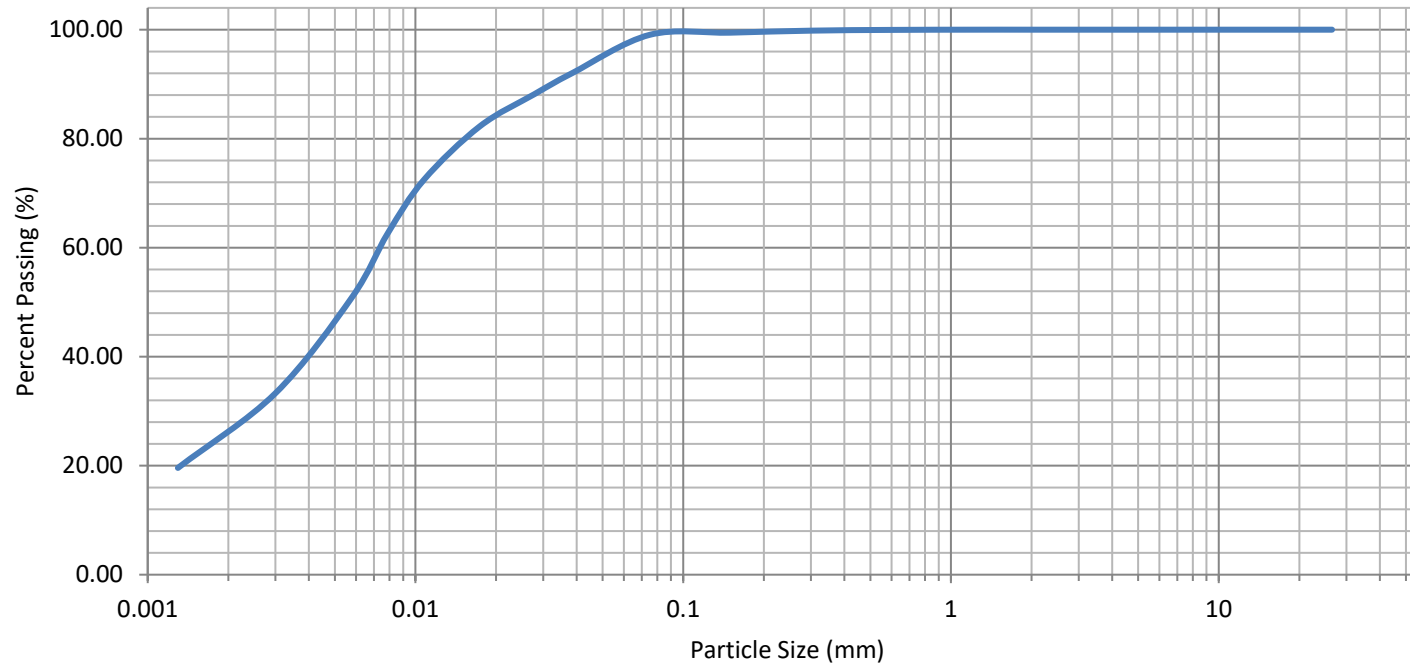
Project Name: 839, 853, 869 Hurontario St. & 7564 Poplar Sideroad, Collingwood

Borehole/Sample No.: BH201-S3

ISSMGE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL		
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE

SIEVE SIZE: 1 2 6 20 60#200 #100 #50 #16 #8 #4 3/8" 3/4" 2-1/2"



Project No.: G2S21366D

Lab No.: 24132B

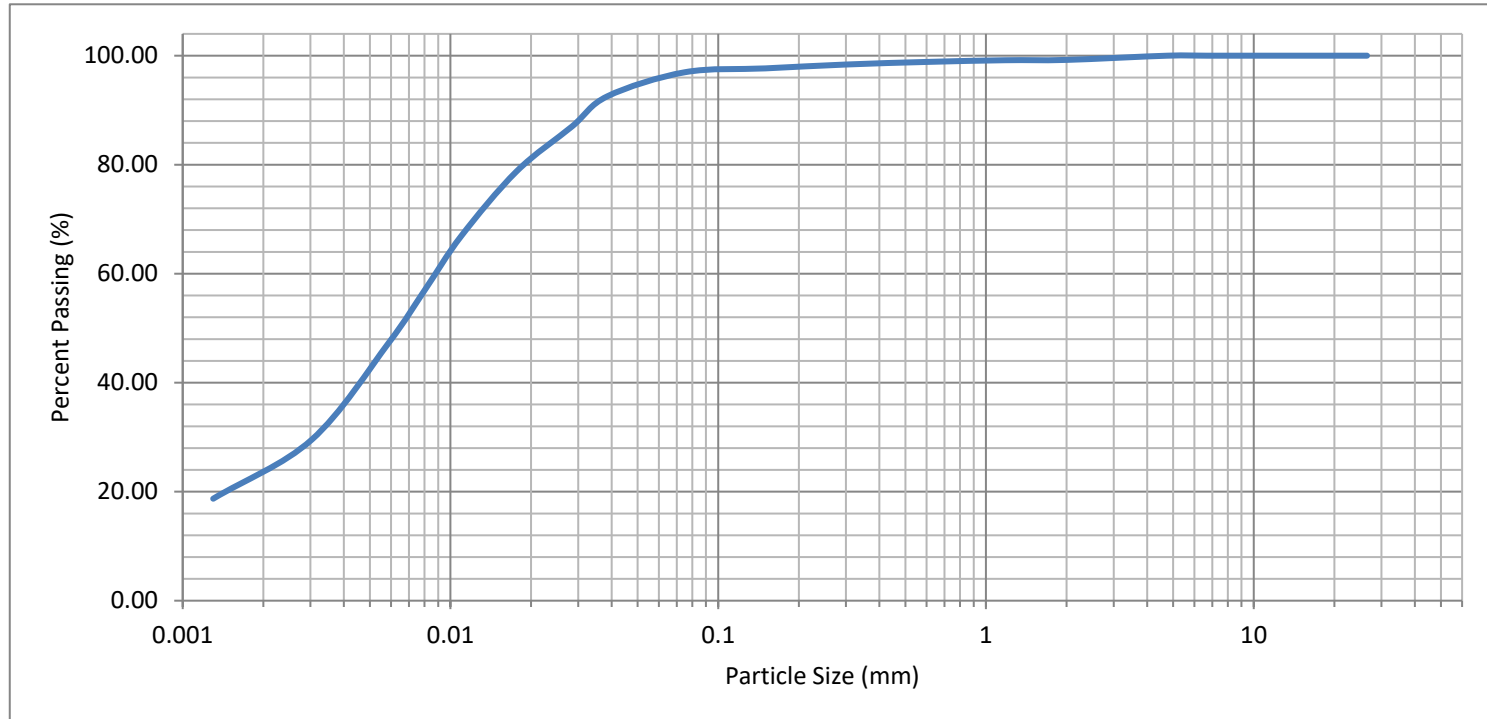
Project Name: 839, 853, 869 Hurontario St. & 7564 Poplar Sideroad, Collingwood

Borehole/Sample No.: BH201-S5

ISSMGE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL		
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE

SIEVE SIZE: 1 2 6 20 60#200 #100 #50 #16 #8 #4 3/8" 3/4" 2-1/2"



Project No.: G2S21366D

Lab No.: 24132C

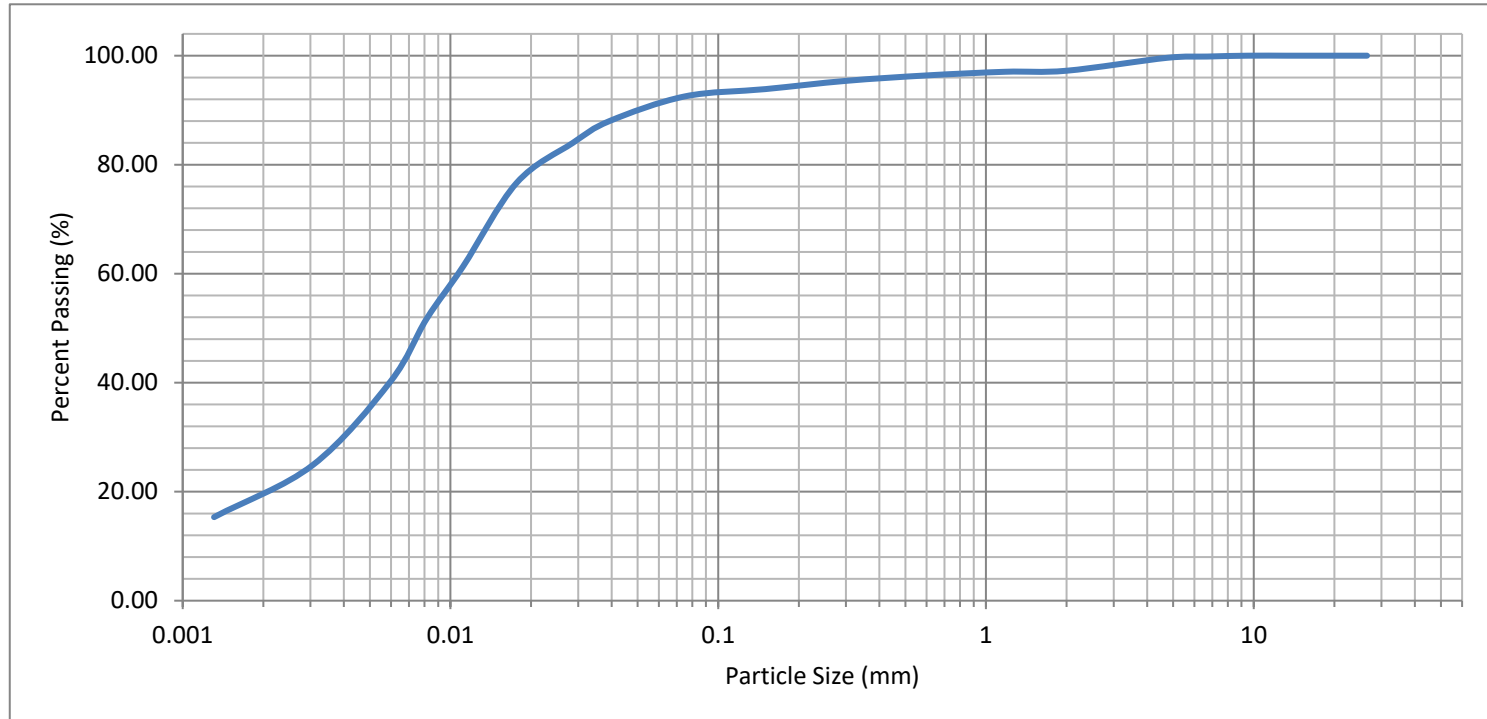
Project Name: 839, 853, 869 Hurontario St. & 7564 Poplar Sideroad, Collingwood

Borehole/Sample No.: BH202-S5

ISSMGE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL		
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE

SIEVE SIZE: 1 2 6 20 60#200 #100 #50 #16 #8 #4 3/8" 3/4" 2-1/2"



**Appendix F:
Certificates of Analysis**

Certificate of Analysis

G2S Environmental Consulting Inc. (Burlington)

4361 Harvester Road, Unit 12

Burlington, ON L7L 5M4

Attn: Melissa King

Client PO: 853 Hurontario St., Collingwood

Project: G2S21366

Custody: 73168

Report Date: 4-Jul-2024

Order Date: 21-Jun-2024

Order #: 2425583

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2425583-01	MW201-UF

Approved By:



Mark Foto, M.Sc.

Lab Supervisor

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	25-Jun-24	25-Jun-24
Oil & Grease, animal/vegetable	SM5520 - Gravimetric	28-Jun-24	2-Jul-24
Collingwood - San/Comb: VOCs	EPA 624 - P&T GC-MS	25-Jun-24	25-Jun-24
Cyanide, total	MOE E3015 - Auto Colour	25-Jun-24	25-Jun-24
Hexachlorobenzene	EPA 8081B - GC-ECD	3-Jul-24	3-Jul-24
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	26-Jun-24	26-Jun-24
Metals, ICP-MS	EPA 200.8 - ICP-MS	26-Jun-24	26-Jun-24
Oil & Grease, mineral/synthetic	SM5520F - Gravimetric	28-Jun-24	2-Jul-24
Oil & Grease, total	SM5520B - Gravimetric, hexane soluble	28-Jun-24	2-Jul-24
PCBs, total	EPA 608 - GC-ECD	3-Jul-24	3-Jul-24
pH	EPA 150.1 - pH probe @25 °C	26-Jun-24	26-Jun-24
Phenolics	EPA 420.2 - Auto Colour, 4AAP	25-Jun-24	25-Jun-24
Phosphorus, total, water	EPA 365.4 - Auto Colour, digestion	25-Jun-24	26-Jun-24
Sulphide	SM 4500SE - Colourimetric	28-Jun-24	28-Jun-24
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	25-Jun-24	26-Jun-24
Total Suspended Solids	SM 2540D - Gravimetric	25-Jun-24	25-Jun-24

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)

Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units	Result	Sewer Use - Collingwood: Storm	Sewer Use - Collingwood: Sanitary
MW201-UF	Total Suspended Solids	2 mg/L	449	-	300 mg/L

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Client ID:	MW201-UF	-	-	-	Criteria:
Sample Date:	20-Jun-24 10:30	-	-	-	Sewer Use -
Sample ID:	2425583-01	-	-	-	Collingwood: Storm
Matrix:	Ground Water	-	-	-	Sewer Use -
					Collingwood: Sanitary
MDL/Units					

General Inorganics

Cyanide, total	0.01 mg/L	<0.01	-	-	-	-	1.2 mg/L
pH	0.1 pH Units	8.1	-	-	-	6.00 - 9.00 pH Units	5.50 - 9.50 pH Units
Phenolics	0.001 mg/L	<0.001	-	-	-	-	0.1 mg/L
Phosphorus, total	0.01 mg/L	0.17	-	-	-	-	10 mg/L
Total Suspended Solids	2 mg/L	449	-	-	-	-	300 mg/L
Sulphide	0.02 mg/L	<0.02	-	-	-	-	1 mg/L
Total Kjeldahl Nitrogen	0.1 mg/L	0.6	-	-	-	-	50 mg/L

Anions

Chloride	1 mg/L	59	-	-	-	-	1500 mg/L
Fluoride	0.1 mg/L	0.3	-	-	-	-	10 mg/L
Sulphate	1 mg/L	17	-	-	-	-	1500 mg/L

Metals - Total

Aluminum	0.01 mg/L	2.86	-	-	-	-	50 mg/L
Antimony	0.001 mg/L	<0.001	-	-	-	-	5 mg/L
Arsenic	0.01 mg/L	<0.01	-	-	-	-	1 mg/L
Bismuth	0.005 mg/L	<0.005	-	-	-	-	5 mg/L
Cadmium	0.001 mg/L	<0.001	-	-	-	1 ug/L	0.7 mg/L
Chromium	0.05 mg/L	<0.05	-	-	-	200 ug/L	2.8 mg/L
Cobalt	0.001 mg/L	0.002	-	-	-	-	5 mg/L
Copper	0.005 mg/L	0.006	-	-	-	10 ug/L	2 mg/L
Iron	0.2 mg/L	3.5	-	-	-	-	50 mg/L
Lead	0.001 mg/L	0.003	-	-	-	50 ug/L	0.7 mg/L
Mercury	0.0001 mg/L	<0.0001	-	-	-	1 ug/L	0.01 mg/L
Manganese	0.05 mg/L	0.16	-	-	-	-	5 mg/L
Molybdenum	0.005 mg/L	0.011	-	-	-	-	5 mg/L

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Client ID:	MW201-UF	-	-	-	Criteria:	
Sample Date:	20-Jun-24 10:30	-	-	-	Sewer Use -	Sewer Use -
Sample ID:	2425583-01	-	-	-	Collingwood: Storm	Collingwood:
Matrix:	Ground Water	-	-	-		Sanitary
MDL/Units						

Metals - Total

Nickel	0.005 mg/L	<0.005	-	-	-	50 ug/L	2 mg/L
Selenium	0.005 mg/L	<0.005	-	-	-	-	0.8 mg/L
Silver	0.001 mg/L	<0.001	-	-	-	-	0.4 mg/L
Tin	0.01 mg/L	<0.01	-	-	-	-	5 mg/L
Titanium	0.01 mg/L	0.07	-	-	-	-	5 mg/L
Vanadium	0.001 mg/L	0.006	-	-	-	-	5 mg/L
Zinc	0.02 mg/L	<0.02	-	-	-	50 ug/L	2 mg/L

Volatiles

Benzene	0.0005 mg/L	0.0006	-	-	-	-	0.01 mg/L
Chloroform	0.0005 mg/L	0.001	-	-	-	-	0.04 mg/L
1,2-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	-	-	0.05 mg/L
1,4-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	-	-	0.08 mg/L
Ethylbenzene	0.0005 mg/L	<0.0005	-	-	-	-	0.06 mg/L
Methylene Chloride	0.005 mg/L	<0.005	-	-	-	-	0.09 mg/L
1,1,2,2-Tetrachloroethane	0.0005 mg/L	<0.0005	-	-	-	-	0.06 mg/L
Tetrachloroethylene	0.0005 mg/L	<0.0005	-	-	-	-	0.06 mg/L
Toluene	0.0005 mg/L	0.002	-	-	-	-	0.02 mg/L
Trichloroethylene	0.0005 mg/L	<0.0005	-	-	-	-	0.05 mg/L
Xylenes, total	0.0005 mg/L	<0.0005	-	-	-	-	0.3 mg/L
4-Bromofluorobenzene	Surrogate	116%	-	-	-	-	-
Dibromofluoromethane	Surrogate	100%	-	-	-	-	-
Toluene-d8	Surrogate	115%	-	-	-	-	-

Hydrocarbons

Oil & Grease, animal/vegetable	mg/L	<1.00	-	-	-	-	150 mg/L
Oil & Grease, mineral/synthetic	0.5 mg/L	<0.5	-	-	-	-	15 mg/L

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Client ID:	MW201-UF	-	-	-	Criteria:
Sample Date:	20-Jun-24 10:30	-	-	-	Sewer Use -
Sample ID:	2425583-01	-	-	-	Collingwood: Storm
Matrix:	Ground Water	-	-	-	Sewer Use -
					Collingwood: Sanitary
MDL/Units					

Hydrocarbons

Oil & Grease, total	0.5 mg/L	0.5	-	-	-	-
---------------------	----------	-----	---	---	---	---

Pesticides, OC

Hexachlorobenzene	0.00001 mg/L	<0.00001	-	-	-	0.0001 mg/L
Decachlorobiphenyl	Surrogate	52.0%	-	-	-	-

PCBs

PCBs, total	0.05 ug/L	<0.05	-	-	-	0.004 mg/L
Decachlorobiphenyl	Surrogate	66.2%	-	-	-	-

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions								
Chloride	ND	1	mg/L					
Fluoride	ND	0.1	mg/L					
Sulphate	ND	1	mg/L					
General Inorganics								
Cyanide, total	ND	0.01	mg/L					
Phenolics	ND	0.001	mg/L					
Phosphorus, total	ND	0.01	mg/L					
Total Suspended Solids	ND	2	mg/L					
Sulphide	ND	0.02	mg/L					
Total Kjeldahl Nitrogen	ND	0.1	mg/L					
Hydrocarbons								
Oil & Grease, mineral/synthetic	ND	0.5	mg/L					
Oil & Grease, total	ND	0.5	mg/L					
Metals - Total								
Aluminum	ND	0.01	mg/L					
Antimony	ND	0.001	mg/L					
Arsenic	ND	0.01	mg/L					
Bismuth	ND	0.005	mg/L					
Cadmium	ND	0.001	mg/L					
Chromium	ND	0.05	mg/L					
Cobalt	ND	0.001	mg/L					
Copper	ND	0.005	mg/L					
Iron	ND	0.2	mg/L					
Lead	ND	0.001	mg/L					
Mercury	ND	0.0001	mg/L					
Manganese	ND	0.05	mg/L					
Molybdenum	ND	0.005	mg/L					
Nickel	ND	0.005	mg/L					
Selenium	ND	0.005	mg/L					
Silver	ND	0.001	mg/L					
Tin	ND	0.01	mg/L					
Titanium	ND	0.01	mg/L					

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Vanadium	ND	0.001	mg/L					
Zinc	ND	0.02	mg/L					
PCBs								
PCBs, total	ND	0.05	ug/L					
Surrogate: Decachlorobiphenyl	0.355		%	71.1	60-140			
Pesticides, OC								
Hexachlorobenzene	ND	0.00001	mg/L					
Surrogate: Decachlorobiphenyl	0.00033		%	66.2	50-140			
Volatiles								
Benzene	ND	0.0005	mg/L					
Chloroform	ND	0.0005	mg/L					
1,2-Dichlorobenzene	ND	0.0005	mg/L					
1,4-Dichlorobenzene	ND	0.0005	mg/L					
Ethylbenzene	ND	0.0005	mg/L					
Methylene Chloride	ND	0.005	mg/L					
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L					
Tetrachloroethylene	ND	0.0005	mg/L					
Toluene	ND	0.0005	mg/L					
Trichloroethylene	ND	0.0005	mg/L					
Xylenes, total	ND	0.0005	mg/L					
Surrogate: 4-Bromofluorobenzene	0.0960		%	120	50-140			
Surrogate: Dibromofluoromethane	0.0778		%	97.2	50-140			
Surrogate: Toluene-d8	0.0939		%	117	50-140			

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	26.0	1	mg/L	25.2			3.2	20	
Fluoride	0.17	0.1	mg/L	0.17			2.3	20	
Sulphate	123	1	mg/L	125			1.8	10	
General Inorganics									
Cyanide, total	0.042	0.01	mg/L	0.042			1.3	20	
pH	8.2	0.1	pH Units	8.2			0.4	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Phosphorus, total	0.085	0.01	mg/L	0.080			6.9	15	
Total Suspended Solids	ND	2	mg/L	ND			NC	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Total Kjeldahl Nitrogen	4.29	0.2	mg/L	4.36			1.7	16	
Metals - Total									
Aluminum	7.18	0.01	mg/L	7.26			1.1	20	
Antimony	ND	0.001	mg/L	ND			NC	20	
Arsenic	ND	0.01	mg/L	ND			NC	20	
Bismuth	ND	0.005	mg/L	ND			NC	20	
Cadmium	ND	0.001	mg/L	ND			NC	20	
Chromium	ND	0.05	mg/L	ND			NC	20	
Cobalt	ND	0.001	mg/L	ND			NC	20	
Copper	0.020	0.005	mg/L	0.021			2.6	20	
Iron	ND	0.2	mg/L	ND			NC	20	
Lead	ND	0.001	mg/L	ND			NC	20	
Mercury	ND	0.0001	mg/L	ND			NC	20	
Manganese	ND	0.05	mg/L	ND			NC	20	
Molybdenum	ND	0.005	mg/L	ND			NC	20	
Nickel	0.006	0.005	mg/L	0.006			6.4	20	
Selenium	ND	0.005	mg/L	ND			NC	20	
Silver	ND	0.001	mg/L	ND			NC	20	
Tin	ND	0.01	mg/L	ND			NC	20	
Titanium	ND	0.01	mg/L	ND			NC	20	

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Vanadium	0.002	0.001	mg/L	0.002			1.7	20	
Zinc	ND	0.02	mg/L	ND			NC	20	
Volatiles									
Benzene	ND	0.0005	mg/L	ND			NC	30	
Chloroform	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
Ethylbenzene	ND	0.0005	mg/L	ND			NC	30	
Methylene Chloride	ND	0.005	mg/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
Tetrachloroethylene	ND	0.0005	mg/L	ND			NC	30	
Toluene	ND	0.0005	mg/L	ND			NC	30	
Trichloroethylene	ND	0.0005	mg/L	ND			NC	30	
m,p-Xylenes	ND	0.0005	mg/L	ND			NC	30	
o-Xylene	ND	0.0005	mg/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	0.0946		%		118	50-140			
Surrogate: Dibromofluoromethane	0.0799		%		99.8	50-140			
Surrogate: Toluene-d8	0.0923		%		115	50-140			

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	34.6	1	mg/L	25.2	94.0	70-124			
Fluoride	0.95	0.1	mg/L	0.17	78.0	70-130			
Sulphate	132	1	mg/L	125	76.7	74-126			
General Inorganics									
Cyanide, total	0.094	0.01	mg/L	0.042	105	64-136			
Phenolics	0.026	0.001	mg/L	ND	105	67-133			
Phosphorus, total	1.07	0.01	mg/L	0.080	99.3	80-120			
Total Suspended Solids	23.0	2	mg/L	ND	107	75-125			
Sulphide	0.51	0.02	mg/L	ND	103	79-115			
Total Kjeldahl Nitrogen	0.98	0.1	mg/L	ND	97.9	81-126			
Hydrocarbons									
Oil & Grease, mineral/synthetic	7.80	0.5	mg/L	ND	78.0	65-110			
Oil & Grease, total	20.4	0.5	mg/L	ND	102	85-110			
Metals - Total									
Aluminum	759	0.01	mg/L	726	65.6	80-120			QM-07
Arsenic	47.6	0.01	mg/L	0.040	95.2	80-120			
Bismuth	55.5	0.005	mg/L	0.133	111	80-120			
Cadmium	44.3	0.001	mg/L	ND	88.7	80-120			
Chromium	51.4	0.05	mg/L	0.090	103	80-120			
Cobalt	48.8	0.001	mg/L	0.021	97.6	80-120			
Copper	48.0	0.005	mg/L	2.06	91.9	80-120			
Iron	2360	0.2	mg/L	8.02	94.2	80-120			
Lead	47.0	0.001	mg/L	0.083	93.8	80-120			
Mercury	0.0027	0.0001	mg/L	ND	91.5	70-130			
Manganese	53.2	0.05	mg/L	0.584	105	80-120			
Molybdenum	48.7	0.005	mg/L	0.081	97.2	80-120			
Nickel	48.4	0.005	mg/L	0.589	95.6	80-120			
Selenium	44.4	0.005	mg/L	0.014	88.7	80-120			
Silver	44.2	0.001	mg/L	ND	88.4	80-120			
Tin	47.9	0.01	mg/L	0.149	95.6	80-120			

Certificate of Analysis

Report Date: 04-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Titanium	55.4	0.01	mg/L	0.113	111	80-120			
Vanadium	52.4	0.001	mg/L	0.211	104	80-120			
Zinc	44.3	0.02	mg/L	1.36	85.8	80-120			
PCBs									
PCBs, total	0.953	0.05	ug/L	ND	95.3	65-135			
Surrogate: Decachlorobiphenyl	0.356		%		71.1	60-140			
Pesticides, OC									
Hexachlorobenzene	0.00060	0.00001	mg/L	ND	119	50-140			
Surrogate: Decachlorobiphenyl	0.000340		%		67.9	50-140			
Volatiles									
Benzene	0.03	0.0005	mg/L	ND	82.8	60-130			
Chloroform	0.03	0.0005	mg/L	ND	86.0	60-130			
1,2-Dichlorobenzene	0.03	0.0005	mg/L	ND	87.2	60-130			
1,4-Dichlorobenzene	0.04	0.0005	mg/L	ND	91.0	60-130			
Ethylbenzene	0.04	0.0005	mg/L	ND	88.2	60-130			
Methylene Chloride	0.04	0.005	mg/L	ND	110	60-130			
1,1,2,2-Tetrachloroethane	0.03	0.0005	mg/L	ND	84.7	60-130			
Tetrachloroethylene	0.04	0.0005	mg/L	ND	98.8	60-130			
Toluene	0.04	0.0005	mg/L	ND	93.1	60-130			
Trichloroethylene	0.03	0.0005	mg/L	ND	80.1	60-130			
m,p-Xylenes	0.07	0.0005	mg/L	ND	86.8	60-130			
o-Xylene	0.04	0.0005	mg/L	ND	87.5	60-130			
Surrogate: 4-Bromofluorobenzene	0.0811		%		101	50-140			
Surrogate: Dibromofluoromethane	0.0819		%		102	50-140			
Surrogate: Toluene-d8	0.0819		%		102	50-140			

Certificate of Analysis

Client: G2S Environmental Consulting Inc. (Burlington)

Client PO: 853 Hurontario St., Collingwood

Report Date: 04-Jul-2024

Order Date: 21-Jun-2024

Project Description: G2S21366

Qualifier Notes:**QC Qualifiers:**

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions:

None

Work Order Revisions / Comments:**Other Report Notes:**

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.



83

(Lab Use Only)

No 73168

Project Ref:	G2521366
Quote #:	standing offer
PO #:	853 Hurontario St, Collingwood
E-mail:	melissak@gzsconsulting.com blakez@ " "

Page 1 of 1

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular

Date Required:

☐ REG 153/04	☐ REG 406/19	Other Regulation	
☐ Table 1	☐ Res/Park ☐ Med/Fine	☐ REG 558	☐ PWQO
☐ Table 2	☐ Ind/Comm ☐ Coarse	☐ CCME	☐ MISA
☐ Table 3	☐ Agri/Other	☒ SU - Sani	☒ SU - Storm
☐ Table _____		Mun: <u>Collingwood</u>	
For RSC: ☐ Yes ☐ No		☐ Other:	

Matrix Type: S (Soil/Sed.) GW (Ground Water)
SW (Surface Water) SS (Storm/Sanitary Sewer)
P (Paint) A (Air) O (Other)

Required Analysis

town of Cellingwood
Sanitary/Stern bylaw

Sample Taken

Date	Time
------	------

Sample ID/Location Name

1	MW201-VF
---	----------

GW

14

14

6/20/2024

4.

+	2
✓	

Comments: all bottles unfiltered

Method of Delivery:

Zoom

Relinquished By (Sign): *Blake*

Relinquished By (Print): Blake Zazinsky

Date/Time: 6/21/2024

Received at Dept:	
Date/Time:	June 25 24 900
Temperature:	9.0 °C

Received at Lab:	<i>afm</i>
Date/Time:	6/21/24 1530
Temperature:	14 °C

Verified By:	okm	
Date/Time:	6/24/24	926
pH Verified:	☒	By: okm

Chain of Custody (Blank) .xlsx

Revision 5.0

Certificate of Analysis

G2S Environmental Consulting Inc. (Burlington)

4361 Harvester Road, Unit 12

Burlington, ON L7L 5M4

Attn: Melissa King

Client PO: 853 Hurontario St., Collingwood

Project: G2S21366

Custody: 144141

Report Date: 27-Jun-2024

Order Date: 21-Jun-2024

Order #: 2426022

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
2426022-01	MW201-F

Approved By:



Dale Robertson, BSc

Laboratory Director

Certificate of Analysis

Report Date: 27-Jun-2024

Client: **G2S Environmental Consulting Inc. (Burlington)**

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 200.8 - ICP-MS	26-Jun-24	26-Jun-24
Total Suspended Solids	SM 2540D - Gravimetric	25-Jun-24	25-Jun-24

Certificate of Analysis

Report Date: 27-Jun-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)

Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units	Result	Sewer Use - Collingwood: Sanitary	Sewer Use - Collingwood: Storm
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Certificate of Analysis

Report Date: 27-Jun-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Client ID:	MW201-F	-	-	-	Criteria:
Sample Date:	20-Jun-24 00:00	-	-	-	Sewer Use -
Sample ID:	2426022-01	-	-	-	Collingwood:
Matrix:	Ground Water	-	-	-	Sanitary
MDL/Units					Sewer Use -
					Collingwood: Storm

General Inorganics

Total Suspended Solids	2 mg/L	<2	-	-	-	300 mg/L	-
------------------------	--------	----	---	---	---	----------	---

Metals - Total

Aluminum	0.01 mg/L	0.02	-	-	-	50 mg/L	-
Antimony	0.001 mg/L	<0.001	-	-	-	5 mg/L	-
Arsenic	0.01 mg/L	<0.01	-	-	-	1 mg/L	-
Bismuth	0.005 mg/L	<0.005	-	-	-	5 mg/L	-
Boron	0.05 mg/L	0.30	-	-	-	-	-
Cadmium	0.001 mg/L	<0.001	-	-	-	0.7 mg/L	1 ug/L
Chromium	0.05 mg/L	<0.05	-	-	-	2.8 mg/L	200 ug/L
Cobalt	0.001 mg/L	<0.001	-	-	-	5 mg/L	-
Copper	0.005 mg/L	<0.005	-	-	-	2 mg/L	10 ug/L
Lead	0.001 mg/L	<0.001	-	-	-	0.7 mg/L	50 ug/L
Manganese	0.05 mg/L	<0.05	-	-	-	5 mg/L	-
Molybdenum	0.005 mg/L	0.008	-	-	-	5 mg/L	-
Nickel	0.005 mg/L	<0.005	-	-	-	2 mg/L	50 ug/L
Selenium	0.005 mg/L	<0.005	-	-	-	0.8 mg/L	-
Silver	0.001 mg/L	<0.001	-	-	-	0.4 mg/L	-
Tin	0.01 mg/L	<0.01	-	-	-	5 mg/L	-
Titanium	0.01 mg/L	<0.01	-	-	-	5 mg/L	-
Vanadium	0.001 mg/L	<0.001	-	-	-	5 mg/L	-
Zinc	0.02 mg/L	<0.02	-	-	-	2 mg/L	50 ug/L

Certificate of Analysis

Report Date: 27-Jun-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics								
Total Suspended Solids	ND	2	mg/L					
Metals - Total								
Aluminum	ND	0.01	mg/L					
Antimony	ND	0.001	mg/L					
Arsenic	ND	0.01	mg/L					
Bismuth	ND	0.005	mg/L					
Boron	ND	0.05	mg/L					
Cadmium	ND	0.001	mg/L					
Chromium	ND	0.05	mg/L					
Cobalt	ND	0.001	mg/L					
Copper	ND	0.005	mg/L					
Lead	ND	0.001	mg/L					
Manganese	ND	0.05	mg/L					
Molybdenum	ND	0.005	mg/L					
Nickel	ND	0.005	mg/L					
Selenium	ND	0.005	mg/L					
Silver	ND	0.001	mg/L					
Tin	ND	0.01	mg/L					
Titanium	ND	0.01	mg/L					
Vanadium	ND	0.001	mg/L					
Zinc	ND	0.02	mg/L					

Certificate of Analysis

Report Date: 27-Jun-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Total Suspended Solids	ND	2	mg/L	ND			NC	10	
Metals - Total									
Aluminum	7.18	0.01	mg/L	7.26			1.1	20	
Antimony	ND	0.001	mg/L	ND			NC	20	
Arsenic	ND	0.01	mg/L	ND			NC	20	
Bismuth	ND	0.005	mg/L	ND			NC	20	
Boron	0.05	0.05	mg/L	0.06			4.5	20	
Cadmium	ND	0.001	mg/L	ND			NC	20	
Chromium	ND	0.05	mg/L	ND			NC	20	
Cobalt	ND	0.001	mg/L	ND			NC	20	
Copper	0.020	0.005	mg/L	0.021			2.6	20	
Lead	ND	0.001	mg/L	ND			NC	20	
Manganese	ND	0.05	mg/L	ND			NC	20	
Molybdenum	ND	0.005	mg/L	ND			NC	20	
Nickel	0.006	0.005	mg/L	0.006			6.4	20	
Selenium	ND	0.005	mg/L	ND			NC	20	
Silver	ND	0.001	mg/L	ND			NC	20	
Tin	ND	0.01	mg/L	ND			NC	20	
Titanium	ND	0.01	mg/L	ND			NC	20	
Vanadium	0.002	0.001	mg/L	0.002			1.7	20	
Zinc	ND	0.02	mg/L	ND			NC	20	

Certificate of Analysis

Report Date: 27-Jun-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 21-Jun-2024

Client PO: 853 Hurontario St., Collingwood

Project Description: G2S21366

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Total Suspended Solids	23.0	2	mg/L	ND	107	75-125			
Metals - Total									
Aluminum	759	0.01	mg/L	726	65.6	80-120			QM-07
Arsenic	47.6	0.01	mg/L	0.040	95.2	80-120			
Bismuth	55.5	0.005	mg/L	0.133	111	80-120			
Boron	54.9	0.05	mg/L	5.63	98.6	80-120			
Cadmium	44.3	0.001	mg/L	ND	88.7	80-120			
Chromium	51.4	0.05	mg/L	0.090	103	80-120			
Cobalt	48.8	0.001	mg/L	0.021	97.6	80-120			
Copper	48.0	0.005	mg/L	2.06	91.9	80-120			
Lead	47.0	0.001	mg/L	0.083	93.8	80-120			
Manganese	53.2	0.05	mg/L	0.584	105	80-120			
Molybdenum	48.7	0.005	mg/L	0.081	97.2	80-120			
Nickel	48.4	0.005	mg/L	0.589	95.6	80-120			
Selenium	44.4	0.005	mg/L	0.014	88.7	80-120			
Silver	44.2	0.001	mg/L	ND	88.4	80-120			
Tin	47.9	0.01	mg/L	0.149	95.6	80-120			
Titanium	55.4	0.01	mg/L	0.113	111	80-120			
Vanadium	52.4	0.001	mg/L	0.211	104	80-120			
Zinc	44.3	0.02	mg/L	1.36	85.8	80-120			

Certificate of Analysis

Client: G2S Environmental Consulting Inc. (Burlington)

Client PO: 853 Hurontario St., Collingwood

Report Date: 27-Jun-2024

Order Date: 21-Jun-2024

Project Description: G2S21366

Qualifier Notes:**QC Qualifiers:**

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.



Client Name: G2S Consulting Inc.	Project Ref: G2521366	Page 1 of 1
Contact Name: Melissa King	Quote #: Standing offer	Turnaround Time ☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular Date Required: _____
Address: 4361 Harvester Road, Suite 12 Burlington, Ontario	PO #: 853 Hurontario St, Collingwood	
Telephone: 905-638-2502	E-mail: melissak@g2sconsulting.com blakez@g2sconsulting.com	

☐ REG 153/04 ☐ REG 406/19 ☐ Table 1 ☐ Res/Park ☐ Med/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ Table _____ For RSC: ☐ Yes ☐ No	Other Regulation ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☒ SU - Sani ☒ SU-Storm Mun: Collingwood ☐ Other	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (paint A (Air) O (Other)	Required Analysis <table border="1"> <tr> <th>PHCs F1-F4+BTEX</th> <th>VOCs</th> <th>PAHs</th> <th>Metals by ICP</th> <th>Hg</th> <th>CrVI</th> <th>B (HWS)</th> <th>TSS</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	TSS																																																										
PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	TSS																																																														
Sample ID/Location Name <table border="1"> <tr> <th>Sample ID/Location Name</th> <th>Matrix</th> <th>Air Volume</th> <th># of Containers</th> <th>Date</th> <th>Time</th> </tr> <tr> <td>1 MW201-F</td> <td>GW</td> <td></td> <td>2</td> <td>6/20/2024</td> <td>Am</td> </tr> <tr><td>2</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td></tr> </table>		Sample ID/Location Name	Matrix	Air Volume	# of Containers	Date	Time	1 MW201-F	GW		2	6/20/2024	Am	2						3						4						5						6						7						8						9						10							
Sample ID/Location Name	Matrix	Air Volume	# of Containers	Date	Time																																																																
1 MW201-F	GW		2	6/20/2024	Am																																																																
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Comments: both bottles filtered		Method of Delivery: Zoom	
Relinquished By (Sign): Blak	Received at Depot: [Signature]	Received at Lab: dm	Verified By: dm
Relinquished By (Print): Blake Zazinsky	Date/Time: Jun 25 2024 9:00	Date/Time: 6/21/24 1530	Date/Time: 6/24/24 953
Date/Time: 6/21/2024	Temperature: 9.00 °C	Temperature: 14.00 °C	pH Verified: ☒ By: dm

Certificate of Analysis

G2S Environmental Consulting Inc. (Burlington)

4361 Harvester Road, Unit 12

Burlington, ON L7L 5M4

Attn: Melissa King

Client PO:

Project: G2S21366

Custody: 73200

Report Date: 3-Jul-2024

Order Date: 26-Jun-2024

Order #: 2426326

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID

2426326-01

Client ID

MW201-UF

Approved By:



Mark Foto, M.Sc.

Lab Supervisor

Certificate of Analysis

Report Date: 03-Jul-2024

Client: **G2S Environmental Consulting Inc. (Burlington)**

Order Date: 26-Jun-2024

Client PO:

Project Description: G2S21366

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Biochemical Oxygen Demand	SM 5210B - DO Probe	28-Jun-24	3-Jul-24
E. coli	MOE E3407	28-Jun-24	28-Jun-24

Certificate of Analysis

Report Date: 03-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 26-Jun-2024

Client PO:

Project Description: G2S21366

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)

Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units	Result	Sewer Use - Collingwood: Sanitary	Sewer Use - Collingwood: Storm
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Certificate of Analysis

Report Date: 03-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 26-Jun-2024

Client PO:

Project Description: G2S21366

Client ID:	MW201-UF	-	-	-	Criteria:
Sample Date:	26-Jun-24 13:00	-	-	-	Sewer Use - Sewer Use -
Sample ID:	2426326-01	-	-	-	Collingwood: Collingwood: Storm
Matrix:	Ground Water	-	-	-	Sanitary
MDL/Units					

Microbiological Parameters

E. coli	1 CFU/100mL	5 [1]	-	-	-	-	-
---------	-------------	-------	---	---	---	---	---

General Inorganics

BOD	2 mg/L	<2	-	-	-	300 mg/L	-
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Certificate of Analysis
 Client: G2S Environmental Consulting Inc. (Burlington)
 Client PO:

Report Date: 03-Jul-2024
 Order Date: 26-Jun-2024
 Project Description: G2S21366

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics								
BOD	ND	2	mg/L					
Microbiological Parameters								
E. coli	ND	1	CFU/100mL					

Certificate of Analysis

Report Date: 03-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 26-Jun-2024

Client PO:

Project Description: G2S21366

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
BOD	6560	2	mg/L	6570			0.2	20	
Microbiological Parameters									
E. coli	4	1	CFU/100mL	5			22.2	30	BAC12

Certificate of Analysis

Report Date: 03-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 26-Jun-2024

Client PO:

Project Description: G2S21366

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
BOD	176	2	mg/L	ND	88.0	71-121			

Certificate of Analysis

Report Date: 03-Jul-2024

Client: G2S Environmental Consulting Inc. (Burlington)

Order Date: 26-Jun-2024

Client PO:

Project Description: G2S21366

Qualifier Notes:

Sample Qualifiers :

- 1: Confluent background/interfering flora: May interfere with target colony growth and the analysts' ability to count discreet colonies. The target colonies may be under-represented.
Applies to Samples: MW201-UF

QC Qualifiers:

- BAC12 Confluent background/interfering flora: May interfere with target colony growth and the analysts' ability to count discreet colonies. The target colonies may be under-represented.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Parcel ID: 2426326



Parcel Order Number
(Lab Use Only)

2426326

Chain Of Custody

(Lab Use Only)

No 73200

Client Name: <u>G2S Consulting</u>	Project Ref: <u>G2521366</u>	Page <u>1</u> of <u>1</u>
Contact Name: <u>Melissa King</u>	Quote #:	Turnaround Time ☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Address: <u>4361 Hamlets Rd, Burlington</u> <u>L7L 5M4</u>	PO #:	
Telephone: <u>289-807-9510</u>	E-mail: <u>melissa.k@g2sconsulting.com</u> <u>dylanb@g2sconsulting.com</u>	
Date Required: _____		

☐ REG 153/04 ☐ REG 406/19 ☐ Table 1 ☐ Res/Park ☐ Med/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ Table _____ For RSC: ☐ Yes ☐ No		Other Regulation ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☒ SU - Sani ☒ SU - Storm Mun: <u>Collingwood</u> ☐ Other:	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)	Required Analysis																
Sample ID/Location Name		Matrix	Air Volume	# of Containers	Sample Taken		BACTERIA		B.O.D.											
					Date	Time														
1	MW201-UF	GW		2	24/06/26	13 ⁰⁰	X	X												
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery:

Relinquished By (Sign): <u>[Signature]</u>	Received at Depot: <u>C-PM</u>	Received at Lab: <u>SO</u>	Method of Delivery: <u>Walk In</u>
Relinquished By (Print): <u>D. BRICE</u>	Date/Time: <u>06/26/24 16:16</u>	Date/Time: <u>June 26, 2024 16:50</u>	Verified By: <u>AK</u>
Date/Time: <u>2024/06/25 16:15</u>	Temperature: <u>1.8</u> °C	Temperature: <u>8.8</u> °C	Date/Time: <u>6/27/24 9:15</u>
Chain of Custody (Blank).xlsx		pH Verified: ☐	By: <u>NA</u>

Appendix G: Water Balance Calculations

Water Balance Calculation

*Stormwater Management Planning and Design Manual, Section 3.2

Calculated Water Budget Balance: Thornthwaite - Mather		435.13 mm	8325.3
			24292.2
			2153
			2833.6
			37604.1 m2
			Per architect: 34% non built/non parking green space
			Permeable area: 12785.39 m2
			Impermeable area: 24818.71 m2
Infiltration Area:		Entire Site:	37,604 m2
		Less impermeable surface areas:	<u>260</u> m2
		Total Infiltration Area:	37,344 m2
% impervious area=		1	
Per year			
Infiltration volume = Infiltration *area		9,749,723 L/year	
Post Development Conditions			
Infiltration Factors (SWMPDM)*:		Topography	0.3
		Soils	0.2
		Cover	<u>0.1</u>
			0.6
Infiltration = Infiltration factor * water budget balance		261.078 mm/year	
Infiltration Area:		Entire Site:	37,604 m2
		Less impermeable surface areas:	<u>24818.706</u> m2
		Total Infiltration Area:	12785.394 m2
% impervious area		66	
Per year			
Infiltration volume = Infiltration *area		3,337,985 L/year	
Difference		6,411,738 L/year decrease	

