APPENDIX 5

PRELIMINARY HYDROGEOLOGICAL INVESTIGATON REPORT

THURBER ENGINEERING LTD.

PRELIMINARY HYDROGEOLOGICAL INVESTIGATION REPORT
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
GUELPH REVITALIZATION PROGRAM
MACDONELL AND ALLAN'S STRUCTURES ASSESSMENT
GUELPH, ONTARIO

Report

To

City of Guelph

c/o

R.V. Anderson Associates Limited

Date: April 10, 2025
File: 30842

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1. INTRODUCTION

This report presents factual findings and general discussion from a preliminary hydrogeological investigation conducted in support of the Municipal Class Environmental Assessment (EA) Study for the Guelph Revitalization Project at Macdonell and Allan's Structures in the City of Guelph, Ontario.

The Macdonell corridor is presently a multi-lane collector roadway crossing the Speed River. Current plans call for improvements and modifications to the Macdonell and Allan's Structures, and surrounding area in the Macdonell corridor at Speed River to facilitate the City's proposed Downtown Infrastructure Revitalization Program. It is understood the work will include replacing and widening of the Macdonell Structure, removal of the Allan's Structure, and rehabilitation of the Allan's Sluiceway and Spillway. Thurber Engineering Ltd. (Thurber) carried out the investigation as a sub-consultant to R.V. Anderson Associates Limited (RVA) who is conducting the EA Study for the City of Guelph.

The purpose of this report is to establish baseline hydrogeological conditions, assess groundwater table conditions, discuss construction dewatering requirements, potential impacts that the proposed construction works may have, and requirements for water taking permitting.

The scope of work included the following:

- Conduct background review within 500 m of the Site including the setting, Ministry of the Environment, Conservation and Parks (MECP) well records, geological maps, relevant existing reports, and proposed design information as available.
- Install monitoring wells with the concurrent geotechnical investigation and develop them prior to further testing.
- Measure groundwater levels in the monitoring wells installed during the concurrent geotechnical investigation.
- Conduct in-situ hydraulic testing in the monitoring wells.
- Collect two groundwater samples from selected monitoring wells for testing in accordance with the Provincial Water Quality Objectives (PWQOs), interim PWQOs, and the City of Guelph Sewer By-Law
- Hydrogeological analysis and reporting, including summary of factual hydrogeological conditions, discussion on construction dewatering requirements, potential impacts due to construction dewatering, requirements for water taking permitting, and recommendations for future work.

The field investigation and original background review were conducted in 2021; however, at that time, information on the structures were not available and RVA asked Thurber to put work on hold on the Hydrogeological Investigation Report until further information was available. In 2025, RVA indicated that the recommendations for the structures were confirmed and RVA asked Thurber to complete the Hydrogeological Investigation Report in 2025.

A geotechnical investigation was completed concurrently for this project. The results of geotechnical investigation and recommendations should be read in conjunction with this report and is presented under a separate cover entitled:

- *Preliminary Geotechnical and Hydrogeological Investigation Report, Municipal Class Environmental Assessment for Macdonell and Allan Structures, Guelph Revitalization Project, City of Guelph, Ontario* by Thurber Engineering Ltd. dated May 18, 2023.

It is a condition of this report that Thurber's performance of its professional services is subject to the attached Statement of Limitations and Conditions.

2. BACKGROUND REVIEW

2.1 Site Description

The project site encompasses Macdonell Street Bridge at Speed River and surrounding intersections (the Site). The approximate limits of the Site are shown on Drawing 30842-1 included in Appendix A. The Study Area for the hydrogeological investigation was defined as 500 m from the Site. The Study Area in relation to the Site is shown on Drawing 30842-2 in Appendix A.

The existing Macdonell Street bridge is located between Woolwich Street and Elizabeth Street approximately 500 m east of downtown Guelph. The bridge runs in a northeast-southwest direction and carries four lanes of Macdonell Street traffic over Speed River. Based on archived drawings, the existing bridge is a two-span reinforced concrete rigid frame supported on spread footings with wingwalls extending towards the north and south from the ends of abutments. The roadway at the bridge presently consists of an urban cross section with concrete sidewalks. The posted speed limit is 50 km/h.

There are presently residential subdivisions to the east of the Site and condominiums and commercial properties to the west. There is also a historic dam and bridge (Allan's Street Bridge) located south of the existing Macdonell Street Bridge as well as a Guelph Junction Railway (GJR) track located immediately west of the existing bridge which crosses Speed River to the south. Additionally, there is an existing overhead steel rail bridge structure immediately south of the

existing bridge which carries two Canadian Nation Railway (CNR) tracks over Wellington Street, the GJR track, Speed River and Elizabeth Street.

A historic General Arrangement drawing provided by RVA shows the regulated water level in Speed River at Elev. 315.6 m.

2.2 Site Physiographic, Geologic and Hydrogeologic Settings

Based on the information in *The Physiography of Southern Ontario*[1] by Chapman and Putnam (1984), the Site is located within the Guelph Drumlin Field physiographic region. The Guelph Drumlin Field is characterized by approximately 300 drumlins of all sizes comprised of loamy and calcareous till mostly derived from dolostone. The intervening low ground between the drumlins are largely occupied by fluvial materials. The predominant physiographic landform located within the Study Area are spillways and drumlins.

Based on *Surficial Geology of Southern Ontario*[2], the surficial geology in the vicinity of the Site is composed of Paleozoic bedrock in the area adjacent to the river (approx. 50 – 100 m from banks of river) and glaciofluvial deposits consisting of river deposits, delta topset facies, and gravel deposits throughout the rest of the Site. Areas of stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain are found within the Study Area, located approximately 80 m north and 400 m southwest of the Site.

According to *Paleozoic Geology of Southern Ontario*[3], the Site is situated on bedrock of the Guelph Formation, consisting of Sandstone, shale, dolostone, and siltstone. The bedrock of the Study Area primarily consists of sandstone, shale, dolostone, and siltstone of the Guelph Formation and a smaller area in the southern portion of the Study Area is situated on the Amabel Formation, consisting of sandstone, shale, dolostone, and siltstone. Based on *Bedrock Topography Map P1985*[4], the Site is located within an area of mapped bedrock exposure, indicating bedrock is at or near the ground surface.

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[1] Chapman, L.J. and Putnam, D.F. 1984. The Physiography of Southern Ontario, Ontario Geological Survey Special Volume 2, Third Edition. Accompanied by Map P.2715, Scale 1:600,000.

[2] Ontario Geological Survey, 2010: Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV

[3] Armstrong, D.K. and Dodge, J.E.P., 2007: Paleozoic geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 219.

[4] Miller, R.F., Farrell, Lorraine, and Karrow, P.P., 1979: Bedrock Topography of the Cambridge Area, Southern Ontario; Ontario Geological Survey Prelim. Map P.1985, Bedrock Topography Sec., Scale 1:50000. Geology 1978.

Based on *Karst Study for Southern Ontario*[5], the Site is located within an area of known karst and potential karst. Key features of the karst in the dolostone bedrock include karren, cave typed and associated precipitates, sinkholes, and disappearing streams.

2.3 Environmental Setting

A natural feature within the Study Area is the Speed River, which flows through the Site. The river flows in a general southerly direction. The Speed River flows into the Grand River in the northwest of Cambridge. The existing Macdonell Street Bridge conveys traffic over the Speed River.

The Site is located within the Speed River subwatershed of the Grand River Watershed and the Site is located within land regulated by Grand River Conservation Authority (GRCA). The Site is located within a GRCA regulatory floodplain and within the Speed River Policy Area. The Site is not located within the designated areas of the Oak Ridges Moraine Conservation Act or Niagara Escarpment Planning and Development Act. No Areas of Natural Significance (ANSI) are located within the Study Area.

The Site and Study Area lie within the Grand River Source Water Protection Area. The Site and Study Area are located in a Wellhead Protection Area (WHPA)-B, which refers to the area with a 0-2 year groundwater travel time to a public water supply wellhead. The Site and Study Area are partially located within an Issue Contributing Area located generally north of the existing Macdonell Street Bridge. An Issue Contributing Area is defined as an area where a known source of contamination may contribute to a known drinking water issue, and the contaminant of concern for this Issue Contributing Area is Trichloroethylene or another Dense Non-Aqueous Phase Liquid (DNAPL).

2.4 MECP Water Well Records Review and Water Well Status

The available records of water wells within a 500 m radius of the Site were obtained from the MECP's online water well record database in September 2021. These well records include all recorded wells regardless of their current status.

In total, 156 recorded wells were located within the 500 m radius Study Area. A summary of well record details is provided in Table B1 of Appendix B. The approximate locations of the wells are shown on Drawing 30842-2 in Appendix A.

Of the available 156 well records, four of the wells are recorded as water supply wells, of which two are for irrigation use and two are for domestic use. One hundred of the well records are

[5] Ontario Geological Survey, 2008: Karst Study for Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV

recorded as either monitoring and test hole, test hole, or observation wells. One well is recorded as a recharge well and twelve wells are listed as abandoned. 39 well records have an unknown status or the status is listed as 'other'.

2.5 Existing Water Taking Permits

A search of MECP's Permit to Take Water mapping application in September 2021 indicated one active permit found within the Study Area. Permit number 0421-BTFKFN is registered for 2223207 Ontario Limited, is located approximately 450 m south of the Site, and has a water taking rate of 4,040,640 litres per day for the purpose of construction dewatering. The permit expires on September 15, 2021. In April 2025, an updated search MECP's Permit to Take Water mapping application indicated that Permit 0421-BTFKFN is now expired and was not extended past 2021. The updated April 2025 search indicated no active PTTW within the Study Area.

A search of MECP's Environmental Activity and Sector Registry (EASR) mapping application in September 2021 found two active water taking registrations in the Study Area. Approval number R-009-5111715482 is registered for Tricar Developments Inc. for the purpose of construction dewatering and is located approximately 450 m south of the Site at 71 Wyndham Street S. Approval number R-009-7110176468 is registered for Vanmar Constructors ON 1002 Inc. for the purpose of construction dewatering and is located approximately 130 m southeast of the Site at 5 Arthur Street S. In April 2025, an updated search of the EASR mapping application found three active water taking registrations in the Study Area. Approval number R-011-7143382695 is registered for the Corporation of the City of Guelph for the purpose of conducting a pumping test and is located approximately 470 m northwest of the Site at 55 Baker Street. Approval number R-009-2198297651 is registered for Tambro Contracting Inc. for the purpose of construction dewatering and is located approximately 160 m southeast of the Site at 93 Arthur Street S. Approval number R-009-7110176468 is registered for Vanmar Constructors ON 1002 INC. for the purpose of construction dewatering and is located approximately 130 m southeast of the Site at 5 Arthur Street S.

3. INVESTIGATION PROCEDURES

3.1 Geotechnical Drilling and Testing

The field investigation for this project was carried out on July 20, 21 and 30, 2021, and comprised drilling a total of nine (9) boreholes (Boreholes 21-01 to 21-08 and 21-05C) to depths ranging from 1.4 to 8.9 m. Borehole details are provided in Table 3.1 and in the Record of Borehole sheets included in Appendix C. The approximate locations of the boreholes are shown on Drawing

30842-1 provided in Appendix A. Further details on the geotechnical investigation are provided in the associated Geotechnical and Hydrogeological Investigation Report (Thurber, 2023).

Table 3.1 – Borehole Details

Borehole No.	Ground Elevation (m)	Borehole Termination Depth (m)	Borehole Termination Elevation (m)
21-01	318.2	2.9	315.3
21-02	318.2	2.1	316.1
21-03	318.1	2.4	315.7
21-04	318.1	8.9	309.2
21-05	317.5	1.4	316.1
21-05C	317.5	3.8	313.7
21-06	318.9	2.5	316.4
21-07	317.8	3.5	314.3
21-08	321.4	6.3	315.1

The ground surface elevations and coordinates of the borehole locations were determined using a Trimble R10 GNSS receiver.

All borehole locations were cleared of utilities prior to commencement of drilling. The boreholes were repositioned as necessary in consideration of surface features, underground utilities, and overhead wires.

The boreholes were advanced using solid stem augers powered by a truck mounted B-57 drill rig supplied and operated by Landshark Drilling of Brantford, Ontario. Soil samples were obtained at selected intervals using a 50 mm outside diameter split-spoon sampler driven in conjunction with the Standard Penetration Test (SPT). The field investigation was supervised on a full-time basis by a member of Thurber's technical staff who marked/staked the boreholes in the field, arranged for the clearance of subsurface utilities, directed the drilling, sampling and in-situ testing operations, logged the boreholes and processed the recovered soil samples for transport to Thurber's laboratory for further examination and testing.

The recovered soil samples were subjected to visual identification (VI) and to natural moisture content determination. Selected samples were subjected to grain size distribution analyses (sieve and/or hydrometer) and Atterberg Limits Testing. Geotechnical laboratory testing results are summarized on the Record of Borehole sheets included in Appendix C.

A generalized description of the subsurface conditions encountered in the boreholes is provided in the below paragraphs. Detailed descriptions of the soil conditions at the specific locations drilled are presented on the Record of Borehole sheets in Appendix C and take precedence over the generalized description. Further details on the subsurface conditions are provided in the associated Geotechnical and Hydrogeological Investigation Report (Thurber, 2023). It should be recognized and expected that soil conditions will vary between and beyond borehole locations.

In general, the subsurface stratigraphy encountered in the boreholes consist of surficial asphalt overlying fill layers underlain by native deposits of silty sand till and clayey silt to silty clay till. These overburden materials are underlain by dolostone bedrock. Further descriptions of the individual strata are presented below.

Asphalt ranging in approximate thickness from 75 mm to 250 mm was encountered at the ground surface in all of the boreholes. A layer of granular fill, approximately 0.6 m to 3.9 m thick, generally consisted of sand and gravel fill containing trace to some silt was encountered underlying the asphalt in all boreholes. At Borehole 21-06, trace peat and occasional brick fragments were noted within the granular fill and at Borehole 21-07, brown sand and silt with variable amounts of gravel and trace clay was encountered underlying the asphalt and cobbles were noted within the granular fill. Approximately 1.5 m of brown sandy silty clay fill with trace gravel was encountered underlying the granular fill in Borehole 21-03. Brown to grey gravelly sand fill, containing varying amounts of silt and gravel and trace to some clay, was encountered in underlying the granular fill in Boreholes 21-04, 21-05C, 21-06, and 21-07, ranging in approximate thickness from 1.1 m to 2.9 m.

Brown gravelly silty sand till, with trace clay and occasional dolostone fragments, was encountered underlying the granular fill in Boreholes 21-01 and 21-02, ranging in approximate thickness from 0.5 m to 1.7 m. Brown to grey clayey silt to silty clay till, sandy to some sand, was encountered in Borehole 21-08 underlying the granular fill at a depth of 0.8 m to 2.3 m and below the silty sand till at a depth of 4.0 m and extending to the termination depth of the borehole.

Highly to completely weathered dolostone bedrock was encountered underlying the silty sand till in Boreholes 21-01 and 21-02 at depths ranging from 2.0 m to 2.6 m and below the sand fill in Borehole 21-04 at a depth of 7.0 m. The bedrock extended to the termination depths of these boreholes and was not proven by coring.

3.2 Groundwater Level Monitoring

Monitoring wells were installed in Boreholes 21-01, 21-04, 21-05C and 21-06 to permit monitoring of the groundwater levels at the Site. The monitoring wells consisted of 50 mm diameter PVC pipe with a slotted screen sealed at a selected depth within the borehole. The installation details are

summarized in Table 3.2 below and provided on the Record of Borehole sheets included in Appendix C.

Table 3.2 – Monitoring Well Details

Borehole/ Monitoring Well (BH/MW) No.	Ground Elevation (m)	Monitoring Well Tip		Slotted Screen Length (m)	Mid-Screen Depth (m)	Mid-Screen Elev. (m)
		Depth (m)	Elevation (m)			
21-01	318.2	2.9	315.3	1.5	2.1	316.1
21-04	318.1	8.9	309.2	3.0	7.4	310.7
21-05C	317.5	3.8	313.7	1.5	3.0	314.5
21-06	318.9	2.5	316.4	0.9	2.0	316.9

The boreholes in which no monitoring wells were installed were backfilled in general accordance with Ontario Regulation 903.

Groundwater conditions were observed in the open boreholes throughout the drilling operations. Water levels in the monitoring wells were measured using a water level meter upon completion of the monitoring well installations and on subsequent dates, as provided in Section 4.1.

3.3 Single Well Response Tests

Single well response tests (“slug” tests) were carried out on monitoring wells 21-04 and 21-05C. The two other monitoring wells (21-01 and 21-06) were dry and therefore, no slug tests were conducted in them. The results of the slug tests are discussed in Section 4.2. The tests were completed using the following method:

- In advance of conducting the slug tests, the monitoring wells were developed and purged, as noted above.
- Once the water level returned to a stabilized level, the static water level was measured and recorded, and a datalogger was inserted into the well below the water level. The datalogger was set to record water levels every 2 – 10 seconds, depending on the anticipated rate of recovery of each well.
- A slug of groundwater was removed from the well with a dedicated bailer for each well to induce a change in hydraulic head (rising head test).
- Manual and electronic measurements were recorded until the water level in the well recovered sufficiently.

3.4 Groundwater Sampling and Chemical Analysis

Groundwater quality samples were collected from monitoring wells 21-04 and 21-05C for the purpose of considering disposal options and potential treatment needs at a preliminary level. The results obtained herein were representative of the water sampled from the selected well at the time of sampling and provide a general understanding of groundwater quality under those conditions; however, the water quality may vary significantly from the results obtained based on location, time, meteorological conditions, and in particular based on construction and dewatering methods. The extent of suspended solids in the groundwater or in water that is collected during construction dewatering (for example from a sump in an open excavation) will significantly affect the concentrations of many parameters that may be regulated based on discharge location, particularly metals. The value of testing groundwater quality during the investigation is primarily to identify the types of contaminants that may need to be managed, the extent to which they are dissolved and therefore unlikely to be filtered by physical means alone, and the presence of anthropogenic contaminants that are listed in the given discharge criteria that may require specific treatment.

The monitoring wells were developed prior to testing to remove excess sediment that may have entered the well during installation, to increase the representativeness of the natural groundwater in the well and to improve the transmissivity of the sand pack and well screen. Prior to any sampling or in-situ testing, the wells were purged dry, or until at least three well volumes had been removed. Development was assessed to be completed based on the number of well volumes purged and qualitative observations such as a decrease in turbidity of the removed water.

The groundwater samples were collected using a peristaltic pump. The samples were placed into prepared laboratory sample bottles and stored in an insulated cooler with ice to keep the samples cool for transportation to SGS Canada Inc. for analysis.

The selected groundwater samples were submitted for analysis of selected general chemistry, organic, and metals and inorganic parameters required for the City of Guelph Sewer By-Law and within the PWQOs. The samples were analyzed and compared to Table 2 - PWQOs and interim PWQOs and the City of Guelph Sewer Use By-Law (2024)-20911. In addition to the unfiltered samples, a dedicated inline disposable 0.45 µm metals filter was used to collect a dissolved metals bottle to estimate the extent to which these components can be filtered. Not all the parameters in the PWQOs or sewer by-law were analyzed.

It is noted that at the time of the groundwater sampling in 2021, the City of Guelph was in the process of updating the sewer by-law, which was finalized and released to the public in 2024. Therefore, at the time of sampling, only parameters included in the previous by-law (City of Guelph

Sewer Use By-Law (1996)-15202) were tested for, which are limited and do not cover all the required parameters in the updated by-law (By-Law (2024)-20911).

4. TESTING RESULTS AND ANALYSIS

4.1 Water Level Monitoring

A summary of the water levels recorded in the monitoring wells is provided in Table 4.1. Groundwater levels that are not under the influence of water taking or dewatering will fluctuate naturally over time, as a function of a number of factors including intensity, duration, and frequency of precipitation events as well as temperatures, which affect precipitation type and timing of snowmelt and accumulation. It is not uncommon for groundwater levels to vary naturally by several metres.

The water levels measured in the monitoring wells are summarized in the table below.

Table 4.1 – Groundwater Level Measurements

Borehole	Date	Water Level (m)		Remark
		Depth	Elevation	
21-01	July 31, 2021	Dry	-	Monitoring Well
	August 11, 2021	Dry	-	
	August 18, 2021	Dry	-	
21-04	July 31, 2021	4.3	313.8	Monitoring Well
	August 11, 2021	5.1	313.0	
	August 18, 2021	5.1	313.0	
21-05C	July 31, 2021	2.1	315.4	Monitoring Well
	August 11, 2021	2.3	315.2	
	August 18, 2021	2.3	315.2	
21-06	July 31, 2021	Dry	-	Monitoring Well
	August 11, 2021	Dry	-	
	August 18, 2021	Dry	-	

It should be noted that the above are short term readings and groundwater levels are expected to fluctuate seasonally. Higher groundwater levels may be expected during wet periods of the year such as spring or after periods of significant or prolonged precipitation.

4.2 Hydraulic Conductivity

Two slug tests were completed and analyzed using the Hvorslev method. The test results indicated that the hydraulic conductivity of the screened gravelly sand fill and sand / dolostone bedrock formations ranged from 4.2×10^{-8} m/s to 3.0×10^{-6} m/s.

Rising head tests results are presented in Table 4.2.

Table 4.2 Rising Head Test Results

Monitoring Well	Hydraulic Conductivity K (m/s)	Screened Depth Interval (m)	Screened Material
21-04	3.0×10^{-6}	5.9 – 9.0	Sand and dolostone bedrock
21-05C	4.2×10^{-8}	2.0 – 3.5	Gravelly sand fill

4.3 Groundwater Quality Results

As described in Section 3.4, groundwater quality samples were collected from monitoring wells installed in Boreholes 21-04, and 21-05C using low flow sampling techniques.

Exceedances of the above standards within the groundwater analytical results are discussed below. A summary of the exceedances and the laboratory certificates of analysis are included in Appendix E.

PWQO and Interim PWQO

Testing of groundwater samples for comparison to the PWQOs and interim PWQOs comprised analysis of general chemistry and selected metals and inorganic parameters. Not all parameters in the PWQOs were analyzed.

From the groundwater sample collected from Monitoring Well 21-04, copper and phosphorous exceeded the interim PWQO. On review of the results of the filtered groundwater sample collected from Monitoring Well 21-04, dissolved copper and dissolved phosphorous exceeded the interim PWQO.

From the groundwater sample collected from Monitoring Well 21-05C, pH, iron, nickel, silver, zinc, and ammonia un-ionized exceed the PWQO and aluminum, arsenic, cobalt, cadmium, copper, molybdenum, phosphorous, lead, vanadium, and zinc exceeded the interim PWQO. On review of the results of the filtered groundwater sample collected from Monitoring Well 21-05C, nickel exceeded the PWQO and aluminum, arsenic, cobalt, cadmium, copper, molybdenum, phosphorous, and vanadium exceeded the interim PWQO.

While filtering lowered some metal parameters below the standards, not all exceedances were eliminated by physical filtration alone.

Groundwater of the quality that was observed herein could not be discharged to surface water without pre-treatment. A water treatment specialist or qualified process engineer must be consulted regarding potential treatment options.

City of Guelph Storm and Sanitary Sewer Use By-Law

Testing of groundwater samples for comparison to the City of Guelph Sewer By-Law comprised analysis of general chemistry, organic, and selected metals and inorganic parameters. Not all parameters in the City of Guelph Sewer By-Law were analyzed.

The results of the groundwater sample collected from Monitoring Well 21-04 and analyzed in comparison to the City of Guelph Sewer Use By-law met the storm and sanitary limits for all tested parameters. The results of the groundwater sample collected from Monitoring Well 21-05C and analyzed in comparison to the City of Guelph Sewer Use By-law exceeded the storm limit for fecal coliforms, pH, biochemical oxygen demand, total suspended solids, copper, phosphorous, and zinc and exceeded the sanitary limit for total suspended solids and chloride.

On review of the results of the filtered groundwater samples for metal parameters, filtering lowered most metals below the by-law limits; however, dissolved copper and dissolved nickel exceeded the storm sewer limits from the groundwater samples collected from Monitoring Well 21-05C. Further, while the filtered metal sample results met the sanitary limit for all tested parameters, chloride was not tested for in the filtered sample but exceeded the sanitary limit from the non-filtered sample from 21-05C, and it is anticipated that physical filtration alone will be insufficient to lower chloride below the limit.

Groundwater of the quality that was observed herein could not be discharged to storm or sanitary sewer without pre-treatment. A water treatment specialist or qualified process engineer must be consulted regarding potential treatment options.

5. Discussion

5.1 Summary of Results

As described in Section 4, the following was determined during the hydrogeological investigation:

- The subsurface stratigraphy underlying the Site consists of surficial asphalt overlying fill layers underlain by native deposits of silty sand till and clayey silt to silty clay till, underlain by dolostone bedrock.
- Groundwater level depths ranged from 5.1 m to 2.1 m below ground surface and groundwater level elevations ranged from 313.0 m to 315.4 m as measured in Monitoring Wells 21-04 and 21-05C on July 31, August 11, and August 18, 2021.
- Monitoring Wells 21-01 and 21-06 were dry during both monitoring events.

- Hydraulic conductivity values ranging from 4.2 x 10^{-8} m/s to 3.0 x 10^{-6} m/s based on the slug tests conducted at Monitoring Wells 21-04 and 21-05C, screened within gravelly sand fill and sand / dolostone bedrock.
- Multiple parameters exceeded the PWQO limits from the unfiltered groundwater sample collected from Monitoring Well 21-05C. Filtering lowered most parameters below the PWQO limits, with the exception of dissolved nickel from the filtered groundwater sample collected from monitoring well 21-05C. There were no exceedances of the PWQO limits from the groundwater sample collected from Monitoring Well 21-04.
- Multiple parameters exceeded the interim PWQO limits from the from the unfiltered and filtered groundwater samples collected from Monitoring Wells 21-04 and 21-05C.
- Multiple parameters exceeded the City of Guelph Storm and Sanitary Sewer Use By-law limits from the unfiltered groundwater sample collected from Monitoring Well 21-05C. Filtering lowered all metal parameters below the Sanitary Sewer Use By-Law Limits and lowered most metal parameters below the Storm Sewer Use By-Law Limits, with the exception of dissolved nickel and dissolved copper from the filtered groundwater sample collected from Monitoring Well 21-05C. There were no exceedances of the By-Law limits from the groundwater sample collected from Monitoring Well 21-04.
- The groundwater analytical results suggest that sediment control alone will be insufficient to address all identified exceedances to meet the limits for discharge to surface water and/or to the Guelph storm or sanitary sewer. It is noted not all parameters in the PWQO or Guelph Sewer By-Law were tested. A water treatment specialist or qualified process engineer must be consulted regarding potential treatment options. Discharge of groundwater to the Guelph storm or sanitary sewer will require a discharge agreement to be obtained from the City of Guelph and it must be verified that the sewer system has capacity for the proposed discharge volume. Discharge of groundwater to the natural environment may require approval by GRCA, Ministry of Natural Resources (MNR), and/or Fisheries and Oceans Canada (DFO). The effects of discharge water temperature and the impacts to the natural environment are beyond the scope of this investigation.

5.2 Construction Dewatering and Future Work

Based on information provided by RVA and the preliminary Geotechnical and Hydrogeological Investigation Report (Thurber, 2023), we understand that the following work is proposed, and the work may require construction dewatering if the excavations are proposed to extend below the water table:

- Replacement and widening of the Macdonell Bridge structure

- Removal of Allan's Bridge
- Rehabilitation of Allan's Sluiceway and Spillway

At the time of preparation of this report, preliminary design drawings or information for the structures were not available and as such, dewatering estimates could not be completed at this time. Based on the shallowest groundwater level depth measured during the investigation of 2.1 m below ground surface, it is anticipated that the excavations to construct foundations for the new structures would advance below the water table and construction dewatering would likely be required; however, this will need to be confirmed once preliminary design information is available and any additional investigation is completed. It is anticipated that removal of the Allan's Structure will not require construction dewatering and can be completed in the wet. Once preliminary design information is available, an assessment of construction dewatering requirements including estimated groundwater inflows and an estimate of the construction dewatering zone of influence will be required for the above identified structures. Furthermore, an assessment of the long-term drainage needs of the structures will need to be assessed.

Within the construction dewatering zone of influence, impacts such as ground settlement, reduction in groundwater flow to groundwater users and watercourses, and other impacts may potentially occur. The potential impacts due to dewatering will need to be assessed following completion of dewatering estimates, and should include discussion on the following:

- Geotechnical impacts
- Impacts to surface water and natural environment
- Impacts to water well users
- Other potential impacts

Based on the estimated dewatering volumes, an assessment of the need for a Category 3 PTTW or registration on the EASR for the project will be required. If the water taking rate will be greater than 50,000 L/day and less than 400,000 L/day, then registration on the Environmental Activity and Sector Registry will be required. If the water taking rate will be greater than 400,000 L/day, then a Category 3 Permit to Take Water will be required.

Considering the proximity of the proposed excavations to the Speed River, it is anticipated that temporary cofferdams or equivalent will be required to temporarily divert the river flow around excavations during construction to keep the excavations dry.

If the dewatering assessment determines a PTTW will be required, a Hydrogeological Study would be required to provide the necessary data and analysis for application to the MECP. The Hydrogeological Study will need to include an impact assessment as well as mitigation measures, a monitoring plan, and a contingency plan. An assessment of the potential need for additional field work will need to be assessed. The timeline for MECP to review PTTW applications was increased on January 1, 2025 to 180 days for normal projects. The fee for applying for a Category 3 PTTW is currently $3,000.

If the dewatering assessment determines registration on the EASR will be required, a water taking report prepared by a qualified professional (QP) would be required. The Water Taking Report will need to meet the requirements of O. Reg. 63/16 and should include a description of the water taking activity and construction works, the estimated area of influence and water taking rates, an impact assessment, a contingency plan, assessment of the need of a water monitoring plan, and a notification protocol, and a summary of the qualifications and experience of the QP. In addition, a Discharge Report prepared by a QP will be required to register on the EASR. The Discharge Report will need to meet the requirements of O. Reg. 63/16 and should include a description of the discharge (location, method), an estimate of the quality and quantity of groundwater and storm water to be discharged, identification of any required mitigation measures including water quality treatment and erosion control, assessment of the need of a monitoring plan, and a contingency plan, and a summary of the qualifications and experience of the QP. Registration on the EASR does not require review by MECP and dewatering can commence immediately after registering. The fee for registering a water taking activity on the EASR is currently $1,190.

5.3 Detailed Hydrogeological Investigation

The information presented in this report is provided for preliminary design and planning purposes only. A detailed hydrogeological investigation will be required to confirm the subsurface conditions and recommendations. This work may include:

- Additional monitoring wells installed in boreholes within the envelope of foundation units to confirm the hydrostratigraphic conditions at the structure locations and develop detailed hydrogeological recommendations for construction dewatering for the bridge foundations.
- Extended groundwater monitoring program at new and existing monitoring wells, to ascertain seasonal maximum and minimum water level elevations. Consideration should be given to instrumenting monitoring wells with long-term datalogger pressure transducers to monitor continuous water levels in the monitoring wells.
- Additional slug tests conducted at newly installed monitoring wells, selected to target various geological materials.

- Additional groundwater samples at newly installed monitoring wells.
- If considering directing dewatering discharge to the Guelph sewer system, groundwater quality samples should be tested for analysis against all the parameters listed in the new Guelph Sewer By-law ((2024)-20911) Limits for Storm Sewer Use and Sanitary Sewer Use.
- If considering directly dewatering discharge to surface water (i.e. the Speed River) or to land surface near surface water (i.e. within 30 m of the river or where runoff may reach the river), surface water quality samples should be tested for analysis against the PWQOs to establish the pre-construction baseline surface water quality. During construction, additional surface water quality samples could be collected and compared to the baseline water quality to assess any potential impact to the river water quality due to construction. In addition, the elevation of the river water level could be surveyed prior to construction to establish baseline surface water elevation to assess any if drawdown of the river is occurring during construction dewatering.
- Assessment of the potential need for a door-to-door well survey of private wells and a baseline private well monitoring program would be required, which will be dependent on the dewatering requirements and the estimated construction dewatering zone of influence relative to any water supply wells. The results of the baseline private well monitoring program can assist in verifying potential impacts on well users and provide the data required to document the effects, where permission is given by residents to monitor their wells.
- Once preliminary design information is available, an assessment of construction dewatering requirements including estimated groundwater inflows and an estimate of the construction dewatering zone of influence will be required for the identified structures. Furthermore, an assessment of the long-term drainage needs of the structures will need to be assessed. These findings will be used to confirm the water takings requirements and the appropriate approvals from the MECP prior to commencement of construction.
- Based on assessment of required water taking approvals, if a PTTW is required, a Hydrogeological Study Report should be prepared, and if registration on the EASR is required, a Water Taking Report and a Discharge Report should be prepared. This current report does not meet the requirements for either a PTTW application or registration on the EASR, and this report would require significant updates to meet the requirements.

6. CLOSURE

We trust that this report provides the information you require at this time. If you have any questions regarding this report, please contact the undersigned at your earliest convenience.

Yours truly,
Thurber Engineering Ltd.

Paul Coulson, P.Geo.
Hydrogeologist

David Hill, M.A.Sc., P.Eng., P.Geo.
Associate | Senior Hydrogeological Engineer

THURBER

STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.

d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

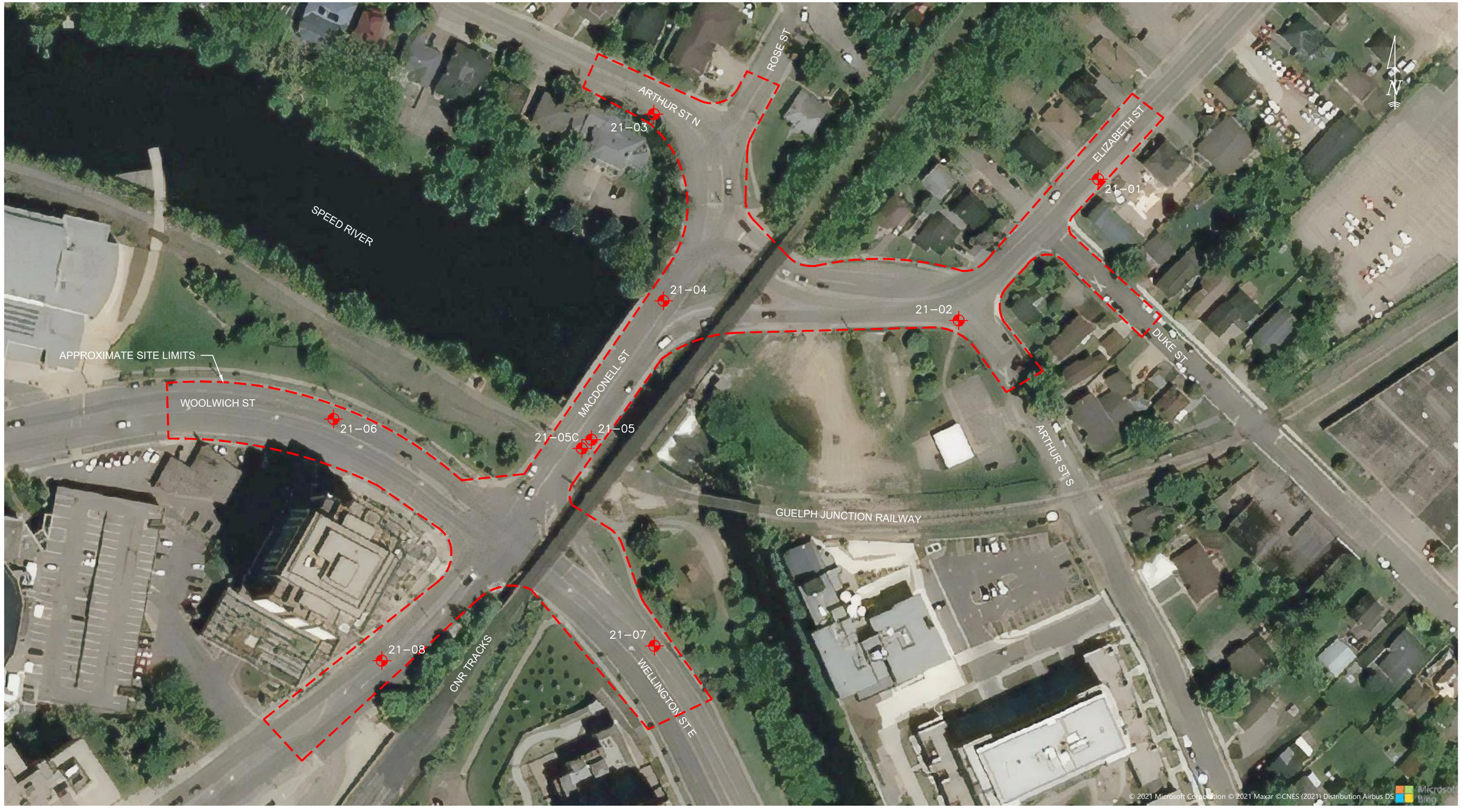
7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

THURBER ENGINEERING LTD.

APPENDIX A

DRAWINGS



LEGEND

BOREHOLE LOCATION

25 0 25 50m

SC-LE 1:1250

R.V. Anderson Associates Limited

GUELPH REVITALIZATION PROJECT
GUELPH, ONTARIO

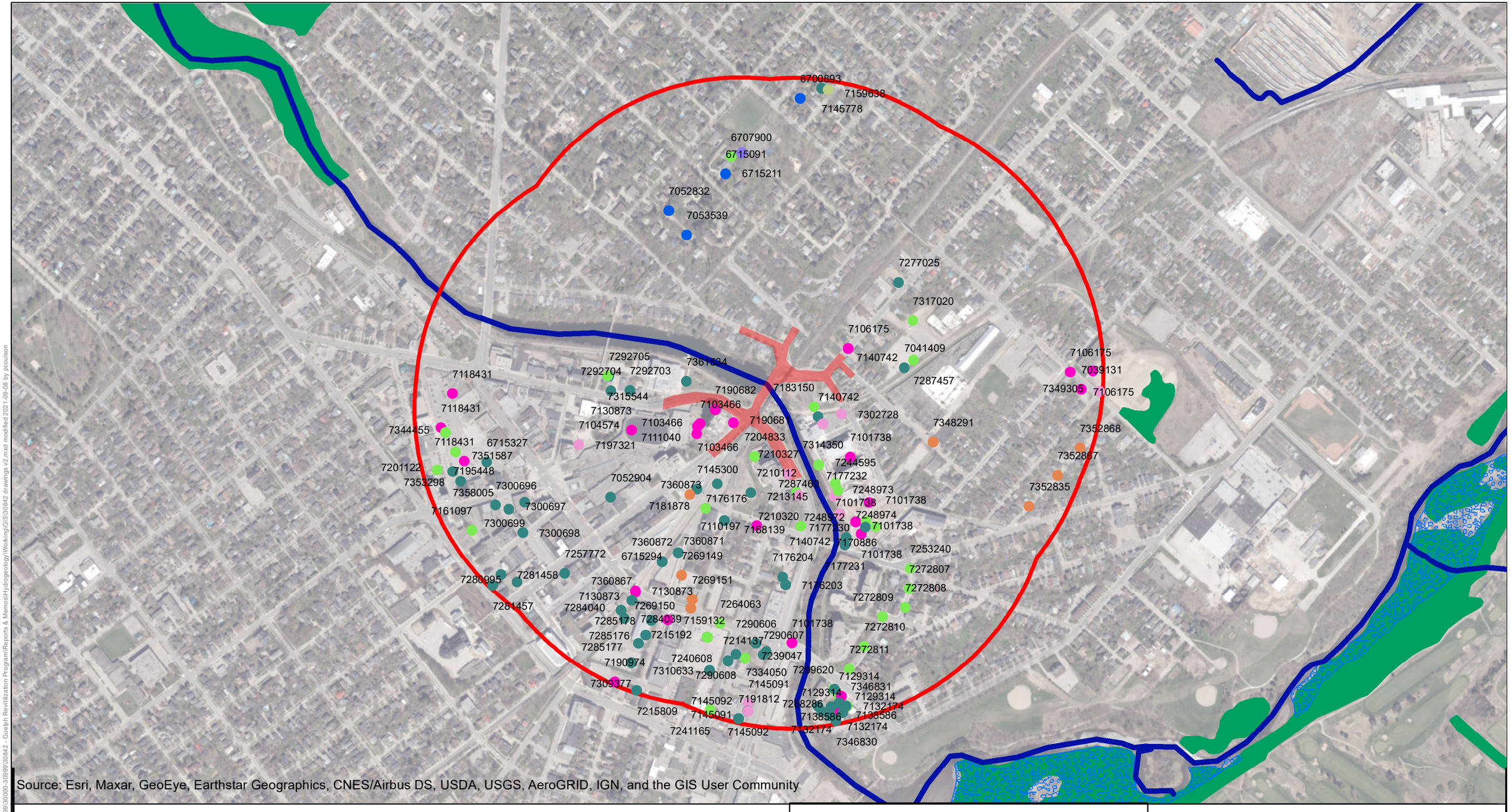
BOREHOLE LOCATION PLAN

JOB# 30842

THURBER ENGINEERING LTD.

ENGINEER :	DRAWN :	APPROVED :
JA	BH	GRL
DATE :	SCALE :	DRAWING No.
May 2023	1:1250	30842-1

FILENAME: H:\Drafting\30000\30842\TED-30842-BHPL.dwg
PLOTDATE: Apr 11, 2023 - 8:57 AM



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND:

- Site
- 500 m buffer
- Watercourse
- Wetland
- Wooded Area

MECP Well Record

- Unknown
- Abandoned-Other
- Monitoring and Test Hole
- Observation Wells
- Other Status
- Recharge Well
- Test Hole
- Water Supply

200 100 0 200 m

UTM 17 NAD 83

Data Source: Ontario Ministry of Enviornment, Conservation and Parks

R.V. ANDERSON ASSOCIATES LTD.

PRELIMINARY HYDROGEOLOGICAL INVESTIGATION
MUNICIPAL CLASS ENVIRORNMENTAL ASSESSMENT
GUELPH REVITALIZATION PROGRAM
MACDONELL AND ALLEN STRUCTURES ASSESSMENT

MECP WELL RECORDS

PROJECT No. **30842**

THURBER ENGINEERING LTD.

DESIGNED:	DRAWN:	APPROVED:
PC	PC	DH
DATE: SEPTEMBER 8, 2021	SCALE: 1:7,500	DRAWING NO. 30842-2

\\torcfs01.thurber.local\Shared\1Projects\30000-39999\30000-30999\30842 - Guelph Revitilization Program\Reports & Memos\Hydrogeology\Working\GIS\30842 drawings v2.mxd modified 2021-09-08 by pcoulson

THURBER ENGINEERING LTD.

APPENDIX B

MECP WELL RECORDS

Well ID	Date Completed	Well Depth (m)	Bedrock Depth (m)	Static Water Level (m)	Well Use
7052832	2007-11-02	63.4	-	28.2	Water Supply
7052904	2007-11-17	5.5	-	-	Observation Wells
7053539	2007-10-31	53.3	-	33.8	Water Supply
6700893	1960-09-27	43.6	27.4	29	Water Supply
6707900	1984-06-21	83.8	33.5	33.5	-
6715091	2004-09-17	67.1	29	37	Water Supply
6715211	2004-12-03	67.1	31.4	35.1	Recharge Well
6715294	2005-03-29	10	9.1	-	Observation Wells
6715327	2005-04-06	8.3	-	-	Observation Wells
7039131	2006-12-19	3.6	-	-	Test Hole
7041409	2006-01-10	3	-	-	Observation Wells
7101738	2007-09-28	3.6	-	2	Test Hole
7103466	2008-01-22	6	-	-	Test Hole
7104574	2007-10-17	6	-	4.5	Test Hole
7111040	2008-03-31	6	-	4.5	Test Hole
7118431	2008-06-13	4.5	-	-	Test Hole
7101738	2008-09-28	-	-	2.5	Test Hole
7101738	2008-09-28	-	-	3	Test Hole
7101738	2008-09-28	-	-	2.3	Test Hole
7101738	2008-09-29	-	-	3	Test Hole
7101738	2008-09-29	-	-	3	Test Hole
7103466	2008-01-22	-	-	-	Test Hole
7103466	2008-01-22	-	-	-	Test Hole
7110197	2008-06-10	-	-	3.5	Test Hole
7106175	2008-05-22	-	-	-	Test Hole
7106175	2008-05-26	-	-	-	Test Hole
7106175	2008-05-22	-	-	-	Test Hole
7129314	2009-07-09	3.6	-	-	-
7130873	2009-08-26	9.3	-	-	Test Hole
7118431	2008-06-13	-	-	-	Test Hole
7118431	2008-06-13	-	-	-	Test Hole
7132174	2009-08-15	3.6	-	-	-
7129314	2009-07-09	-	-	-	-
7129314	2009-07-09	-	-	-	-
7130873	2009-08-26	-	-	9	Test Hole
7130873	2009-08-27	-	-	8	Test Hole
7138586	2009-12-10	4	-	-	Test Hole
7140742	2009-12-30	3.9	-	-	Observation Wells
7145091	2010-04-26	3.9	-	1.5	Observation Wells
7145092	2010-04-26	-	-	1.5	Abandoned-Other
7145300	2010-04-21	7.6	-	-	Observation Wells
7145778	2010-05-11	4.4	-	-	Observation Wells
7132174	2009-08-09	-	-	-	-
7132174	2009-08-09	-	-	-	-
7132174	2009-08-09	-	-	-	-
7132174	2009-08-15	-	-	-	-
7138586	2009-12-14	-	-	-	Test Hole
7138586	2009-12-14	-	-	-	Test Hole
7138586	2009-12-11	-	-	-	Test Hole
7138586	2009-12-10	-	-	-	Test Hole
7138586	2009-12-10	-	-	-	Test Hole
7140742	2009-12-29	-	-	-	Observation Wells
7140742	2010-01-14	-	-	-	Observation Wells
7145091	2010-04-26	-	-	1.5	Observation Wells
7145092	2010-04-26	-	-	1.5	Abandoned-Other
7159132	2010-11-19	7.6	-	-	Test Hole
7159638	2011-01-26	-	-	-	Other Status
7161097	2011-02-10	-	-	-	-
7168139	2011-07-05	-	-	-	-
7170886	2011-05-19	-	-	-	-

Well ID	Date Completed	Well Depth (m)	Bedrock Depth (m)	Static Water Level (m)	Well Use
7176204	2011-12-05	10.3	-	-	Observation Wells
7176176	2011-12-22	10.7	-	-	Monitoring and Test Hole
7176203	2011-12-03	10.2	-	-	Observation Wells
7177230	2012-01-13	12.2	-	-	Observation Wells
7177232	2012-01-13	12.2	-	-	Observation Wells
7177231	2012-01-13	16.8	-	-	Observation Wells
7181878	2012-01-26	-	-	-	-
7183150	2012-06-12	-	-	-	-
7190681	2012-10-25	5.9	-	-	Test Hole
7190682	2012-10-25	4.7	-	-	Test Hole
7190974	2012-10-03	7.6	-	-	Test Hole
7191812	2012-11-13	4.1	-	-	Observation Wells
7197321	2012-11-14	-	-	-	Abandoned-Other
7195448	2012-11-08	6	-	-	Observation Wells
7204833	2013-07-09	-	-	-	-
7201122	2013-04-26	-	-	-	-
7210112	2013-08-12	-	-	-	-
7210320	2013-10-29	3.4	-	-	Abandoned-Other
7210327	2013-10-29	3	-	-	Abandoned-Other
7213145	2013-10-09	10.1	-	-	Observation Wells
7214137	2013-12-19	-	-	-	-
7215192	2014-01-09	-	-	-	-
7215809	2013-10-16	3.7	-	-	Observation Wells
7239047	2014-04-17	-	-	-	-
7240608	2015-04-13	2.3	-	-	Observation Wells
7241165	2015-05-06	-	-	-	-
7244595	2015-06-24	-	-	-	-
7248972	2015-09-11	-	-	-	Abandoned-Other
7248973	2015-09-11	-	-	-	Abandoned-Other
7248974	2015-09-11	-	-	-	Abandoned-Other
7248991	2015-09-11	-	-	-	Abandoned-Other
7253240	2015-06-16	-	-	-	-
7257772	2016-01-27	6.3	-	-	Observation Wells
7264063	2016-04-11	-	-	-	-
7268286	2016-07-04	3.9	-	-	Observation Wells
7268287	2016-07-14	2.8	-	-	Observation Wells
7269149	2016-07-04	7.3	-	-	Monitoring and Test Hole
7269150	2016-07-04	5.8	-	-	Monitoring and Test Hole
7269151	2016-07-04	5.8	-	-	Monitoring and Test Hole
7272807	-	-	-	-	-
7272808	-	-	-	-	-
7272809	-	-	-	-	-
7272810	-	-	-	-	-
7272811	-	-	-	-	-
7277025	2016-11-17	6.4	-	-	Observation Wells
7280995	2016-05-18	3.8	-	-	Observation Wells
7281457	2016-05-18	3	-	-	Observation Wells
7281458	2016-05-18	3	-	-	Observation Wells
7284039	2016-12-20	5	-	-	Observation Wells
7284040	2016-12-20	5.2	-	-	Observation Wells
7285176	2017-01-19	4.6	-	-	Observation Wells
7285177	2017-01-16	4.6	-	-	Observation Wells
7285178	2017-01-13	6.1	-	-	Observation Wells
7287457	-	-	-	-	-
7287458	-	-	-	-	-
7287459	-	-	-	-	-
7287460	-	-	-	-	-
7290606	2017-05-15	2.4	-	-	Observation Wells
7290607	2017-05-14	3.6	-	-	Observation Wells
7290608	2017-05-16	2.1	-	-	Observation Wells

Well ID	Date Completed	Well Depth (m)	Bedrock Depth (m)	Static Water Level (m)	Well Use
7292703	2017-07-31	9.4	-	-	Observation Wells
7292704	2017-08-01	9.1	-	-	Observation Wells
7292705	2017-08-01	8.7	-	-	Observation Wells
7299620	2017-11-14	-	-	-	-
7300696	2017-09-12	7	-	-	Observation Wells
7300697	2017-09-12	7.2	-	-	Observation Wells
7300698	2017-09-13	2	-	-	Observation Wells
7300699	2017-09-13	3.2	-	-	Observation Wells
7302728	2017-11-15	-	-	-	Abandoned-Other
7309377	2016-12-20	3.8	-	-	Observation Wells
7310633	2018-03-26	29	-	-	Observation Wells
7314350	2018-06-07	-	-	-	Abandoned-Other
7315544	2018-07-11	-	-	-	-
7317020	2018-07-24	-	-	-	-
7334050	2019-05-08	3.2	-	-	Observation Wells
7344455	2019-08-27	-	-	-	-
7346829	2019-10-28	3	-	-	Observation Wells
7346830	2019-10-28	3	-	-	Observation Wells
7346831	2019-10-28	4.3	-	-	Observation Wells
7346832	2019-10-28	3	-	-	Observation Wells
7346833	2019-10-28	3	-	-	Observation Wells
7346834	2019-10-25	10.7	-	-	Observation Wells
7346835	2019-10-23	3	-	-	Observation Wells
7348291	2019-10-15	3	-	-	Monitoring and Test Hole
7349305	2019-11-19	-	-	-	Abandoned-Other
7351587	2019-11-21	-	-	-	-
7352867	2019-11-28	3.8	-	-	Monitoring and Test Hole
7352868	2019-11-28	2.6	-	-	Monitoring and Test Hole
7352835	2019-11-29	2.3	-	-	Monitoring and Test Hole
7353298	2020-01-18	9.3	-	-	Observation Wells
7358005	2020-04-09	8.5	-	-	Observation Wells
7360867	-	-	-	-	Observation Wells
7360871	-	-	-	-	Observation Wells
7360872	-	-	-	-	Observation Wells
7360873	-	-	-	-	Observation Wells
7361534	2020-04-24	3.7	-	-	Observation Wells

THURBER ENGINEERING LTD.

APPENDIX C

RECORD OF BOREHOLE SHEETS

RECORD OF BOREHOLE 21-01

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 21, 2021
COMPLETED : July 21, 2021

Project No. 30842
SHEET 1 OF 1
DATUM Geodetic

N 4 821 950.7 E 561 264.9

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	COMMENTS
		GROUND SURFACE		318.23				
		ASPHALT(113mm)						
		SAND and **GRAVEL**, dense brown, moist: (FILL)		0.11	1	SS	38	
1	Hollow Stem Augers				2	SS	33	
				316.78				
		SAND, silty, gravelly, trace clay, occasional lime stone fragments, dense to dense, brown, moist: (TILL)		1.45	3	SS	33	Grain Size Analysis: Gr 25%/Sa 48%/ Si & Cl 27%
2					4	SS	110/ 0.225	
				315.64				
		DOLOSTONE, highly weathered		2.59	5	SS	60/ 0.075	
				315.33				
3		END OF BOREHOLE AT 2.9m UPON AUGER REFUSAL. Monitoring Well installation consists of 50mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.		2.90				
4		WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) Aug 11/21 Dry - Aug 18/21 Dry -						
5								
6								
7								
8								
9								

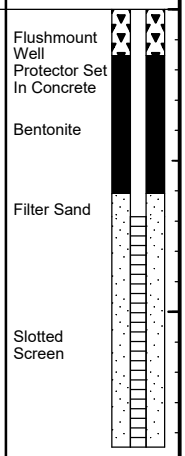
DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH: Cu, KPa
nat V - ✤ Q - ✖
rem V - ● Cpen ▲
40 80 120 160

WATER CONTENT, PERCENT
wp w wl
10 20 30 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION



GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

RECORD OF BOREHOLE 21-02

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 21, 2021
COMPLETED : July 21, 2021

Project No. 30842
SHEET 1 OF 1
DATUM Geodetic

N 4 821 902.7 E 561 217.6

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	COMMENTS
		GROUND SURFACE		318.22				
		ASPHALT(100mm)						
		SAND and **GRAVEL**, trace silt, dense to compact, brown, moist: (FILL)		0.10				
	Hollow Stem Augers				1	SS	48	Grain Size Analysis: Gr 38%/Sa 54%/ Si & Cl 8%
1					2	SS	29	
				316.77				
		SAND, silty, gravelly, compact, brown: (TILL)		1.45				
					3	SS	17	
2				316.23				
		DOLOSTONE, highly weathered		1.98				
		END OF BOREHOLE AT 2.1m UPON AUGER REFUSAL.		2.06				
3								
4								
5								
6								
7								
8								
9								

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH: Cu, KPa
nat V - ✚ Q - ✖
rem V - ● Cpen ▲
40 80 120 160

WATER CONTENT, PERCENT
wp w wl
10 20 30 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

RECORD OF BOREHOLE 21-03

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 30, 2021
COMPLETED : July 30, 2021

Project No. 30842
SHEET 1 OF 1
DATUM Geodetic

N 4 821 972.9 E 561 114.0

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) / WATER CONTENT, PERCENT (wp, w, wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		318.07							
	Hollow Stem Augers	**ASPHALT**(75mm)		0.10							
		SAND and **GRAVEL**, trace silt, dense, brown, moist: (FILL)			1	SS	22		○		
1		**CLAY**, silty, sandy, trace gravel, soft, brown: (FILL)		317.15 0.91	2	SS	2		○		
					3	SS	3	Grain Size Analysis: Gr 1%/ Sa 23%/ Si 55%/ Cl 21%	○		
2				315.65	4	SS	60/ 0.125		○		
		END OF BOREHOLE AT 2.4m UPON AUGER REFUSAL.		2.41							
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

RECORD OF BOREHOLE 21-04

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 20, 2021
COMPLETED : July 20, 2021

Project No. 30842
SHEET 1 OF 2
DATUM Geodetic

N 4 821 909.4 E 561 117.3

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤ rem V - ● Q - ✖ Cpen ▲ 40 80 120 160) / WATER CONTENT, PERCENT (wp w wl 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		318.11							
	Hollow Stem Augers	**ASPHALT**(250mm)		0.00							
		SAND and **GRAVEL**, some silt, very dense to dense, grey to brown, moist: (FILL)		0.25	1	SS	89		○		Flushmount Well Protector Set In Concrete
1					2	SS	51		○		
2					3	SS	43		○		
					4	SS	45		○		
3											Bentonite
					5	SS	33	Grain Size Analysis: Gr 46%/Sa 41%/ Si & Cl 13%	○		
4				314.00							
		SAND, some gravel, trace silt to silty, compact, brown, wet		4.11							
					6	SS	12		○		▼
5											
											Filter Sand
6					7	SS	100/0.075	Grain Size Analysis: Gr 15%/Sa 76%/ Si 9%/ Cl 0%	○		
				311.10							
7		**DOLOSTONE**, completely to highly weathered		7.01							
											Slotted Screen
					8	SS	100/0.075				
8											
				309.20	9	SS	100/0.075				
9		END OF BOREHOLE AT 8.9m UPON AUGER REFUSAL. Monitoring Well installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.04m slotted screen.		8.92							
		WATER LEVEL READINGS:									

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

August 18, 2021

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

RECORD OF BOREHOLE 21-04

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 20, 2021
COMPLETED : July 20, 2021

Project No. 30842
SHEET 2 OF 2
DATUM Geodetic

N 4 821 909.4 E 561 117.3

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲; 40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION

DATE DEPTH(m) ELEV.(m)
Aug 11/21 4.31 313.80
Aug 18/21 5.10 313.01

11
12
13
14
15
16
17
18
19

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION

▼ WATER LEVEL IN WELL/PIEZOMETER
August 18, 2021

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

RECORD OF BOREHOLE 21-05

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 20, 2021
COMPLETED : July 20, 2021

Project No. 30842
SHEET 1 OF 1
DATUM Geodetic

N 4 821 862.2 E 561 092.8

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) 40 80 120 160 / WATER CONTENT, PERCENT wp w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		317.45							
	Hollow Stem Augers	**ASPHALT**(250mm)		0.00							
		SAND and **GRAVEL**, trace silt, dense, brown, moist: (FILL)		0.25	1	SS	34		○		
1					2	SS	31		○		
				316.08							
		END OF BOREHOLE AT 1.4m UPON AUGER REFUSAL ON POSSIBLE BRIDGE FOUNDATION.		1.37							
2											
3											
4											
5											
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

RECORD OF BOREHOLE 21-05C

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 30, 2021
COMPLETED : July 30, 2021

Project No. 30842
SHEET 1 OF 1
DATUM Geodetic

N 4 821 862.2 E 561 092.7

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	COMMENTS: DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)	SHEAR STRENGTH: Cu, KPa (nat V - ✤, rem V - ●, Q - ✖, Cpen ▲) (40 80 120 160) / WATER CONTENT, PERCENT (wp, w, wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		317.48							
	Hollow Stem Augers	**ASPHALT**(100mm)		0.10							Concrete
		SAND and **GRAVEL**, trace silt, dense to compact, brown, moist: (FILL)			1	SS	36		○		
1					2	SS	20		○		
				316.03							Bentonite
		SAND, gravelly, silty, trace clay, compact to very loose, brown, moist: (FILL)		1.45							
2					3	SS	13		○		Filter Sand
					4	SS	5	Grain Size Analysis: Gr 32%/Sa 44%/ Si 23%/ Cl 1%	○		
3					5	SS	2		○		Slotted Screen
				313.67							
4		END OF BOREHOLE AT 3.8 M UPON AUGER REFUSAL. Monitoring Well installation consists of 50mm diameter Schedule 40 PVC pipe with a 3.04m slotted screen. Dolostone fragments		3.81							
5		WATER LEVEL READINGS: DATE / DEPTH(m) / ELEV.(m): Aug 11/21 2.30 315.18; Aug 18/21 2.30 315.18									
6											
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION

▼ WATER LEVEL IN WELL/PIEZOMETER
August 18, 2021

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

RECORD OF BOREHOLE 21-06

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 21, 2021
COMPLETED : July 21, 2021

Project No. 30842
SHEET 1 OF 1
DATUM Geodetic

N 4 821 869.2 E 561 005.2

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	COMMENTS
		GROUND SURFACE		318.93				
	Hollow Stem Augers	**ASPHALT**(150mm)		0.00				
		SAND and **GRAVEL**, trace silt, dense to compact, brown, damp: (FILL)		0.15	1	SS	45	
1		trace peat, occasional brick fragments, black			2	SS	26	
				317.48				
		SAND and **SILT**, some clay, trace gravel to gravelly, loose to very dense, brown, moist: (FILL)		1.45	3	SS	5	Grain Size Analysis: Gr 2%/ Sa 43%/ Si 44%/ Cl 11%
2				316.44	4	SS	86/ 0.200	
		END OF BOREHOLE AT 2.5m UPON AUGER REFUSAL. Monitoring Well installation consists of 50mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.		2.49				
3		WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) Aug 11/21 Dry - Aug 18/21 Dry -						
4								
5								
6								
7								
8								
9								

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH: Cu, KPa
nat V - ✚ Q - ✖
rem V - ● Cpen ▲
40 80 120 160

WATER CONTENT, PERCENT
wp w wl
10 20 30 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

RECORD OF BOREHOLE 21-07

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 21, 2021
COMPLETED : July 21, 2021

Project No. 30842
SHEET 1 OF 1
DATUM Geodetic

N 4 821 792.2 E 561 114.2

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	COMMENTS
		GROUND SURFACE		317.79				
		ASPHALT(125mm)						
		SAND and **SILT**, gravelly to some gravel, trace clay, very dense to compact, brown, moist: (FILL)		0.13	1	SS	54	
1	Hollow Stem Augers				2	SS	28	Grain Size Analysis: Gr 11%/Sa 39%/ Si 42%/ Cl 8%
				316.34				
		SAND and **GRAVEL**, trace silt, loose, grey, moist: (FILL)		1.45	3	SS	4	
2		Cobbles			4	SS	9	
3					5	SS	20	
				314.29				
		END OF BOREHOLE AT 3.5m UPON AUGER REFUSAL.		3.51				
4								
5								
6								
7								
8								
9								

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH: Cu, KPa
nat V - ✚ Q - ✖
rem V - ● Cpen ▲
40 80 120 160

WATER CONTENT, PERCENT
wp w wl
10 20 30 40

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

RECORD OF BOREHOLE 21-08

PROJECT : Guelph Revitalization Project
LOCATION : Guelph, ON
STARTED : July 30, 2021
COMPLETED : July 30, 2021

Project No. 30842
SHEET 1 OF 1
DATUM Geodetic

N 4 821 787.1 E 561 021.6

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	COMMENTS	SHEAR STRENGTH: Cu, KPa (nat V - ✚, rem V - ●, Q - ✖, Cpen ▲) 40 80 120 160 / WATER CONTENT, PERCENT wp ○w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		321.40				DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100			
		ASPHALT(125mm)									
		SAND and **GRAVEL**, trace silt, very dense, greyish brown, moist: (FILL)		0.13							
					1	SS	56		○		
				320.64							
1		Clayey **SILT**, some sand to sandy, trace gravel, compact, brown: (TILL)		0.76	2	SS	22		○		
					3	SS	22	Grain Size Analysis: Gr 1%/ Sa 13%/ Si 68%/ Cl 18%	○		
2				319.12							
		SAND, silty, gravelly, trace clay, very dense, brown, moist: (TILL)		2.29	4	SS	101/ 0.250		○		
3	Hollow Stem Augers				5	SS	60/ 0.100		○		
				317.44							
4		**CLAY**, silty, some sand, hard, grey, wet: (TILL)		3.96							
					6	SS	42	Grain Size Analysis: Gr 0%/ Sa 19%/ Si 48%/ Cl 33%	○		
5											
					7	SS	73		○		
6				315.08							
		END OF BOREHOLE AT 6.3m UPON AUGER REFUSAL.		6.32							
7											
8											
9											

GROUNDWATER ELEVATIONS

▽ WATER LEVEL UPON COMPLETION ▼ WATER LEVEL IN WELL/PIEZOMETER

LOGGED : SM
CHECKED : JA

THURBER

THURBER2S TEL-30842.GPJ 12/6/21

THURBER ENGINEERING LTD.

APPENDIX D

SINGLE WELL RESPONSE TEST ANALYSIS

THURBER ENGINEERING LTD.

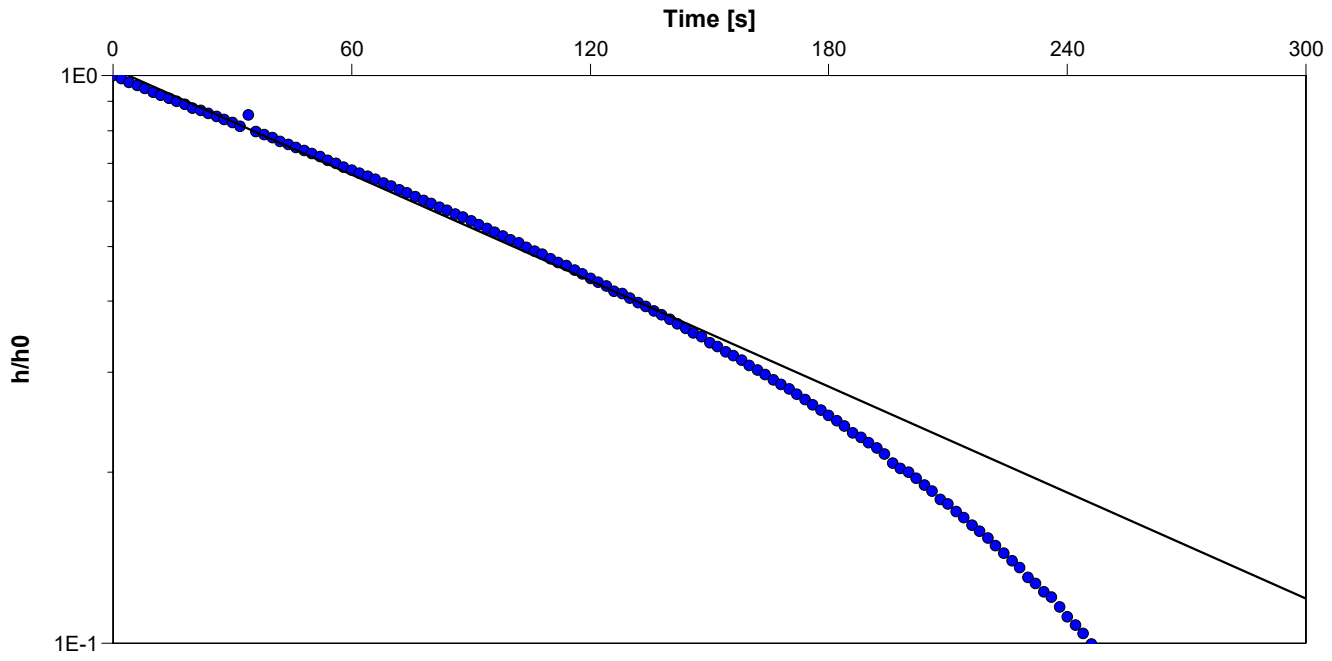
Slug Test Analysis Report

Project: Guelph Revitalization Program

Number: 30842

Client: R.V. Anderson Associates Ltd.

Location: Guelph, Ontario	Slug Test: 21-04	Test Well: 21-04
Test Conducted by: JA		Test Date: 2021-08-11
Analysis Performed by: PC	21-04 SWRT Analysis	Analysis Date: 2021-08-23
Aquifer Thickness:		
Checked by: DH		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
21-04	3.0×10^{-6}	

THURBER ENGINEERING LTD.

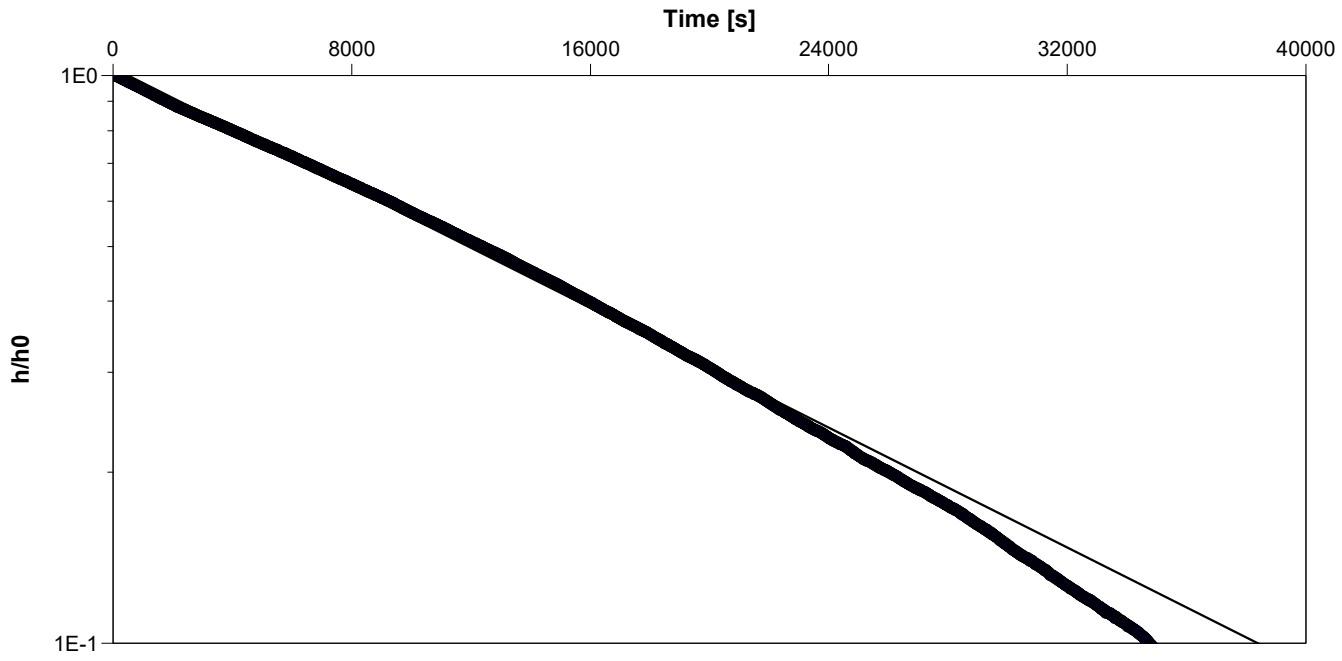
Slug Test Analysis Report

Project: Guelph Revitalization Program

Number: 30842

Client: R.V. Anderson Associates Ltd.

Location: Guelph, Ontario	Slug Test: 21-05C	Test Well: 21-05C
Test Conducted by: JA		Test Date: 2021-08-18
Analysis Performed by: PC	21-05C SWRT Analysis	Analysis Date: 2021-08-23
Aquifer Thickness:		
Checked by: DH		



Calculation using Hvorslev

Observation Well	Hydraulic Conductivity [m/s]	
21-05C	4.2×10^{-8}	

THURBER ENGINEERING LTD.

APPENDIX E

GROUNDWATER ANALYTICAL RESULTS AND CERTIFICATES OF ANALYSIS

			Sample Identification	**BH21-04**	**BH21-05C**	**BH21-04 (Dissolved)**	**BH21-05C (Dissolved)**
			Sampling Date	18-Aug-21 11:15	18-Aug-21 12:10	18-Aug-21 11:10	18-Aug-21 12:20
			Laboratory Certificate of Analysis No.	CA14232-AUG21	CA14232-AUG21	CA15111-SEP21	CA15111-SEP21
			Laboratory Name	SGS	SGS	SGS	SGS
			Consultant Name	Thuber Engineering	Thuber Engineering	Thuber Engineering	Thuber Engineering
Analysis	PWQO	Interim PWQO	**Units**				
Alkalinity	---	---	mg/L as CaCO3	221	178	---	---
Bicarbonate	---	---	mg/L as CaCO3	219	86	---	---
Carbonate	---	---	mg/L as CaCO3	2	92	---	---
OH	---	---	mg/L as CaCO3	< 2	< 2	---	---
Colour	---	---	TCU	6	85	---	---
Conductivity	---	---	uS/cm	753	9050	---	---
pH	6.5-8.5	---	No unit	8.32	**9.56**	---	---
Turbidity	---	---	NTU	3.8	36.3	---	---
Ammonia+Ammonium (N)	---	---	as N mg/L	0.13	6.74	---	---
Chromium VI	1	---	µg/L	< 0.2	0.5	---	---
Total Reactive Phosphorous	---	---	mg/L	< 0.03	0.08	---	---
Total Organic Carbon	---	---	mg/L	4	68	---	---
Chloride	---	---	mg/L	100	3300	---	---
Fluoride	---	---	mg/L	0.1	0.92	---	---
Bromide	---	---	mg/L	<0.05	0.98	---	---
Nitrite (as N)	---	---	as N mg/L	0.028	< 0.03	---	---
Nitrate (as N)	---	---	as N mg/L	0.18	0.032	---	---
Sulphate	---	---	mg/L	15	230	---	---
Mercury (dissolved)	0.0002	---	mg/L	< 0.00001	0.00004	---	---
Aluminum (0.2µm)	---	0.015 - 0.075*	mg/L	0.008	0.406	0.009	0.248
Aluminum (total)	---	---	µg/L	28	6505	---	---
Arsenic (total)	100	5	µg/L	0.4	15.8	0.3	18.8
Boron (total)	---	200	µg/L	22	109	---	---
Barium (total)	---	---	µg/L	20	66.9	---	---
Beryllium (total)	11 - 1100**	---	µg/L	0.03	0.23	---	---
Cobalt (total)	---	0.9	µg/L	0.26	4.42	0.167	2.89
Calcium (total)	---	---	mg/L	74.3	127	---	---
Cadmium (total)	0.2	0.1 - 0.5***	µg/L	0.03	0.2	0.036	0.103
Copper (total)	---	1 - 5****	µg/L	1.8	22.6	2.1	15.9
Chromium (total)	---	---	µg/L	0.32	8.3	< 0.08	28.5
Iron (total)	300	---	µg/L	40	**4630**	< 7	82
Potassium (total)	---	---	mg/L	2.42	10.8	---	---
Magnesium (total)	---	---	mg/L	24.7	9.14	---	---
Manganese (total)	---	---	µg/L	104	107	94.2	27.4
Molybdenum (total)	---	40	µg/L	0.79	73.6	0.87	103
Nickel (total)	25	---	µg/L	1.2	**59**	1.1	**61.1**
Sodium (total)	---	---	mg/L	64.8	1940	---	---
Phosphorus (total)	---	0.01 - 0.03*****	mg/L	0.03	0.59	0.090	0.268
Lead (total)	5 - 25^{+}	1 - 5$^{\pm}$	µg/L	0.62	23.2	0.1	0.96
Silicon (total)	---	---	µg/L	2500	14200	---	---
Silver (total)	0.1	---	µg/L	< 0.05	**0.16**	< 0.05	0.06
Strontium (total)	---	---	µg/L	178	484	---	---
Thallium (total)	---	0.3	µg/L	0.04	0.08	---	---
Tin (total)	---	---	µg/L	0.28	4.13	0.14	1.26
Titanium (total)	---	---	µg/L	1.03	288	0.09	1.36
Antimony (total)	---	20	µg/L	< 0.9	1.5	< 0.9	2.4
Selenium (total)	100	---	µg/L	0.14	3.96	0.13	6.11
Uranium (total)	---	5	µg/L	0.82	1.4	---	---
Vanadium (total)	---	6	µg/L	0.23	36.6	0.15	33.02
Zinc (total)	30	20	µg/L	16	**113**	5	< 2
Cation sum	---	---	meq/L	8.64	93.1	---	---
Anion Sum	---	---	meq/L	7.55	102	---	---
Anion-Cation Balance	---	---	% difference	6.73	-4.3	---	---
Ion Ratio	---	---	No unit	1.14	0.92	---	---
Total Dissolved Solids (calculated)	---	---	mg/L	414	5725	---	---
Conductivity (calculated)	---	---	uS/cm	810	9731	---	---
Langeliers Index 4° C	---	---	@ 4° C	0.57	1.83	---	---
Saturation pH 4°C	---	---	pHs @ 4°C	7.75	7.73	---	---
Ammonia Un-Ionized (calculated)	0.02	---	mg/L	0.0169	**3.9766**	---	---

Notes:

mg/L	milligram per litre
µg/L	microgram per litre
s.u.	standard unit
<	Value not detected above the associated analytical laboratory detection limit
---	Not analyzed
10	Exceeds Table 2 - Provincial Water Quality Objectives
10	Exceeds Table 2 - Interim PWQOs
10	Exceeds Table 2 - Provincial Water Quality Objectives and Interim PWQOs

*	If pH is between 4.5 - 5.5, interim PWQO = 0.015 mg/L. At pH >6.0 to 9.0, interim PWQO = 0.075 mg/L. In addition, pH values of <6.5 and >8.5 are outside the range considered acceptable by the PWQO for pH.
**	If Hardness (as CaCO3) <75 mg/L, PWQO = 11 µg/L. If Hardness (as CaCO3) >75 mg/L, PWQO = 1100 µg/L.
***	If Hardness (as CaCO3) <100 mg/L, Interim PWQO = 0.1 µg/L. If Hardness (as CaCO3) >100mg/L, PWQO = 0.5 µg/L.
****	If Hardness (as CaCO3) is between 0 mg/L to 20 mg/L, Interim PWQO = 1 µg/L. If Hardness (as CaCO3) >20 mg/L, PWQO = 5 µg/L.
*****	To avoid nuisance concentrations of algae in lakes, average total phosphorus concentrations for the ice-free period should not exceed 20 µg/L; A high level of protection against aesthetic deterioration will be provided by a total phosphorus concentration for the ice-free period of 10 µg/L or less. This should apply to all lakes naturally below this value; Excessive plant growth in rivers and streams should be eliminated at a total phosphorus concentration below 30 µg/L.
+	If Alkalinity (as CaCO3) <20 mg/L, PWQO = 5 µg/L. If Alkalinity (as CaCO3) 20 - 40 mg/L, PWQO = 10 µg/L. If Alkalinity (as CaCO3) 40 - 80 mg/L, PWQO = 20 µg/L. If Alkalinity (as CaCO3) >80 mg/L, PWQO =25 µg/L.
±	If Hardness (as CaCO3) <30 mg/L, Interim PWQO = 1 µg/L. If Hardness (as CaCO3) 30 - 80 mg/L, Interim PWQO = 3 µg/L. If Hardness (as CaCO3) >80 mg/L, Interim PWQO = 5 µg/L.

			Sample Identification	**BH21-04**	**BH21-05C**	**BH21-04 (dissolved)**	**BH21-05C (dissolved)**
			Sampling Date	18-Aug-21 11:10	18-Aug-21 12:20	18-Aug-21 11:10	18-Aug-21 12:20
			Laboratory Certificate of Analysis No.	CA14233-AUG21	CA14233-AUG21	CA15111-SEP21	CA15111-SEP21
			Laboratory Name	SGS	SGS	SGS	SGS
			Consultant Name	Thuber Engineering	Thuber Engineering	Thuber Engineering	Thuber Engineering
Analysis	Guelph Storm By-law Limit	Guelph Sanitary Sewer By-Law Limit	**Units**				
Fecal Coliform	200	---	cfu/100mL	0	**NDOGFC**	---	---
pH	6.0-9.0	6.0 - 9.5	No unit	7.71	**9.31**	---	---
Carbonaceous Biochemical Oxygen Demand	15	300	mg/L	< 4	**75**	---	---
Total Suspended Solids	15	350	mg/L	9	**806**	---	---
Oil & Grease (total)	---	---	mg/L	2	4	---	---
Oil & Grease (animal/vegetable)	---	100	mg/L	< 4	< 4	---	---
Oil & Grease (mineral/synthetic)	---	15	mg/L	< 4	< 4	---	---
4AAP-Phenolics	---	1.0	mg/L	0.002	0.095	---	---
Total Kjeldahl Nitrogen	---	100	as N mg/L	< 0.5	11.4	---	---
Cyanide (total)	---	1.2	mg/L	< 0.01	0.01	---	---
Fluoride	---	10.0	mg/L	0.11	0.89	---	---
Chloride	---	1500	mg/L	100	2900	---	---
Sulphate	---	1500	mg/L	17	210	---	---
Mercury (total)	0.001	0.01	mg/L	< 0.00001	0.00003	---	---
Aluminum (total)	---	50	mg/L	0.018	3.38	0.009	0.248
Antimony (total)	---	5.0	mg/L	< 0.0009	0.0014	< 0.0009	0.0024
Arsenic (total)	---	1.0	mg/L	0.0003	0.0135	0.0003	0.0188
Bismuth (total)	---	5.0	mg/L	0.00004	0.00012	0.00002	0.00018
Cadmium (total)	0.001	0.7	mg/L	0.000044	0.000216	0.000036	0.000103
Chromium (total)	0.2	2.8	mg/L	0.00046	0.00618	< 0.00008	0.0285
Cobalt (total)	---	5.0	mg/L	0.000151	0.00364	0.000167	0.00289
Copper (total)	0.01	2.0	mg/L	0.0014	**0.0177**	0.0021	**0.0159**
Iron (total)	---	50	mg/L	0.037	3.09	< 0.007	0.082
Lead (total)	0.05	0.7	mg/L	0.00045	0.0193	0.0001	0.00096
Manganese (total)	---	5.0	mg/L	0.091	0.0934	0.0942	0.0274
Molybdenum (total)	---	5.0	mg/L	0.00068	0.0687	0.00087	0.103
Nickel (total)	0.05	2.0	mg/L	0.001	0.0465	0.0011	**0.0611**
Phosphorus (total)	0.4	10.0	mg/L	0.07	**0.445**	0.09	0.268
Selenium (total)	---	0.8	mg/L	0.00014	0.00347	0.00013	0.00611
Silver (total)	---	0.4	mg/L	< 0.00005	0.00015	< 0.00005	0.00006
Tin (total)	---	5.0	mg/L	0.00045	0.00343	0.00014	0.00126
Titanium (total)	---	5.0	mg/L	0.0028	0.07166	0.00009	0.00136
Vanadium (total)	---	5.0	mg/L	0.00016	0.0285	0.00015	0.03302
Zinc (total)	0.05	2.0	mg/L	0.012	**0.085**	0.005	< 0.002
Barium	---	5.0	mgL	0.02	0.0669	---	---

Notes:

mg/L	milligram per litre
cfu/100mL	colony-forming unit per 100 mL
s.u.	standard unit
<	Value not detected above the associated analytical laboratory detection limit
---	Not analyzed
NDOGFC	No Data, Overgrown with Fecal Coliforms
10	Exceeds Guelph Storm Sewer By-Law Limit
10	Exceeds Guelph Sanitary Sewer By-law Limit
10	Exceeds Guelph Storm Sewer and Sanitary Sewer By-law Limits

FINAL REPORT

CA14232-AUG21 R1

30842, Guelph Revitalization Project

Prepared for

Thurber Engineering Ltd.

FINAL REPORT

CA14232-AUG21 R1

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Thurber Engineering Ltd.	Project Specialist	Jill Campbell, B.Sc.,GISAS
		Laboratory	SGS Canada Inc.
Address	103, 2010 Winston Park Drive Oakville, ON L6H 5R7. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Paul Coulson	Telephone	2165
Telephone	905-829-8666 x 234	Facsimile	705-652-6365
Facsimile		Email	jill.campbell@sgs.com
Email	pcoulson@thurber.ca	SGS Reference	CA14232-AUG21
Project	30842, Guelph Revitalization Project	Received	08/18/2021
Order Number		Approved	08/24/2021
Samples	Ground Water (2)	Report Number	CA14232-AUG21 R1
		Date Reported	08/24/2021

COMMENTS

MAC - Maximum Acceptable Concentration
AO/OG - Aesthetic Objective / Operational Guideline
NR - Not reportable under applicable Provincial drinking water regulations as per client.

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

Chain of Custody Number:026094

Raise RL for NO2 due ot matrix interference

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

TABLE OF CONTENTS

Client: Thurber Engineering Ltd.
Project: 30842, Guelph Revitalization Project
Project Manager: Paul Coulson
Samplers: Joshua Alexander

PACKAGE: **General Chemistry** (WATER)

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

Sample Number	7	8
Sample Name	BH21-04	BH21-05C
Sample Matrix	Ground Water	Ground Water
Sample Date	18/08/2021	18/08/2021

Parameter	Units	RL	L1	Result	Result
General Chemistry					
Alkalinity	mg/L as CaCO3	2		221	178
Bicarbonate	mg/L as CaCO3	2		219	86
Carbonate	mg/L as CaCO3	2		2	92
OH	mg/L as CaCO3	2		< 2	< 2
Colour	TCU	3		6	85
Conductivity	uS/cm	2		753	9050
Turbidity	NTU	0.10		3.80	36.3
Ammonia+Ammonium (N)	as N mg/L	0.04		0.13	6.74
Phosphorus (total reactive)	mg/L	0.03		< 0.03	0.08
Total Organic Carbon	mg/L	1		4	68
Metals and Inorganics					
Fluoride	mg/L	0.06		0.10	0.92
Bromide	mg/L	0.05		<0.05	0.98
Nitrite (as N)	as N mg/L	0.003		0.028	< 0.03↑
Nitrate (as N)	as N mg/L	0.006		0.180	0.032
Sulphate	mg/L	0.04		15	230
Hardness	mg/L as CaCO3	0.05		287	354
Aluminum (0.2µm)	mg/L	0.001	0.015	0.008	0.406
Aluminum	µg/L	1	15	28	6505

Client: Thurber Engineering Ltd.

Project: 30842, Guelph Revitalization Project

Project Manager: Paul Coulson

Samplers: Joshua Alexander

PACKAGE: **Metals and Inorganics** (WATER)

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

Sample Number	7	8
Sample Name	BH21-04	BH21-05C
Sample Matrix	Ground Water	Ground Water
Sample Date	18/08/2021	18/08/2021

Metals and Inorganics (continued)

Parameter	Units	RL	L1	Result	Result
Arsenic	µg/L	0.2	5	0.4	15.8
Boron	µg/L	2	200	22	109
Barium	µg/L	0.02		20.0	66.9
Beryllium	µg/L	0.007	11	0.030	0.230
Cobalt	µg/L	0.004	0.9	0.260	4.42
Calcium	mg/L	0.01		74.3	127
Cadmium	µg/L	0.003	0.1	0.030	0.200
Copper	µg/L	0.2	1	1.8	22.6
Chromium	µg/L	0.08		0.32	8.30
Iron	ug/L	7	300	40	4630
Potassium	mg/L	0.009		2.42	10.8
Magnesium	mg/L	0.001		24.7	9.14
Manganese	µg/L	0.01		104	107
Molybdenum	µg/L	0.04	40	0.79	73.6
Nickel	µg/L	0.1	25	1.2	59.0
Sodium	mg/L	0.01		64.8	1940
Phosphorus	mg/L	0.003	0.01	0.030	0.590
Lead	µg/L	0.01	1	0.62	23.2
Silicon	ug/L	20		2500	14200
Silver	µg/L	0.05	0.1	< 0.05	0.16
Strontium	µg/L	0.02		178	484
Thallium	µg/L	0.005	0.3	0.040	0.080
Tin	µg/L	0.06		0.28	4.13

Client: Thurber Engineering Ltd.
Project: 30842, Guelph Revitalization Project
Project Manager: Paul Coulson
Samplers: Joshua Alexander

PACKAGE: **Metals and Inorganics** (WATER)

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

Sample Number	7	8
Sample Name	BH21-04	BH21-05C
Sample Matrix	Ground Water	Ground Water
Sample Date	18/08/2021	18/08/2021

Parameter	Units	RL	L1	Result	Result
Metals and Inorganics (continued)					
Titanium	ug/L	0.05		1.03	288
Antimony	µg/L	0.9	20	< 0.9	1.5
Selenium	µg/L	0.04	100	0.14	3.96
Uranium	µg/L	0.002	5	0.820	1.40
Vanadium	µg/L	0.01	6	0.23	36.6
Zinc	µg/L	2	20	16	113
Other (ORP)					
pH	No unit	5	8.5	8.32	9.56
Chromium VI	µg/L	0.2	1	< 0.2	0.5
Chloride	mg/L	0.04		100	3300
Mercury (dissolved)	mg/L	0.00001		< 0.00001	0.00004

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	PWQO / WATER / - - Table 2 - General - July 1999 PIBS 3303E L1
BH21-04				
Aluminum	SM 3030/EPA 200.8	µg/L	28	15
Copper	SM 3030/EPA 200.8	µg/L	1.8	1
Phosphorus	SM 3030/EPA 200.8	mg/L	0.030	0.01
BH21-05C				
Aluminum	SM 3030/EPA 200.8	µg/L	6505	15
Aluminum (dissolved)	SM 3030/EPA 200.8	mg/L	0.406	0.015
Arsenic	SM 3030/EPA 200.8	µg/L	15.8	5
Cadmium	SM 3030/EPA 200.8	µg/L	0.200	0.1
Cobalt	SM 3030/EPA 200.8	µg/L	4.42	0.9
Copper	SM 3030/EPA 200.8	µg/L	22.6	1
Iron	SM 3030/EPA 200.8	ug/L	4630	300
Lead	SM 3030/EPA 200.8	µg/L	23.2	1
Molybdenum	SM 3030/EPA 200.8	µg/L	73.6	40
Nickel	SM 3030/EPA 200.8	µg/L	59.0	25
Phosphorus	SM 3030/EPA 200.8	mg/L	0.590	0.01
Silver	SM 3030/EPA 200.8	µg/L	0.16	0.1
Vanadium	SM 3030/EPA 200.8	µg/L	36.6	6
Zinc	SM 3030/EPA 200.8	µg/L	113	20
pH	SM 4500	No unit	9.56	8.5

QC SUMMARY

QCR_SubCategory

Method: SM 2130 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-003

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Turbidity	EWL0341-AUG21	NTU	0.10	< 0.10	1	10	100	90	110	NA		

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0336-AUG21	mg/L as CaCO3	2	< 2	ND	20	102	80	120	NA		
Alkalinity	EWL0338-AUG21	mg/L as CaCO3	2	< 2	0	20	104	80	120	NA		

QC SUMMARY

Ammonia by SFA

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0209-AUG21	mg/L	0.04	<0.04	1	10	98	90	110	91	75	125
Ammonia+Ammonium (N)	SKA0210-AUG21	mg/L	0.04	<0.04	0	10	92	90	110	95	75	125

Anions by IC

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0371-AUG21	mg/L	0.04	<0.04	NV	20	98	90	110	NV	75	125
Sulphate	DIO0371-AUG21	mg/L	0.04	<0.04	1	20	96	90	110	91	75	125
Bromide	DIO0372-AUG21	mg/L	0.05	<0.05	2	20	99	90	110	99	75	125
Nitrite (as N)	DIO0372-AUG21	mg/L	0.003	<0.003	NV	20	99	90	110	NV	75	125
Nitrate (as N)	DIO0372-AUG21	mg/L	0.006	<0.006	0	20	102	90	110	97	75	125
Bromide	DIO0374-AUG21	mg/L	0.05	<0.05	1	20	99	90	110	106	75	125
Nitrate (as N)	DIO0374-AUG21	mg/L	0.006	<0.006	0	20	102	90	110	107	75	125
Sulphate	DIO0383-AUG21	mg/L	0.04	<0.04	0	20	103	90	110	NV	75	125
Nitrite (as N)	DIO0391-AUG21	mg/L	0.003	<0.003	9	20	94	90	110	92	75	125
Chloride	DIO0417-AUG21	mg/L	0.04	<0.04	0	20	101	90	110	98	75	125

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-[ENV]SFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Organic Carbon	SKA0198-AUG21	mg/L	1	<1	2	10	100	90	110	114	75	125
Total Organic Carbon	SKA0211-AUG21	mg/L	1	<1	ND	10	94	90	110	102	75	125

Carbonate/Bicarbonate

Method: SM 2320 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Carbonate	EWL0336-AUG21	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0336-AUG21	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
OH	EWL0336-AUG21	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Carbonate	EWL0338-AUG21	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		
Bicarbonate	EWL0338-AUG21	mg/L as CaCO3	2	< 2	0	10	NA	90	110	NA		
OH	EWL0338-AUG21	mg/L as CaCO3	2	< 2	ND	10	NA	90	110	NA		

QC SUMMARY

Colour

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Colour	EWL0410-AUG21	TCU	3	< 3	2	10	95	80	120	NA		

Conductivity

Method: SM 2510 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0336-AUG21	uS/cm	2	< 2	ND	20	99	90	110	NA		
Conductivity	EWL0338-AUG21	uS/cm	2	< 2	0	20	99	90	110	NA		

QC SUMMARY

Flouride by Specific Ion Electrode

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-014

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0351-AUG21	mg/L	0.06	<0.06	ND	10	103	90	110	104	75	125
Fluoride	EWL0392-AUG21	mg/L	0.06	<0.06	0	10	101	90	110	NV	75	125

Hexavalent Chromium by SFA

Method: EPA218.6/EPA3060A I Internal ref.: ME-CA-[ENV]SKA-LAK-AN-012

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chromium VI	SKA0207-AUG21	ug/L	0.2	<0.2	ND	20	96	80	120	94	75	125

Mercury by CVAAS

Method: EPA 7471A/SM 3112B I Internal ref.: ME-CA-[ENV]SPE-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (dissolved)	EHG0026-AUG21	mg/L	0.00001	< 0.00001	ND	20	105	80	120	104	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver	EMS0132-AUG21	ug/L	0.05	<0.00005	ND	20	101	90	110	98	70	130
Aluminum	EMS0132-AUG21	ug/L	1	<0.001	8	20	94	90	110	126	70	130
Aluminum (0.2µm)	EMS0132-AUG21	mg/L	0.001	<1	8	20	94	90	110	126	70	130
Arsenic	EMS0132-AUG21	ug/L	0.2	<0.0002	3	20	98	90	110	108	70	130
Barium	EMS0132-AUG21	ug/L	0.02	<0.00002	7	20	92	90	110	111	70	130
Beryllium	EMS0132-AUG21	ug/L	0.007	<0.00007	18	20	94	90	110	91	70	130
Boron	EMS0132-AUG21	ug/L	2	<0.002	2	20	102	90	110	107	70	130
Calcium	EMS0132-AUG21	mg/L	0.01	<0.01	4	20	104	90	110	112	70	130
Cadmium	EMS0132-AUG21	ug/L	0.003	<0.000003	6	20	102	90	110	98	70	130
Cobalt	EMS0132-AUG21	ug/L	0.004	<0.000004	4	20	98	90	110	106	70	130
Chromium	EMS0132-AUG21	ug/L	0.08	<0.00008	ND	20	100	90	110	106	70	130
Copper	EMS0132-AUG21	ug/L	0.2	<0.0002	8	20	96	90	110	101	70	130
Iron	EMS0132-AUG21	ug/L	7	<0.007	0	20	105	90	110	125	70	130
Potassium	EMS0132-AUG21	mg/L	0.009	<0.009	7	20	103	90	110	109	70	130
Magnesium	EMS0132-AUG21	mg/L	0.001	<0.001	3	20	108	90	110	103	70	130
Manganese	EMS0132-AUG21	ug/L	0.01	<0.00001	7	20	97	90	110			
Molybdenum	EMS0132-AUG21	ug/L	0.04	<0.00004	16	20	105	90	110	106	70	130
Sodium	EMS0132-AUG21	mg/L	0.01	<0.01	4	20	109	90	110	112	70	130
Nickel	EMS0132-AUG21	ug/L	0.1	<0.0001	1	20	98	90	110	100	70	130
Lead	EMS0132-AUG21	ug/L	0.01	<0.00001	4	20	106	90	110	112	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS (continued)

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus	EMS0132-AUG21	mg/L	0.003	0.003	ND	20	102	90	110	NV	70	130
Antimony	EMS0132-AUG21	ug/L	0.9	<0.0009	5	20	102	90	110	97	70	130
Selenium	EMS0132-AUG21	ug/L	0.04	<0.00004	15	20	99	90	110	106	70	130
Silicon	EMS0132-AUG21	ug/L	20	<0.02	11	20	96	90	110	NV	70	130
Tin	EMS0132-AUG21	ug/L	0.06	<0.00006	15	20	94	90	110	NV	70	130
Strontium	EMS0132-AUG21	ug/L	0.02	<0.00002	3	20	96	90	110	106	70	130
Titanium	EMS0132-AUG21	ug/L	0.05	<0.00005	0	20	97	90	110	NV	70	130
Thallium	EMS0132-AUG21	ug/L	0.005	<0.000005	ND	20	96	90	110	108	70	130
Uranium	EMS0132-AUG21	ug/L	0.002	<0.000002	5	20	99	90	110	109	70	130
Vanadium	EMS0132-AUG21	ug/L	0.01	<0.00001	0	20	98	90	110	106	70	130
Zinc	EMS0132-AUG21	ug/L	2	<0.002	ND	20	93	90	110	119	70	130

QC SUMMARY

pH

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0336-AUG21	No unit	5	NA	0		100			NA		
pH	EWL0338-AUG21	No unit	5	NA	0		100			NA		

Reactive Phosphorus by SFA

Method: SM 4500-P F I Internal ref.: ME-CA-[ENV]SFA-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Phosphorus (total reactive)	SKA0196-AUG21	mg/L	0.03	<0.03	ND	10	98	90	110	87	75	125
Phosphorus (total reactive)	SKA0202-AUG21	mg/L	0.03	<0.03	10	10	101	90	110	94	75	125

QC SUMMARY

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

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

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

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

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

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

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

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

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

LEGEND

FOOTNOTES

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

Samples analysed as received. Solid samples expressed on a dry weight basis. “Temperature Upon Receipt” is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act” published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

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

No: 026094 Page ____ of ____

Laboratory Information Section - Lab use only

Received By: Joel R | Received By (signature): E
Received Date: 08/18/2021 (mm/dd/yy) | Custody Seal Present: Yes ☑ No ☐ | Cooling Agent Present: Yes ☑ No ☐ Type: Ice
Received Time: 16:45 (hr:min) | Custody Seal Intact: Yes ☑ No ☐ | Temperature Upon Receipt (°C): 9°C 9°C 8°C
LAB LIMS #: CA14232-33-AUG21

REPORT INFORMATION	INVOICE INFORMATION
Company: Thurber Engineering Ltd.	☐ (same as Report Information)
Contact: Paul Coulson	Company:
Address: 2010-103 Lowndes Park Dr. Oakville, L6H5R7	Contact:
Phone: 613-606-7303	Address:
Fax: jalexander@thurber.ca	Phone:
Email: pcoulson@thurber.ca	Email: accountingON@thurber.ca

Quotation #: | P.O. #:
Project #: 30842 | Site Location/ID: Guelph Revitalization Project

TURNAROUND TIME (TAT) REQUIRED

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

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

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

REGULATIONS

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

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

Sewer By-Law: ☒ Sanitary ☒ Storm Municipality: Guelph Hall

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	M&I: Metals & Inorganics (incl CrVI, CN, Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water)	M&I: Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI	M&I: ICP Metals only (Sb,As,Ba,Be,B,Cd,Cr,Co,Cu,Pb,Mo,Ni,	SVOC: PAHs only	SVOC: SVOCs all incl PAHs, ABNs, CPs	PCB: PCBs Total ☐ Aroclor ☐	PHC: F1-F4 + BTEX	PHC: F1-F4 only no BTEX	VOC: VOCs all incl BTEX	VOC: BTEX only	Pest: Pesticides Organochlorine or specify other	Other: CR+VT	Other: Sewer Use: San.+Sewer Storm Specify pkg: Guelph	Other: Water Characterization Pkg ☐ Extended ☒ General	SPLP: Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	TCLP: Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	COMMENTS:
1	BH21-04	08/18/21	11:15	9	water	N														X			
2	BH 21-04	08/18/21	11:10	11	water	N												X	X				
3	BH 21-05C	08/18/21	12:10	9	water	N														X			
4	BH.21-05C	08/18/21	12:20	11	water	N												X	X				
5																							
6																							
7																							
8																							
9																							
10																							
11																							
12																							

Observations/Comments/Special Instructions

Sampled By (NAME): Joshua Alexander | Signature: | Date: 08/18/21 (mm/dd/yy)
Relinquished by (NAME): Joshua Alexander | Signature: | Date: 08/18/21 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.5
Date of Issue: 11 June 2021

FINAL REPORT

CA14233-AUG21 R1

30842, Guelph Revitalization Project

Prepared for

Thurber Engineering Ltd.

FINAL REPORT

CA14233-AUG21 R1

First Page

CLIENT DETAILS		LABORATORY DETAILS	
Client	Thurber Engineering Ltd.	Project Specialist	Jill Campbell, B.Sc.,GISAS
		Laboratory	SGS Canada Inc.
Address	103, 2010 Winston Park Drive Oakville, ON L6H 5R7. Canada	Address	185 Concession St., Lakefield ON, K0L 2H0
Contact	Paul Coulson	Telephone	2165
Telephone	905-829-8666 x 234	Facsimile	705-652-6365
Facsimile		Email	jill.campbell@sgs.com
Email	pcoulson@thurber.ca	SGS Reference	CA14233-AUG21
Project	30842, Guelph Revitalization Project	Received	08/18/2021
Order Number		Approved	08/26/2021
Samples	Ground Water (2)	Report Number	CA14233-AUG21 R1
		Date Reported	08/26/2021

COMMENTS

RL - SGS Reporting Limit

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

Chain of Custody Number:026094

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

TABLE OF CONTENTS

Client: Thurber Engineering Ltd.
Project: 30842, Guelph Revitalization Project
Project Manager: Paul Coulson
Samplers: Joshua Alexander

PACKAGE: **SANSEW - General Chemistry**
(WATER)

L1 = SANSEW / WATER / - - Guelph - Sanitary Sewer Discharge - BL_1996_15202
L2 = SANSEW / WATER / - - Guelph - Storm Sewer Discharge - BL_1996_15202

					Sample Number	8	9
					Sample Name	BH21-04	BH21-05C
					Sample Matrix	Ground Water	Ground Water
					Sample Date	18/08/2021	18/08/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
General Chemistry						
Carbonaceous Biochemical Oxygen Demand	mg/L	2	300	15	< 4 ↑	75
Total Suspended Solids	mg/L	2	350	15	9	806
Total Kjeldahl Nitrogen	as N mg/L	0.5	100		< 0.5	11.4

PACKAGE: **SANSEW - Metals and Inorganics**
(WATER)

L1 = SANSEW / WATER / - - Guelph - Sanitary Sewer Discharge - BL_1996_15202
L2 = SANSEW / WATER / - - Guelph - Storm Sewer Discharge - BL_1996_15202

					Sample Number	8	9
					Sample Name	BH21-04	BH21-05C
					Sample Matrix	Ground Water	Ground Water
					Sample Date	18/08/2021	18/08/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics						
Cyanide (total)	mg/L	0.01	2		< 0.01	0.01
Fluoride	mg/L	0.06	10		0.11	0.89
Sulphate	mg/L	0.2	1500		17	210
Aluminum (total)	mg/L	0.001	50		0.018	3.38
Antimony (total)	mg/L	0.0009	5		< 0.0009	0.0014
Arsenic (total)	mg/L	0.0002	1		0.0003	0.0135
Bismuth (total)	mg/L	0.00001	5		0.00004	0.00012
Cadmium (total)	mg/L	0.000003	1	0.001	0.000044	0.000216
Chromium (total)	mg/L	0.00008	5	0.2	0.00046	0.00618

Client: Thurber Engineering Ltd.
Project: 30842, Guelph Revitalization Project
Project Manager: Paul Coulson
Samplers: Joshua Alexander

PACKAGE: **SANSEW - Metals and Inorganics**
(WATER)

L1 = SANSEW / WATER / - - Guelph - Sanitary Sewer Discharge - BL_1996_15202
L2 = SANSEW / WATER / - - Guelph - Storm Sewer Discharge - BL_1996_15202

				Sample Number	8	9
				Sample Name	BH21-04	BH21-05C
				Sample Matrix	Ground Water	Ground Water
				Sample Date	18/08/2021	18/08/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Metals and Inorganics (continued)						
Cobalt (total)	mg/L	0.000004	5		0.000151	0.00364
Copper (total)	mg/L	0.0002	3	0.01	0.0014	0.0177
Iron (total)	mg/L	0.007	50		0.037	3.09
Lead (total)	mg/L	0.00009	5	0.05	0.00045	0.0193
Manganese (total)	mg/L	0.00001	5		0.0910	0.0934
Molybdenum (total)	mg/L	0.00004	5		0.00068	0.0687
Nickel (total)	mg/L	0.0001	3	0.05	0.0010	0.0465
Phosphorus (total)	mg/L	0.003	10		0.070	0.445
Selenium (total)	mg/L	0.00004	5		0.00014	0.00347
Silver (total)	mg/L	0.00005	5		< 0.00005	0.00015
Tin (total)	mg/L	0.00006	5		0.00045	0.00343
Titanium (total)	mg/L	0.00005	5		0.00280	0.07166
Vanadium (total)	mg/L	0.00001	5		0.00016	0.02850
Zinc (total)	mg/L	0.002	3	0.05	0.012	0.085

Client: Thurber Engineering Ltd.
Project: 30842, Guelph Revitalization Project
Project Manager: Paul Coulson
Samplers: Joshua Alexander

PACKAGE: **SANSEW - Microbiology** (WATER)

L1 = SANSEW / WATER / - - Guelph - Sanitary Sewer Discharge - BL_1996_15202
L2 = SANSEW / WATER / - - Guelph - Storm Sewer Discharge - BL_1996_15202

Parameter	Units	RL	L1	L2	Sample Number: 8 / Sample Name: BH21-04 / Sample Matrix: Ground Water / Sample Date: 18/08/2021 Result	Sample Number: 9 / Sample Name: BH21-05C / Sample Matrix: Ground Water / Sample Date: 18/08/2021 Result
Microbiology						
Fecal Coliform	cfu/100mL	-		200	0	#NDOGFC

PACKAGE: **SANSEW - Oil and Grease** (WATER)

L1 = SANSEW / WATER / - - Guelph - Sanitary Sewer Discharge - BL_1996_15202
L2 = SANSEW / WATER / - - Guelph - Storm Sewer Discharge - BL_1996_15202

Parameter	Units	RL	L1	L2	Sample Number: 8 / Sample Name: BH21-04 / Sample Matrix: Ground Water / Sample Date: 18/08/2021 Result	Sample Number: 9 / Sample Name: BH21-05C / Sample Matrix: Ground Water / Sample Date: 18/08/2021 Result
Oil and Grease						
Oil & Grease (total)	mg/L	2			2	4
Oil & Grease (animal/vegetable)	mg/L	4	100		< 4	< 4
Oil & Grease (mineral/synthetic)	mg/L	4	15		< 4	< 4

PACKAGE: **SANSEW - Other (ORP)** (WATER)

L1 = SANSEW / WATER / - - Guelph - Sanitary Sewer Discharge - BL_1996_15202
L2 = SANSEW / WATER / - - Guelph - Storm Sewer Discharge - BL_1996_15202

Parameter	Units	RL	L1	L2	Sample Number: 8 / Sample Name: BH21-04 / Sample Matrix: Ground Water / Sample Date: 18/08/2021 Result	Sample Number: 9 / Sample Name: BH21-05C / Sample Matrix: Ground Water / Sample Date: 18/08/2021 Result
Other (ORP)						
pH	No unit	0.05	9.5	9	7.71	9.31
Chloride	mg/L	0.2	1500		100	2900
Mercury (total)	mg/L	0.00001	0.1	0.001	< 0.00001	0.00003

Client: Thurber Engineering Ltd.
Project: 30842, Guelph Revitalization Project
Project Manager: Paul Coulson
Samplers: Joshua Alexander

PACKAGE: **SANSEW - Phenols** (WATER)

L1 = SANSEW / WATER / - - Guelph - Sanitary Sewer Discharge - BL_1996_15202

L2 = SANSEW / WATER / - - Guelph - Storm Sewer Discharge - BL_1996_15202

				Sample Number	8	9
				Sample Name	BH21-04	BH21-05C
				Sample Matrix	Ground Water	Ground Water
				Sample Date	18/08/2021	18/08/2021
Parameter	**Units**	**RL**	**L1**	**L2**	**Result**	**Result**
Phenols						
4AAP-Phenolics	mg/L	0.002	1		0.002	0.095

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	SANSEW / WATER / - - Guelph - Sanitary Sewer Discharge - BL_1996_15202 L1	SANSEW / WATER / - - Guelph - Storm Sewer Discharge - BL_1996_15202 L2
BH21-05C					
Chloride	EPA300/MA300-Ions1.3	mg/L	2900	1500	
Total Suspended Solids	SM 2540D	mg/L	806	350	15
Copper	SM 3030/EPA 200.8	mg/L	0.0177		0.01
Zinc	SM 3030/EPA 200.8	mg/L	0.085		0.05
pH	SM 4500	mg/L	9.31		9
CBOD	SM 5210	mg/L	75		15

QC SUMMARY

Anions by IC

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0371-AUG21	mg/L	0.2	<0.2	NV	20	98	90	110	NV	75	125
Sulphate	DIO0371-AUG21	mg/L	0.2	<0.2	1	20	96	90	110	91	75	125
Chloride	DIO0395-AUG21	mg/L	0.2	<0.2	ND	20	99	90	110	106	75	125
Sulphate	DIO0395-AUG21	mg/L	0.2	<0.2	0	20	101	90	110	100	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Carbonaceous Biochemical Oxygen Demand	BOD0037-AUG21	(CBOD5) mg/L	2	< 2	2	30	95	70	130	NV	70	130

QC SUMMARY

Cyanide by SFA

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Cyanide (total)	SKA0203-AUG21	mg/L	0.01	<0.01	ND	10	93	90	110	80	75	125

Fluoride by Specific Ion Electrode

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fluoride	EWL0351-AUG21	mg/L	0.06	<0.06	ND	10	103	90	110	104	75	125
Fluoride	EWL0392-AUG21	mg/L	0.06	<0.06	0	10	101	90	110	NV	75	125

Mercury by CVAAS

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Mercury (total)	EHG0026-AUG21	mg/L	0.00001	< 0.00001	ND	20	105	80	120	104	70	130

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (total)	EMS0132-AUG21	mg/L	0.00005	<0.00005	ND	20	101	90	110	98	70	130
Aluminum (total)	EMS0132-AUG21	mg/L	0.001	<0.001	8	20	94	90	110	126	70	130
Arsenic (total)	EMS0132-AUG21	mg/L	0.0002	<0.0002	3	20	98	90	110	108	70	130
Bismuth (total)	EMS0132-AUG21	mg/L	0.00001	<0.00001	ND	20	94	90	110	102	70	130
Cadmium (total)	EMS0132-AUG21	mg/L	0.000003	<0.000003	6	20	102	90	110	98	70	130
Cobalt (total)	EMS0132-AUG21	mg/L	0.000004	<0.000004	4	20	98	90	110	106	70	130
Chromium (total)	EMS0132-AUG21	mg/L	0.00008	<0.00008	ND	20	100	90	110	106	70	130
Copper (total)	EMS0132-AUG21	mg/L	0.0002	<0.0002	8	20	96	90	110	101	70	130
Iron (total)	EMS0132-AUG21	mg/L	0.007	<0.007	0	20	105	90	110	125	70	130
Manganese (total)	EMS0132-AUG21	mg/L	0.00001	<0.00001	7	20	97	90	110			
Molybdenum (total)	EMS0132-AUG21	mg/L	0.00004	<0.00004	16	20	105	90	110	106	70	130
Nickel (total)	EMS0132-AUG21	mg/L	0.0001	<0.0001	1	20	98	90	110	100	70	130
Lead (total)	EMS0132-AUG21	mg/L	0.00009	<0.00001	4	20	106	90	110	112	70	130
Phosphorus (total)	EMS0132-AUG21	mg/L	0.003	0.003	ND	20	102	90	110	NV	70	130
Antimony (total)	EMS0132-AUG21	mg/L	0.0009	<0.0009	5	20	102	90	110	97	70	130
Selenium (total)	EMS0132-AUG21	mg/L	0.00004	<0.00004	15	20	99	90	110	106	70	130
Tin (total)	EMS0132-AUG21	mg/L	0.00006	<0.00006	15	20	94	90	110	NV	70	130
Titanium (total)	EMS0132-AUG21	mg/L	0.00005	<0.00005	0	20	97	90	110	NV	70	130
Vanadium (total)	EMS0132-AUG21	mg/L	0.00001	<0.00001	0	20	98	90	110	106	70	130
Zinc (total)	EMS0132-AUG21	mg/L	0.002	<0.002	ND	20	93	90	110	119	70	130

QC SUMMARY

Microbiology

Method: SM 9222D | Internal ref.: ME-CA-IENVIMIC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Fecal Coliform	BAC9349-AUG21	cfu/100mL	-	ACCEPTED	ACCEPTED							

Oil & Grease

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (total)	GCM0382-AUG21	mg/L	2	<2	NSS	20	93	75	125			

QC SUMMARY

Oil & Grease-AV/MS

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Oil & Grease (animal/vegetable)	GCM0382-AUG21	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (mineral/synthetic)	GCM0382-AUG21	mg/L	4	< 4	NSS	20	NA	70	130			
Oil & Grease (animal/vegetable)	GCM0415-AUG21	mg/L	4	< 4	NSS	20	114	70	130			
Oil & Grease (mineral/synthetic)	GCM0415-AUG21	mg/L	4	< 4	NSS	20	108	70	130			

pH

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0387-AUG21	No unit	0.05	NA	0		100			NA		

QC SUMMARY

Phenols by SFA

Method: SM 5530B-D | Internal ref.: ME-CA-[ENVISFA-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
4AAP-Phenolics	SKA0189-AUG21	mg/L	0.002	<0.002	ND	10	105	80	120	90	75	125

Suspended Solids

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0399-AUG21	mg/L	2	< 2	6	10	91	90	110	NA		

Total Nitrogen

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen	SKA0221-AUG21	as N mg/L	0.5	<0.5	ND	10	107	90	110	94	75	125

QC SUMMARY

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

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

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

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

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

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

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

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

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

LEGEND

FOOTNOTES

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

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

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

No: 026094 Page _____ of _____

Laboratory Information Section - Lab use only

Received By: Liat R | Received By (signature): E
Received Date: 08/18/2021 (mm/dd/yy) | Custody Seal Present: Yes ☒ No ☐ | Cooling Agent Present: Yes ☒ No ☐ Type: Ice
Received Time: 16:45 (hr:min) | Custody Seal Intact: Yes ☒ No ☐ | Temperature Upon Receipt (°C): 9°C, 9°C, 8°C | LAB LIMS # CA14232-33-AUG21

REPORT INFORMATION	INVOICE INFORMATION
Company: Thurber Engineering Ltd.	☐ (same as Report Information)
Contact: Paul Coulson	Company:
Address: 2010-105 Leinster Park Dr. Oakville, L6H5R7	Contact:
Phone: 613-606-7303	Address:
Fax: jalexander@thurber.ca	Phone:
Email: pcoulson@thurber.ca	Email: accountingON@thurber.ca

Quotation #: | P.O. #:
Project #: 30842 | Site Location/ID: Guelph Revitalization Project

TURNAROUND TIME (TAT) REQUIRED

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

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

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

REGULATIONS

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

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

Sewer By-Law: ☒ Sanitary ☒ Storm Municipality: Guelph well.

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	M&I: Metals & Inorganics (incl CrVI, CN,Hg pH,(B(HWS),EC,SAR-soil) (Cl, Na-water)	M&I: Full Metals Suite (ICP metals plus B(HWS-soil only),Hg, CrVI	M&I: ICP Metals only (Sb,As,Ba,Be,B,Cd,Cr,Co,Cu,Pb,Mo,Ni,	SVOC: PAHs only	SVOC: SVOCs (all incl PAHs, ABNs, CPs	PCB: PCBs Total ☐ Aroclor ☐	PHC: F1-F4 + BTEX	PHC: F1-F4 only (no BTEX	VOC: VOCs (all incl BTEX	VOC: BTEX only	Pest: Pesticides (Organochlorine or specify other	Other: CR+VT	Other: Sewer Use: San.+Sewer+Storm Specify pkg: Guelph Storm	Other: Water Charactefization Pkg ☐ Extended ☒ General	SPLP: Specify tests ☐ Metals ☐ VOC ☐ 1,4-Dioxane ☐ OCP ☐ ABN	TCLP: Specify tests ☐ M&I ☐ VOC ☐ PCB ☐ B(a)P ☐ ABN ☐ Ignit.	COMMENTS:
1	BH21-04	08/18/21	11:15	9	water	N														X			
2	BH 21-04	08/18/21	11:10	11	water	N												X	X				
3	BH 21-05C	08/18/21	12:10	9	water	N														X			
4	BH.21-05C	08/18/21	12:20	11	water	N												X	X				
5																							
6																							
7																							
8																							
9																							
10																							
11																							
12																							

Observations/Comments/Special Instructions

Sampled By (NAME): Joshua Alexander | Signature: | Date: 08/18/21 (mm/dd/yy)
Relinquished by (NAME): Joshua Alexander | Signature: | Date: 08/18/21 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.5
Date of Issue: 11 June 2021

FINAL REPORT

CA15111-SEP21 R1

Prepared for

Thurber Engineering Ltd.

FINAL REPORT

First Page

CLIENT DETAILS

Client	Thurber Engineering Ltd.
Address	103, 2010 Winston Park Drive, Oakville Canada, L6H 5R7 Phone: 905-829-8666 x 234. Fax:
Contact	Paul Coulson
Telephone	905-829-8666 x 234
Facsimile	
Email	pcoulson@thurber.ca
Project	
Order Number	
Samples	Ground Water (2)

LABORATORY DETAILS

Project Specialist	Jill Campbell, B.Sc.,GISAS
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	2165
Facsimile	705-652-6365
Email	jill.campbell@sgs.com
SGS Reference	CA15111-SEP21
Received	09/03/2021
Approved	09/10/2021
Report Number	CA15111-SEP21 R1
Date Reported	09/10/2021

COMMENTS

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

TABLE OF CONTENTS

Client: Thurber Engineering Ltd.
Project:
Project Manager: Paul Coulson
Samplers: Joshua Alexander

PACKAGE: **SANSEW - Metals and Inorganics**
(WATER)

Sample Number	8	9
Sample Name	BH21-04	BH21-05C
Sample Matrix	Ground Water	Ground Water
Sample Date	18/08/2021	18/08/2021

Parameter	Units	RL		Result	Result
Metals and Inorganics					
Aluminum (dissolved)	mg/L	0.001		0.009	0.248
Antimony (dissolved)	mg/L	0.0009		< 0.0009	0.0024
Arsenic (dissolved)	mg/L	0.0002		0.0003	0.0188
Bismuth (dissolved)	mg/L	0.00001		0.00002	0.00018
Cadmium (dissolved)	mg/L	0.000003		0.000036	0.000103
Chromium (dissolved)	mg/L	0.00008		< 0.00008	0.0285
Cobalt (dissolved)	mg/L	0.000004		0.000167	0.00289
Copper (dissolved)	mg/L	0.0002		0.0021	0.0159
Iron (dissolved)	mg/L	0.007		< 0.007	0.082
Lead (dissolved)	mg/L	0.00009		0.00010	0.00096
Manganese (dissolved)	mg/L	0.00001		0.0942	0.0274
Molybdenum (dissolved)	mg/L	0.00004		0.00087	0.103
Nickel (dissolved)	mg/L	0.0001		0.0011	0.0611
Phosphorus (dissolved)	mg/L	0.003		0.090	0.268
Selenium (dissolved)	mg/L	0.00004		0.00013	0.00611
Silver (dissolved)	mg/L	0.00005		< 0.00005	0.00006
Tin (dissolved)	mg/L	0.00006		0.00014	0.00126
Titanium (dissolved)	mg/L	0.00005		0.00009	0.00136
Vanadium (dissolved)	mg/L	0.00001		0.00015	0.03302
Zinc (dissolved)	mg/L	0.002		0.005	< 0.002

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Silver (dissolved)	EMS0027-SEP21	mg/L	0.00005	<0.00005	ND	20	99	90	110	98	70	130
Aluminum (dissolved)	EMS0027-SEP21	mg/L	0.001	<0.001	2	20	106	90	110	109	70	130
Arsenic (dissolved)	EMS0027-SEP21	mg/L	0.0002	<0.0002	3	20	101	90	110	98	70	130
Bismuth (dissolved)	EMS0027-SEP21	mg/L	0.00001	<0.00001	1	20	101	90	110	97	70	130
Cadmium (dissolved)	EMS0027-SEP21	mg/L	0.000003	<0.000003	4	20	97	90	110	96	70	130
Cobalt (dissolved)	EMS0027-SEP21	mg/L	0.000004	<0.000004	3	20	102	90	110	100	70	130
Chromium (dissolved)	EMS0027-SEP21	mg/L	0.00008	<0.00008	2	20	99	90	110	95	70	130
Copper (dissolved)	EMS0027-SEP21	mg/L	0.0002	<0.0002	0	20	104	90	110	98	70	130
Iron (dissolved)	EMS0027-SEP21	mg/L	0.007	<0.007	1	20	95	90	110	100	70	130
Manganese (dissolved)	EMS0027-SEP21	mg/L	0.00001	<0.00001	0	20	100	90	110	96	70	130
Molybdenum (dissolved)	EMS0027-SEP21	mg/L	0.00004	<0.00004	1	20	99	90	110	100	70	130
Nickel (dissolved)	EMS0027-SEP21	mg/L	0.0001	<0.0001	1	20	103	90	110	93	70	130
Lead (dissolved)	EMS0027-SEP21	mg/L	0.00009	<0.00001	4	20	104	90	110	107	70	130
Phosphorus (dissolved)	EMS0027-SEP21	mg/L	0.003	<0.003	2	20	97	90	110	NV	70	130
Antimony (dissolved)	EMS0027-SEP21	mg/L	0.0009	<0.0009	1	20	99	90	110	94	70	130
Selenium (dissolved)	EMS0027-SEP21	mg/L	0.00004	<0.00004	1	20	97	90	110	94	70	130
Tin (dissolved)	EMS0027-SEP21	mg/L	0.00006	<0.00006	1	20	100	90	110	NV	70	130
Titanium (dissolved)	EMS0027-SEP21	mg/L	0.00005	<0.00005	1	20	99	90	110	NV	70	130
Vanadium (dissolved)	EMS0027-SEP21	mg/L	0.00001	<0.00001	1	20	104	90	110	103	70	130
Zinc (dissolved)	EMS0027-SEP21	mg/L	0.002	<0.002	0	20	98	90	110	105	70	130

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.
Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.
LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.
Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.
Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.
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RPD: Relative percent difference
AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.
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Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

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

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

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-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

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

No: 026094 Page ____ of ____

CAISIII-Sep 21

Laboratory Information Section - Lab use only

Received By: Liet R | Received By (signature): E
Received Date: 08/18/2021 (mm/dd/yy) | Custody Seal Present: Yes ☑ No ☐ | Cooling Agent Present: Yes ☑ No ☐ Type: Ice
Received Time: 16:45 (hr:min) | Custody Seal Intact: Yes ☑ No ☐ | Temperature Upon Receipt (°C): 9c. 9c. 9c
LAB LIMS #: ~~SA1423233-Aug21~~

REPORT INFORMATION	INVOICE INFORMATION
Company: Thurber Engineering Ltd.	☐ (same as Report Information)
Contact: Paul Coulson	Company:
Address: 2010-193 Winston Park Dr. Oakville, L6H5R7	Contact:
Phone: 613-600-7303	Address:
Fax: jalexander@thurber.ca	Phone:
Email: pcoulson@thurber.ca	Email: accounting ON@thurber.ca

Quotation #: | P.O. #:
Project #: 30842 | Site Location/ID: Guelph Revitalization Project

TURNAROUND TIME (TAT) REQUIRED

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

RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 4 Days

PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

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

REGULATIONS

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

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

Sewer By-Law: ☒ Sanitary ☒ Storm Municipality: Guelph Hall

RECORD OF SITE CONDITION (RSC) ☐ YES ☐ NO

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX	Field Filtered (Y/N)	M&I: Metals & Inorganics (incl CrVI, CN, Hg pH, (B(HWS), EC, SAR-soil) (Cl, Na-water)	M&I: Full Metals Suite (ICP metals plus B(HWS-soil only) Hg, CrVI	M&I: ICP Metals only (Sb,As,Ba,Be,B,Cd,Cr,Co,Cu,Pb,Mo,Ni,	SVOC: PAHs only	SVOC: SVOCs all incl PAHs, ABNs, CPs	PCB: PCBs (Aroclor ☐ Total ☐)	PHC: F1-F4 + BTEX	PHC: F1-F4 only no BTEX	VOC: VOCs all incl BTEX	VOC: BTEX only	Pest: Pesticides (Organochlorine or specify other)	Other (please specify)					SPLP: Specify tests	TCLP: Specify tests	COMMENTS:
																			CR+VT	Sewer Use: Sani+Sewer Storm Specify pkg: Guelph	Water Characterization Pkg Genaral ☐ Extended ☒				
1	BH21-04	08/18/21	11:15	9	water	N															X				
2	BH 21-04	08/18/21	11:18	11	water	N													X	X					
3	BH 21-05C	08/18/21	12:10	9	water	N															X				
4	BH.21-05C	08/18/21	12:25	11	Water	N													X	X					
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																									

Observations/Comments/Special Instructions

Sampled By (NAME): Joshua Alexander | Signature: | Date: 08/18/21 (mm/dd/yy)
Relinquished by (NAME): Joshua Alexander | Signature: | Date: 08/18/21 (mm/dd/yy)

Pink Copy - Client
Yellow & White Copy - SGS

Revision #: 1.5
Date of Issue: 11 June 2021