



Hydrogeological and Impact Assessment Report

**Proposed Commercial Development, 301
Somme Street, Ottawa, Ontario**

Consolidated Fastfrate (Ottawa) Holdings Inc.

September 22, 2022

→ **The Power of Commitment**



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1. Introduction

GHD Limited (GHD) was retained by Consolidated Fastfrate (Ottawa) Holdings Inc. to conduct a hydrogeological impact assessment in support of a proposed commercial development at the intersection of Rideau Road and Somme Street in Ottawa (the Site). The municipal address is 301 Somme Street, Ottawa, Ontario and is geographically located at Lot 26, Gloucester Concession 6 from the Rideau River. The Site encompasses an area on the order of 7.0 ha (17.4 acres) and is currently vacant of structures. The development will be privately serviced with a well and septic system. The location of the Site is provided on the **Site Location Plan, Figure 1**.

The purpose of this hydrogeological and impact assessment was to assess the groundwater conditions to evaluate that sufficient drinking water supply exists for the proposed development in accordance with the City of Ottawa Hydrogeological and Terrain Analysis Guidelines (HTAG). Groundwater conditions were assessed through a constant rate pumping test and data collection to evaluate potential impacts to the local groundwater regime (quality and quantity).

The scope of work included a desktop review of available geological and groundwater mapping; a review of the Ministry of the Environment, Conservation and Parks (MECP) well records; a water well survey within 500 m of the development; and a 12-hour, constant rate pumping test with recovery measurements.

This report is organized into the following sections:

Section 1.0 – Introduction: Outlines the purpose, objectives and scope of work, and presents the report organization.

Section 2.0 – Background: Provides a description of the existing Site conditions, background information and surrounding land uses, as well as an outline of the proposed development. The regional environmental setting, including the physiography, topography, surface water features in the vicinity, and the surficial geology is presented.

Section 3.0 – Methodology: Describes the field activities and methodologies used to assess the groundwater supply and quality and to evaluate potential impacts associated with the undertaking.

Section 4.0 – Geology and Hydrogeology: Provides a detailed description of the Site geology, hydrogeology, and the hydraulic properties of the underlying stratigraphy and aquifer.

Section 5.0 – Water Quality Impact Assessment: Provides information regarding the water quality impact related to the proposed septic system.

Section 6.0 – Construction Dewatering: Provides a summary of the shallow groundwater quality compared to the Ottawa Storm Sewer Use By-Law 2003-514, which addresses discharge to the Municipal sewage system for potential construction dewatering.

Section 7.0 – Summary and Conclusions: Provides a summary of the assessment findings. Sections 8 and 9 provide a Statement of Limitations and References. The Figures and Appendices are provided following the text of this report, as indicated in the Table of Contents. Tabulated data is presented in tables within the text.

The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. This report should be read in conjunction with the Statement of Limitations appended to this report. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

2. Background

2.1 Site Description

The Site is located at the intersection of Rideau Road and Somme Street in Ottawa, Ontario. The parcel has the municipal address of 301 Somme Street and currently vacant of structures. Surrounding lots consisted of commercial / industrial lots to the west and south, undeveloped and forested lands and a few residential lots. The lands to the north, east and south are privately serviced for water and sanitary services; with municipally services lots located to the west of the Site. Findlay Creek flows from west to east along the northern Site boundary on the south side of Rideau Road.

The proposed development is to consist of a one-storey warehouse with office space and various amenities covering a total building area of 8,641 square metres (m²) with a projected occupancy of 36 staff. The Site will also have asphalt parking, a stormwater pond and septic bed area as depicted in the **Concept Plan, Figure 2**. The drilled water well location is also shown on **Figure 2** and will service the development.

2.2 Regional Setting

The Site is relatively flat with the regional topography sloping generally towards the east / northeast. Topographic relief is on the order of 3 to 4 metres across the Site. Regional topography is provided as **Figure 3**. Excess surface water is directed towards ditches alongside the Site with drainage generally to the east / northeast.

The Site is situated within the physiographic region known as the Russell and Prescott Sand Plains. In the United Counties of Prescott and Russell, and the Regional Municipality of Ottawa-Carleton, there is a group of large sand plains separated by the clays of the lower Ottawa Valley. The plains cover an area of nearly 1500 square kilometers and a level surface of about 85 metres above sea level. The plains were originally a continuous delta that was built by the Ottawa River into the Champlain Sea. The plains are as thick as 6 to 10 m in some areas (Chapman and Putnam, 1984). The local physiography is illustrated on **Figure 4** showing the Site is within a sand plains with Peat and Muck to the north and Limestone Plains to the west.

Surficial geology mapping on **Figure 5** indicates the Site is a mix of organic deposits, coarse textured glaciolacustrine deposits and Paleozoic bedrock. Based upon GHD's previous geotechnical work (GHD, 2020), the upper soils are comprised of fill. Underlying the fill is native silty sand / sandy silt followed by a glacial till (GHD, 2020).

The Quaternary geology (**Figure 6**) suggests carbonate and clastic sedimentary rock exposed at surface or covered by a discontinuous thin layer of drift. Bedrock outcrops are common in the area; however, were not observed on the Site.

The bedrock is Dolostone / Sandstone of the Beekmantown group (**Figure 7**). Based upon water well records, bedrock was found varying from 8.5 metres below ground surface (mbgs) to 14.0 mbgs at the Site. Golder's report also outlined the Gloucester Fault, a major northwest-southeast trending, steeply dipping structural feature in close proximity and northeast of the Site.

2.3 Previous Investigations

GHD and others have completed various studies at the Site. GHD has considered them, where applicable, in this report. The studies include:

- GHD Limited, November 2, 2021. Hydrogeological Assessment – Large Sewage Disposal System. Rideau Road and Somme Street. Ottawa Ontario. Project No. 12565773-01
- GHD Limited, April 12, 2021. Terrain Analysis. Septic Assessment and Percolation Rate Evaluation. Proposed Commercial Development – Rideau Road and Somme Street. Gloucester Con 6 from Rideau River, Lot 26, Ottawa Ontario. Project No. 11220832-01

- GHD Limited, January 19, 2021. Hydrogeological Assessment Report. Proposed Commercial Development – Rideau Road and Somme Street. Gloucester Con 6 from Rideau River, Lot 26, Ottawa Ontario. Project No. 11220832-01;
- GHD Limited, September 10, 2020. Geotechnical Investigation. Warehouse and Offices. Intersection of Rideau Street and Somme Street, Ottawa Ontario. Project No. 11215612-01;
- Stormwater Management Report. Hawthorne Industrial Park, Report Reference. No. JLR 20983, by J.L. Richards & Associates Limited, dated February 2009 (Revised May 2009);
- Geotechnical Study Subdivision Plan, Hawthorne Industrial Park, Report Reference No. T020556-A1, by Inspec-Sol, dated May 4, 2009;
- Phase II Environmental Site Assessment and Hydrogeological Assessment, Report Reference No. 045804 (12), by Conestoga-Rovers & Associates, dated September 2008; and
- Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, Report Reference. No. 08-1122-0215, by Golder Associates, dated December 2008.

3. Methodology

To achieve the purpose and objectives of this assessment, the following activities were undertaken:

- Review of existing local water supplies by reviewing MECP water well records within 500 m of the Site;
- Completion of a Health and Safety Plan for field activities;
- Site inspection and well survey of local water wells within approximately 500 m of the pumping test wellhead;
- Aquifer performance testing and water level monitoring of observation wells

3.1 Existing Local Water Supplies

The Site and areas surrounding the Site are generally privately serviced with municipal services present to the west of the Site. Physical and hydraulic data are presented on MECP well records (**Appendix A**). The well records indicate a mix of overburden materials (fill, sand, clay, gravel etc.) overlying bedrock including shale, sandstone, limestone and quartz. Based upon the well records, there is one (1) primary bedrock aquifer in this immediate area that is tapped by drilled wells. Of the 17 records, seven (7) are for monitoring wells and will not be considered further within this discussion.

The groundwater was generally described as “fresh” in the well records reviewed. The information from the MECP data indicates that all ten (10) wells were drilled bedrock wells averaging a depth of about 41 m. The bedrock wells encountered water at an average depth of 31 m with pumping rates averaging nearly 100 L/min. No flowing artesian wells were reported.

No dug / bored well records were reviewed. Shallow dug / bored wells are susceptible to large seasonal fluctuations in the groundwater. The result is that shallow wells are also more prone to becoming dry in the winter and summer months. From a quality perspective, shallow dug / bored wells are generally difficult to seal at the surface and therefore considered to be susceptible to shallow sources of contamination and are not recommended for this commercial development.

Table 3.1 summarizes the data reviewed in the well records within 500 m of the Site:

Table 3.1 Summary of MECP Well Record Data

Total Number of Wells Inventoried: 17 Dug/Bored Wells: 0 (0%) Drilled Wells (Overburden): 0 (0%) Drilled Wells (Bedrock): 10 (59%) NOT INCLUDED IN STATISTICAL SUMMARY: Abandonments, Monitoring Wells, Unknown Wells: 7 (41%)				
Parameters	Statistical Summary			
	Drilled – Overburden		Drilled– Bedrock	
WELL YIELDS				
Range	--	--	19 to 680 L/min	5 to 180 USgpm
Average	--	--	99.1 L/min	26.2 USgpm
REPORTED YIELDS	Frequency		Frequency	
Not Reported	0	0%	0	0%
Dry	0	0%	0	0%
0 to 1 USgpm	0	0%	0	0%
2 to 4 USgpm	0	0%	0	0%
5 to 9 USgpm	0	0%	6	60%
≥10 USgpm	0	0%	4	40%
STATIC WATER LEVELS				
Range	--	--	2.3 to 14.2 m	7.5 to 46.6 ft
Average	--	--	8.4 m	27.6 ft
WATER ENCOUNTERED				
Range	--	--	9.1 to 75.0 m	30 to 246 ft
Average	--	--	31.2 m	103.5 ft
WELL DEPTH				
Range	--	--	17.4 to 75.6 m	57 to 248 ft
Average	--	--	40.8 m	133.9 ft

Notes:

Data based on MECP well record information (refer to **Appendix A** for well information).

*Abandonments, well upgrades and unknown well records are not included in the statistical data summarized in **Table 3.1**

3.2 Health and Safety

A Site-specific Health and Safety Plan (HASP) was prepared for implementation during the field investigation program. The HASP presents the visually observed Site conditions to identify potential physical hazards to field personnel. Required personal protective equipment was also listed in the HASP. It is mandatory for all GHD personnel involved in the field program, to read and have a copy of the HASP available at the Site during the investigative work. Health and Safety requirements in the HASP were implemented during the field investigation program.

In addition to the abovementioned safety measures, GHD’s safety protocol related to COVID-19 issues was implemented and preventive measures were reinforced.

3.3 Site Inspection and Well Survey

The field work was conducted on August 9 and 10, 2022 by GHD to observe the general surficial characteristics of the Site, neighbouring lands and complete the well survey and pumping test. The Site consists of undeveloped lands. Photographs are provided in **Appendix B**.

GHD observed the drilled water well and a monitoring well on the Site. Other water wells in the vicinity of the Site were also observed. No surface water was observed on the Site.

The well survey was conducted on August 9, 2022 and involved collecting water levels from local area wells. There is one home within 500 m of the Site located at 4885 Hawthorne Road. This residential dwelling utilizes a drilled well that was measured by GHD to be 15 metres deep. The owner did not indicate any issues with water quantity or quality. The owner also provided authorization to use the well for monitoring purposes during our pumping test.

GHD also collected information from commercial properties located at 3500 Rideau Road to the west (MECP tag no. A018916), 5213 Hawthorne Road to the south (MECP tag no. A342260) and 300 Somme Street to the south (MECP tag no. A305146). No issues were communicated to GHD regarding the wells from these commercial properties. These wells were also monitored during GHD's pumping test. The locations of the various water wells / observation wells utilized for monitoring in this assessment and included in the well survey is provided on the **Well Location Plan, Figure 8**. The MECP tag numbers are referenced on **Figure 8**.

3.4 Aquifer Performance Testing

3.4.1 Test Well Information

An onsite drilled well was utilized for assessment of the local aquifer via a pumping test. The well was constructed by Air Rock Drilling Co Ltd with drilling completed on July 27, 2022. The well has a MECP well tag number of A342117 and its location is shown on **Figure 2**. The water well record and Certificate of Well Compliance is provided in **Appendix C**.

A summary of the information presented on the water well record, is as follows:

- Drilled to total depth of 42.7 m (140 feet). The well record indicates overburden materials consisting of gravel, hardpan and boulders to 14 m (46 feet) followed by grey and black limestone with white sandstone mix to the depth of the well. The well is considered to be a confined well within the sandstone;
- Water was encountered at 39 m and 40.8 m (128 and 134 feet) and was not tested. The static water level was 8.6 m resulting in an available drawdown of 34.1 m to the bottom of the well;
- Construction was completed on July 27, 2022. Constructed with steel casing to 15.8 m (52 feet) then open hole to the bottom of the well. From grade to 15.8 m, the annular space was grouted and sealed with neat cement slurry with a total volume of about 0.4 cubic metres (~12.5 cubic feet). As per previous recommendations, the well was constructed with greater than 6 m of casing and 2 m into the bedrock;
- The well was tested by the drillers at 75.6 litres per minute or L/min (20 gallons per minute or gpm) resulting in a drawdown of 0.7 m or about 2% of the available drawdown. The well is recommended for pumping at 75.6 L/min; and
- The well is drilled 4 m from the proposed building and 3 m from a proposed paved walkway. The ground surface is to be positively sloped away from the water well in all directions (refer to the inset illustrated on **Figure 2**).

Adjacent water wells, monitoring well MW22-1 and a residential well that were monitored during testing are illustrated on **Figure 8**.

3.4.2 Pumping Test Methodology

GHD completed a constant rate pumping test of well A342117 on August 9, 2022 to assess aquifer conditions and evaluate the availability of a suitable groundwater resource for the proposed commercial development. The pumping test was conducted for twelve (12) hours at a constant rate of 37.8 L/min (10 gpm). Recovery measurements were collected after the pumping was completed.

A submersible pump was installed in the well to conduct the testing. Water levels in the pumped water well, adjacent observation wells and an onsite shallow monitoring well were monitored throughout the aquifer performance testing. Measurements were collected manually and through the use of data loggers to evaluate drawdown, recovery and the potential of mutual interference with adjacent wells. The discharge water was directed away from the pumped well a distance of about 30 m downgradient and also away from observation wells. This practice safeguards against artificial recharge of the well from occurring during the pumping test.

The pumped water well was chlorinated in advance of the pumping test. Non-detect chlorine levels were confirmed in the field prior to bacteria sampling conducted at the water well.

Water samples were collected throughout the testing and submitted to SGS Environmental Laboratories (SGS), a CALA accredited analytical laboratory for the testing. Water samples were collected for the following parameters:

- Polycyclic aromatic hydrocarbons (sampled after 12 hours of pumping);
- Volatile organic compounds (sampled after 12 hours of pumping);
- Petroleum hydrocarbons fractions F1 – F4 (sampled after 12 hours of pumping);
- Trace metals (filtered) (sampled after 12 hours of pumping);
- Bacteriological parameters including total coliform; E.coli, fecal coliform (sampled after 1, 6 and 12 hours of pumping); and
- General chemistry, Ottawa subdivision package and D-5-5 parameters.

Field measurements of methane, pH, temperature, free chlorine, turbidity, and conductivity were completed with a turbidity meter, Hach Pocket Pro+ Multi 2 and chlorine meter. Water levels were collected from the pumped water well using a dedicated, audible water level meter and a data logger. Water levels were also collected from neighbouring wells using an audible water level meter. Calibration of these instruments / equipment was completed prior to the pumping test. The calibration records are provided in **Appendix D**.

4. Geology and Hydrogeology

The following sections provide a detailed description of the geology and hydrogeology of the Site, based on the results of the investigations completed and on the available background information.

4.1 Site Geology

Based upon information reviewed within GHD's geotechnical report, the following are the predominant surficial materials and geologic deposits that underlie the Site:

- Ground Cover and Fill (ground surface up to 6 m thick) – topsoil, silty sand to gravel to silty clay fill
- Native sandy silt / silty sand (depths ranging from 8.2 to 11.9 mbgs)
- Bedrock (8.2 to 14.0 mbgs)

The depths of the materials listed above vary within the Site and have been simplified for purposes of this report.

4.2 Site Hydrogeology

4.2.1 Hydrostratigraphic Units

The primary hydrostratigraphic units (i.e. aquifer/aquitard units) underlying the Site include the following:

- Shallow, unconfined unit of fill and native soil and upper bedrock zone
 - Shallow groundwater found within the fill
 - Shallow unit is not suitable as a water supply
- Deeper confined aquifer within the sandstone bedrock generally at depths between about 25 m and 40 mbgs. This is the aquifer tapped by the drilled well on the Site.

4.2.2 Groundwater Levels

Water levels were obtained from the new supply well (MECP tag no. A342117), a monitoring well installed on the Site (MW22-1), and the nearby commercial and residential wells shown in **Table 4.1** on August 9, 2022 prior to the commencement of the pumping test. The data is summarized in **Table 4.1**. Based upon the water levels obtained from these wells, the groundwater flow tapped by the drilled wells is generally in an easterly direction including northeast and southeast components (note: groundwater elevations are based upon regional topographic contours and are for the purposes of evaluation potentiometric elevations only). Shallow groundwater flow tapped by monitoring wells was not assessed.

Table 4.1 Water Level Summary

Location	Description	Ground Elevation* (m)	Depth of Well (mbgs)	Water Level (mbgs)	Potentiometric Elevation (masl)
				August 9, 2022	
A342117	New Site water well	91.1	42.7	7.31	85.8
MW22-1	New Site monitoring well	91.4	3.7	2.05	89.4
4885 Hawthorne Rd	Residential well	85	15.2	0.95	84.1
3500 Rideau Rd	A018916 – Commercial property	100	35.4	11.80	88.2
5213 Hawthorne Rd	A342260 – Commercial property	95	>30	10.60	84.4
TW-5	A295342	90	29.9	6.70	83.3
300 Somme St	A305146 – Commercial property	85	42.7	7.42	77.6

Notes:

masl = metres above sea level

*Elevations estimated from regional topographic contours provided on Figure 3; and elevations on the Site are based upon a topographic elevations provided to GHD. The elevations provided are for the purposes of evaluating potentiometric elevations and should not be relied upon as a legal survey or topographic elevation survey.

4.3 Aquifer Performance Assessment

The following sections discuss the pumping test results and coefficients, well interference and water quality.

4.3.1 Pumping Test

The pumping test was commenced on August 9, 2022. The results of the constant rate pumping test including field testing data are graphically presented in **Appendix E**.

The water level during the pumping test at A342117 is illustrated on **Figures E-1** and **E-2** showing water level versus time. The plot shows a slow, minimal drawdown of the water level over the course of the 12-hour test at 37.8 L/min. After 12 hours of pumping, the water level was 8.7 metres below top of pipe (mbtp). The maximum drawdown was about 0.8 m over the course of the testing with about 30.3 m of available drawdown above the pump remaining. Approximately 2.5% of the available drawdown was used during the pumping test. A total groundwater volume of about 27,215 L was pumped during the testing. Based upon the septic design flow calculations, about 12,000 L/day has been estimated. Actual groundwater usage is expected to be much less than 12,000 L/day for the warehouse and offices.

Recovery measurements were collected manually for 60 minutes after pumping ceased. The water level recovered about 50% in one (1) hour and fully recovered 100% in seven (7) hours. The estimated transmissivity for the pumped water well was 33.4 m²/day (2238 gpd/ft) based on the drawdown and 26.7 m²/day (1791 gpd/ft) based on the recovery period and represents a high transmissivity. The specific capacity for this well is calculated to be 48.5 L/min/m based upon the pumping test completed.

The plotted data indicates the aquifer that this well is tapped into can safely provide long-term quantities of groundwater at a pumping rate of 37.8 L/min (10 gpm) based upon the pumping test completed.

Pumping tests were completed previously within a test well located on the Site (i.e. TW2) within the same sandstone aquifer. The test well, TW2, was pumped in 1994, 2008 and in 2020 at 67 L/min, 55 L/min, and 60 L/min, respectively. The drawdowns of these tests were similar to our drawdown at the new well ranging from about 1.1 m to 1.2 m. Static water levels from TW-2 were also similar ranging from 3.15 mbgs in 1994 to 6.90 mbgs in 2020, indicating that development in this area including quarries on nearby properties has not resulted in significant negative effects to the underlying water supply aquifer.

4.3.2 Summary of Aquifer Performance

The following **Table 4.2** summarizes the data and coefficients obtained from the pumping test.

Table 4.2 Aquifer Performance Testing Summary

Well No.	Step No.	Yield		Test Type	Time	Maximum drawdown		Available Drawdown*		Specific Capacity		Estimated Transmissivity	
		gpm	L/min			min	feet	metres	feet	metres	gpm/ft	L/min/m	gpd/ft
A342117	1	0	0	Static	0	0	0	103.3	31.5	--	--	--	--
	2	10	37.8	Const.	720	2.6	0.8	100.7	30.7	3.9	48.5	2238	33.4
	3	0	0	Recvy.	50% recovery in 1 hour; 100% recovery in 7 hours							1791	26.7

Notes:

gpm = gallons per minute; gpd/ft = gallons per day per foot

"Recvy" refers to Recovery measurements; "Const" refers to the Constant Rate test conducted for 720 minutes.

*Available Drawdown refers to the height of water in the well above the pump.

Static water level at the pumped well A342117 was 7.96 metres below top of pipe (7.31 metres below ground surface) at the start of the testing.

4.3.3 Water Quality

Groundwater samples from the pumped well were obtained for laboratory testing during the course of the pumping test for the purpose of water quality analyses. The well was sampled after one (1) hour; at six (6) hours; and at the end of the constant rate test on August 9, 2022. The water samples were delivered to SGS laboratories in Lakefield, ON. Certificates of chemical analyses are presented in **Appendix F**. The water quality data are summarized and compared with the Ontario Drinking Water Standards (ODWS)¹ in **Table 4.3**. Regulation 153/04 parameters are also compared with the Table 2 Standards in a Potable Ground Water Condition for all property uses including a commercial property use². For the Regulation 153/04 parameters, the most stringent standard was used for comparison purposes.

Table 4.3 Test Well Water Quality Summary

Parameter	Pumped Water Well A342117			O.Reg. 153 – Table 2	ODWS	
	1 hr	6 hrs	12 hrs		MAC / IMAC	AO/OG
Bacteriological (Colony Forming Units)						
Total Coliform	--	--	3	NS	<6*	NS
E.coli	--	--	0	NS	0	NS
Fecal coliform	--	--	0	NS	0	NS
Background	--	--	33	NS	NS	NS
Heterotrophic Plate Count	--	--	55	NS	NS	NS
Semi-Volatile Organic Compounds (µg/L)						
Acenaphthene	--	--	<0.1	4.1	NS	NS
Acenaphthylene	--	--	<0.1	1	NS	NS
Anthracene	--	--	<0.1	2.4	NS	NS
Benzo(a)anthracene	--	--	<0.1	1	NS	NS
Benzo(a)pyrene	--	--	<0.01	0.01	0.01	NS
Benzo(b+j)fluoranthene	--	--	<0.1	NS	NS	NS
Benzo(ghi)perylene	--	--	<0.2	0.2	NS	NS
Benzo(k)fluoranthene	--	--	<0.1	0.1	NS	NS
Chrysene	--	--	<0.1	0.1	NS	NS
Dibenzo(a,h)anthracene	--	--	<0.1	0.2	NS	NS
Fluoranthene	--	--	<0.1	0.41	NS	NS
Fluorene	--	--	<0.1	120	NS	NS
Indeno(1,2,3-cd)pyrene	--	--	<0.2	0.2	NS	NS
1-Methylnaphthalene	--	--	<0.5	3.2	NS	NS
2-Methylnaphthalene	--	--	<0.5		NS	NS
Naphthalene	--	--	<0.5	11	NS	NS
Phenanthrene	--	--	<0.1	1	NS	NS
Pyrene	--	--	<0.1	4.1	NS	NS

¹ Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines. June 2003, revised June 2006.

² Ministry of the Environment, April 15, 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.

Parameter	Pumped Water Well A342117			O.Reg. 153 – Table 2	ODWS	
	1 hr	6 hrs	12 hrs		MAC / IMAC	AO/OG
<i>Volatile Organic Compounds (µg/L)</i>						
Acetone	--	--	<30	2700	NS	NS
Bromomethane	--	--	<0.5	0.89	NS	NS
Carbon tetrachloride	--	--	<0.2	0.79	5	NS
Chlorobenzene	--	--	<0.5	30	NS	NS
Chloroform	--	--	<0.5	2.4	NS	NS
1,2-Dichlorobenzene	--	--	<0.5	3	20	3
1,3-Dichlorobenzene	--	--	<0.5	59	NS	NS
1,4-Dichlorobenzene	--	--	<0.5	1	5	1
Dichlorofluoromethane	--	--	<2	590	NS	NS
1,1-Dichloroethane	--	--	<0.5	5	NS	NS
1,2-Dichloroethane	--	--	<0.5	1.6	5	NS
1,1-Dichloroethylene	--	--	<0.5	1.6	NS	NS
trans-1,2-Dichloroethane	--	--	<0.5	1.6	NS	NS
cis-1,2-Dichloroethane	--	--	<0.5	1.6	NS	NS
1,2-Dichloropropane	--	--	<0.5	5	NS	NS
cis-1,3-Dichloropropane	--	--	<0.5	NS	NS	NS
trans-1,3-Dichloropropane	--	--	<0.5	NS	NS	NS
1,3-Dichloropropene	--	--	<0.5	0.5	NS	NS
Ethylene Dibromide	--	--	<0.2	0.2	NS	NS
Hexane	--	--	<1	51	NS	NS
Methyl Ethyl Ketone	--	--	<20	1000	NS	NS
Methyl Isobutyl Ketone	--	--	<20	400	NS	NS
Methyl Tert-Butyl Ether	--	--	<2	15	NS	NS
Methylene Chloride	--	--	<0.5	50	NS	NS
Styrene	--	--	<0.5	5.4	NS	NS
Tetrachloroethylene	--	--	<0.5	1.6	30	NS
1,1,1,2-Tetrachloroethane	--	--	<0.5	1.1	NS	NS
1,1,2,2-Tetrachloroethane	--	--	<0.5	1	NS	NS
1,1,1-Trichloroethane	--	--	<0.5	200	NS	NS
1,1,2-Trichloroethane	--	--	<0.5	4.7	NS	NS
Trichloroethylene	--	--	<0.5	1.6	5	NS
Trichlorofluoromethane	--	--	<5	150	NS	NS
Vinyl Chloride	--	--	<0.2	0.5	2	NS
Benzene	--	--	<0.5	5	5	NS
Toluene	--	--	<0.5	24	NS	24
Ethylbenzene	--	--	<0.5	2.4	NS	2.4

Parameter	Pumped Water Well A342117			O.Reg. 153 – Table 2	ODWS	
	1 hr	6 hrs	12 hrs		MAC / IMAC	AO/OG
Xylenes	--	--	<0.5	300	NS	300
Bromodichloromethane	--	--	<0.5	16	NS	NS
Bromoform	--	--	<0.5	25	NS	NS
Dibromochloromethane	--	--	<0.5	25	NS	NS
<i>Petroleum Hydrocarbons</i>						
PHC F1 (C ₆ – C ₁₀)	--	--	<25	750	NS	NS
PHC F2 (C ₁₀ – C ₁₆)	--	--	<100	150	NS	NS
PHC F3 (C ₁₆ – C ₃₄)	--	--	<200	500	NS	NS
PHC F4 (C ₃₄ – C ₅₀)	--	--	<200	500	NS	NS
PHC F4 Gravimetric	--	--	Yes ¹	500	NS	NS
<i>Trace Metals (dissolved) (mg/L)</i>						
Aluminum	<0.001	<0.001	<0.001	NS	NS	0.1
Arsenic	0.0006	0.0004	0.0004	0.25	0.025	NS
Boron	0.199	0.216	0.216	5	5	NS
Barium	0.09451	0.09889	0.09880	1	1	NS
Beryllium	<0.000007	<0.000007	0.000011	0.004	NS	NS
Cobalt	0.000094	0.0000910	0.000082	0.0038	NS	NS
Calcium	103	112	117	NS	NS	NS
Cadmium	0.000016	0.000017	0.000020	0.0027	0.005	NS
Copper	<0.0002	<0.0002	<0.0002	0.087	NS	1
Chromium	0.00012	<0.00008	<0.00008	0.05	0.05	NS
Iron	0.369	0.276	0.481	NS	NS	0.3
Magnesium	47.8	53.4	53.5	NS	NS	NS
Manganese	0.175	0.173	0.171	NS	NS	0.05
Mercury	<0.00001	<0.00001	<0.00001	0.00029	0.001	NS
Molybdenum	0.02195	0.02931	0.03188	0.07	NS	NS
Nickel	0.0014	0.0013	0.0012	0.1	NS	NS
Sodium	54.5	57.4	57.0	490	NS	200 (20*)
Lead	<0.00009	<0.00009	<0.00009	0.01	0.01	NS
Silver	<0.00005	<0.00005	<0.00005	0.0015	NS	NS
Strontium	5.15	5.91	5.92	NS	NS	NS
Thallium	<0.000005	<0.000005	<0.000005	0.002	NS	NS
Antimony	<0.0009	<0.0009	<0.0009	0.006	0.006	NS
Selenium	0.00015	0.00020	0.00011	0.01	0.01	NS
Uranium	0.000219	0.000227	0.000219	0.02	0.02	NS
Vanadium	0.00011	0.00008	0.00009	0.0062	NS	NS
Zinc	<0.002	<0.002	<0.002	1.1	NS	5

Parameter	Pumped Water Well A342117			O.Reg. 153 – Table 2	ODWS	
	1 hr	6 hrs	12 hrs		MAC / IMAC	AO/OG
General Chemistry Parameters (units listed per parameter)						
Tannin + Lignin (mg phenol/L)	0.32	0.34	0.40	NS	NS	NS
Alkalinity (mg/L as CaCO ₃)	265	261	261	NS	NS	30 – 500
Carbonate (mg/L as CaCO ₃)	<2	<2	<2	NS	NS	NS
Bicarbonate (mg/L as CaCO ₃)	265	261	261	NS	NS	NS
pH	8.14	8.20	8.23	NS	NS	6.5 – 8.5
Conductivity (µS/cm)	1180	1290	1350	NS	NS	NS
Total Dissolved Solids (mg/L)	763	914	914	NS	NS	500
Colour (TCU)	3	<3	<3	NS	NS	5
Turbidity (NTU)	2.5	2.89	4.21	NS	NS	5
Organic Nitrogen (mg/L)	<0.05	<0.05	<0.05	NS	NS	0.15
Total Kjeldahl Nitrogen (mg/L)	0.18	0.17	0.16	NS	NS	NS
Ammonia + Ammonium (mg/L)	0.19	0.17	0.17	NS	NS	NS
Nitrite (as N mg/L)	<0.003	<0.003	<0.003	NS	1	NS
Nitrate (as N mg/L)	<0.006	<0.006	<0.006	NS	10	NS
Chloride (mg/L)	62	66	68	790	NS	250
Hydrogen Sulphide	<0.02	<0.02	<0.02	NS	NS	0.05
Sulphide (mg/L)	<0.02	<0.02	<0.02	NS	NS	NS
Sulphate (mg/L)	300	370	400	NS	NS	500
Dissolved Organic Carbon (mg/L)	2	2	2	NS	NS	5
Hardness (mg/L as CaCO ₃)	453	500	511	NS	NS	80 – 100
Ryznar Stability Index	6.4	6.2	6.2	NS	NS	NS
Potassium	7.16	7.56	7.39	NS	NS	NS

Notes:

"1" denotes that PHC F4 gravimetric returned to baseline

"<" indicates concentrations are less than laboratory reporting limits

MAC = maximum acceptable concentration; IMAC – Interim MAC; AO / OG = aesthetic objective / operational guideline

Bold / shaded indicates the concentration exceeds the ODWS AO / OG. There are no exceedances of MAC or IMAC (health related).

*The aesthetic objective for sodium in drinking water is 200 mg/L. When the sodium concentration exceeds 20 mg/L, this information should be communicated to those on sodium restricted diets.

The laboratory analyses confirmed that there were no health-related parameter exceedances of the ODWS. VOCs, PAHs and PHCS were reported below detection limits and meet all Ontario Regulation Table 2 Standards for the parameters tested in a potable groundwater condition for all property uses.

In general, the test results indicate the majority of parameters meet the ODWS with the exception of the aesthetic objectives for:

- Hardness;
- Total Dissolved Solids;
- Manganese; and
- Iron.

Elevated hardness is related to the overburden materials containing calcium and to a lesser extent, magnesium. Elevated hardness, iron and manganese are common traits of groundwater supplies in Southern Ontario and can be

treated using commercially available treatment equipment such as a water softener. The iron and manganese are within treatable limits. Although hardness in excess of 500 mg/L is considered very hard, a maximum treatable value is not provided within the D-5-5 Guideline. Treatment for hardness (and other parameters) is provided in the following sub-section.

Total dissolved solids (TDS) were also elevated above its aesthetic objective of 500 mg/L. TDS may be the result of hard water including calcium and/or magnesium as well as other constituents such as sodium and chloride. Treatment consideration is provided in the following sub-section. The Ryznar Stability Index was calculated to be between 6.2 and 6.4 which is within the neutral range and therefore incrustation and corrosion are not considered to be problematic due to the elevated TDS.

Turbidity was reported as less than 5 NTU in the laboratory samples and ranged from 3.25 to 1.2 NTU at the wellhead. These values indicated acceptable turbidity.

The bacteriological results were three (3) colony forming units per 100 mL (CFU) for total coliform which is acceptable for raw water as fecal coliform and E.coli are zero CFU. The residual chlorine residual was measured in the field at the wellhead prior to testing and confirmed to be non-detect.

As a proactive measure, GHD recommends that bacteriological treatment (i.e. ultraviolet (UV) treatment) be used at a minimum. As it is anticipated that this well system will be regulated and will require treatment to meet appropriate standards to ensure potable water is available to employees and visitors.

To supplement the analytical data, field measurements were obtained throughout the pumping test by GHD. At the end of the pump test, the groundwater at the well head had a conductivity of 1.35 mS/cm, a water temperature of 16.0 degrees Celsius, a pH of 7.82, a chlorine residual of 0 mg/L and turbidity of 1.2 NTU. There was no methane detected within the water.

4.3.3.1 Water Treatment

MacLellan Water Treatment (MacLellan) was contacted to provide water treatment based upon the pumped well chemistry. Based upon the chemistry provided from the pumping test, MacLellan provided recommendations for water treatment. Their report is provided in **Appendix G** and summarized below:

- a. Installation of a filtration system for iron that utilizes a manganese greensand filter with chlorine regeneration. This filter would also remove a certain amount of manganese.
- b. Installation of an activated carbon filter to remove residual chlorine and organically-complexed metals.
- c. Install a water softener to soften the water to improve the aesthetics of the water and protect the water disinfection system and water-using appliances (hot water tanks, etc.) in the facility from fouling due to hard water scale. A twin alternating system was recommended to ensure that softening is uninterrupted.
- d. Disinfection of the water will be provided with ultraviolet (UV) disinfection. The unit will be sized to allow adequate flow to the facility and will be equipped with turbidity-reducing cartridge-style prefilters to screen out particles that bacteria might shelter behind while passing through the UV light.
- e. As the concentration of sodium in the water is already slightly high, the use of a water softener will increase the sodium content of the treated water by about 300 mg/L. Therefore, one or more point of use reverse osmosis (RO) units will be installed to remove sodium at locations (like lunch rooms) where staff will actually consume the water. The RO units will be equipped with small storage tanks so that pre-treated water will be ready on demand.

Based upon the MacLellan report, the water can be treated for use at the proposed commercial facility.

4.3.4 Well Interference

In order to assess the potential for hydraulic connection between the pumped water well A342117 and neighbouring wells were monitored during the pumping test. Data logger water levels were installed at each of the observation wells during the pumping test and the data is provided in **Appendix H**. Manual water levels at TW-5, A305146, A342260

and A018916 were collected prior to and after the pumping test was conducted between August 3 and August 18, 2022. The data illustrates the water level conditions during this time as well as during the pumping test.

The approximate linear distances between the pumped water well and observation wells are provided in **Table 4.4** based upon the locations plotted on **Figure 8**.

Table 4.4 Distance Between Pumping Well and Observation Wells

Location	Distances between Pumped Water Well A342117 and Observation Wells (metres)					
	MW22-1	4885 Hawthorne Rd.	TW-5	A305146	A018916	A342260
Pumped well A342117	45	630	570	140	475	640

Notes:

Distances based upon locations identified on **Well Locations, Figure 8**.

MW = monitoring well

The following table provides the manual water levels collected during the pumping test at the observation wells monitored during the pumping test.

Table 4.5 Maximum Drawdowns in Pumping and Observation Wells

Location	Water Level (start of test) mbgs	Water Level (end of test) mbgs	Drawdown (m)
A342117 (pumped water well)	7.31	8.11	-0.80
MW22-1	2.05	1.95	+0.10
4885 Hawthorne Road	0.95	0.93	+0.02
TW-5	6.70	6.71	-0.01
A305146	7.42	7.69	-0.27
A018916	11.85	11.81	+0.04
A342260	10.62	10.59	+0.03

Notes:

Negative drawdown (denoted by minus sign and RED text) indicates water level lowered during the testing

Positive drawdown (denoted by plus sign and BLACK text) indicates water level was rising during the testing

4.3.4.1 Interference Assessment

Prior to the pumping test, data loggers were installed within the adjacent wells including TW-5, A305146, 4885 Hawthorne Road, A342260 and A018916 to collect background water levels. Water levels were also collected from these locations during the pumping test and after the pumping test was completed. The data was collected was used to evaluate groundwater level trends and to aid in assessing hydraulic connection between the overburden and bedrock aquifer, and, within the bedrock aquifer itself.

There was no drawdown attributable to pumping at the pumped well within the monitoring well MW22-1 indicating that there is no vertical hydraulic connection between the overburden groundwater and confined bedrock aquifer that A342117 draws from.

There was no drawdown measured at water wells A018916, A342260 or 4885 Hawthorne Road and minimal drawdown within TW-5 throughout the duration of the pumping test. The drawdown at TW-5 was about one (1) cm based upon the data logger readings and is considered negligible. No impacts are expected at these wells as a result of future usage of the water well on the Site.

The results of the interference monitoring did illustrate a hydraulic connection between the pumping well A342117 and A305146 about 140 m to the south. Both wells are drilled to 42.7 m (140 feet) and are expected to tap into the same aquifer unit. The drawdown at this well was manually measured to be about 27 cm during the pumping test and the

data logger shows a similar water level response in A305146, albeit to a lower magnitude, as the pumped well. The data confirms that these wells are confined within the same aquifer unit and are hydraulically connected. With the drawdown of 27 cm (less than 1% of the available drawdown within this well), about 35 m of available drawdown remains within the well.

The testing showed that the pumping of nearly 30,000 L resulted in the usage of about 2.5% of the available drawdown of the pumped well. As daily usage is expected to be below 10,000 L/day, the pump test results indicate that there is sufficient water quantity below the Site for the planned development with without significant interference to future and existing neighbouring wells. In our professional opinion, the risk of interference is minimal.

4.4 Septic Waste Disposal

The septic waste disposal system is being designed by others. The septic will be about 25 m from the water well, maintaining the minimum 15 m horizontal buffer as per the Ontario Building Code.

5. Water Quality Impact Assessment

Procedure D-5-4 provides a methodology for assessing potential impact to downgradient groundwater resources as a result of the installation of private sewage disposal systems on a development property. The procedure is to consider the following:

- Lot Size Considerations
- System Isolation Considerations
- Contaminant Attenuation Considerations

Using D-5-4 as a guide, the proponent is to determine the background nitrate concentration in the receiving groundwater; demonstrate that the area is not hydrogeologically sensitive; and, demonstrate that the maximum nitrate limit prescribed by the procedure will not be exceeded in the receiving groundwater at the downgradient site boundary.

However, this guideline does not apply to Large Subsurface Sewage Disposal Systems (i.e. septic effluent of greater than 10,000 L/day). The projected design septic effluent for this Site is on the order 12,000 L/day. If the septic effluent from the Site was to be less than 10,000 L/day, then the Procedure would also not be applicable as the development area is greater than one (1) hectare

GHD completed a hydrogeological assessment for a large subsurface septic system (GHD report dated November 2, 2021). Based upon the impact assessment, tertiary treatment will be required. Based upon the impact assessment, the proposed sewage system will have no significant impact on the groundwater aquifer, shallow water or any downgradient receptors that utilize groundwater.

6. Construction Dewatering

A water sample was collected from the monitoring well (MW22-1) for purposes of establishing the water quality should excavations extend into the shallow groundwater and require dewatering. Depending upon the construction activities, dewatering to remove groundwater seepage, surface water runoff and precipitation may be required to ensure safe and dry working conditions.

6.1.1 Groundwater Sampling for Construction Dewatering

On August 9, 2022, a groundwater sample was collected from MW22-1 (referred to “Piezo” in the certificate of analysis). The sample was submitted to SGS for analysis of parameters described in City of Ottawa By Law 2003-514, which addresses discharge to the Municipal sewage system. The analytical results are summarized within the certificates of analysis in **Appendix I**.

Based upon the analytical results, and upon comparison with the City of Ottawa criteria, the following parameters exceeded the criteria:

- Total suspended solids; and,
- Manganese.

The results represent total concentrations including dissolved and sorbed particulate. Based on these observations, the water discharged from an excavation would require treatment (i.e. filtration) to minimize the particulate and reduce the total concentrations to meet the City of Ottawa criteria. The discharge would be expected to be a combination of groundwater, surface water runoff and precipitation into the excavation and would require further assessment to verify its quality. City of Ottawa approval, sewer-use discharge permit and pre-treatment will be required prior to discharge to a drainage ditch or sewer.

7. Summary and Recommendations

Supporting data upon which our conclusions and recommendations are based have been presented in the foregoing sections of this report. The following conclusions and recommendations are governed by the physical properties of the subsurface materials that were encountered at the Site and assume that they are representative of the overall Site conditions. It should be noted that these conclusions and recommendations are intended for use by the designers only. Contractors bidding on or undertaking any work at the Site should examine the factual results of the assessment, satisfy themselves as to the adequacy of the information for construction, and make their own interpretation of this factual data as it affects their proposed construction techniques, equipment capabilities, costs, sequencing, and the like. Comments, techniques, or recommendations pertaining to construction should not be construed as instructions to the contractor.

Based on the results of the hydrogeological and impact assessment, the pumped water well has sufficient water of good quality and quantity to provide ample supply of potable groundwater for the proposed commercial development while preserving the long-term water quality of the aquifer complex. In the certification letter WSP has indicated that the new water well, A342117, was properly constructed and adequately sealed in accordance with Ontario Regulation 903. The well will have adequate separation from the proposed building and future septic area. Based upon the pumping test, there was marginal interference between an adjacent well; however, the interference is not considered significant to impact the operation of the wells. Based on the data collected no vertical hydraulic connection between the shallow overburden groundwater and the bedrock aquifer unit was identified. In the long-term, it is our opinion that the bedrock aquifer tested can support the commercial development with minimal to negligible impact to neighbouring wells.

The water quality, as indicated in the MacLellan report, can be treated to meet the needs of the proposed facility. The treatment is to consist of filters, water softening, UV disinfection and RO at selected point(s) of consumption such as lunch room(s).

Based upon the impact assessment, water quality impacts are not expected provided that the waste disposal system is properly constructed. The waste disposal system will be a large subsurface system that, based upon the daily design, will exceed 10,000 L/day of septic effluent. The actual daily septic effluent is expected to be much less than 10,000 L/day. No impact is anticipated on downgradient baseline water quality functions or to the existing water bearing aquifers.

Should construction dewatering of shallow water be required, filtration of the pumped water will be required to remove particulate and ensure that total suspended solids and manganese concentrations meet the City of Ottawa storm sewer use by-law criteria. No significant impacts from construction dewatering are anticipated.

It is our opinion that the results of this hydrogeologic and impact assessment support the development of the proposed commercial development.

All of Which is Respectfully Submitted,

GHD



Jason Gerald, M.Sc., C.Chem.
Project Manager



Robert Neck, P.Ge. (Limited)
Senior Geoscientist



Steve Gagné, H.B.Sc.
Associate, Project Director

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9. Statement of Limitations

This report is intended solely for Consolidated Fastfrate (Ottawa) Holdings Inc. in assessing the hydrogeological aspects of the Site (301 Somme Street, Ottawa, Ontario) and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. Client shall defend, indemnify and hold GHD harmless from any liability arising from or related to Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

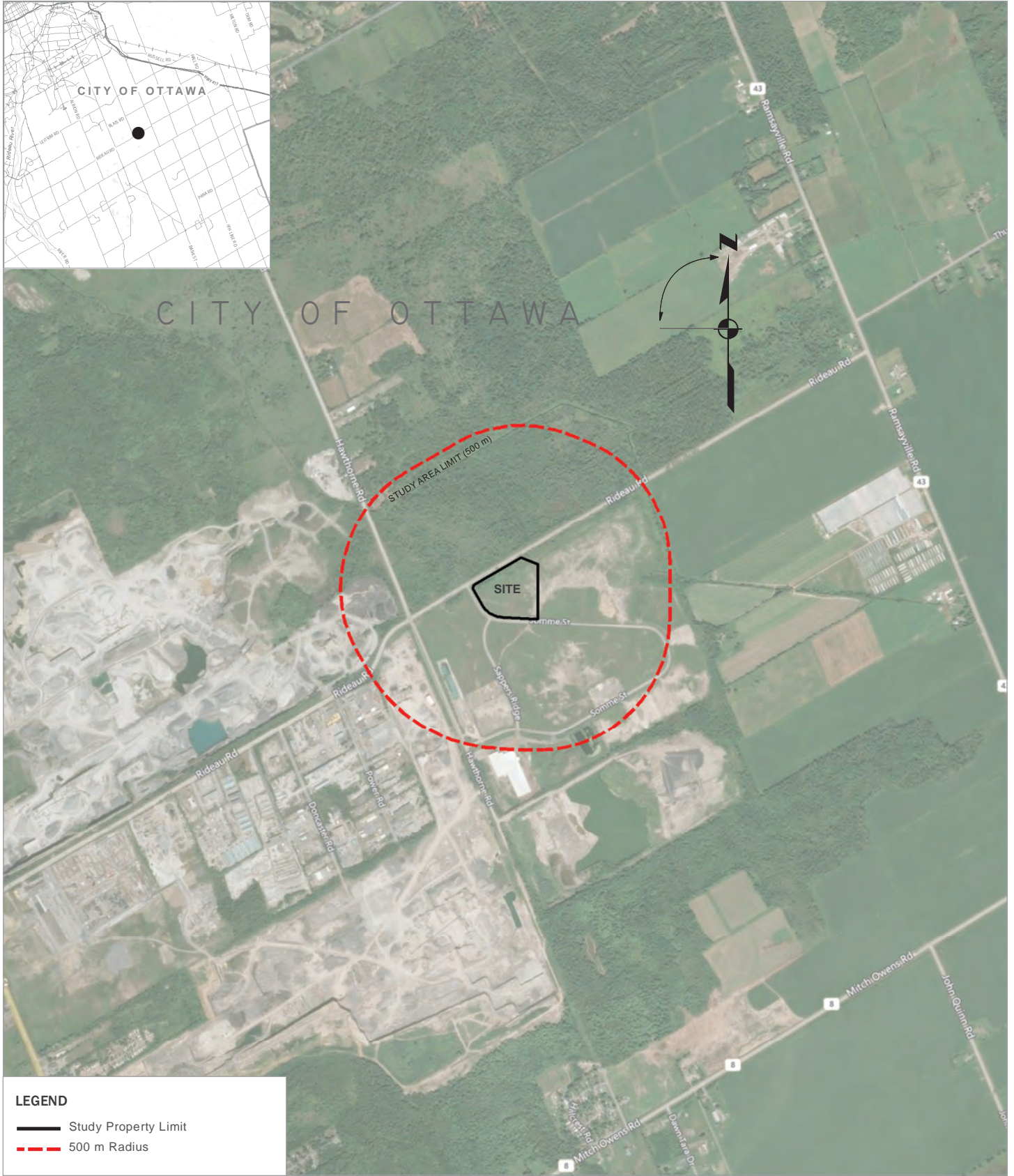
The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of hydrogeological engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All details of design and construction are rarely known at the time of completion of a hydrogeological study. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

Figures



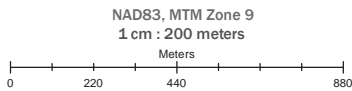
CITY OF OTTAWA



LEGEND

- Study Property Limit
- 500 m Radius

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Consolidated Fastfrate (Ottawa) Holdings Inc.
RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

Project No. 12580314-01
Revision No. 1
Date September 2022

**HYDROGEOLOGY ASSESSMENT
SITE LOCATION PLAN**

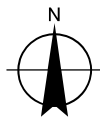
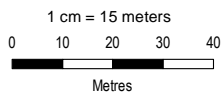
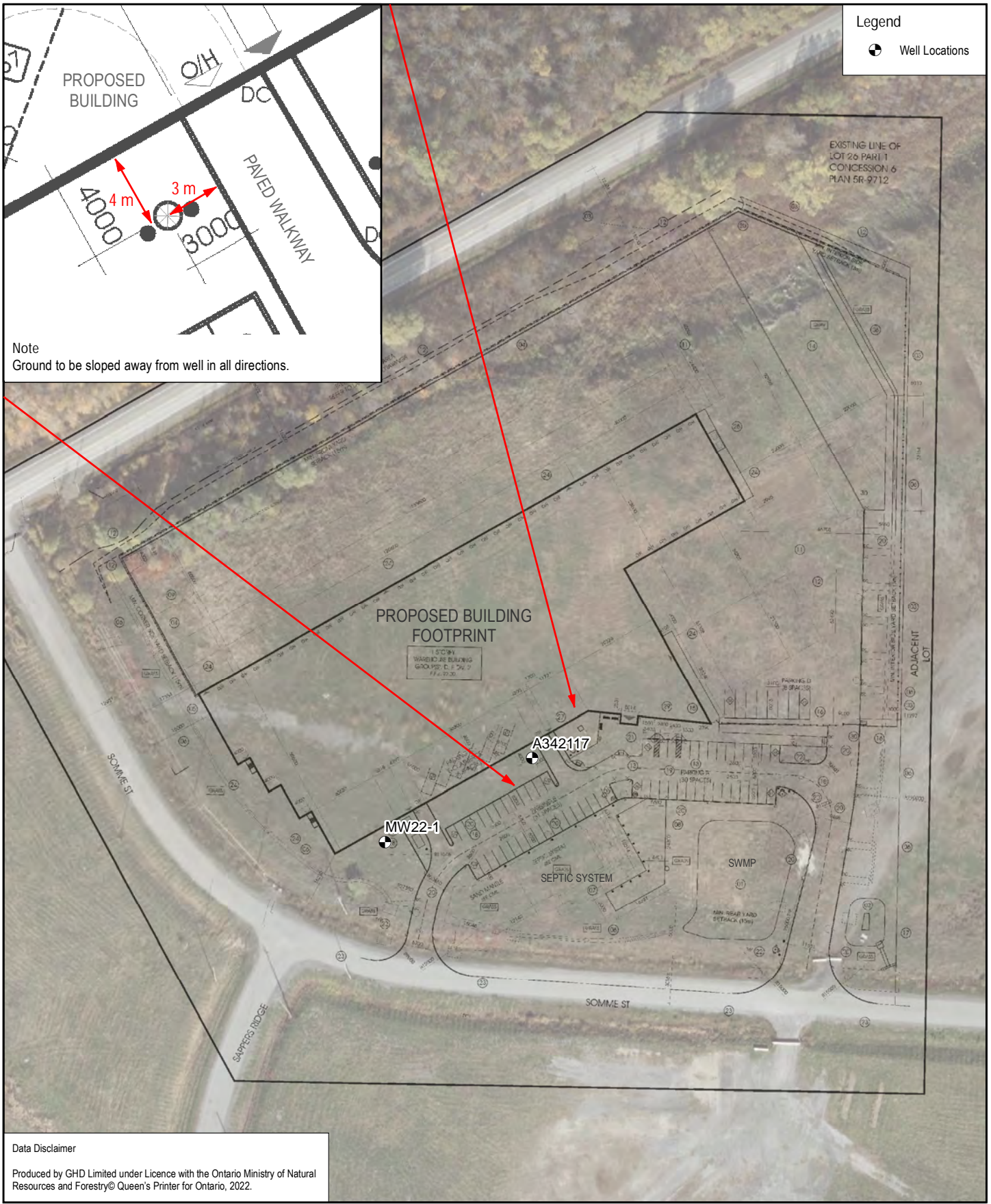
FIGURE 1

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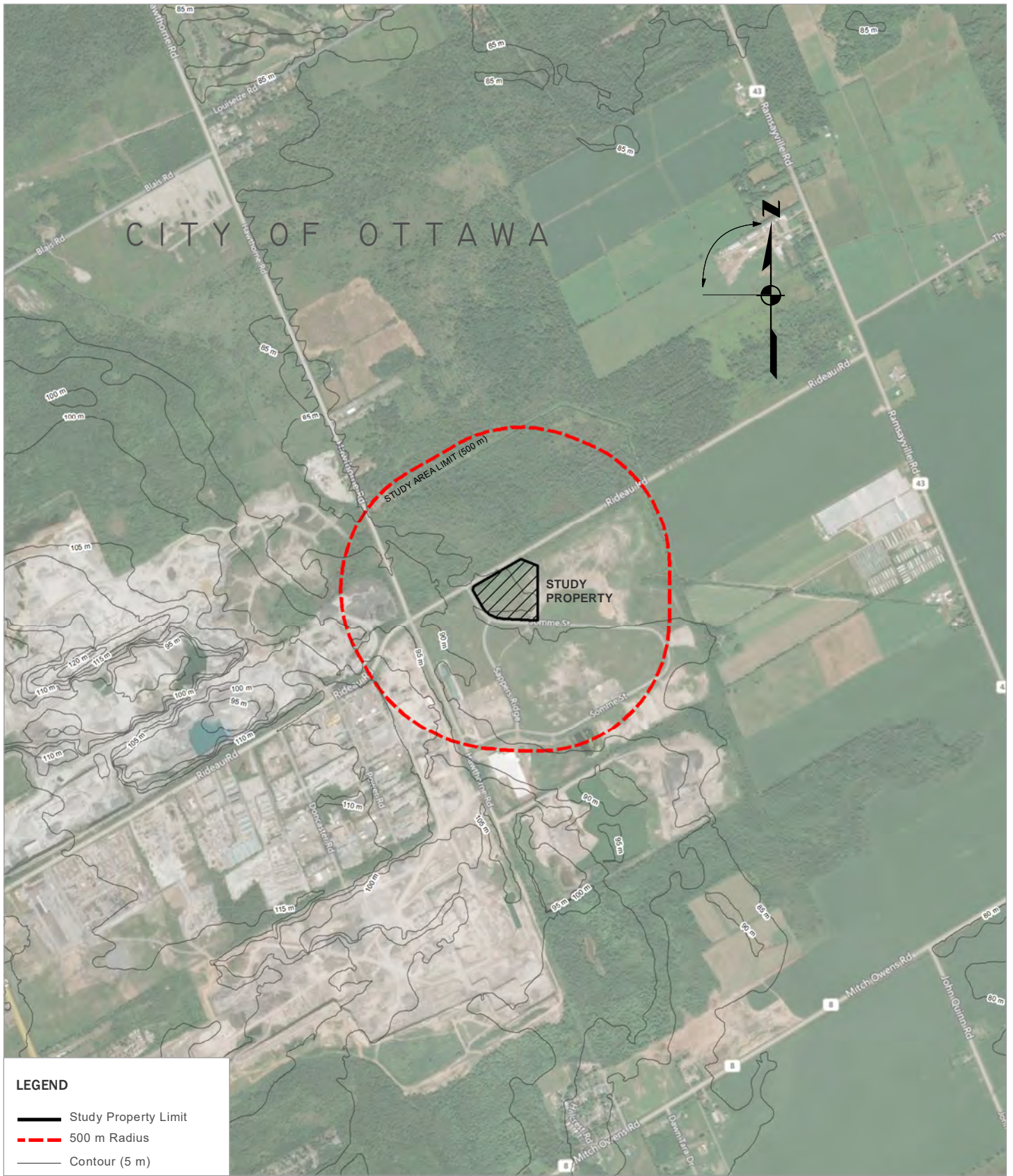
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 Horizontal Datum: North American 1983
 Grid: NAD 1983 UTM Zone 18N

Consolidated Fastrate (Ottawa) Holdings Inc.
 301 Somme Street, Ottawa, ON
 City of Ottawa

Project No. 12580314
 Revision No.
 Date Sep 19, 2022

Concept Plan

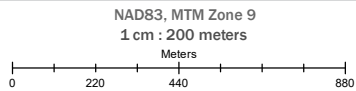
Figure 2



LEGEND

- Study Property Limit
- 500 m Radius
- Contour (5 m)

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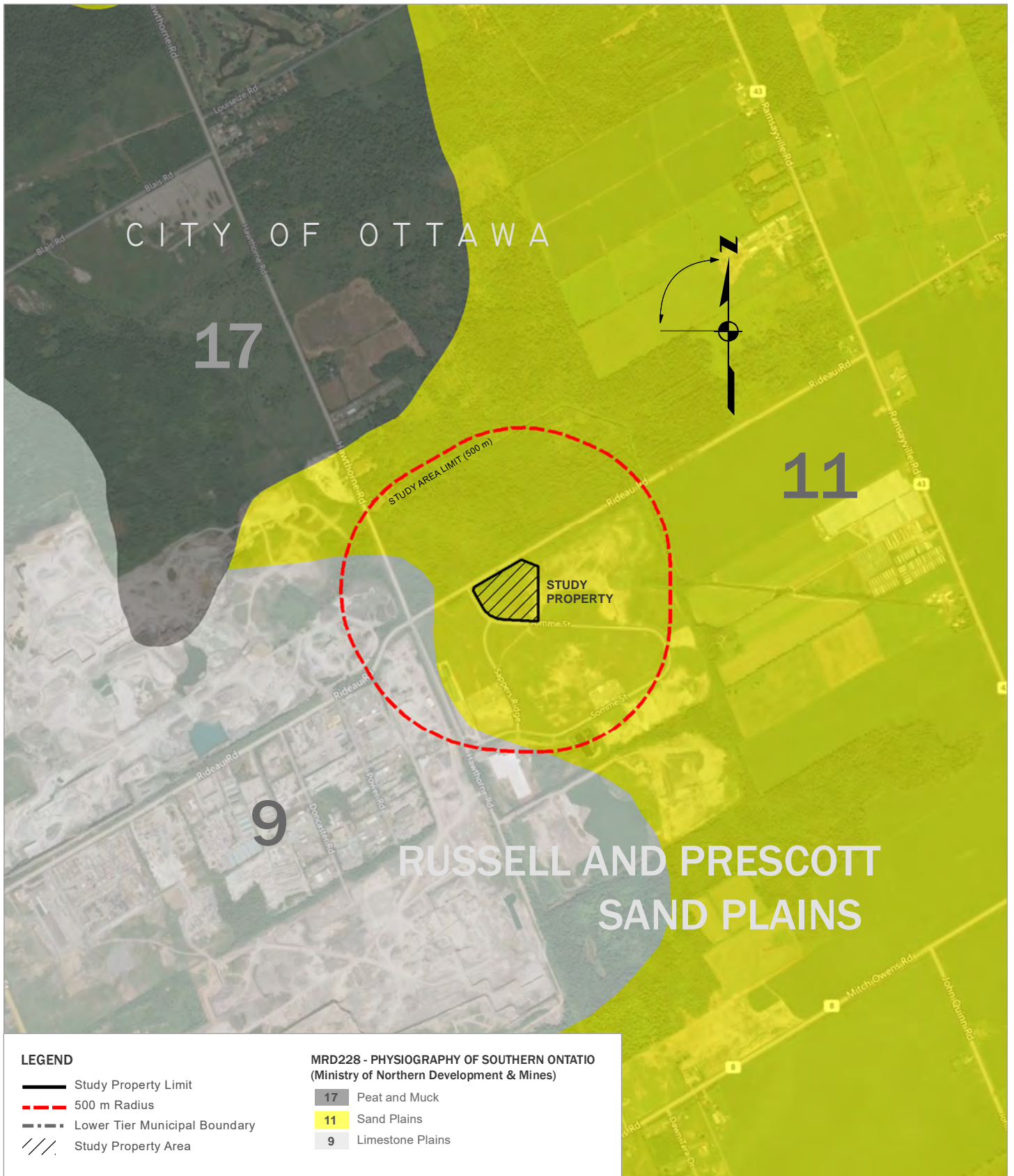
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**HYDROGEOLOGY ASSESSMENT
REGIONAL TOPOGRAPHY**

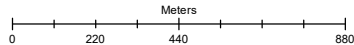
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Revision No. -
Date September 2022

FIGURE 3

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NAD83, MTM Zone 9
1 cm : 200 meters



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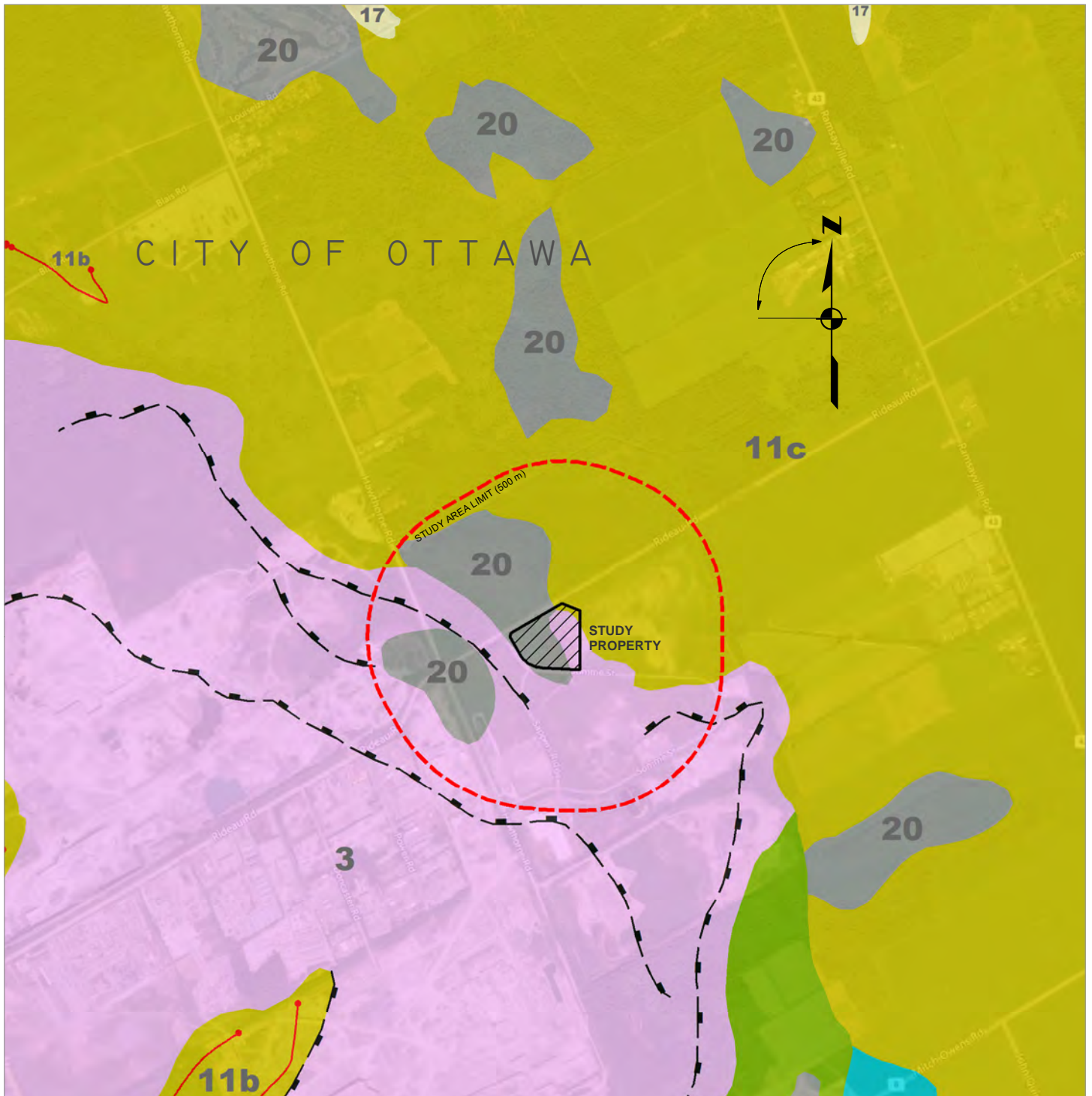
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ONTARIO

**HYDROGEOLOGY ASSESSMENT
PHYSIOGRAPHY**

Project No. 12580314-01
Revision No. -
Date September 2022

FIGURE 4

Created by: Will Pridham



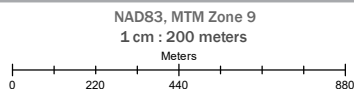
LEGEND

- Study Property Limit
- 500 m Radius
- Landslide Scar
- Beach

MRD128 - SURFICIAL GEOLOGY (Ministry of Northern Development & Mines)

- | | |
|---|---|
| <ul style="list-style-type: none"> 3 Paleozoic Bedrock 20 Organic Deposits: peat, muck, marl 17 Eolian deposits: fine to very fine sand and silt 11 Coarse-textured glaciolacustrine deposits: sand, gravel, minor silt and clay <ul style="list-style-type: none"> 11b Littoral deposits 11c Foreshore and basinal deposits | <ul style="list-style-type: none"> 10 Fine-textured glaciomarine deposits <ul style="list-style-type: none"> 10a Massive to well laminated 5b Till: Silty sand to sand-textured till on Precambrian terrain <ul style="list-style-type: none"> 5b Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain |
|---|---|

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ATtribution STATEMENTS

- ▶ MRD128-REV. Ontario Geological Survey 2010. Surficial geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 128 – Revised.
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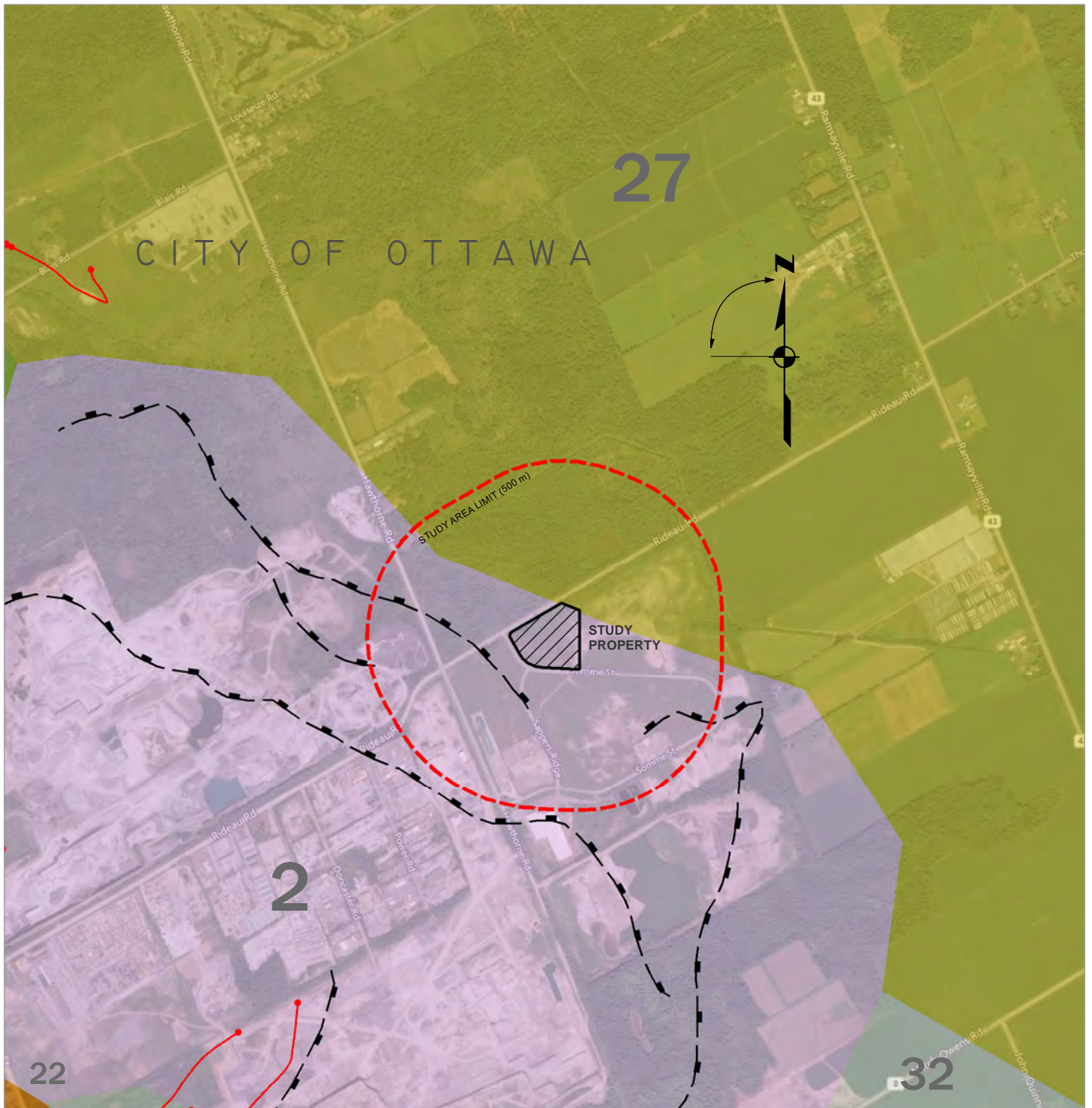
Consolidated Fastfrate (Ottawa) Holdings Inc.
 RIDEAU ROAD & SOMME STREET
 CITY OF OTTAWA
 ONTARIO

**HYDROGEOLOGY ASSESSMENT
 SURFICIAL GEOLOGY**

Project No. 12580314-01
Revision No. -
Date September 2022

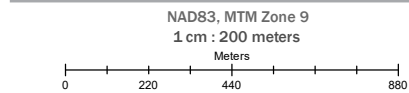
FIGURE 5

Created by: Will Pridham



LEGEND			
	Study Property Limit		
	500 m Radius		
	Landslide Scar		
	Beach		
EDS014 - QUATERNARY GEOLOGY (Ministry of Northern Development & Mines)			
	32 Organic deposits: peat, muck and marl		22 Glaciofluvial ice-contact deposits: gravel and sand minor till includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits
	27 Glaciomarine and marine deposits: sand, gravelly sand and gravel nearshore and beach deposits		2 Bedrock: undifferentiated carbonate and clastic sedimentary rock, exposed at surface or covered by a discontinuous, thin layer of drift

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ATtribution STATEMENTS

- ▶ EDS014-REV. Ontario Geological Survey, 1997. Quaternary geology, seamless coverage of the province of Ontario: Ontario Geological Survey, Data Set 14.
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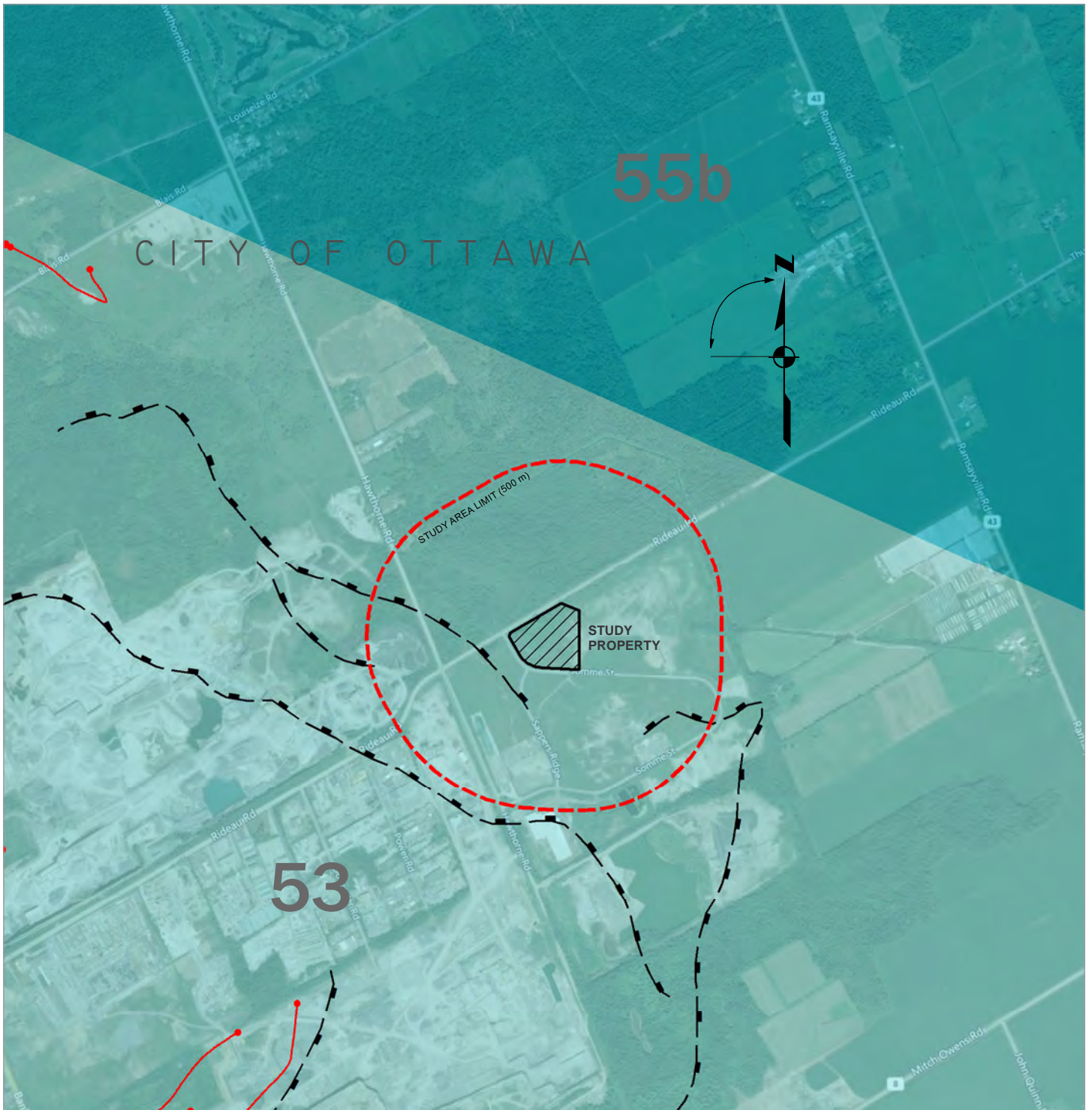
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RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

**HYDROGEOLOGY ASSESSMENT
QUATERNARY GEOLOGY**

Project No. 12580314-01
Revision No. -
Date September 2022

FIGURE 6

Created by: Will Pridham



LEGEND

- Study Property Limit
- 500 m Radius
- Landslide Scar
- Beach

MRD126 - BEDROCK GEOLOGY (Ministry of Northern Development & Mines)

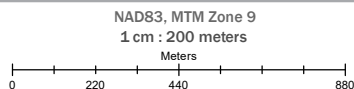
ORDOVICIAN (443.7 Ma to 488.3 Ma)
 UPPER ORDOVICIAN

55 Shale, limestone, dolostone, siltstone

53 Dolostone, sandstone: Beekmantown Gp.

55b Georgian Bay Fm.; Blue Mountain Fm.; Billings Fm.;
 Collingwood Mb.; Eastview Mb.

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ATtribution STATEMENTS

- ▶ MRD126-REV. Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision
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 RIDEAU ROAD & SOMME STREET
 CITY OF OTTAWA
 ONTARIO




**HYDROGEOLOGY ASSESSMENT
 BEDROCK GEOLOGY**

Project No. 12580314-01
 Revision No. -
 Date September 2022

FIGURE 7

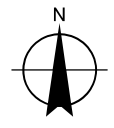
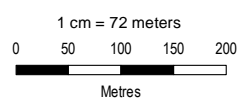
Created by: Will Pridham

Legend

-  Well Locations
-  500 m Radius
-  Property Limit



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Consolidated Fastrate (Ottawa) Holdings Inc.
 301 Somme Street, Ottawa, ON
 City of Ottawa

Project No. 12580314
 Revision No.
 Date Sep 19, 2022

Map Projection: Transverse Mercator
 Horizontal Datum: North American 1983
 Grid: NAD 1983 UTM Zone 18N

Well Locations



Figure 8

Appendices




Appendix A

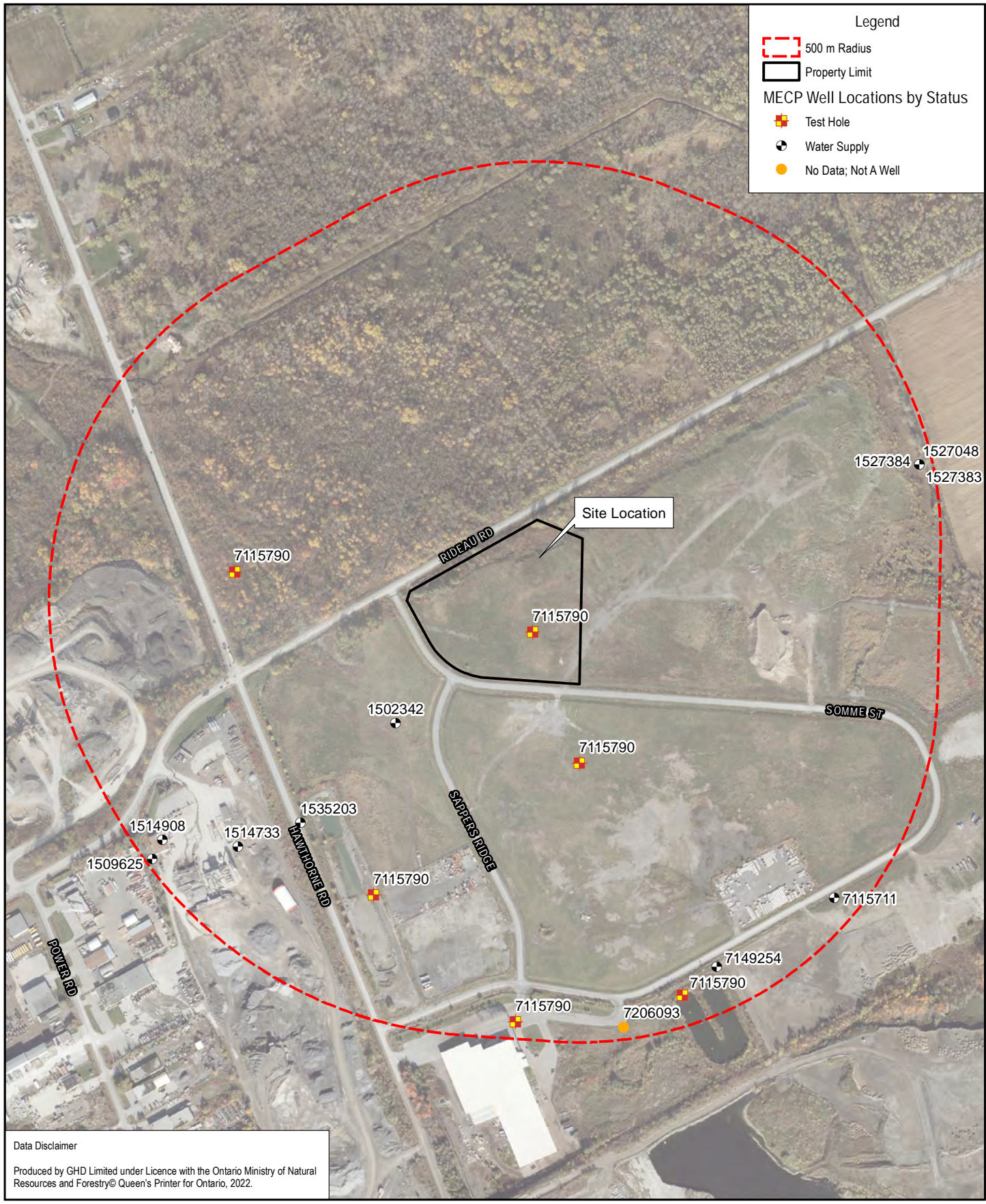
MECP Well Records

Legend

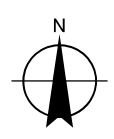
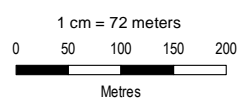
-  500 m Radius
-  Property Limit

MECP Well Locations by Status

-  Test Hole
-  Water Supply
-  No Data; Not A Well



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Consolidated Fastrate (Ottawa) Holdings Inc.
 301 Somme Street, Ottawa, ON
 City of Ottawa

Project No. 12580314
 Revision No.
 Date Sep 19, 2022

Map Projection: Transverse Mercator
 Horizontal Datum: North American 1983
 Grid: NAD 1983 UTM Zone 18N

MECP Well Locations

Appendix A

MECP WELL RECORD LISTINGS



Ministry of the Environment, Conservation & Parks (MECP)
 © Water Well Information System (WWIS). Ministry of the Environment, Conservation, and Parks. 2021.
 Powered by Location Intelligence

DISCLAIMER: All effort has been taken to ensure the accuracy of the data is the same as the source. There are instances where the original PDF document is different and in those cases, the PDF should be used instead.

18	Easting:	456430.80	Latitude: 45.30598 Longitude: -75.555767	Well ID: 1502342
	Northing:	5017092.00		
	Elev (masl):	87.74		

LOCATION	Lot: 026 Con: 06 Municipality: OTTAWA-CARLETON Township: GLOUCESTER TOWNSHIP Street: City: n/a	Tag: Audit No: Contractor License: 3504 Well Completion Date: 11/30/1950 Received Date: 12/06/1951
WELL	Well Status: Water Supply Prim. Use: n/a Sec. Use: Domestic Boring Method: Cable Tool	Well Depth (m): 17.3736 Depth to Bedrock (m): 27 Depth to Water: ft Water Kind: FRESH
PUMP TEST	Test Method: CLEAR Pump Set (m): n/a SWL (ft): 13 Final Level: 18 ft Pump Rate: 1 GPM Recom. Rate: n/a GPM	Pipe ID: 10572955 Pump Test ID: 991502342 Flowing: N Pump Duration (hr): 0 Pump Duration (m): 30

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930041541	5	inch	STEEL	n/a	27 ft
2	930041542	5	inch	OPEN HOLE	n/a	57 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	PREV. DRILLED	n/a	n/a	n/a	0	27 ft
2	SANDSTONE	n/a	n/a	n/a	27	57 ft

End of Record

18	Easting:	456090.80	Latitude: 45.304248 Longitude: -75.560087	Well ID: 1509625
	Northing:	5016902.00		
	Elev (masl):	103.27		

LOCATION	Lot: 026 Con: 05 Municipality: OTTAWA-CARLETON Township: GLOUCESTER TOWNSHIP Street: City: n/a	Tag: Audit No: Contractor License: 3002 Well Completion Date: 05/04/1968 Received Date: 06/12/1968
WELL	Well Status: Water Supply Prim. Use: n/a Sec. Use: n/a Boring Method: Cable Tool	Well Depth (m): 58.5216 Depth to Bedrock (m): 0 Depth to Water: ft Water Kind: FRESH
PUMP TEST	Test Method: CLEAR Pump Set (m): n/a SWL (ft): 36 Final Level: 63 ft Pump Rate: 180 GPM Recom. Rate: 180 GPM	Pipe ID: 10580227 Pump Test ID: 991509625 Flowing: N Pump Duration (hr): 24 Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930055956	10	inch	STEEL	n/a	18 ft
2	930055957	9	inch	OPEN HOLE	n/a	192 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	SANDSTONE	n/a	n/a	BROWN	0	52 ft
2	QUARTZITE	n/a	n/a	GREY	52	72 ft
3	SANDSTONE	n/a	n/a	WHITE	72	160 ft
4	SANDSTONE	n/a	n/a	GREY	160	192 ft

End of Record

18	Easting:	456210.80
	Northing:	5016920.00
	Elev (masl):	99.42

Latitude: 45.304418
Longitude: -75.558558

Well ID: **1514733**

LOCATION

Lot: 026
Con: 05
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 1517
Well Completion Date: 04/15/1975
Received Date: 07/08/1975

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Cable Tool

Well Depth (m): 35.3568
Depth to Bedrock (m): 2
Depth to Water: ft
Water Kind: FRESH

PUMP TEST

Test Method: CLOUDY
Pump Set (m): n/a
SWL (ft): 40
Final Level: 65 ft
Pump Rate: 10 GPM
Recom. Rate: 5 GPM

Pipe ID: 10585273
Pump Test ID: 991514733
Flowing: N
Pump Duration (hr): 1
Pump Duration (m): 20

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930064874	5	inch	STEEL	n/a	18 ft
2	930064875	5	inch	OPEN HOLE	n/a	116 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	SAND	n/a	BROWN	0	2 ft
2	SHALE	n/a	n/a	BROWN	2	10 ft
3	LIMESTONE	n/a	n/a	GREY	10	116 ft

End of Record

18	Easting:	456104.80
	Northing:	5016929.00
	Elev (masl):	101.82

Latitude: 45.304492
Longitude: -75.559911

Well ID: **1514908**

LOCATION

Lot: 026
Con: 05
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street:
City: n/a

Tag:
Audit No:
Contractor License: 1558
Well Completion Date: 08/15/1975
Received Date: 09/11/1975

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: Domestic
Boring Method: Air Percussion

Well Depth (m): 75.5904
Depth to Bedrock (m): 0
Depth to Water: ft
Water Kind: Not stated

PUMP TEST

Test Method:
Pump Set (m): n/a
SWL (ft): 40
Final Level: 100 ft
Pump Rate: 15 GPM
Recom. Rate: 5 GPM

Pipe ID:
Pump Test ID: 991514908
Flowing: N
Pump Duration (hr): 1
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Table with 7 columns: Layer, Case ID, Casing Diameter, Diameter Units, Material, Top Depth, Bottom Depth. Rows 1 and 2.

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Table with 7 columns: Layer, Material, Material 2, Material 3, Colour, Top Depth, Bottom Depth. Rows 1 to 4.

End of Record

Table with 2 columns: Easting, Northing, Elev (masl). Row 18.

Latitude: 45.309274
Longitude: -75.546472

Well ID: 1527048

LOCATION

Lot: 026
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street:
City: n/a

Tag:
Audit No: 130025
Contractor License: 1558
Well Completion Date: 04/19/1993
Received Date: 05/06/1993

WELL

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Air Percussion

Well Depth (m): 41.148
Depth to Bedrock (m): 0
Depth to Water: ft
Water Kind: Not stated

PUMP TEST

Test Method: n/a
Pump Set (m): n/a
SWL (ft): 31
Final Level: 130 ft
Pump Rate: 15 GPM
Recom. Rate: 5 GPM

Pipe ID: 10597297
Pump Test ID: 991527048
Flowing: N
Pump Duration (hr): 1
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Table with 7 columns: Layer, Case ID, Casing Diameter, Diameter Units, Material, Top Depth, Bottom Depth. Rows 1 to 3.

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Table with 7 columns: Layer, Material, Material 2, Material 3, Colour, Top Depth, Bottom Depth. Rows 1 to 4.

End of Record

Table with 2 columns: Easting, Northing, Elev (masl). Row 18.

Latitude: 45.309274
Longitude: -75.546472

Well ID: 1527383

LOCATION

Lot: 026
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street:

Tag:
Audit No: 135946
Contractor License: 1558
Well Completion Date: 08/16/1993
Received Date:

L	City:	n/a	09/21/1993	
WELL	Well Status:	Water Supply	Well Depth (m):	30.48
	Prim. Use:	n/a	Depth to Bedrock (m):	28
	Sec. Use:	n/a	Depth to Water:	ft
	Boring Method:	Air Percussion	Water Kind:	Not stated
PUMP TEST	Test Method:	CLOUDY	Pipe ID:	10597603
	Pump Set (m):	n/a	Pump Test ID	991527383
	SWL (ft)	7	Flowing:	N
	Final Level:	15 ft	Pump Duration (hr):	1
	Pump Rate:	20 GPM	Pump Duration (m):	0
	Recom. Rate:	5 GPM		

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diameter	Diameter Units	Material	Top Depth	Bottom Depth
1	930085613	6	inch	STEEL	n/a	39 ft
2	930085614	6	inch	OPEN HOLE	n/a	100 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	SAND	STONES	n/a	BROWN	0	5 ft
2	HARDPAN	BOULDERS	n/a	GREY	5	28 ft
3	SANDSTONE	HARD	n/a	GREY	28	100 ft

End of Record

18	<table border="1" style="width: 100%;"> <tr><td>Easting:</td><td>457162.00</td></tr> <tr><td>Northing:</td><td>5017453.00</td></tr> <tr><td>Elev (masl):</td><td>82.18</td></tr> </table>	Easting:	457162.00	Northing:	5017453.00	Elev (masl):	82.18	Latitude: 45.309274 Longitude: -75.546472	Well ID: 1527384
Easting:	457162.00								
Northing:	5017453.00								
Elev (masl):	82.18								

LOCATION	Lot:	026	Tag:	
	Con:	06	Audit No:	135944
	Municipality:	OTTAWA-CARLETON	Contractor License:	1558
	Township:	GLOUCESTER TOWNSHIP	Well Completion Date:	08/16/1993
WELL	Street:		Received Date:	09/21/1993
	City:	n/a		
	Well Status:	Water Supply	Well Depth (m):	30.48
	Prim. Use:	n/a	Depth to Bedrock (m):	0
PUMP TEST	Sec. Use:	n/a	Depth to Water:	ft
	Boring Method:	Air Percussion	Water Kind:	Not stated
	Test Method:	CLOUDY	Pipe ID:	10597604
	Pump Set (m):	n/a	Pump Test ID	991527384
	SWL (ft)	22	Flowing:	N
	Final Level:	24 ft	Pump Duration (hr):	1
Pump Rate:	15 GPM	Pump Duration (m):	0	
Recom. Rate:	5 GPM			

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diameter	Diameter Units	Material	Top Depth	Bottom Depth
1	930085615	6	inch	STEEL	n/a	22 ft
2	930085616	6	inch	OPEN HOLE	n/a	100 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	SANDSTONE	HARD	n/a	GREY	0	100 ft

End of Record

18	<table border="1" style="width: 100%;"> <tr><td>Easting:</td><td>456298.00</td></tr> <tr><td>Northing:</td><td>5016953.00</td></tr> <tr><td>Elev (masl):</td><td>90.37</td></tr> </table>	Easting:	456298.00	Northing:	5016953.00	Elev (masl):	90.37	Latitude: 45.30472 Longitude: -75.557449	Well ID: 1535203
Easting:	456298.00								
Northing:	5016953.00								
Elev (masl):	90.37								

LOCATION
Lot:
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: 3500 RIDEAU ROAD
City: GLOUCESTER

Tag: A018916
Audit No: Z19099
Contractor License: 1119
Well Completion Date: 10/27/2004
Received Date: 11/26/2004

WELL
Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Air Percussion

Well Depth (m): 42.67
Depth to Bedrock (m): 4
Depth to Water: r3
Water Kind:

PUMP TEST
Test Method: CLEAR
Pump Set (m): 41.16
SWL (ft): 14.18
Final Level: 15.8m
Pump Rate: 75.7LPM
Recom. Rate: 75.7LPM

Pipe ID: 11181474
Pump Test ID: 11189805
Flowing: n/a
Pump Duration (hr): 1
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	930843335	15.88	cm	STEEL	0	6.7 m
2	930843336	n/a	cm	OPEN HOLE	6.09	42.67 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	GRAVEL	TOPSOIL	n/a	n/a	0	1.21 m
2	SANDSTONE	n/a	n/a	GREY	1.21	35.05 m
3	LIMESTONE	SANDSTONE	n/a	GREY	35.05	42.67 m

End of Record

17	Eastings:	436883.00
	Northings:	4794755.00
	Elev (masl):	87.38

Latitude: 45.303821
Longitude: -75.547937

Well ID: **7115711**

LOCATION
Lot: 026
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: TW #5
City: GLOUCESTER

Tag: A068335
Audit No: Z84410
Contractor License: 1558
Well Completion Date: 09/26/2008
Received Date: 12/02/2008

WELL
Well Status: Water Supply
Prim. Use: n/a
Sec. Use: Industrial
Boring Method: Rotary (Air)

Well Depth (m): 29.86
Depth to Bedrock (m): n/a
Depth to Water: r2
Water Kind: Untested

PUMP TEST
Test Method: CLEAR
Pump Set (m): 22.85
SWL (ft): 6.85
Final Level: 9.99m
Pump Rate: 54.6LPM
Recom. Rate: 45.6LPM

Pipe ID: 1002442328
Pump Test ID: 1002442329
Flowing: n/a
Pump Duration (hr): 6
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	1002442337	15.86	cm	STEEL	-0.45	12.8 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	STONES	FILL	BROWN	0	1.21 m
2	TOPSOIL	STONES	SANDY	GREY	1.21	3.96 m
3	SANDSTONE	n/a	HARD	GREY	3.96	29.86 m

End of Record

17	Eastings:	555808.00
	Northings:	4809940.00
	Elev (masl):	85.10

Latitude: 45.303818
Longitude: -75.556139

Well ID: **7115790**

LOCATION
Lot: 026
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa

Tag: A074584
Audit No: M02897
Contractor License: 1844
Well Completion Date: 07/15/2008
Received Date: 11/26/2008

WELL
Well Status: Test Hole
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 7.6
Depth to Bedrock (m): n/a
Depth to Water:
Water Kind:

PUMP TEST
Test Method: n/a
Pump Set (m): n/a
SWL (ft): 1.7
Final Level: n/a m
Pump Rate: n/a
Recom. Rate: n/a

Pipe ID: 1002782586
Pump Test ID: 1002782562
Flowing: n/a
Pump Duration (hr): n/a
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diameter	Diameter Units	Material	Top Depth	Bottom Depth
0	1002782579	n/a	n/a	PLASTIC	n/a	3 m
0	1002782525	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782570	n/a	n/a	PLASTIC	n/a	3 m
0	1002782597	n/a	n/a	PLASTIC	n/a	1.37 m
0	1002782561	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782588	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782552	n/a	n/a	PLASTIC	n/a	1.22 m
0	1002782534	n/a	n/a	PLASTIC	n/a	0.6 m
0	1002782543	n/a	n/a	PLASTIC	n/a	2.13 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	FINE SAND	SILT	DENSE	GREY	0	0.9 m
2	FILL	SAND	SILT	BROWN	0.9	4.7 m
3	SAND	SILT	n/a	GREY	4.7	6 m
4	TILL	SAND	GRAVEL	BROWN	6	7.6 m

End of Record

n/a	Eastings:	<null>
	Northings:	<null>
	Elev (masl):	94.41

Latitude: 45.302584
Longitude: -75.55063

Well ID: **7115790**

LOCATION
Lot: 026
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa

Tag: A074584
Audit No: M02897
Contractor License: 1844
Well Completion Date: 07/15/2008
Received Date: 11/26/2008

WELL
Well Status: Test Hole
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water:
Water Kind:

PUMP TEST
Test Method: n/a
Pump Set (m): n/a
SWL (ft): 1.3
Final Level: n/a m
Pump Rate: n/a
Recom. Rate: n/a

Pipe ID: 1002782595
Pump Test ID: 1002782535
Flowing: n/a
Pump Duration (hr): n/a
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1002782588	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782570	n/a	n/a	PLASTIC	n/a	3 m
0	1002782543	n/a	n/a	PLASTIC	n/a	2.13 m
0	1002782561	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782525	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782534	n/a	n/a	PLASTIC	n/a	0.6 m
0	1002782597	n/a	n/a	PLASTIC	n/a	1.37 m
0	1002782552	n/a	n/a	PLASTIC	n/a	1.22 m
0	1002782579	n/a	n/a	PLASTIC	n/a	3 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	FINE SAND	SILT	DENSE	GREY	0	0.9 m
2	FILL	SAND	SILT	BROWN	0.9	4.7 m
3	SAND	SILT	n/a	GREY	4.7	6 m
4	TILL	SAND	GRAVEL	BROWN	6	7.6 m

End of Record

n/a	Easting:	<null>
	Northing:	<null>
	Elev (masl):	103.53

Latitude: 45.302237
Longitude: -75.553598

Well ID: **7115790**

LOCATION
Lot: 026
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa

Tag: A074584
Audit No: M02897
Contractor License: 1844
Well Completion Date: 07/08/2008
Received Date: 11/26/2008

WELL
Well Status: Test Hole
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water:
Water Kind:

PUMP TEST
Test Method: n/a
Pump Set (m): n/a
SWL (ft): 3.6
Final Level: n/a m
Pump Rate: n/a
Recom. Rate: n/a

Pipe ID: 1002782586
Pump Test ID: 1002782535
Flowing: n/a
Pump Duration (hr): n/a
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1002782552	n/a	n/a	PLASTIC	n/a	1.22 m
0	1002782597	n/a	n/a	PLASTIC	n/a	1.37 m
0	1002782543	n/a	n/a	PLASTIC	n/a	2.13 m
0	1002782525	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782579	n/a	n/a	PLASTIC	n/a	3 m
0	1002782561	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782534	n/a	n/a	PLASTIC	n/a	0.6 m
0	1002782570	n/a	n/a	PLASTIC	n/a	3 m
0	1002782588	n/a	n/a	PLASTIC	n/a	1.5 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	FINE SAND	SILT	DENSE	GREY	0	0.9 m
2	FILL	SAND	SILT	BROWN	0.9	4.7 m
3	SAND	SILT	n/a	GREY	4.7	6 m
4	TILL	SAND	GRAVEL	BROWN	6	7.6 m

End of Record

n/a	Easting:	<null>
	Northing:	<null>
	Elev (masl):	

Latitude: 45.307135
Longitude: -75.55334

Well ID: **7115790**

103.53

LOCATION
Lot: 026
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa

WELL
Well Status: Test Hole
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

PUMP TEST
Test Method: n/a
Pump Set (m): n/a
SWL (ft): 1.7
Final Level: n/a m
Pump Rate: n/a
Recom. Rate: n/a

Tag: A074584
Audit No: M02897
Contractor License: 1844
Well Completion Date: 07/15/2008
Received Date: 11/26/2008

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water:
Water Kind:

Pipe ID: 1002782532
Pump Test ID: 1002782571
Flowing: n/a
Pump Duration (hr): n/a
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diameter	Diameter Units	Material	Top Depth	Bottom Depth
0	1002782588	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782597	n/a	n/a	PLASTIC	n/a	1.37 m
0	1002782561	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782579	n/a	n/a	PLASTIC	n/a	3 m
0	1002782525	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782534	n/a	n/a	PLASTIC	n/a	0.6 m
0	1002782543	n/a	n/a	PLASTIC	n/a	2.13 m
0	1002782552	n/a	n/a	PLASTIC	n/a	1.22 m
0	1002782570	n/a	n/a	PLASTIC	n/a	3 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	FINE SAND	SILT	DENSE	GREY	0	0.9 m
2	FILL	SAND	SILT	BROWN	0.9	4.7 m
3	SAND	SILT	n/a	GREY	4.7	6 m
4	TILL	SAND	GRAVEL	BROWN	6	7.6 m

End of Record

n/a	Easting:	<null>
	Northing:	<null>
	Elev (masl):	94.41

Latitude: 45.305492
Longitude: -75.552495

Well ID: **7115790**

LOCATION
Lot: 026
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa

WELL
Well Status: Test Hole
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

PUMP TEST
Test Method: n/a
Pump Set (m): n/a
SWL (ft): 1.3
Final Level: n/a m
Pump Rate: n/a
Recom. Rate: n/a

Tag: A074584
Audit No: M02897
Contractor License: 1844
Well Completion Date: 07/14/2008
Received Date: 11/26/2008

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water:
Water Kind:

Pipe ID: 1002782595
Pump Test ID: 1002782544
Flowing: n/a
Pump Duration (hr): n/a
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diameter	Diameter Units	Material	Top Depth	Bottom Depth
0	1002782525	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782597	n/a	n/a	PLASTIC	n/a	1.37 m

0	1002782534	n/a	n/a	PLASTIC	n/a	0.6	m
0	1002782588	n/a	n/a	PLASTIC	n/a	1.5	m
0	1002782579	n/a	n/a	PLASTIC	n/a	3	m
0	1002782552	n/a	n/a	PLASTIC	n/a	1.22	m
0	1002782570	n/a	n/a	PLASTIC	n/a	3	m
0	1002782543	n/a	n/a	PLASTIC	n/a	2.13	m
0	1002782561	n/a	n/a	PLASTIC	n/a	1.5	m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	FINE SAND	SILT	DENSE	GREY	0	0.9 m
2	FILL	SAND	SILT	BROWN	0.9	4.7 m
3	SAND	SILT	n/a	GREY	4.7	6 m
4	TILL	SAND	GRAVEL	BROWN	6	7.6 m

End of Record

n/a	Easting:	<null>
	Northing:	<null>
	Elev (masl):	84.01

Latitude: 45.307865
Longitude: -75.558653

Well ID: **7115790**

LOCATION
Lot: 026
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa

Tag: A074584
Audit No: M02897
Contractor License: 1844
Well Completion Date: 07/14/2008
Received Date: 11/26/2008

WELL
Well Status: Test Hole
Prim. Use: n/a
Sec. Use: n/a
Boring Method: n/a

Well Depth (m): 0
Depth to Bedrock (m): n/a
Depth to Water:
Water Kind:

PUMP TEST
Test Method: n/a
Pump Set (m): n/a
SWL (ft): 1
Final Level: n/a m
Pump Rate: n/a
Recom. Rate: n/a

Pipe ID: 1002782599
Pump Test ID: 1002782589
Flowing: n/a
Pump Duration (hr): n/a
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
0	1002782588	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782525	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782543	n/a	n/a	PLASTIC	n/a	2.13 m
0	1002782534	n/a	n/a	PLASTIC	n/a	0.6 m
0	1002782561	n/a	n/a	PLASTIC	n/a	1.5 m
0	1002782579	n/a	n/a	PLASTIC	n/a	3 m
0	1002782552	n/a	n/a	PLASTIC	n/a	1.22 m
0	1002782597	n/a	n/a	PLASTIC	n/a	1.37 m
0	1002782570	n/a	n/a	PLASTIC	n/a	3 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	FINE SAND	SILT	DENSE	GREY	0	0.9 m
2	FILL	SAND	SILT	BROWN	0.9	4.7 m
3	SAND	SILT	n/a	GREY	4.7	6 m
4	TILL	SAND	GRAVEL	BROWN	6	7.6 m

End of Record

n/a	Easting:	<null>
	Northing:	<null>
	Elev (masl):	88.61

Latitude: 45.302947
Longitude: -75.550021

Well ID: **7149254**

LOCATION
WELL
PUMP TEST

Lot:
Con:
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: TW#7 HOAWTHORNE RD.
City: GLOUCESTER

Tag: A082844
Audit No: Z101832
Contractor License: 1558
Well Completion Date: 05/25/2010
Received Date: 08/04/2010

Well Status: Water Supply
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Rotary (Reverse)

Well Depth (m): 29.86
Depth to Bedrock (m): n/a
Depth to Water: m!
Water Kind: Untested

Test Method: CLEAR
Pump Set (m): 23.38
SWL (ft): 4.41
Final Level: 7.01m
Pump Rate: 27.3LPM
Recom. Rate: 27.3LPM

Pipe ID: 1003263559
Pump Test ID: 1003263560
Flowing: n/a
Pump Duration (hr): 6
Pump Duration (m): 0

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	1003263568	15.86	cm	STEEL	-0.45	6.4 m

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	TOPSOIL	STONES	PACKED	BROWN	0	4.26 m
2	SANDSTONE	n/a	HARD	GREY	4.26	29.86 m

End of Record

n/a	Easting:	<null>
	Northing:	<null>
	Elev (masl):	89.57

Latitude: 45.302183
Longitude: -75.551672

Well ID: **7206093**

LOCATION
WELL
PUMP TEST

Lot: 027
Con: 06
Municipality: OTTAWA-CARLETON
Township: GLOUCESTER TOWNSHIP
Street: 35 SAPPERS RIDGE
City: Ottawa

Tag: A089801
Audit No: Z103282
Contractor License: 3749
Well Completion Date: 07/18/2013
Received Date: 08/12/2013

Well Status: <null>
Prim. Use: n/a
Sec. Use: n/a
Boring Method: Rotary (Convent.)

Well Depth (m): 47.244
Depth to Bedrock (m): n/a
Depth to Water: ft
Water Kind: FRESH

Test Method: CLEAR
Pump Set (m): 130
SWL (ft): 25
Final Level: 34 ft
Pump Rate: 10 GPM
Recom. Rate: n/a GPM

Pipe ID: 1004977760
Pump Test ID: 1004977761
Flowing: n/a
Pump Duration (hr): 1
Pump Duration (m): n/a

CASING DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Case ID	Casing Diamter	Diamter Units	Material	Top Depth	Bottom Depth
1	1004977768	5.625	inch	STEEL	40	-2 ft

FORMATION DETAILS

Layer Value of "0" denotes a Null value and cannot be stratified and ordered.

Layer	Material	Material 2	Material 3	Colour	Top Depth	Bottom Depth
1	FILL	n/a	LOOSE	n/a	0	8 ft
2	CLAY	GRAVEL	PACKED	GREY	8	24 ft
3	LIMESTONE	n/a	n/a	n/a	24	155 ft

End of Record

Appendix B

Photographs



Photo 1 - View of drilled water well on the Site used during pumping test and proposed building area showing ground improvement.



Photo 2 - View of ground improvement area.



Site Photographs



Photo 3 - Wellhead at pumped water well A342117.



Photo 4 - Observation well (ID A305146) used during pumping test for monitoring of potential interference effects.





Photo 5 - Observation well (ID A295342) used during pumping test for monitoring of potential interference effects.



Photo 6 - Observation well (ID A342260) used during pumping test for monitoring of potential interference effects.



Site Photographs

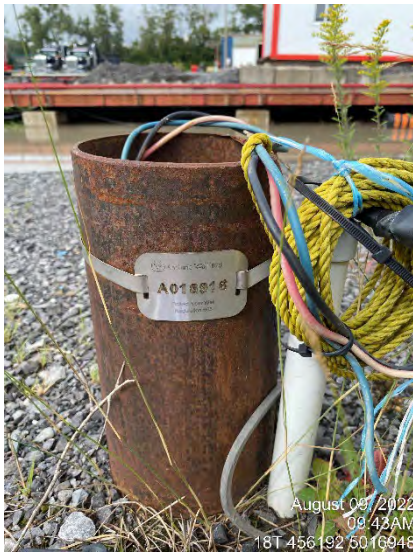


Photo 7 - Observation well (ID A018916) used during pumping test for monitoring of potential interference effects.



Photo 8 - Observation well at 4885 Hawthorne Road used during pumping test for monitoring of potential interference effects.



Site Photographs

Appendix C

**Well Record A342117 and WSP Well
Certificate**

CERTIFICATE OF WELL COMPLIANCE



I (Jeremy Hanna) AIR ROCK DRILLING CO. LTD. - DO HEREBY CERTIFY

that I am licensed to drill water wells in the Province of Ontario, and that I have

supervised the drilling of the water well on the property of:

CONSOLIDATED FASTFRATE (OTTAWA)
OWNER: HOLDINGS INC.

Location: # 301 SOMME STREET, GLOUCESTER

Part 26 +
LOT: 27 CON: 6 R.F. PLAN # 4M-1388 S/L # X

Ottawa-Carleton / Geographical Township of GLOUCESTER

I CERTIFY FURTHER that, I am aware of the well drilling requirements, the guidelines, recommendations and regulations of the Ministry of the Environment governing well installations in the Province of Ontario, and the standards specified in any subdivision agreement and hydrogeological report applicable to this site and City Standards.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased, grouted (cement or bentonite) as applicable and constructed in strict conformity with the standards required.

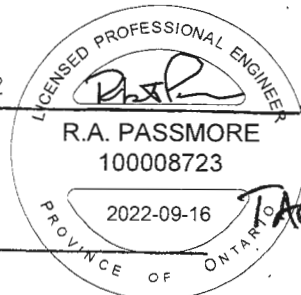
Signed this 27th Day of JULY, 2022

Jeremy Hanna (T3632)

Air Rock Drilling Co. Ltd. (C-7681)

The Engineer on behalf of the Landowner set out above, Certifies that he/she has inspected the well and it was constructed in accordance with the specifications in O.Reg 903, this report and the Hydrogeological Report with regards to casing length and grouting requirements.

Signed this 16th day of Aug 2022



2022511
TAGA342117

(Engineer)

Shaping our future together
Ensemble, formons notre avenir

City of Ottawa
Client Service Centre
8243 Victoria Street

Ville d'Ottawa
Centre de service
8243, rue Victoria



Measurements recorded in: Metric Imperial

Page _____ of _____

Well Owner's Information

First Name: Consolidated Last Name/Organization: FastRate (Ottawa) Holdings Inc. E-mail Address: _____
 Mailing Address (Street Number/Name): 330 Preston Street, 7th Floor, Ottawa, Ont K1P 5N4 Municipality: _____ Province: _____ Postal Code: _____ Telephone No. (inc. area code): _____

Well Location

Address of Well Location (Street Number/Name): # 301 SOMME STREET Township: GLOUCESTER Lot: P/L26407 Concession: 6 R.F.
 County/District/Municipality: OTTAWA-CARLETON City/Town/Village: GLOUCESTER Province: Ontario Postal Code: _____
 UTM Coordinates: Zone: NAD 83 Easting: 18456582 Northing: 5017208 Municipal Plan and Sublot Number: 4M-1388 Other: _____

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m)
From	To			From To
	Gravel, Hard Pan, Boulders			0' 46'
	Grey Black limestone w/ white sandstone mix			46' 140'

Annular Space

Depth Set at (m)	Type of Sealant Used	Volume Placed
From To	(Material and Type)	(m ³)
52' 0'	Neat cement slurry	12.48

Method of Construction

Cable Tool Diamond Public Commercial Not used
 Rotary (Conventional) Jetting Domestic Municipal Dewatering
 Rotary (Reverse) Driving Livestock Test Hole Monitoring
 Boring Digging Irrigation Cooling & Air Conditioning
 Air percussion Industrial Other, specify _____
 Other, specify _____

Construction Record - Casing

inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)	Status of Well
			From To	
6 1/4"	Steel	.188"	2' 52'	<input checked="" type="checkbox"/> Water Supply
6"	Open hole		52' 140'	<input type="checkbox"/> Replacement Well

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft)	Status of Well
			From To	
				<input type="checkbox"/> Abandoned, Poor Water Quality
				<input type="checkbox"/> Abandoned, other, specify _____
				<input type="checkbox"/> Other, specify _____

Water Details

Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	Hole Diameter
		Depth (m/ft) From To Diameter (cm/in)
128 (m/ft)		0' 52' 9 3/4"
134 (m/ft)		52' 140' 6"

Well Contractor and Well Technician Information

Business Name of Well Contractor: Air Pack Drilling Co Ltd Well Contractor's Licence No.: C7681
 Business Address (Street Number/Name): 6659 Front town road Richmond Municipality: _____
 Province: Ont Postal Code: K0A2R0 Business E-mail Address: _____

Bus. Telephone No. (inc. area code): 038382170 Name of Well Technician (Last Name, First Name): HANNA Jeremy
 Well Technician's Licence No.: T3632 Signature of Technician and/or Contractor: _____ Date Submitted: 2020 3 10

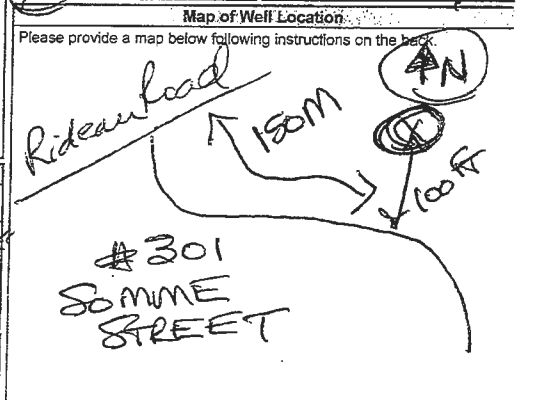
Results of Well Yield Testing

After test of well yield, water was: Clear and sand free Other, specify _____

If pumping discontinued, give reason: _____

Draw Down	Recovery		
Time (min)	Water Level (m)	Time (min)	Water Level (m)
1	28.2'	1	30.7'
2	29.3	2	29.2
3	29.4	3	29.1
4	29.5	4	29.1
5	29.6	5	29.1
10	29.7	10	29.1
15	29.9	15	28.2
20	30.1	20	28.2
25	30.3	25	
30	30.4	30	
40	30.5	40	
50	30.6	50	
60	30.7	60	

Pump intake set at (m/ft): 120'
 Pumping rate (l/min/GPM): 20
 Duration of pumping: 1 hrs + 0 min
 Final water level end of pumping (m/ft): 30.7"
 If flowing give rate (l/min/GPM): _____
 Recommended pump depth (m/ft): 100'
 Recommended pump rate (l/min/GPM): 20
 Well production (l/min/GPM): 20
 Disputed? Yes No



Comments: 1 HP 20 GPM Set @ 100 FT

Well owner's information package delivered: Yes No Date Package Delivered: 2020 07 28 Date Work Completed: 2020 07 27

Ministry Use Only: Audit No.: 2379047 Receiver: _____

Appendix D

Calibration Records

Control number: PET-TE-19 Project number: 12580314
 Date (mm/dd/yyyy): 08/09/2022 Project name: Consolidated Fastfrate,
 HydroG Assessment
 User (print name): Jason Gerald Location: 301 Somme Street, Ottawa

Additional equipment control numbers and descriptions: Hach Pocket Colorimeter II
(S/N 15100E283721)

Field procedure before use:

	Check when completed
<ul style="list-style-type: none"> • Check batteries are charged. Replace AAA batteries if needed. • Review applicable MSDS sheets for the DPD foil pillows (21055-69 & 21056-69 – in equipment case). • Proceed with a Spec $\sqrt{\text{TM}}$ Secondary Standard repeatability test if required. Please note that this test is done at the shop. Please see pages 1-43 and 1-44 (Pocket Colorimeter) or 1-47 and 1-48 (Pocket Colorimeter II) of instruction manual. • Proceed with a User-Entered Calibration if the project requires it. This is usually done at the shop. Please see pages 2-15 to 2-27 in instruction manual. 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

Filing: Field file

Signature: _____



Control number: PET-TE-3
 Date (mm/dd/yyyy): 08/09/2022
 User (print name): Jason Gerald

Project number: 12580314
 Project name: Consolidated Fastfrate
HydroG Assessment
 Location: 301 Somme Street,
Ottawa

Additional equipment control numbers and descriptions: Gastech NP-204 natural gas
detector used for methane detection at wellhead.

Field procedure before use:

	Check when completed
<ul style="list-style-type: none"> • Check for damages • Ensure the instrument has been properly calibrated <p>Note: The equipment does not require a data entry sheet, so only one page will print out.</p>	<p><input checked="" type="checkbox"/></p> <p><input checked="" type="checkbox"/></p>

Filing: Field file

Signature: _____



Control number: PET-WL-25
 Date (mm/dd/yyyy): 08/09/2022
 User (print name): Jason Gerald

Project number: 12580314
 Project name: Consolidated Fastfrate
 HydroG Assessment
 Location: 301 Somme Street,
 Ottawa

Additional equipment control numbers and descriptions: Heron Instruments, Dipper-T 100 m,
 S/N 4009-T

Field procedure before use:

	Check when completed
<ul style="list-style-type: none"> • Check for broken or missing parts. • Check battery • Check operation of buzzer. • Check operation of signal light. • Test probe in water to ensure unit operates, both visually and audibly. • Check cable. 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

Filing: Field file

Signature:



Control number: <u>PET-WL-34</u> Date (mm/dd/yyyy): <u>08/09/2022</u> User (print name): <u>Jason Gerald</u>	Project number: <u>12580314</u> Project name: <u>Consolidated Fastfrate</u> <u>HydroG Assessment</u> Location: <u>301 Somme Street,</u> <u>Ottawa</u>
---	--

Additional equipment control numbers and descriptions: Waterra, WS-2 Closed Reel,
S/N WS2-00518

Field procedure before use:

	Check when completed
<ul style="list-style-type: none"> • Check for broken or missing parts. • Check battery • Check operation of buzzer. • Check operation of signal light. • Test probe in water to ensure unit operates, both visually and audibly. • Check cable. 	 <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

Filing: Field file

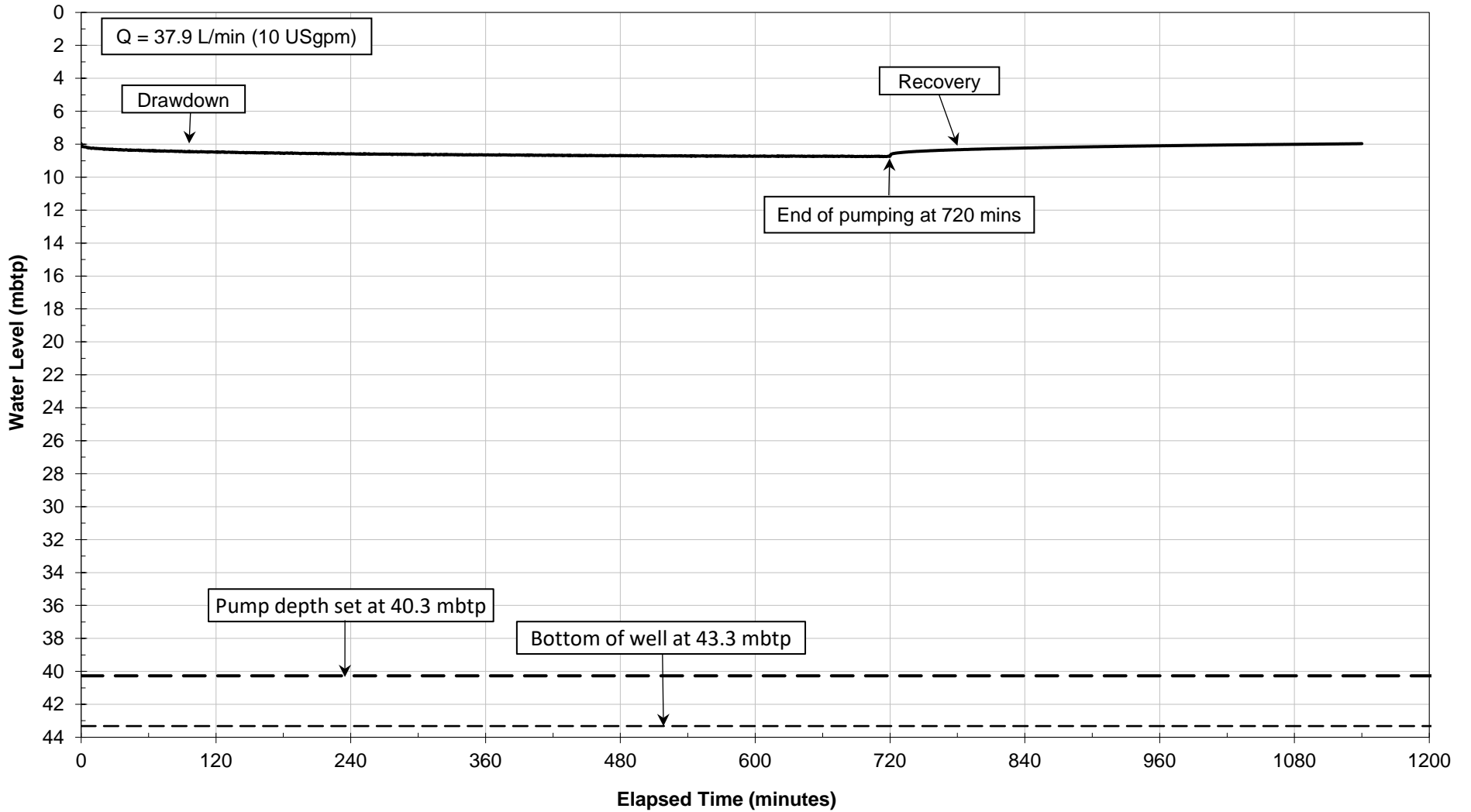
Signature: _____



Appendix E

Aquifer Performance Testing

PUMP HISTORY CURVE
Well A342117: August 9-10, 2022



PUMP HISTORY CURVE

Drilled Water Well
MECP Well ID: A342117
Static Level = 7.96 mbtp (7.31 mbgs)

Note: m = metres; mbtp = metres below top of pipe; mbgs = metres below ground surface

DATE: SEPTEMBER 2022

LOCATION: 301 Somme Street, Ottawa, ON

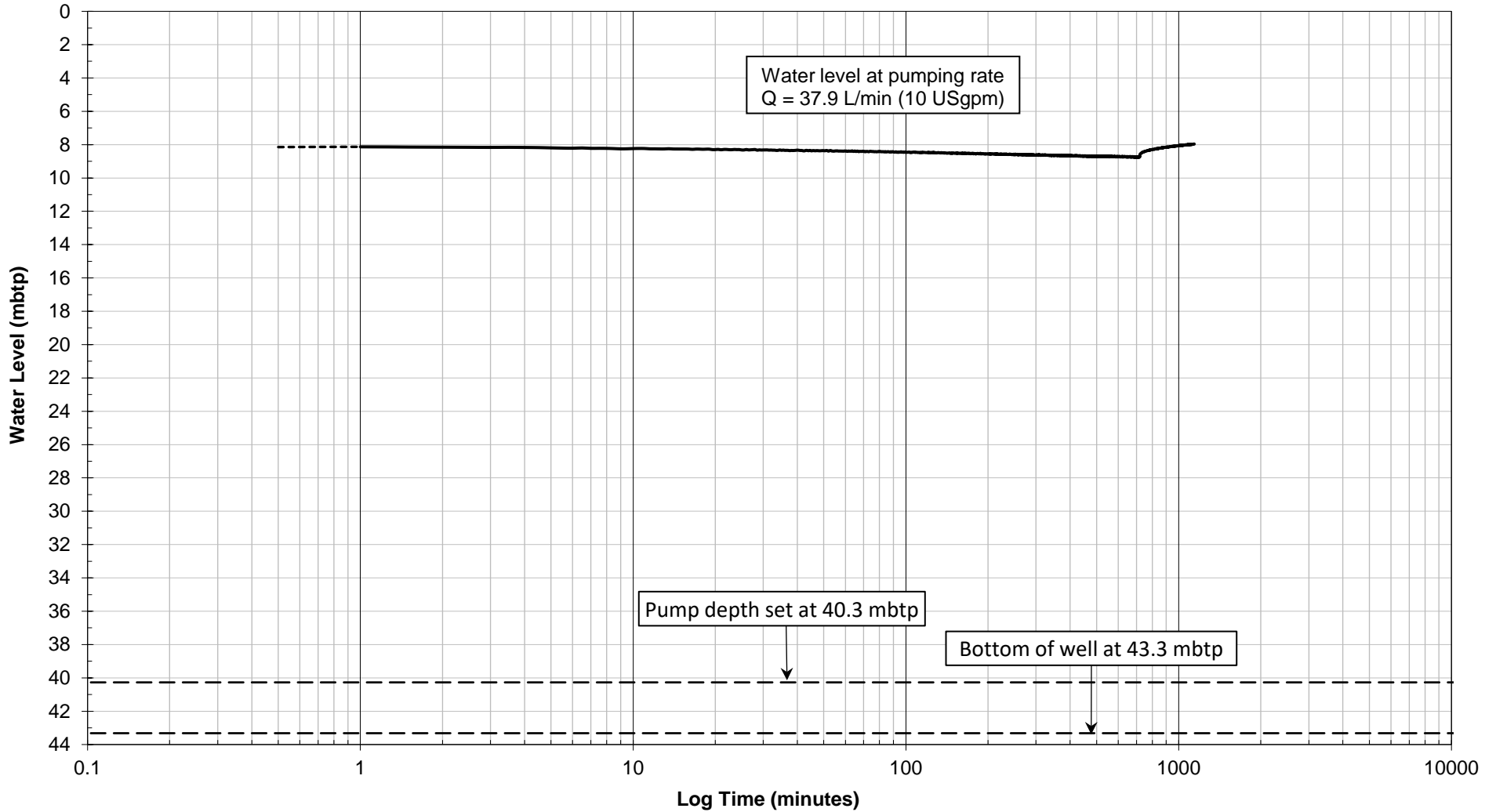
JOB NUMBER: 12580314-01

DRAWING NUMBER: E-1



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
www.ghd.com

CONSTANT RATE TEST: WATER LEVEL vs LOG TIME
Well A342117: August 9-10, 2022



CONSTANT RATE

Drilled Water Well
 MECP Well ID: A342117
 Static Level = 7.96 mbtp (7.31 mbgs)

Note: m = metres; mbtp = metres below top of pipe; mbgs = metres below ground surface

DATE: SEPTEMBER 2022

LOCATION: 301 Somme Street, Ottawa, ON

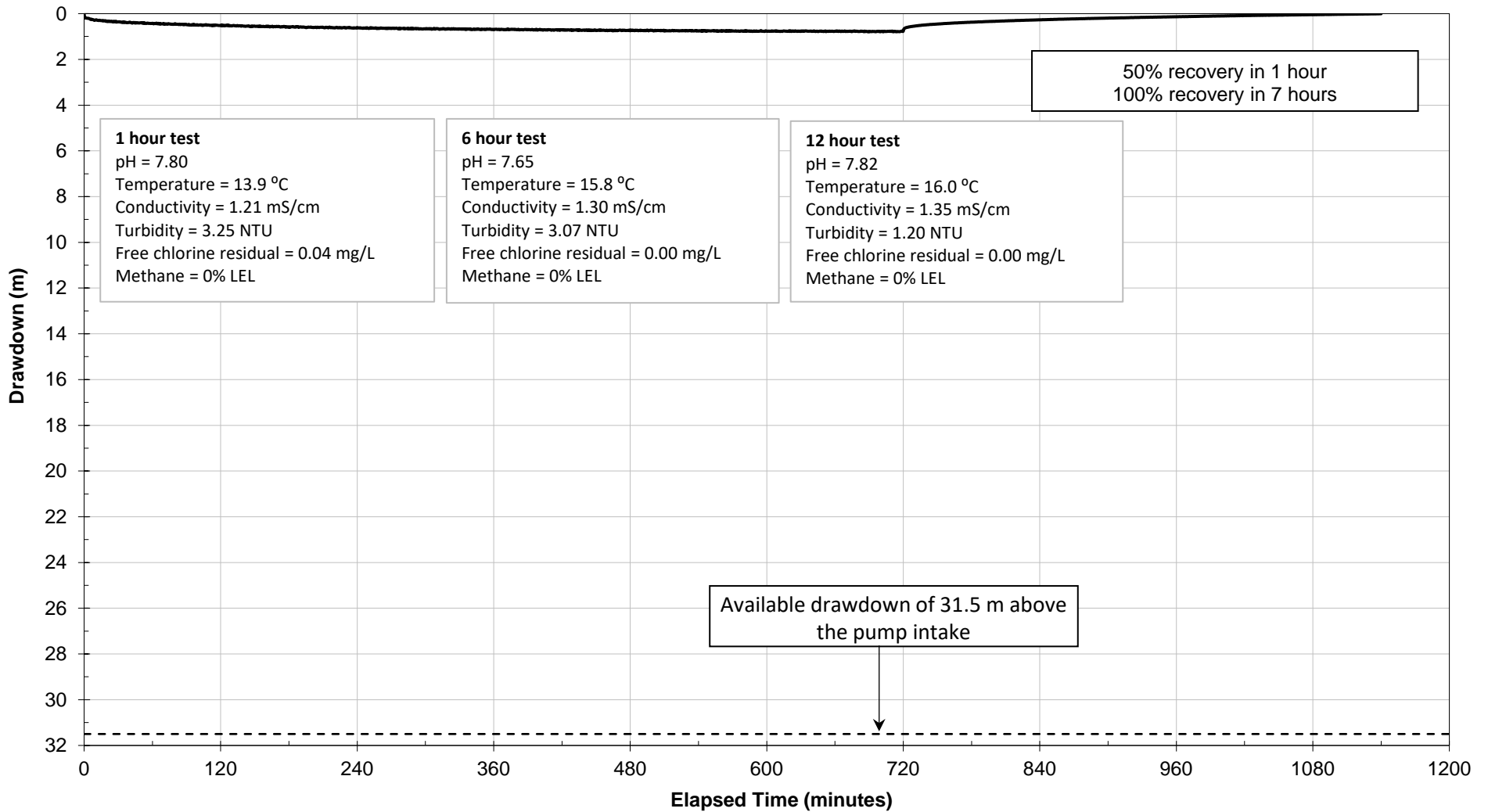
JOB NUMBER: 12580314-01

DRAWING NUMBER: E-2



347 PIDO ROAD, UNIT 29
 PETERBOROUGH, ON K9J 6X7
 www.ghd.com

CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS
Well A342117: August 9-10, 2022



CONSTANT RATE DRAWDOWN

Drilled Water Well
 MECP Well ID: A342117
 Static Level = 7.96 mbtp (7.31 mbgs)

Note: m = metres; mbtp = metres below top of pipe; mbgs = metres below ground surface

DATE: SEPTEMBER 2022

LOCATION: 301 Somme Street, Ottawa, ON

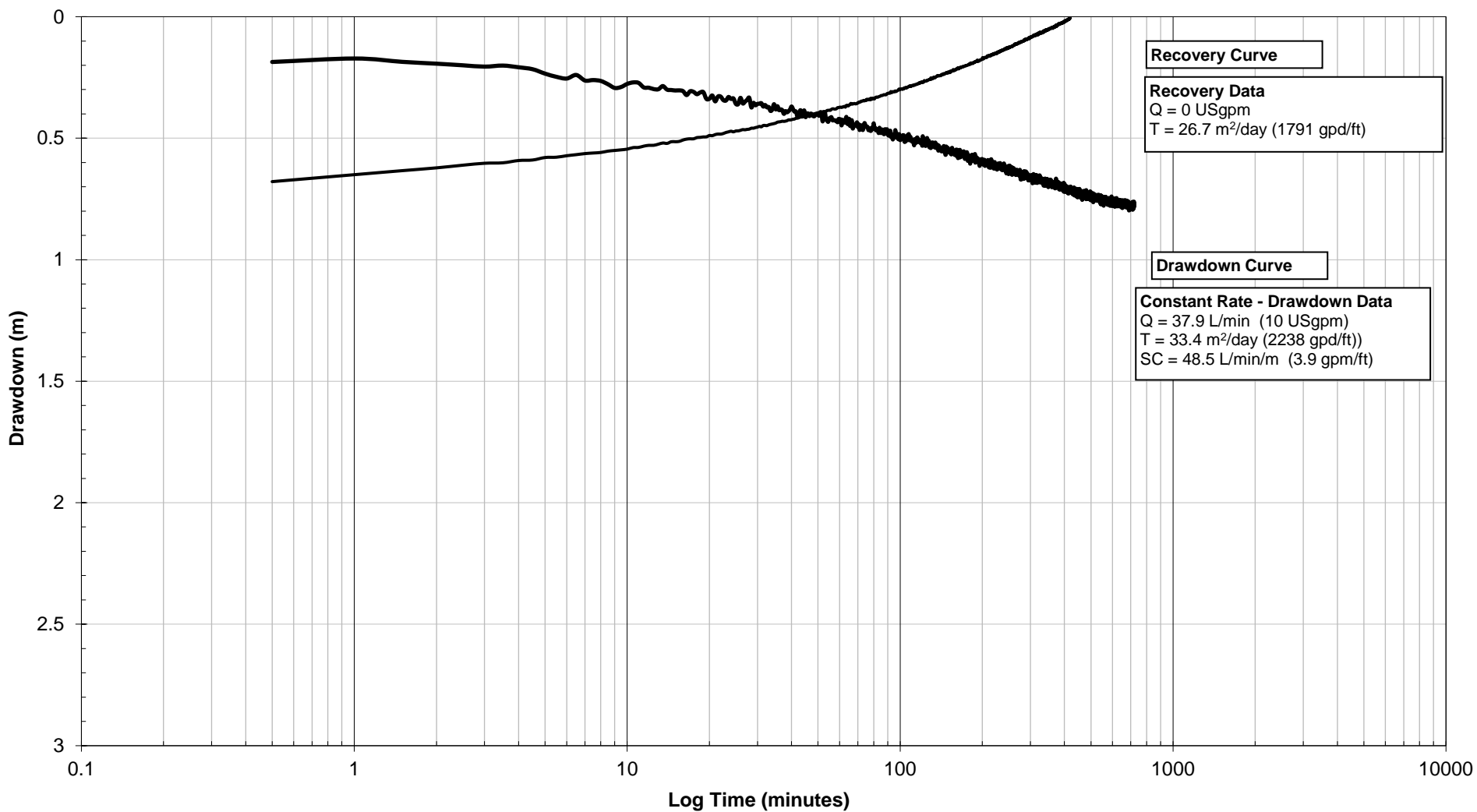
JOB NUMBER: 12580314-01

DRAWING NUMBER: E-3



347 PIDO ROAD, UNIT 29
 PETERBOROUGH, ON K9J 6X7
 www.ghd.com

CONSTANT RATE: DRAWDOWN and RECOVERY VS LOG TIME
Well A342117: August 9-10, 2022



TRANSMISSIVITY

Drilled Water Well
 MECP Well ID: A342117
 Static Level = 7.96 mbtp (7.31 mbgs)

Note: m = metres; mbtp = metres below top of pipe; mbgs = metres below ground surface

DATE: SEPTEMBER 2022

LOCATION: 301 Somme Street, Ottawa, ON

JOB NUMBER: 12580314-01

DRAWING NUMBER: E-4



347 PIDO ROAD, UNIT 29
 PETERBOROUGH, ON K9J 6X7
 www.ghd.com

Appendix F

Water Well Certificates of Analyses



SGS Canada Inc.

P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Project : 12580314-01

17-August-2022

GHD Limited - 735

Attn : Jason Gerald

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8, Canada

Phone: 705-749-3317
Fax:705-749-9248

Date Rec. : 10 August 2022
LR Report: CA15144-AUG22
Reference: PO#:735-003858,
12580314-01, Jason
Gerald

Copy: #1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	6: A342117 12hr
Sample Date & Time					09-Aug-22 19:07
Temp Upon Receipt [°C]	***	***	***	***	***
Total Coliform [cfu/100mL]	11-Aug-22	14:01	15-Aug-22	15:25	3
E.coli [cfu/100mL]	11-Aug-22	14:01	15-Aug-22	15:25	0
Fecal Coliform [cfu/100mL]	11-Aug-22	14:01	15-Aug-22	15:25	0
Background [cfu/100mL]	11-Aug-22	14:01	15-Aug-22	15:25	33
HPC [cfu/1mL]	11-Aug-22	14:01	15-Aug-22	15:25	55

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

Temperature of Sample upon Receipt: 13 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes

Chain of Custody Number: 024625

Jill Campbell, B.Sc., GISAS
Project Specialist,
Environment, Health & Safety



SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2H0
Phone: 705-652-2000 FAX: 705-652-6365

GHD Limited - 735
Attn : Jason Gerald

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8, Canada

Phone: 705-749-3317
Fax: 705-749-9248

Project : 12580314-01

22-September-2022

Date Rec. : 10 August 2022
LR Report: CA15142-AUG22
Reference: PO#:735-003858, 12580314-01,
Jason Gerald

Copy: 2

CERTIFICATE OF ANALYSIS

Final Report - Revised

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MAC	6: AO/OG	7: A342117 1hr	8: A342117 6hr	9: A342117 12hr
Sample Date & Time							09-Aug-22 08:07	09-Aug-22 13:07	09-Aug-22 19:07
Temp Upon Receipt [°C]	***	***	***	***	***	***	***	***	***
Tannin+Lignin [mg phenol/L]	16-Aug-22	13:12	17-Aug-22	13:09			0.32	0.34	0.40
Alkalinity [mg/L as CaCO3]	15-Aug-22	15:41	17-Aug-22	12:21	---	30-500	265	261	261
CO3 [mg/L as CaCO3]	15-Aug-22	15:41	17-Aug-22	12:21	---	---	< 2	< 2	< 2
HCO3 [mg/L as CaCO3]	15-Aug-22	15:41	24-Aug-22	10:32			265	261	261
Temperature @ pH [°C]	15-Aug-22	15:41	24-Aug-22	10:32			21.9	21.7	20.5
pH [No unit]	15-Aug-22	15:41	17-Aug-22	12:21	---	6.5-8.5	8.14	8.20	8.23
Conductivity [uS/cm]	15-Aug-22	15:41	17-Aug-22	12:21			1180	1290	1350
TDS [mg/L]	15-Aug-22	08:47	17-Aug-22	12:04			763	914	914
Colour [TCU]	15-Aug-22	11:22	16-Aug-22	12:52			3	< 3	< 3
Turbidity [NTU]	10-Aug-22	17:53	11-Aug-22	09:56	1	5	2.50	2.89	4.21
Organic N [mg/L]	15-Aug-22	16:28	19-Aug-22	14:07			< 0.05	< 0.05	< 0.05
TKN [as N mg/L]	15-Aug-22	16:28	17-Aug-22	09:37	---	---	0.18	0.17	0.16
NH3+NH4 [as N mg/L]	18-Aug-22	19:31	19-Aug-22	14:07			0.19	0.17	0.17
NO2 [as N mg/L]	16-Aug-22	11:08	16-Aug-22	13:46	1	---	<0.003	<0.003	<0.003
NO3 [as N mg/L]	16-Aug-22	11:08	16-Aug-22	13:46	10	---	<0.006	<0.006	<0.006
NO2+NO3 [as N mg/L]	16-Aug-22	11:08	16-Aug-22	13:46			<0.006	<0.006	<0.006
Cl [mg/L]	17-Aug-22	14:11	18-Aug-22	16:18			62	66	68



SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Project : 12580314-01
LR Report : CA15142-AUG22

Analysis	1: Analysis Start Date	2: Analysis Start Time Completed	3: Analysis Date Completed	4: Analysis Time Completed	5: MAC	6: AO/OG	7: A342117 1hr	8: A342117 6hr	9: A342117 12hr
SO4 [mg/L]	17-Aug-22	14:37	18-Aug-22	16:18			300	370	400
DOC [mg/L]	15-Aug-22	12:00	16-Aug-22	08:37			2	2	2
Hardness [mg/L as CaCO3]	16-Aug-22	11:55	22-Aug-22	10:47			453	500	511
Al (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:03			0.016	0.004	0.001
Al (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:47	---	0.1	< 0.001	< 0.001	< 0.001
As (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:03			0.0006	0.0006	0.0005
As (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:47	0.025	---	0.0006	0.0004	0.0004
B (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:03			0.188	0.192	0.194
B (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:47	5	---	0.199	0.216	0.216
Ba (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:03			0.08335	0.08734	0.09029
Ba (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:47	1	---	0.09451	0.09889	0.09880
Be (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:03			< 0.000007	< 0.000007	< 0.000007
Be (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:47	---	---	< 0.000007	< 0.000007	0.000011
Co (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:03			0.000100	0.000084	0.000061
Co (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:47	---	---	0.000094	0.000091	0.000082
Ca (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:03			135	156	161
Ca (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48	---	---	103	112	117
Cd (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			0.000016	0.000025	0.000021
Cd (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48	0.005	---	0.000016	0.000017	0.000020
Cu (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			0.0006	0.0003	< 0.0002
Cu (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48	---	1	< 0.0002	< 0.0002	< 0.0002
Cr (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			0.00040	0.00035	0.00010
Cr (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48	0.05	---	0.00012	< 0.00008	< 0.00008
Fe (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			0.653	0.881	0.656
Fe (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48			0.369	0.276	0.481
K (tot) [mg/L]	16-Aug-22	11:55	22-Sep-22	12:28	---	---	8.73	9.15	9.50
K (diss) [mg/L]	16-Aug-22	11:55	22-Sep-22	12:53	---	---	7.16	7.56	7.39
Mg (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			58.5	66.0	69.8
Mg (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48			47.8	53.4	53.5
Mn (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			0.172	0.187	0.192
Mn (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48			0.175	0.173	0.171
Mo (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			0.02270	0.03083	0.03435
Mo (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48	---	---	0.02195	0.02931	0.03188
Ni (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			0.0007	0.0007	0.0006
Ni (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48	---	---	0.0014	0.0013	0.0012
Na (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			60.4	64.3	67.6

OnLine LIMS

0003057687



SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Project : 12580314-01
LR Report : CA15142-AUG22

Analysis	1: Analysis Start Date	2: Analysis Start Time Completed	3: Analysis Date Completed	4: Analysis Time Completed	5: MAC	6: AO/OG	7: A342117 1hr	8: A342117 6hr	9: A342117 12hr
Na (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48	20*	200	54.5	57.4	57.0
Pb (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			< 0.00009	< 0.00009	< 0.00009
Pb (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:48	0.01	---	< 0.00009	< 0.00009	< 0.00009
Ag (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			< 0.00005	< 0.00005	< 0.00005
Ag (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:49	---	---	< 0.00005	< 0.00005	< 0.00005
Sr (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			5.66	6.35	6.65
Sr (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:49	---	---	5.15	5.91	5.92
Tl (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:04			< 0.000005	< 0.000005	< 0.000005
Tl (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:49	---	---	< 0.000005	< 0.000005	< 0.000005
Sb (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:05			< 0.0009	< 0.0009	< 0.0009
Sb (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:49	0.006	---	< 0.0009	< 0.0009	< 0.0009
Se (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:05			< 0.00004	< 0.00004	< 0.00004
Se (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:49	0.01	---	0.00015	0.00020	0.00011
U (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:05			0.000166	0.000201	0.000204
U (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:49	0.02	---	0.000219	0.000227	0.000219
V (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:05			0.00021	0.00016	0.00014
V (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:49	---	---	0.00011	0.00008	0.00009
Zn (tot) [mg/L]	16-Aug-22	11:55	17-Aug-22	14:05			< 0.002	< 0.002	< 0.002
Zn (diss) [mg/L]	16-Aug-22	11:55	22-Aug-22	10:49	---	5	< 0.002	< 0.002	< 0.002
Cation Sum [meq/L]					---	---	14.37	16.23	16.93
Anion Sum [meq/L]					---	---	13.29	14.78	15.46
Anion-Cation Balance [% difference]					---	---	3.9	4.67	4.53
Ion Ratio					---	---	1.08	1.1	1.09
TDS (calculated) [mg/L]					---	---	775	879	923
Conductivity (calc) [uS/cm]					---	---	1383	1550	1619
Langelier's Index [@ 4° C]					---	---	0.7	0.81	0.85
Saturation pH [pHs @ 4° C]					---	---	7.44	7.39	7.38
Ryznar Stability Ind [no unit]	09-Sep-22	10:04	09-Sep-22	10:04	---	---	6.4	6.2	6.2

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

Total phosphorous includes all Ortho-phosphates as well as Organics and hydrolyzable Phosphorous.

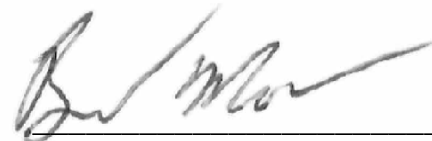
Temperature of Sample upon Receipt: 13 degrees C
Cooling Agent Present: Yes
Custody Seal Present: Yes

Chain of Custody Number: 015249

Ryzner Stability Index calculated as per the following link with an assumed water temperature of 20 °C.

<https://www.lenntech.com/calculators/ryznar/index/ryznar.htm>

Revision 1 - total and dissolved potassium data included. Only dissolved hardness reported



Brad Moore Hon. B.Sc
Project Specialist,
Environment, Health & Safety



SGS Canada Inc.

P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Project : 12580314-01

18-August-2022

GHD Limited - 735

Attn : Jason Gerald

347 Pido Rd., Unit #29
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Date Rec. : 10 August 2022
LR Report: CA15143-AUG22
Reference: PO#:735-003858,
12580314-01, Jason
Gerald

Copy: 1

CERTIFICATE OF ANALYSIS

Final Report

Analysis	1: Date Extracted / Digested	3: Analysis Completed Date	6: RL	7: A342117 12hr
Sample Date & Time				09-Aug-22 19:07
1.1.8 PAHs (sVOC)	***	***	***	***
Acenaphthene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Acenaphthylene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Anthracene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Benzo(a)anthracene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Benzo(a)pyrene [µg/L]	15-Aug-22	17-Aug-22	0.01	< 0.01
Benzo(b+)fluoranthene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Benzo(ghi)perylene [µg/L]	15-Aug-22	17-Aug-22	0.2	< 0.2
Benzo(k)fluoranthene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Chrysene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Dibenzo(a,h)anthracene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Fluoranthene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Fluorene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Indeno(1,2,3-cd)pyrene [µg/L]	15-Aug-22	17-Aug-22	0.2	< 0.2
1-Methylnaphthalene [µg/L]	15-Aug-22	17-Aug-22	0.5	< 0.5
2-Methylnaphthalene [µg/L]	15-Aug-22	17-Aug-22	0.5	< 0.5
Methylnaphthalene, 2 [µg/L]	15-Aug-22	17-Aug-22	0.5	< 0.5
Naphthalene [µg/L]	15-Aug-22	17-Aug-22	0.5	< 0.5
Phenanthrene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Pyrene [µg/L]	15-Aug-22	17-Aug-22	0.1	< 0.1
Surrogates - SVOCs	***	***	***	***
Surr 2-Methylnaphtha [Surr Rec %]	15-Aug-22	17-Aug-22		86
Surr Fluoranthene-D1 [Surr Rec %]	15-Aug-22	17-Aug-22		97
Surr 2-Fluorobipheny [Surr Rec %]	15-Aug-22	17-Aug-22		82
Surr 4-Terphenyl-d14 [Surr Rec %]	15-Aug-22	17-Aug-22		92

Analysis	1: Date Extracted / Digested	3: Analysis Completed Date	6: RL	7: A342117 12hr
1.1.10 VOC	***	***	***	***
Acetone [µg/L]	13-Aug-22	15-Aug-22	30	< 30
Bromomethane [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Carbon tetrachloride [µg/L]	13-Aug-22	15-Aug-22	0.2	< 0.2
Chlorobenzene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Chloroform [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,2-Dichlorobenzene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,3-Dichlorobenzene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,4-Dichlorobenzene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Dichlorodifluorometh [µg/L]	13-Aug-22	15-Aug-22	2	< 2
1,1-Dichloroethane [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,2-Dichloroethane [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,1-Dichloroethylene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
trans-1,2-Dichloroet [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
cis-1,2-Dichloroethe [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,2-Dichloropropane [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
cis-1,3-Dichloroprop [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
trans-1,3-Dichloropr [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,3-dichloropropene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Ethylenedibromide [µg/L]	13-Aug-22	15-Aug-22	0.2	< 0.2
n-Hexane [µg/L]	13-Aug-22	15-Aug-22	1	< 1
MEK [µg/L]	13-Aug-22	15-Aug-22	20	< 20
MIBK [µg/L]	13-Aug-22	15-Aug-22	20	< 20
MtBE [µg/L]	13-Aug-22	15-Aug-22	2	< 2
Methylene Chloride [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Styrene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Tetrachloroethylene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,1,1,2-Tetrachloroe [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,1,2,2-Tetrachloroe [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,1,1-Trichloroethan [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1,1,2-Trichloroethan [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Trichloroethylene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Trichlorofluorometha [µg/L]	13-Aug-22	15-Aug-22	5	< 5
Vinyl Chloride [µg/L]	13-Aug-22	15-Aug-22	0.2	< 0.2
1.1.11 BTEX	***	***	***	***
Benzene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Ethylbenzene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Toluene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Xylene (total) [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
m-p-xylene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
o-xylene [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
1.1.9 THMs (VOC)	***	***	***	***

Analysis	1: Date Extracted / Digested	3: Analysis Completed Date	6: RL	7: A342117 12hr
Bromodichloromethane [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Bromoform [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Dibromochloromethane [µg/L]	13-Aug-22	15-Aug-22	0.5	< 0.5
Surrogates (VOCs)	***	***	***	***
Surr 1,2-Dichloroeth [Surr Rec %]	13-Aug-22	15-Aug-22		101
Surr 2-Bromo-1-Chlor [Surr Rec %]	13-Aug-22	15-Aug-22		85
Surr 4-Bromofluorobe [Surr Rec %]	13-Aug-22	15-Aug-22		90
1.1.6 PHCs	***	***	***	***
F1 (C6-C10) [µg/L]	12-Aug-22	15-Aug-22	25	< 25
F1-BTEX (C6-C10) [µg/L]	12-Aug-22	15-Aug-22		< 25
F2 (C10-C16) [µg/L]	15-Aug-22	18-Aug-22	100	< 100
F3 (C16-C34) [µg/L]	15-Aug-22	18-Aug-22	200	< 200
F4 (C34-C50) [µg/L]	15-Aug-22	18-Aug-22	200	< 200
Baseline at nC50 [Yes / No]	15-Aug-22	18-Aug-22		YES

CCME Method Compliance: Analyses were conducted using analytical procedures that comply with the Reference Method for the CWS for Petroleum Hydrocarbons in Soil and have been validated for use at the SGS Laboratory, Lakefield, ON site.

Quality Compliance: Instrument performance / calibration quality criteria were met and extraction and analysis limits for holding times were met.

nC6 and nC10 response factors within 30% of response factor for toluene: YES

nC10, nC16 and nC34 response factors within 10% of the average response for the three compounds: YES

C50 response factors within 70% of nC10 + nC16 + nC34 average: YES

Linearity is within 15%: YES

Benzo(b)fluoranthene results for comparison to the standard are reported as benzo(b+j)fluoranthene. Benzo(b)fluoranthene and benzo(j)fluoranthene co-elute and cannot be reported individually by the analytical method used.

Temperature of Sample upon Receipt: 13 degrees C

Cooling Agent Present: Yes

Custody Seal Present: Yes

Chain of Custody Number: 024624

Methylene Chloride LCS; Recovery is outside control limits; the overall quality control for this analysis has been assessed and was determined to be acceptable.

Acetone matrix spike; recovery for this parameter is outside control limits; the overall quality control for this analysis has been assessed and was determined to be acceptable.

F3(C16-C34) Dup RPD is outside control limits. The average of the two duplicates is less than five times the RL, therefore greater uncertainty is expected.



SGS Canada Inc.

P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Project : 12580314-01

LR Report : CA15143-AUG22

*Jill Campbell, B.Sc., GISAS
Project Specialist,
Environment, Health & Safety*



FINAL REPORT

CA14875-SEP22 R1

12580314-01

Prepared for

GHD Limited - 735

First Page

CLIENT DETAILS

Client GHD Limited - 735

Address 347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8. Canada

Contact Jason Geraldi

Telephone 705-749-3317

Facsimile 705-749-9248

Email Jason.Geraldi@ghd.com

Project 12580314-01

Order Number

Samples Ground Water (3)

LABORATORY DETAILS

Project Specialist Brad Moore Hon. B.Sc

Laboratory SGS Canada Inc.

Address 185 Concession St., Lakefield ON, K0L 2H0

Telephone 705-652-2143

Facsimile 705-652-6365

Email brad.moore@sgs.com

SGS Reference CA14875-SEP22

Received 09/21/2022

Approved 09/27/2022

Report Number CA14875-SEP22 R1

Date Reported 09/27/2022

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: 13 degrees C
 Cooling Agent Present: Yes
 Custody Seal Present: Yes

Chain of Custody Number: 015249

SIGNATORIES

Brad Moore Hon. B.Sc




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FINAL REPORT

CA14875-SEP22 R1

Client: GHD Limited - 735

Project: 12580314-01

Project Manager: Jason Gerald

Samplers: Jason Gerald

MATRIX: WATER

Sample Number	7	8	9
Sample Name	A342117 1HR	A342117 6HR	A342117 12HR
Sample Matrix	Ground Water	Ground Water	Ground Water
Sample Date	09/08/2022	09/08/2022	09/08/2022

L1 = ODWS_AO_OG / WATER / - - Table 4 - Drinking Water - Reg O.169_03

L2 = ODWS_MAC / WATER / - - Table 1,2 and 3 - Drinking Water - Reg O.169_03

Parameter	Units	RL	L1	L2	Result	Result	Result
General Chemistry							
Hydrogen Sulphide	mg/L	0.02	0.05		< 0.02	< 0.02	< 0.02
Metals and Inorganics							
Sulphide	mg/L	0.02			< 0.02	< 0.02	< 0.02
Other (ORP)							
Mercury (dissolved)	mg/L	0.00001		0.001	< 0.00001	< 0.00001	< 0.00001

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated



FINAL REPORT

CA14875-SEP22 R1

QC SUMMARY

Mercury by CVAAS

Method: EPA 7471A/SM 3112B | Internal ref.: ME-CA-IENVISPE-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)	EHG0048-SEP22	mg/L	0.00001	< 0.00001	ND	20	101	80	120	121	70	130

Sulphide by SFA

Method: SM 4500 | Internal ref.: ME-CA-IENVISFA-LAK-AN-008

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
Sulphide	SKA0224-SEP22	mg/L	0.02	<0.02	ND	20	100	80	120	NA	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

Results relate only to the sample tested.

Data reported represent the sample as submitted to SGS. 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 and Excess Soil Quality" 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.

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

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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. Reproduction of this analytical report in full or in part is prohibited.

This report supersedes all previous versions.

-- End of Analytical Report --

Appendix G

MacLellan Water Treatment Recommendations



Telephone: (613) 386-0550
Toll-Free: 1-800-200-0865
Fax: 613-386-9889
Website: www.mwater.ca
Email: info@mwater.ca

Address: 388 Millhaven Road
P.O. Box 392
Odessa, ON K0H 2H0

Report for GHD – Ottawa Warehouse Project

September 21, 2022

Introduction

This report has been prepared based on water quality information that was provided to MacLellan Water. The principal purpose of this report is to make recommendations for a water treatment system for the warehouse facility. Maximum use is estimated at 10 000 L per day although 5000 L per day is expected to be a more typical use.

Water Quality

Several sets of water quality information were provided, corresponding to samples collected at different times during pumping of the well. Although there was some variation among the samples, the results were broadly similar. We have used the last set of samples when discussing specific numbers in this report. The following parameters returned noteworthy values:

Turbidity

Turbidity is a measure of the “cloudiness” of the water. Turbidity is a concern because the materials that cause turbidity can interfere with disinfection efforts. The operational limit for turbidity is 1 NTU. The turbidity of this water was measured at 4.21 NTU.

Hardness

Water is considered hard when the hardness exceeds 100 mg/L. This water was measured with a hardness of 689 mg/L.

Iron

The aesthetic limit for iron is 0.3 mg/L. Above this limit, it can cause problems with colour, staining, and taste in the water. The concentration of iron in this water was measured at 0.481 mg/L. A further 0.175 mg/L of iron was present in a form where it is bound up with organic matter.

Manganese

The aesthetic limit for manganese is 0.05 mg/L. Above this limit, it can cause problems with colour, staining, and taste similar to those caused by iron. The concentration of manganese in this water was measured at 0.171 mg/L.

Sodium

People consuming water with a sodium content above 20 mg/L are encouraged to inform their physician. This is so that the physician can take the sodium content of the drinking water into consideration should it ever become necessary to prescribe a low sodium diet for medical reasons.

Above 200 mg/L sodium has a negative aesthetic effect in that it imparts a disagreeable, salty tang to the water.

The concentration of sodium in this water was measured at 67.6 mg/L.

Langelier's Index

The Langelier's Index (LI) is a calculation that assesses the "character" of the water. Water with an LI below -0.5 is aggressive and will tend to corrode metal pipes, fixtures, and appliances. Water with an LI from -0.5 to +0.5 is neutral. Water with an LI of more than +0.5 will tend to form hard water scale at an appreciably accelerated rate.

The LI is temperature dependent. The LI of this water was calculated at +0.85 at 4°C. It will actually be even higher for water that has warmed up to room temperature while sitting inside the building.

Recommendations

The following items are presented for your consideration. It is assumed that they would be carried out at the appropriate time in the construction of the facility. MacLellan Water would be happy to provide price estimates to carry out the recommended work.

1. A submersible pump should be installed in the well and connected to the building with pipe and wire that are run inside protective conduit. An appropriate pressure system will need to be installed inside the building.
2. A filtration system for iron should be installed. There are a number of options for this, but the best would be a manganese greensand filter with chlorine regeneration. The filter will also remove a certain amount of manganese.
3. An activated carbon filter should be installed to both remove residual chlorine and organically-complexed metals.
4. A water softener should be used to soften the water. This will improve the aesthetics of the water. More importantly, it will protect the water disinfection system and water-using appliances (hot water tanks, etc.) in the facility from fouling due to hard water scale.

A twin alternating softener system will be used. With this system, one tank remains in service until its capacity is exhausted. The second tank then takes over softening duties while the first tank regenerates. This ensures an uninterrupted supply of softened water and allows the use of smaller, less expensive softening equipment than a single tank model.

5. Disinfection of the water will be provided with ultra violet (UV) disinfection. Depending on preferences for redundancy, this may involve one or two units. Depending on preferences, these may be fairly straight forward units or units equipped with sensors and automatic fail-safe shutoffs.

Regardless, the unit(s) will be sized to allow adequate flow to the facility and will be equipped with turbidity-reducing cartridge-style prefilters to screen out particles that bacteria might shelter behind while passing through the UV light.

6. The concentration of sodium in the water is already slightly high. The use of a water softener will increase the sodium content of the treated water by about 300 mg/L to a total of about 360 mg/L.

One or more point of use reverse osmosis (RO) units will be installed to remove sodium at locations (like lunch rooms) where people will actually consume the water. This is done in preference to treating all the water in the facility because the output of RO units is slow. The RO units will be equipped with small storage tanks so that pre-treated water will be ready on demand.

7. MacLellan Water will arrange a servicing schedule to ensure that all the equipment remains in proper working order.

Conclusion

We hope that this report contains all the information you require. Please do not hesitate to contact me with any questions. We would be happy to provide price estimates for this work once a few additional details have been established.

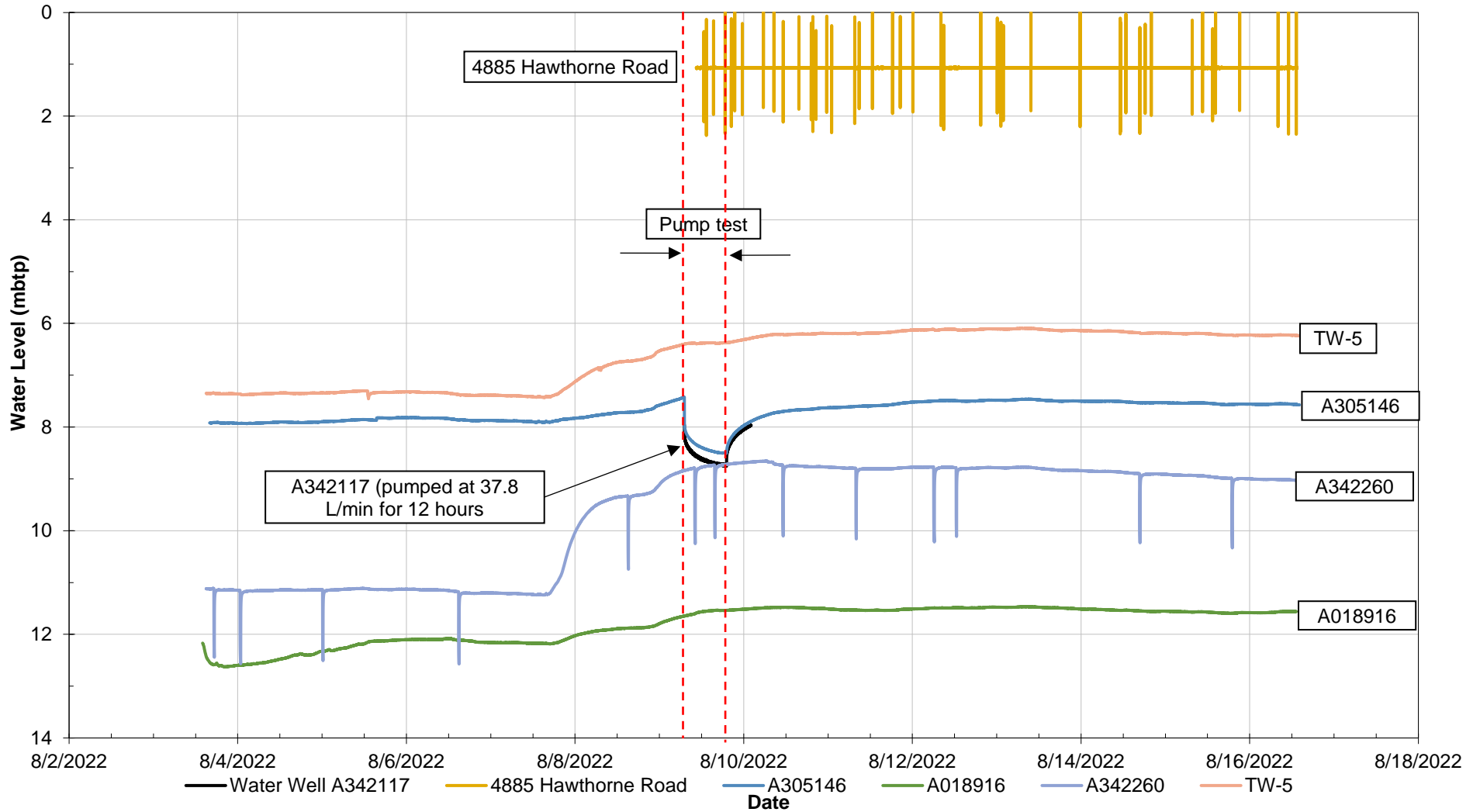
Sincerely,

William Vander Wilp
MacLellan Water Treatment and Pumps
1-800-200-0865 x 24

Appendix H

Observation Well Hydrographs

OBSERVATION WELL HYDROGRAPHS August 3-18, 2022



Observation Well Water Levels

Drilled Water Well
MECP Well ID: A342117
Static Level = 7.96 mbtp (7.31 mbgs)

Note: m = metres; mbtp = metres below top of pipe; mbgs = metres below ground surface

DATE: SEPTEMBER 2022

LOCATION: 301 Somme Street, Ottawa, ON

JOB NUMBER: 12580314-01

DRAWING NUMBER: H-1



347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
www.ghd.com

Appendix I

Storm Sewer Use Certificate of Analysis



SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Project : 12580314-01

18-August-2022

GHD Limited - 735
Attn : Jason Gerald

Date Rec. : 10 August 2022
LR Report: CA15141-AUG22
Reference: PO#:735-003858,
12580314-01, Jason
Gerald

347 Pido Rd., Unit #29
Peterborough, ON
K9J 6Z8, Canada

Phone: 705-749-3317
Fax:705-749-9248

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Table with 7 columns: Analysis, 1: Analysis Start Date, 3: Analysis Completed Date, 5: Ottawa Storm By-law Limit, 6: RL, 7: Piezo. Rows include various chemical and physical parameters like Ecoli, pH, BOD5, TSS, and heavy metals.

SGS Canada Inc.

P.O. Box 4300 - 185 Concession St.
 Lakefield - Ontario - K0L 2H0
 Phone: 705-652-2000 FAX: 705-652-6365

Project : 12580314-01

LR Report : CA15141-AUG22

Analysis	1: Analysis Start Date	3: Analysis Completed Date	5: Ottawa Storm By-law Limit	6: RL	7: Piezo
Benzo(b+j)fluoranthene [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	0.0002
Benzo[e]pyrene [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	0.0001
Benzo(ghi)perylene [mg/L]	16-Aug-22	17-Aug-22	---	0.0002	0.0003
Benzo(k)fluoranthene [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	< 0.0001
Chrysene [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	< 0.0001
Dibenzo(a,h)anthracene [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	< 0.0001
Dibenzo(a,i)pyrene [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	< 0.0001
Dibenzo(a,j)acridine [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	< 0.0001
Fluoranthene [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	0.0002
Perylene [mg/L]	16-Aug-22	17-Aug-22	---	0.0005	< 0.0005
Phenanthrene [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	0.0001
Pyrene [mg/L]	16-Aug-22	17-Aug-22	---	0.0001	0.0002
Naphthalene [mg/L]	16-Aug-22	17-Aug-22	0.0064	0.0005	< 0.0005
Hexachlorobenzene [mg/L]	16-Aug-22	17-Aug-22	0.00004	0.0001	< 0.0001
Benzene [mg/L]	16-Aug-22	17-Aug-22	0.002	0.0005	< 0.0005
Chloroform [mg/L]	16-Aug-22	17-Aug-22	0.002	0.0005	< 0.0005
1,2-Dichlorobenzene [mg/L]	16-Aug-22	17-Aug-22	0.0056	0.0005	< 0.0005
1,4-Dichlorobenzene [mg/L]	16-Aug-22	17-Aug-22	0.0068	0.0005	< 0.0005
cis-1,2-Dichloroethane [mg/L]	16-Aug-22	17-Aug-22	0.0056	0.0005	< 0.0005
trans-1,3-Dichloropropane [mg/L]	16-Aug-22	17-Aug-22	0.0056	0.0005	< 0.0005
Ethylbenzene [mg/L]	16-Aug-22	17-Aug-22	0.002	0.0005	< 0.0005
Methylene Chloride [mg/L]	16-Aug-22	17-Aug-22	0.0052	0.0005	< 0.0005
1,1,2,2-Tetrachloroethane [mg/L]	16-Aug-22	17-Aug-22	0.017	0.0005	< 0.0005
Tetrachloroethylene [mg/L]	16-Aug-22	17-Aug-22	0.0044	0.0005	< 0.0005
Toluene [mg/L]	16-Aug-22	17-Aug-22	0.002	0.0005	< 0.0005
Trichloroethylene [mg/L]	16-Aug-22	17-Aug-22	0.0076	0.0005	< 0.0005
Xylene (total) [mg/L]	16-Aug-22	17-Aug-22	0.0044	0.0005	< 0.0005
m-p-xylene [mg/L]	16-Aug-22	17-Aug-22	---	0.0005	< 0.0005
o-xylene [mg/L]	16-Aug-22	17-Aug-22	---	0.0005	< 0.0005
Nonylphenol [mg/L]	15-Aug-22	17-Aug-22	0.001	0.001	< 0.001
Nonylphenol Ethoxylate [mg/L]	15-Aug-22	17-Aug-22	0.01	0.01	< 0.01
Nonylphenol diethoxy [mg/L]	15-Aug-22	17-Aug-22	---	0.01	< 0.01
Nonylphenol monoethoxy [mg/L]	15-Aug-22	17-Aug-22	---	0.01	< 0.01

RL - SGS Reporting Limit

Nonyl phenol Ethoxylate is the sum of nonyl phenol monoethoxylate and nonyl phenol diethoxylate.

Temperature of Sample upon Receipt: 10 degrees C
 Cooling Agent Present: Yes
 Custody Seal Present: Yes

Chain of Custody Number: 015194



SGS Canada Inc.

P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - K0L 2H0
Phone: 705-652-2000 FAX: 705-652-6365

Ottawa Storm Bylaw 2003-514

Project : 12580314-01

LR Report : CA15141-AUG22

*Jill Campbell, B.Sc., GISAS
Project Specialist,
Environment, Health & Safety*



ghd.com

→ **The Power of Commitment**