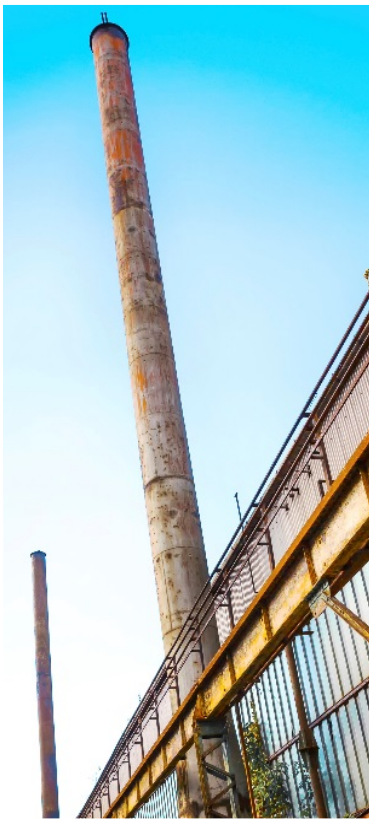
Hydrogeological Assessment Report

Proposed Commercial Development
Rideau Road and Somme Street
Gloucester Con 6 from Rideau River, Lot 26
Ottawa, Ontario

Prepared for: Consolidated Fastfrate (Ottawa) Holdings Inc.



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1. Introduction

GHD Limited (GHD) is pleased to present the following hydrogeological report in support of a proposed commercial development at the intersection of Rideau Road and Somme Street in Ottawa, Ontario (herein referred to as "the Site"). The proposed development is to consist of a warehouse, cross-docks and office building, geographically located at Lot 26, Gloucester Concession 6 from the Rideau River. The Site covers an area of 7.02 hectares (17.35 acres) and will also consist of asphalt parking and storm water pond. The development will be serviced by a well and septic system. The Site consists of vacant parcel with evidence of fill (gravel, concrete, asphalt) observed on the ground surface. The surrounding lots in the area were in a similar condition.

This report has been prepared for the purposes of examining the hydrogeological characteristics of the Site and assessing the capacity of the on-site well to supply the proposed development and the potential impact to neighbouring properties. The scope of work was to identify the local hydrogeology of the Site including a desktop review of available geological and groundwater mapping and Ministry of the Environment, Conservation and Parks (MECP) well records; a water well survey within 500 m of the development, aquifer performance testing including analytical sampling; and single well response testing to determine hydraulic conductivity for purposes of construction dewatering. A septic assessment was not conducted in this report and the design is being completed by others.

1.1 Terms of Reference

GHD was retained by Consolidated Fastfrate (Ottawa) Holdings Inc. (the Client) to complete this hydrogeological assessment in accordance with our proposal reference no. 11216085 and dated November 6, 2020.

GHD (formerly Inspec Sol and Conestoga-Rovers & Associates) completed a Geotechnical Investigation and Phase II Environmental Site Assessment for the Site in 2008 and 2009, respectively; and a Geotechnical Investigation in 2020.

GHD has reviewed the following documents provided by the client as part of the investigation:

- Phase II Environmental Site Assessment and Hydrogeological Assessment, Report Ref. No. 045804 (12), by Conestoga-Rovers & Associates, dated September 2008;
- Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, Report Ref. No. 08-1122-0215, by Golder Associates, dated December 2008;
- Geotechnical Study Subdivision Plan, Hawthorne Industrial Park, Report Ref. No. T020556-A1, by Inspec-Sol, dated May 4, 2009; and
- Stormwater Management Report. Hawthorne Industrial Park, Report Ref. No. JLR 20983, by J.L. Richards & Associates Limited, dated February 2009 (Revised May 2009).

2. Hydrogeological Assessment

2.1 Existing Conditions

The following sections provide details and discussion regarding the existing conditions of the Site.

2.1.1 Assessment Overview

The location of the Site relative to nearby roads and watercourses is illustrated on the mapping entitled Site Location Plan, Figure 1. The mapping shows the Site is undeveloped. The areas to the north, east and south are currently privately serviced. To the west is a quarry development and additional industrial / commercial properties that are municipally serviced. Plans and figures are discussed throughout this report and provided following the text.

A field program was completed consisting of a site inspection; aquifer performance testing and observation well monitoring; well survey; and, single well response testing in support of the proposed development. A preliminary concept plan was provided to GHD that illustrated a 4,650 square metre (m^2) (50,000 square feet or s.f.) warehouse; a 1,860 m^2 (20,000 s.f.) cross-docks and 280 m^2 (3,000 s.f.) office area with asphalt parking, stormwater pond, underground water tanks and a septic bed area. The concept plan is provided as Figure 2. As the concept plan is preliminary, locations of the well, building, septic, stormwater pond etc may be subject to change; however, the final locations will need to respect the setback distances required by the Ontario Building Code.

The hydrogeological assessment consisted of performing a pumping test of an existing drilled well at the Site known as test well TW-2 and monitoring of various observation wells including a private domestic well. The locations of the test well and observation wells is illustrated on the Well Location Plan, Figure 3.

The field work was conducted on November 19 and 20, 2020 by GHD to observe the general surficial characteristics of the Site, neighbouring lands and complete the pumping and hydraulic testing. The Site consists of undeveloped lands. GHD observed the test well and various production and monitoring wells in the vicinity of the Site. No surface water was observed on the Site. Photographs are provided in Appendix A.

Surrounding land use within 500 m of the Site are:

- East – undeveloped lands;
- West – undeveloped lands; Hawthorne Road then industrial properties (Tomlinson Rideau Quarry and Plant; LaFarge);
- North – Rideau Road, forested area then residential lots; and
- South – Somme Street; undeveloped lands then industrial / commercial lots (gated equipment lay-down yard and stormwater ponds; then Renewi Canada Ltd.).

Within 500 m of the proposed development, one residential lot was observed at 4885 Hawthorne Road.

2.1.2 Topography and Drainage

Regional topography is illustrated on Figure 4. The Site is relatively flat with the regional topography sloping from south to north. Topographic relief is on the order of 3 to 4 metres across the Site. Shallow groundwater flow is expected to follow the local topography.

Drainage of surface water is directed towards ditches alongside the Site. Drainage is generally to the east / northeast.

2.1.3 Physiography

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 5 showing the Site is within a sand plains with Peat and Muck to the north and Limestone Plains to the west.

2.1.4 Geology and Soils

Surficial geology mapping on Figure 6 indicates the Site is a mix of organic deposits, Paleozoic bedrock and coarse textured glaciolacustrine deposits. The Quaternary geology (Figure 7) 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. 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). Bedrock was found at 8.5 metres below ground surface (mbgs) based upon the well record for TW-2 at the Site.

The bedrock is Dolostone / Sandstone of the Beekmantown group (Figure 8). 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.

Based upon the well records reviewed within 500 m of the Site, bedrock was encountered within the drilled production wells at depths between ground surface and 8.5 mbgs.

2.1.5 Description of Surface Water Features

There are no surface water features on the Site.

2.1.6 MECP Well Records

Information regarding groundwater characteristics of the immediate area was obtained from an inventory of existing MECP well records. A total of seventeen (17) well records were identified within 500 m of the Site for statistical breakdown. A summary of the MECP well records and their locations are provided in Appendix B and summarized in Table 2.1.

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 2.1: Summary of Information from MECP Well Records

Total Number of Wells Inventoried:	17
Dug/Bored Wells:	0 (0%)
Drilled Wells (Overburden):	0 (0%)
Drilled Wells (Bedrock):	10 (59%)
Monitoring Wells*:	7 (41%)

Parameters	Statistical Summary					
	Dug / Bored Wells		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		Frequency	
Not Reported	0	0%	0	0%	0	0%
Dry	0	0%	0	0%	0	0%
0 to 1 USgpm	0	0%	0	0%	0	0%
2 to 4 USgpm	0	0%	0	0%	0	0%
5 to 9 USgpm	0	0%	0	0%	6	60%
≥10 USgpm	0	0%	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 B for well information).
*Monitoring wells are not included in the statistical data summarized in Table 2.1

2.1.7 Well Survey

A well survey was conducted. There was one home within 500 m of the Site at 4885 Hawthorne Road. This residential dwelling utilizes a drilled well that is 10.9 metres deep. The owner indicated they had resided at the home for about 3 months and that the water had a sulphur odour and was of sufficient quantity. No other issues were identified. The owner also provided authorization to use the well for monitoring purposes during our pumping test.

2.1.8 Groundwater Levels

Water levels were obtained from the test well, observation wells and neighbouring residential well on November 19, 2020 prior to the commencement of the pumping test. The data is summarized in Table 2.2. Based upon the water levels obtained from the drilled production wells, the groundwater flow tapped by the drilled wells is in a southeasterly direction. Shallow groundwater flow tapped by monitoring wells was not assessed.

Table 2.2: Water Level Summary

Location	Ground Elevation* (masl)	Depth of Well (mbgs)	Water Level (mbgs)	Potentiometric Elevation (masl)
			November 19, 2020	
TW-2	90	34.9	6.90	83.1
MW7-08	90	5.9	3.00	87.0
MW1-20	90	7.0	3.80	86.2
A305146	90	> 30	7.00	83.0
4885 Hawthorne	85	10.9	1.23	83.8
TW-5	90	29.9	7.23	82.8
Well 1514733	100	35.4	12.36	87.6

Notes:
masl = metres above sea level
*Elevations estimated from topographic contours provided on Figure 4. 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.

2.2 Aquifer Performance Assessment

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

2.2.1 Test Well Information

The following sections discuss the test well utilized for the aquifer performance testing. For this project, an existing production well was utilized for assessment of the local aquifer via a pumping test. Based upon the location of the well and location identified on the well record, it is GHD professional opinion that the test well record provided in Appendix B is TW-2. The existing well is a drilled well constructed by Capital Water Supply Ltd. (MECP License No. 1558) and completed in on August 8, 1993. The test well is located on Figure 3 and is identified as TW-2. Adjacent water production wells, monitoring wells and a residential well that were monitored during testing are also illustrated on Figure 3.

Test Well TW-2

Test well TW-2 has the following characteristics based upon the well record filed with the MECP:

- Drilled to total depth of 30.5 mbgs (100 feet). GHD measured the actual well depth to be 34.9 mbgs. The well record indicates overburden materials consisting of brown sand with stone to 1.5 m and hardpan with boulders from 1.5 m to 8.5 m. The well is confined with the sandstone between 8.5 m and 30.5 m;
- Water was encountered at 17.7 mbgs and 26.8 mbgs and was not tested;
- 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 2.1 m or about 7% of the available drawdown. The well is recommended for pumping at 18.9 L/min; and
- Construction was completed in August 1993. Constructed with steel casing to 11.9 mbgs (39 feet) then open hole to the bottom of the well. From grade to 11.4 mbgs (37.5 feet) the annular space was grouted and sealed with cement.

2.2.2 Discussion of Pumping Test

A pumping test was conducted at TW-2 on November 19, 2020 to assess aquifer conditions and confirm the availability of a suitable groundwater resource for the proposed commercial development. A pumping test was conducted for six (6) hours at a constant rate of 60 L/min (15.9 gpm). Recovery measurements were collected after the pumping was completed.

A submersible pump was used in the well to conduct the testing. Water levels in the test well and adjacent observation and monitoring wells were monitored throughout the aquifer performance testing 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. This practice safeguards against artificial recharge of the well from occurring during the pumping test.

The test well was chlorinated in advance of the pumping test. Chlorine levels were confirmed in the field prior to bacteria sampling conducted at the test well. The residual chlorine was at trace levels or non-detect prior to obtaining the bacteriological samples.

Water samples were collected and submitted to an accredited analytical laboratory for testing. The analytical data is provided in Appendix C.

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. Calibration of the instruments was completed prior to the pumping test. The field measurements are provided in Appendix D on Figure D-3.

The results of the constant rate pumping tests including field testing data are graphically presented in Appendix D. Pumping test information is summarized in Table 2.4.

Test Well TW-2

The water level during the pumping test at TW-2 is illustrated on Figures D-1 and D-2 showing water level versus time. The plot shows the water level very slowly lowering over the course of the testing at 60.0 L/min. After six hours of pumping, the water level was about 9.0 metres below top of pipe (mbtp). The drawdown was about 1.15 m over the course of the testing with about 23.9 m of available drawdown above the pump remaining. Approximately 4.6% of the available drawdown was used during the pumping test. A total groundwater volume of 21,600 L was pumped during the testing. Based upon the preliminary septic design flow calculations, about 10,000 L/day has been estimated. Actual groundwater usage is expected to be much less than 10,000 L/day for the warehouse and offices.

Recovery measurements were collected manually for 60 minutes after pumping ceased. The water level recovered about 46% in one (1) hour and fully recovered 100% in 13.5 hours. The estimated transmissivity for TW-2 was 47.6 m^2/day (3193 gpd/ft) based on the drawdown and 46.4 m^2/day (3115 gpd/ft) based on the recovery period and represents a high transmissivity. The specific capacity for this well is calculated to be 52.6 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 60 L/min (15.9 gpm) based upon the pumping test completed.

Pumping tests were completed previously at TW2 in 1994 and 2008 and documented by Golder in 2008. Previous testing was completed at 67 L/min and 55 L/min in 1994 and 2008, respectively. The drawdowns of these tests were similar to our drawdown at 1.18 m in 1994 and 1.2 m in 2008. Static water levels were also similar 3.15 mbgs in 1994 and 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 water supply well at the Site.

2.2.3 Summary of Aquifer Performance

Table 2.3 summarizes the data and coefficients obtained from the pumping test.

Table 2.3: Aquifer Performance Testing Summary

WELL No.	STEP No.	YIELD		TEST TYPE	TIME	MAXIMUM DRAWDOWN		AVAILABLE DRAWDOWN*		SPECIFIC CAPACITY		ESTIMATED TRANSMISSIVITY	
		gpm	L/min		minutes	feet	metres	feet	metres	gpm/ft	L/min/m	gpd/ft	m^2/day
TW-2	1	0	0	Static	0	0	0	82.1	25.0	---	---	---	---
	2	10	60.0	Const.	360	3.7	1.15	78.4	23.85	4.2	52.6	3193	47.6
	3	0	0	Recvy.	46% recovery in 60 minutes; 100% recovery in 13.5 hours							3115	46.4

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 360 minutes.
*Available Drawdown refers to the height of water in the well above the pump.
Static water level at TW-2 was 7.83 metres below top of pipe (6.90 metres below ground surface).

2.2.4 Test Well Water Quality

Groundwater samples for laboratory testing were collected during the course of the pumping test for the purpose of water quality analyses. The well was sampled after one (1) hour into the constant rate test and at the end of the test on November 19, 2020. The water samples were delivered to Paracel Laboratories Ltd. in Ottawa, an accredited laboratory, for chemical analyses. The bacteria parameters of E.coli, Total Coliform and Fecal Coliform were re-sampled on December 10, 2020 to confirm the initial bacteria results were non-detect (i.e. zero colony forming units). Certificates of chemical analyses are presented in Appendix D. The water quality data are summarized and compared with the Ontario Drinking Water Standards (ODWS) in Table 2.4.

Table 2.4: Test Well Water Quality Summary

PARAMETER	Test Well TW-2			ODWS	
	1 hour (Nov. 19, 2020)	End of test (Nov. 19, 2020)	TW-2 Re-Test** (Dec. 10, 2020)	MAC	AO/OG
Alkalinity (as $CaCO_3$)	269	267	--	--	30 to 500
Ammonia as N	0.25	0.25	--	--	--
Dissolved Organic Carbon	2.4	2.2	--		
Calcium	154	153	--	--	--
Chloride	91	94	--	--	250
Colour (ACU)	67	68	--	--	--
Conductivity (mS/cm)	1390	1380	--	--	--
Fluoride	0.3	0.3	--	1.5	--
Hardness (as $CaCO_3$)	**633**	**632**	--	--	80 to 100
Iron	**0.739**	**0.699**	--	--	0.3
Magnesium	60.6	60.9	--	--	--
Manganese	**0.176**	**0.180**	--	--	0.05
Nitrite as N	<0.05	<0.05	--	1.0	--
Nitrate as N	<0.1	<0.1	--	10	--
pH (units)	7.8	7.7	--	--	6.5 to 8.5
Potassium	9.55	9.77	--	--	--
Phenolics	<0.001	<0.001	--	--	--
Sodium	69.2*	68.6*	--	--	200
Sulphate	378	389	--		500
Sulphide	<0.02	<0.02	--	--	0.05
Tannin and Lignin	<0.1	<0.1	--	--	--
Total Dissolved Solids	**930**	**940**	--	--	500
Total Kjeldahl Nitrogen	0.3	0.4	--	--	--
Turbidity (NTU)	**10**	**9.5**	--	--	5
E. coli	--	ND (<10)	0	0	--
Total Coliform	--	ND (<10)	0	< 6	--
Fecal Coliform	--	ND (<10)	0	0	--
Heterotrophic Plate Count	--	<10	--	--	--

Notes:
Units are mg/L unless otherwise stated; "<" indicates concentrations are less than laboratory reporting limits
MAC = maximum acceptable concentration
AO / OG = aesthetic objective / operational guideline
Bold / shaded indicates the concentration exceeds the ODWS AO / OG. There are no exceedances of MAC (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.
**Re-tested at SGS Laboratory to confirm bacteria was non-detect.

The laboratory analyses confirmed that there were no health-related parameter exceedances of the ODWS. In general, the test results indicate the majority of parameters meet the ODWS with several exceedances of aesthetic objectives:

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

Elevated hardness is related to the overburden materials containing calcium and to a lesser extent, magnesium. Elevated hardness and iron are common traits of groundwater supplies in Southern Ontario and can be treated using commercially available treatment equipment such as a water softener.

The bacteria results were reported by Paracel as non-detect (i.e. <10 colony forming units per 100 mL (CFU)). GHD collected a re-sample from the well on December 10, 2020 to confirm that the bacteria results were non-detect. The sample was collected after pumping a well volume from the well and submitting the sample to SGS Environmental Laboratory in Lakefield, ON. The residual chlorine was measured in the field prior to testing and confirmed to be less than 0.05 mg/L.

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 1.2 mS/cm, a water temperature of 9.2 degrees Celsius, a pH of 6.65 and turbidity of 1.4 NTU. There was no methane detected within the water.

2.2.5 Well Interference

The potential for hydraulic connection between the test well TW-2 and neighbouring wells was monitored during the pumping test to assess the potential for hydraulic connection and well interference and overall impact on the aquifer with increased groundwater usage. Water levels were recorded of the observation wells during the pumping test and is provided in Appendix E. The approximate linear distances between the test well and observation wells are provided in Table 2.5.

Table 2.5: Distance Between Pumping Well and Observation Wells

Location	Distances between Test Wells and Observation Wells in metres						
	TW-2	TW-5	4885 Hawthorne	Well 1514733	Well A305146	MW1-20	MW7-08
TW-2 (test well)	---	555	635	495	130	125	10
TW-5	555	---	1185	785	450	670	550
4885 Hawthorne	635	1185	---	675	735	510	640
Well 1514733	495	785	675	---	450	430	520
Well A305146	130	450	735	450	---	225	145
MW1-20	125	670	510	430	225	---	145
MW7-08	10	550	640	520	145	145	---

Notes:
Distances based upon locations identified on Well Location Plan, Figure 3.
MW = monitoring well; TW = test well

The following table illustrates the maximum drawdowns that were observed in the test well and adjacent neighbouring wells during the pumping test.

Table 2.6: Maximum Drawdowns in Pumping and Observation Wells

PUMPING WELL		OBSERVATION WELLS	
LOCATION	MAXIMUM DRAWDOWN AT PUMPING WELL(m)	LOCATION	DRAWDOWN AT OBSERVATION WELL(m)
TW-2	**1.15**	TW-5	~0.03
		4885 Hawthorne	~0.03
		Well 1514733	0
		Well A305146	~0.95
		MW1-20	0
		MW7-08	0

2.2.5.1 Interference Assessment

During the pumping test, data loggers were installed within nearby production wells (TW-5, Well 1514733 and Well A305146); a residential well (4885 Hawthorne Road) and monitoring wells (MW1-20 and MW7-08). This was completed to quantify any hydraulic connection between the overburden and bedrock aquifer, and, within the bedrock aquifer itself.

There was no drawdown attributable to pumping at TW-2 within the monitoring wells (MW1-20 and MW7-08) indicating that there is no vertical hydraulic connection between the overburden groundwater and confined bedrock aquifer that TW-2 draws from.

There was no drawdown at Well 1514733 and minimal drawdown within TW-5 and the residential well throughout the duration of the pumping test. The drawdown at TW-5 and 4885 Hawthorne Road was about 3 cm based upon the data logger readings and is considered insignificant. No impacts are expected at these wells as a result of future TW-2 usage.

The results of the interference monitoring did illustrate a hydraulic connection between TW-2 and Well A305146 about 130 m to the south. The drawdown at this well was about 95 cm during the pumping test. It is expected that these wells are confined within the same aquifer unit and are hydraulically connected.

The testing showed that the pumping of over 20,000 L resulted in the usage of about 5% of the available drawdown of the test 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 without significant interference to future and existing neighbouring wells. In our professional opinion the risk of interference is minimal.

2.3 Water Supply

The water supply system for the commercial development is expected to be regulated under Ontario Regulation 170 with the MECP. Based upon the pumping test, the test well TW-2 provided sufficient water quantity and could support a higher yield if required. The testing indicated that the bedrock aquifer below the Site can produce enough groundwater to support the proposed commercial development without significant impact to other wells.

It is also understood by GHD that, due to the location of TW-2, a replacement production well may be drilled for the Site. The following requirements are outlined for a new replacement well.

2.3.1 Production Well Requirements

Based on the results of this assessment, it is recommended that the commercial development be serviced by a properly constructed drilled well. GHD understands that the current drilled well used at the Site may be used to support the proposed development. However, if a new replacement well is needed, the current well should be abandoned in accordance with Regulation 903 of the Ontario Water Resources Act.

A future well should target the bedrock aquifer on the order of about 30 m deep. Large diameter (300 mm or greater) wells are not considered suitable as a source of water supply as they can be susceptible to shallow sources of contamination and may be prone to going dry during summer and winter months. Water wells installed should be in accordance with Regulation 903 of the Ontario Water Resources Act and the following design specifics:

1. If the well is a bedrock well, the casing should be sealed in accordance with Regulation 903 to the bedrock.
2. The well must be developed by conventional techniques to obtain a minimum of 70% efficiency. It is recommended that a statement be provided that indicates the well is essentially sand-free (i.e. less than 5 mg/L sand). In addition, the statement should also include that the total drawdown in the well, comprising the pumping level plus the mutual interference from the other wells, is within a reasonable tolerance of the available drawdown.
3. A water sample must be collected from the new well and analyzed for the following, at a minimum, test parameters to meet the ODWS:

-Iron	-Manganese	-Nitrate
-Sodium	-Hardness	-Turbidity
-Total Coliform	-E.*coli*	-Fecal coliform
-Chloride	-Total Dissolved Solids	

4. It is recommended that the new well be pump tested by qualified hydrogeologic personnel prior to issuance of a building permit. The well should be pump tested to determine a safe long-term yield and short-term capacity to ensure uninterrupted water supply for the development and to ensure that adjacent properties will not be impacted. A report should be prepared by a Professional Engineer or Professional Geoscientist verifying the pump testing data.

The use of a properly constructed drilled well that is adequately sealed and certified by qualified hydrogeological personnel should be sufficient to provide ample quantities of potable water while preserving the long term water quality of the existing aquifer complexes. Based on the aforementioned water quality data, some aesthetic related exceedances were noted. Aesthetic objectives are not health related. Methane was not observed in the test well discharge water or detected with our field instrumentation.

The use of groundwater heat pumps that extract water from the aquifer is not recommended. Geothermal drilling is unregulated and there are no mandatory requirements to seal boreholes that are drilled through or into aquifers. Therefore, unsealed or improperly sealed boreholes into the aquifer could put the water supply at risk.

2.4 Septic Waste Disposal

The septic waste disposal system is being designed by others.

2.5 Construction Dewatering

Based upon the GHD Geotechnical Report (2020), approximately 6 m of fill was encountered on the Site. The report suggests that foundations are to be either shallow foundations completed in the fill (requiring soil improvements, such as dynamic compaction) or deep foundations (Drilled Micro piles or drilled cast-in-place concrete piles / caissons). Bedrock was encountered at depths of 8.2 to 11.1 mbgs. Groundwater during the geotechnical program was encountered at depths of 3.3 to 4.0 mbgs at the Site and measured on November 19, 2020 to be 3.0 mbgs at MW7-08 and 3.8 mbgs at MW1-20.

Based on these observations, the excavations for the deep foundation option will extend below the water table and will require dewatering to remove groundwater seepage as well as surface water runoff and precipitation to ensure safe and dry working conditions.

2.5.1 Groundwater Sampling for Construction Dewatering

On November 19, 2020, a groundwater sample was collected from MW7-08 as part of the hydrogeological assessment. The sample was submitted to Paracel Laboratories in Ottawa, Ontario for analysis of metals, general inorganics, and volatile organic compounds (VOCs). The results were compared to criteria described in City of Ottawa By Law 2003-514, which addresses discharge to the Municipal sewage system. The analytical results are summarized and provided with the certificates of analysis in Appendix G.

When the analytical results are compared to the City of Ottawa criteria, it is noted that the following parameters exceeded the criteria:

- Phosphorus (total);
- Suspended solids (total);
- Arsenic (total);
- Copper (total);
- Manganese (total);
- Nickel (total); and
- Zinc (total).

The results represent total concentrations including dissolved and sorbed particulate. Based on these observations, the water discharged from an excavation must be filtered 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.

2.5.2 Single Well Response Testing

On November 20, 2020, Single Well Response Tests (SWRTs) were completed on monitoring wells MW1-20 and MW7-08, both of which are completed within the overburden. The tests consisted of inducing a measurable change to the water level in the monitoring well and measuring the rate at which the water level recovers. In this case, dataloggers were placed in the wells, then water in the wells were displaced by inserting a solid slug. When water levels had stabilized, the slug was then removed.

The SWRT was analysed using AQTESOLV and the Bouwer-Rice solution for unconfined groundwater unit within the fill. The results yielded a geometric mean of $5.7x10^{-5}$ cm/s at MW1-20 and $2.1x10^{-3}$ cm/s at MW7-08 in the general area of the southern edge of the proposed warehouse. The SWRT analyses are provided in Appendix F. The hydraulic conductivity testing suggests that excavations within fill material such as MW7-08 would be expected to yield moderate water infiltration.

It is noted that the hydraulic conductivities in MW7-08 was significantly faster than that measured at MW1-20 (near the northwest limit of the Site). This is attributed to a combination of differing

screened depths and variations in fill composition. Accordingly, it is assumed that the hydraulic conductivities vary across the Site. For the calculations used in this report, hydraulic conductivity will be assumed to be 1 x10^{-3} cm/sec.

2.5.3 Water Taking Evaluation

This section of the report is not intended to be considered for use as a dewatering plan for the construction contractor, as the water takings are for the purposes of regulatory submissions. It must also be noted that groundwater levels are transient and tend to fluctuate with the seasons, periods of precipitation and temperature.

The Site-specific borehole data, results of the hydraulic testing (i.e. single well response tests) and groundwater water monitoring were utilized to determine the aquifer hydraulic properties (hydraulic conductivity) and conditions to provide the basis for estimating the construction water taking rates and area of influence. If excavations extend beyond 3 mbgs, it is expected that groundwater will be encountered. The water takings and area of influence were determined using the field data and by employing analytical modelling methods. The projected drawdown was calculated as a partially penetrating excavation in an unconfined aquifer within the fill.

The radius of influence (R_o) was estimated using an empirical relationship developed by Sichardt and Kryieleis that gives R_o as a function of drawdown and hydraulic conductivity (Powers et al., 2007).

$R_o = 3000(H - h)\sqrt{K}$ (For circular source)

$R_o = 1750(H - h)\sqrt{K}$ (For line source)

Based upon an excavation depth of 8.5 m (i.e. removing all of the fill and native soil to bedrock as per the depth of bedrock at TW-2), the radius of influence is about 70 to 90 m. Based upon the size of the Site, no impacts to neighbouring properties is expected.

The steady state dewatering (Q) into the excavation was estimated using:

$$Q = \frac{\pi K\left(H^2 - h_w^2\right)}{\ln R_0 / r_w}$$ (For steady state into a semi-penetrating shaft)

Where: $r_w = \sqrt{\frac{ab}{\pi}}$

There are a number of assumptions to this method including:

- Homogeneous material
- Steady state
- Initial horizontal potentiometric surface
- Unconfined aquifer
- Partially penetrating well
- Gravity flow
- Circular source
- Effect of a large rectangular excavation is equivalent to circular excavation of same area

Based upon an excavation size that includes the entire warehouse area (4650 m^2) but does not include the cross docks or office areas, and assuming a dewatering depth to 9.5 m (one (1) m below the bedrock as per the bedrock depth at TW-2 to maintain dry conditions) steady state dewatering is estimated to be on the order of 725,000 L/day. This estimation includes a safety factor of 1.5 that was applied to the infiltration rate. The initial flows from the excavation may also be expected to be two to three times greater than the steady state.

Accordingly, the Owner should be aware of the limitations associated with the flow volume estimate contained in this report before utilizing the flow estimates for any use beyond their intended purpose (the generation of estimates to assess the need for a Permit To Take Water or an Environmental Activity and Sector Registry (EASR) application for construction). Our calculations assumed that there are 8.5 m of material to be removed to the bedrock for construction of the warehouse and dewatering to a depth of 9.5 m required to maintain 'dry' conditions. There may be areas on the Site with greater depths of material above the bedrock; or, other areas that have greater permeability and have more significant groundwater volume to be dewatered. The calculations also assumed that the footprint of the warehouse would be excavated in its entirety. To reduce groundwater pumping efforts, smaller areas of the warehouse footprint could be excavated at one time or alternative construction methods may be considered.

It is recommended that any contractor carry out a test excavation and / or pump testing of the fill layer prior to dewatering to evaluate the conditions and the most appropriate method to deal with the onsite conditions.

Based on the above assumptions and the scenario presented, we suggest that that the Client should:

- **Submit a Permit To Take Water (PTTW) application** to remove water from the Site, allowing for a water taking volume of greater than **400,000 Litres/day (L/day)** for the purposes of the submission. It should be noted that PTTW reviews may take up to 90 business days (i.e. 4.5 months). Alternatively, an EASR application for construction dewatering can be obtained within several days and allows for up to 400,000 L/day of groundwater pumping for construction dewatering purposes.
- **If required, obtain a City Ottawa Discharge Permit** to allow discharge to the local municipal sewer system or ditch. At a minimum, the construction water takings will require sediment filtration prior to discharge such as a sediment filter bag or equivalent methods.

The discharge from the dewatering should be directed to the nearby ditches or ground surface away from the excavation in an area protected from erosion. In addition, the discharge water should be properly filtered to reduce turbidity and total suspended solids. The volume and rate of the water takings will be recorded daily and measured using a flow meter or other acceptable method. The daily groundwater discharge shall be maintained below the limits identified in PTTW or EASR permit, and the City of Ottawa Discharge Permit (if required).

It is important to conduct the excavation and dewatering work in a timely manner (i.e. short duration) if possible. In addition, the ideal period to conduct the program is during the summer when groundwater and surface water are expected to be at their lowest. Any suppression of the local shallow groundwater from dewatering during the construction phase is expected to be of a temporary nature.

3. 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 assessment, the test 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. There was minor interference between adjacent wells; however, the interference is not considered significant to impact the operation of the wells. There is no vertical hydraulic connection between the shallow overburden groundwater and the bedrock aquifer unit. In the long term, it is our opinion that the bedrock aquifer tested can support the commercial development and neighbouring wells.

Water quality impacts are not expected provided that the waste disposal system is properly constructed. No impact is anticipated on downgradient baseline water quality functions or to the existing water bearing aquifers.

If a new well is drilled for the development, the well must be properly constructed and adequately sealed and the existing well decommissioned in accordance with Ontario Regulation 903.

Construction dewatering is estimated to be about 725,000 L/day or greater based upon field testing and dewatering the entire warehouse footprint to the bedrock surface. A PTTW is recommended for this approach. For dewatering of volumes up to 400,000 L/day, an EASR application is recommended. No significant impacts from construction dewatering are anticipated.

It is GHD's opinion that the results of this hydrogeological assessment support the development of the proposed commercial development.

The following Statement of Limitations should be read carefully and is an integral part of this report. We trust this report meets your immediate needs. Should any questions arise regarding any aspect of our report, please contact our office.

Sincerely,

GHD

Robert Neck, M.Eng., P.Geo. (Limited)

Nyle McIlveen, P.Eng.

4. References

Chapman and Putnam, 1966. The Physiography of Southern Ontario, 2nd Edition. University of Toronto Press.

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Occupational Health and Safety Act, R.S.O. 1990, and associated regulations.

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Ontario Ministry of the Environment, 2011. Ontario Regulation 153/04: Records of Site Condition Part XV.1 of the Act (*Environmental Protection Act* 153/04, as amended).

Ontario Ministry of the Environment. June 2003. Revised June 2006. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines.

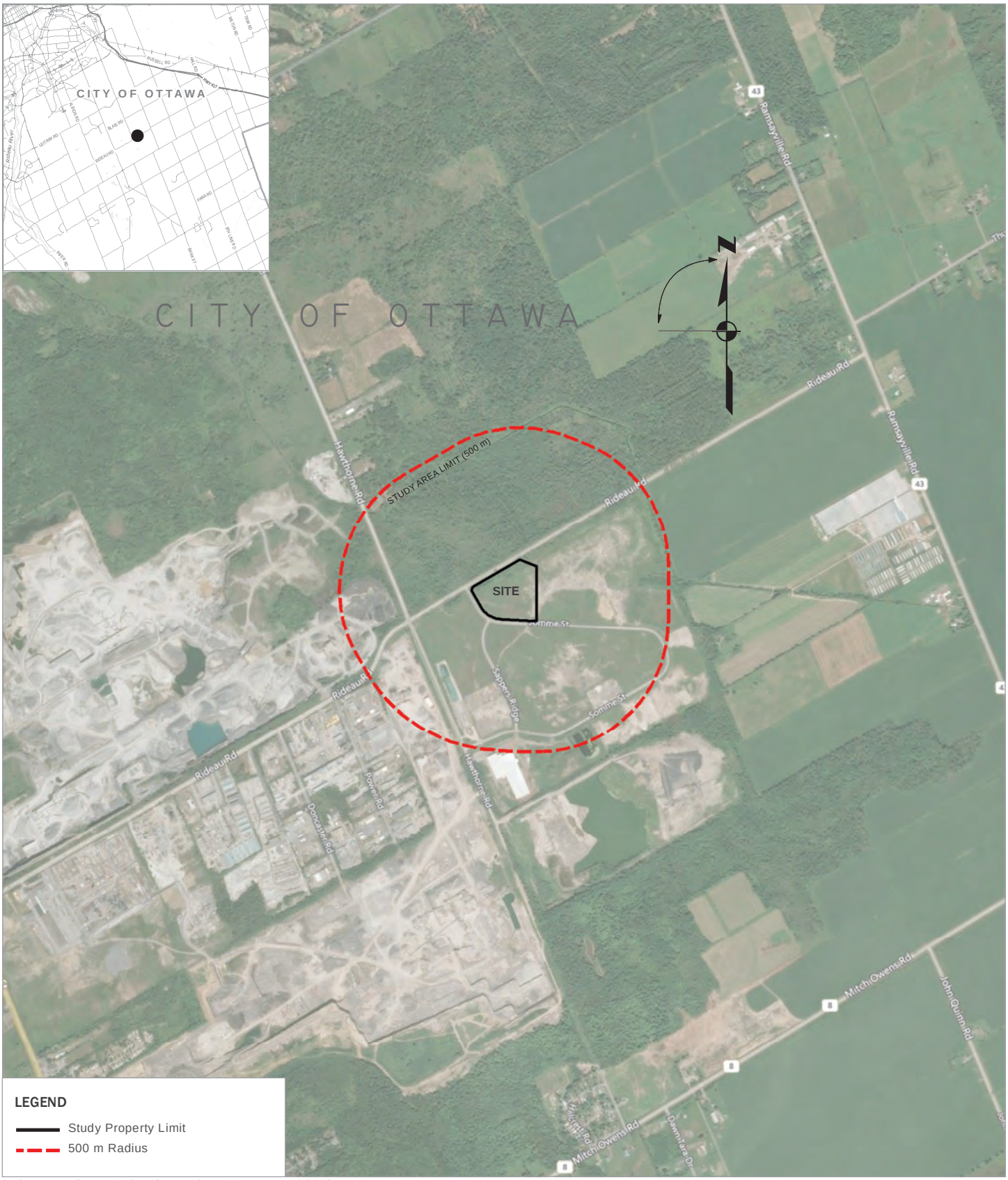
5. Statement of Limitations

This report is intended solely for Consolidated Fastfrate (Ottawa) Holdings Inc. in assessing the hydrogeological aspects of the Site (Rideau Road and 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.

Enclosures



NAD83, MTM Zone 9
1 cm : 200 meters

Meters
0 220 440 880

ATTRIBUTION STATEMENTS

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Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
SITE LOCATION PLAN

Project No.	11220832-01
Revision No.	1
Date	Jan. 2021

FIGURE 1

Created by: Will Pridham

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Distribution Airbus DS © 2020 HERE

NAD83, MTM Zone 9
1 cm : 18 meters

Meters
0 20 40 80

ATTRIBUTION STATEMENTS

- Preliminary Site Blocking Diagram [A100]. Civitas Group. 2020-11-04.
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Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
PRELIMINARY CONCEPT PLAN

Project No. 11220832-01
Revision No. 1
Date Jan 21

FIGURE 2

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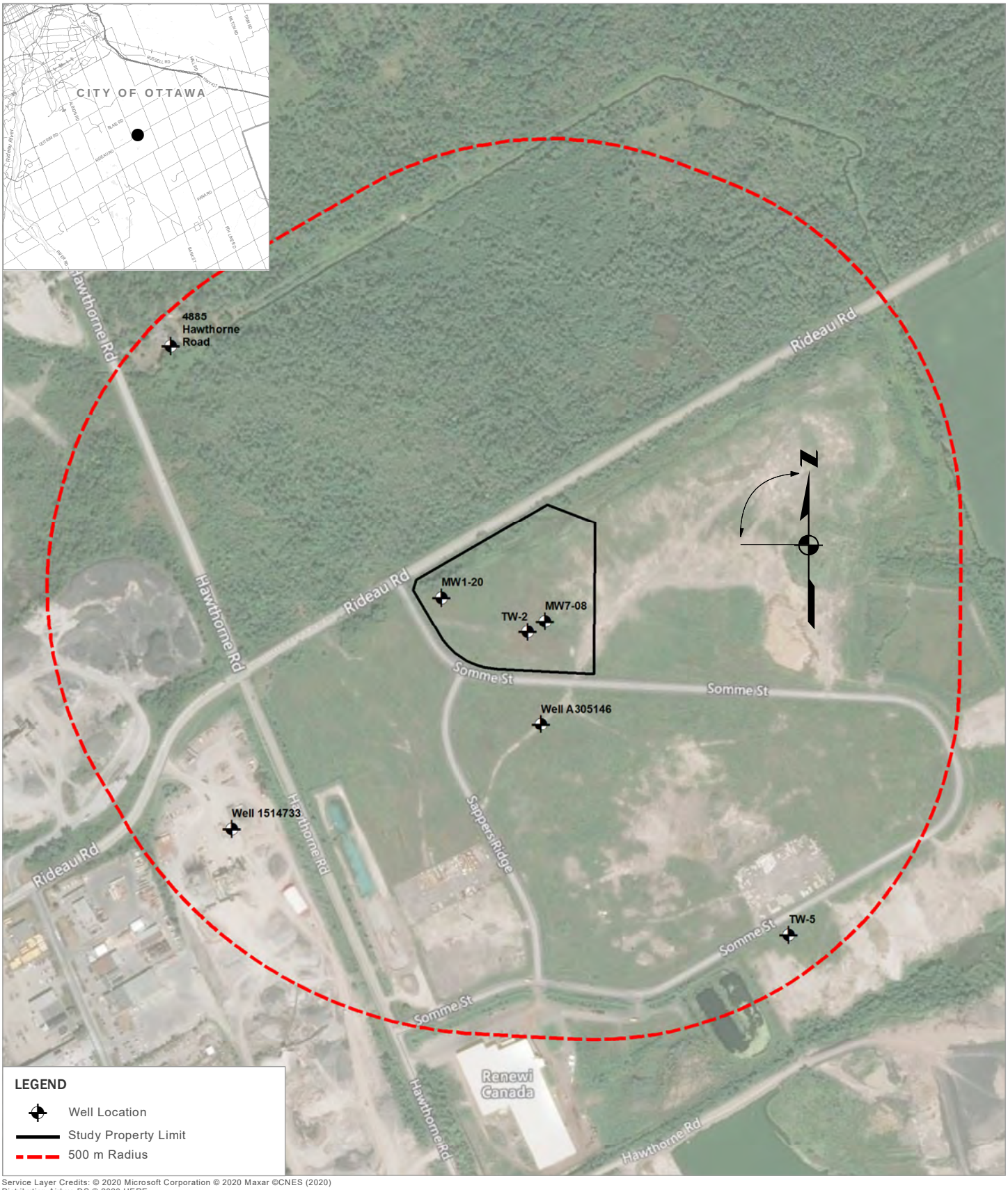

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NAD83, MTM Zone 9
1 cm : 72 meters
Meters
0 80 160 320

ATTRIBUTION STATEMENTS

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Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
WELL LOCATION PLAN

Project No. 11220832-01
Revision No. 1
Date Jan 21

FIGURE 3

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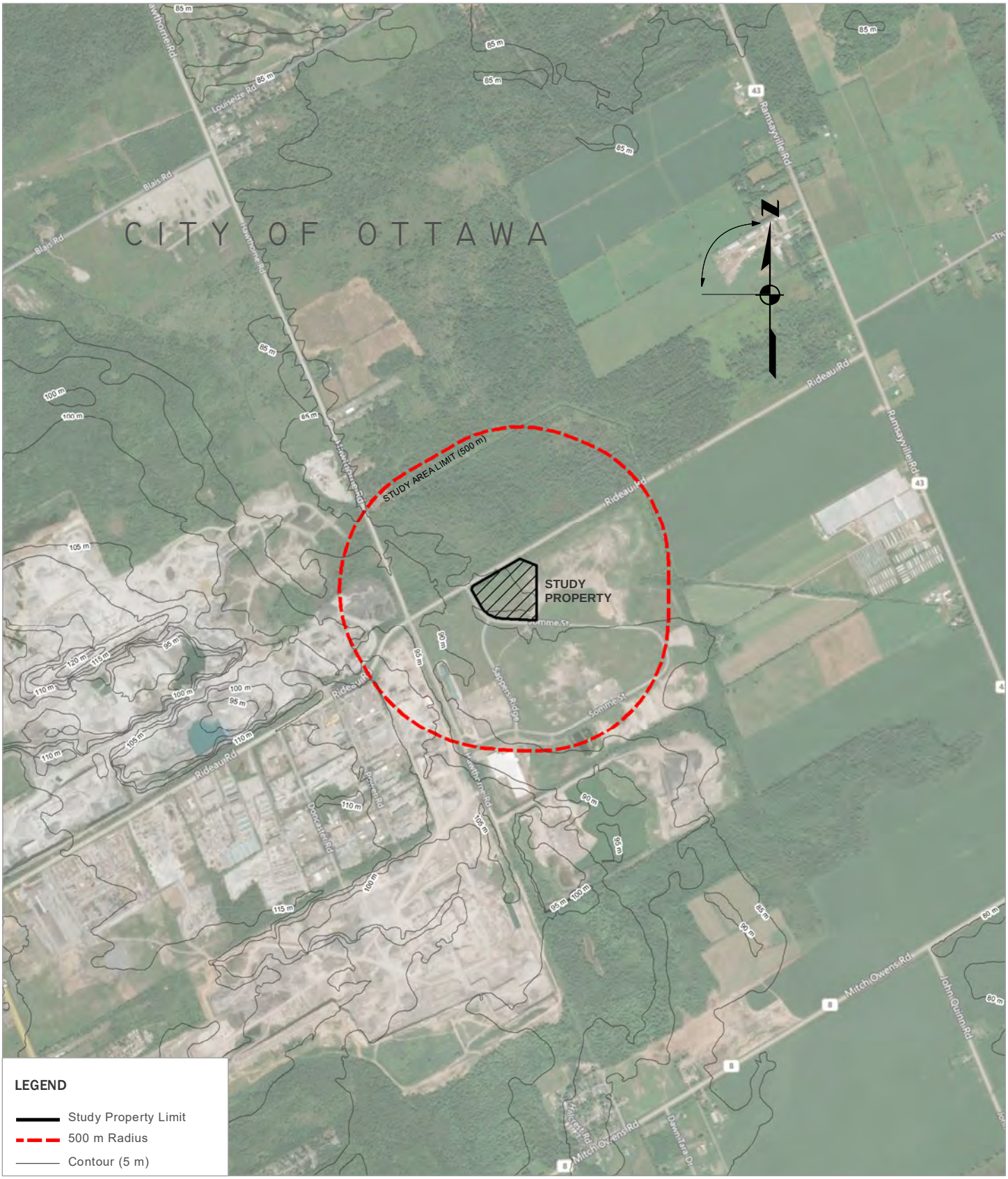

NAD83, MTM Zone 9
1 cm : 200 meters

Meters
0 220 440 880

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.

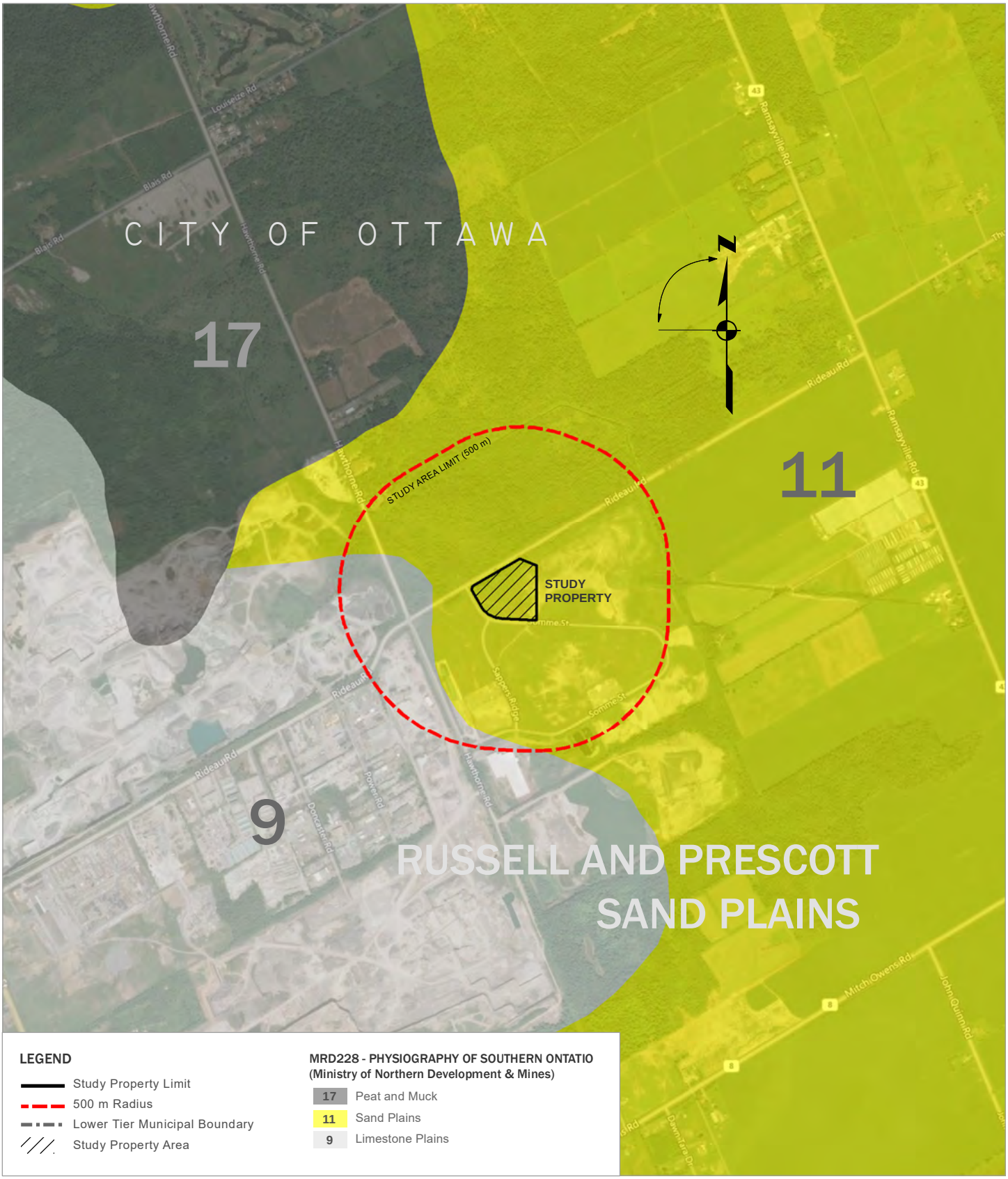
RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
REGIONAL TOPOGRAPHY

Project No.	11220832
Revision No.	-
Date	Jan 21

FIGURE 4

Created by: Will Pridham



LEGEND

- Study Property Limit
- 500 m Radius
- Lower Tier Municipal Boundary
- Study Property Area

MRD228 - PHYSIOGRAPHY OF SOUTHERN ONTATIO (Ministry of Northern Development & Mines)

17	Peat and Muck
11	Sand Plains
9	Limestone Plains

NAD83, MTM Zone 9
1 cm : 200 meters

Meters
0 220 440 880

ATTRIBUTION STATEMENTS

- MRD228-REV. Chapman, L.J. and Putnam, D.F. 2007. Physiography of southern Ontario; Ontario Geological Survey, Miscellaneous Release—Data 228.
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Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
PHYSIOGRAPHY

Project No. 11220832
Revision No. -
Date Jan 21

FIGURE 5

Created by: Will Pridham

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LEGEND

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

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

- 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
  - 11b Littoral deposits
  - 11c Foreshore and basinal deposits
- 10 **Fine-textured glaciomarine deposits**
  - 10a Massive to well laminated
- 5b **Till:** Silty sand to sand-textured till on Precambrian terrain
  - 5b Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain

NAD83, MTM Zone 9
1 cm : 200 meters
Meters
0 220 440 880

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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RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
SURFICIAL GEOLOGY

Project No.	11220832
Revision No.	-
Date	Jan 21

FIGURE 6

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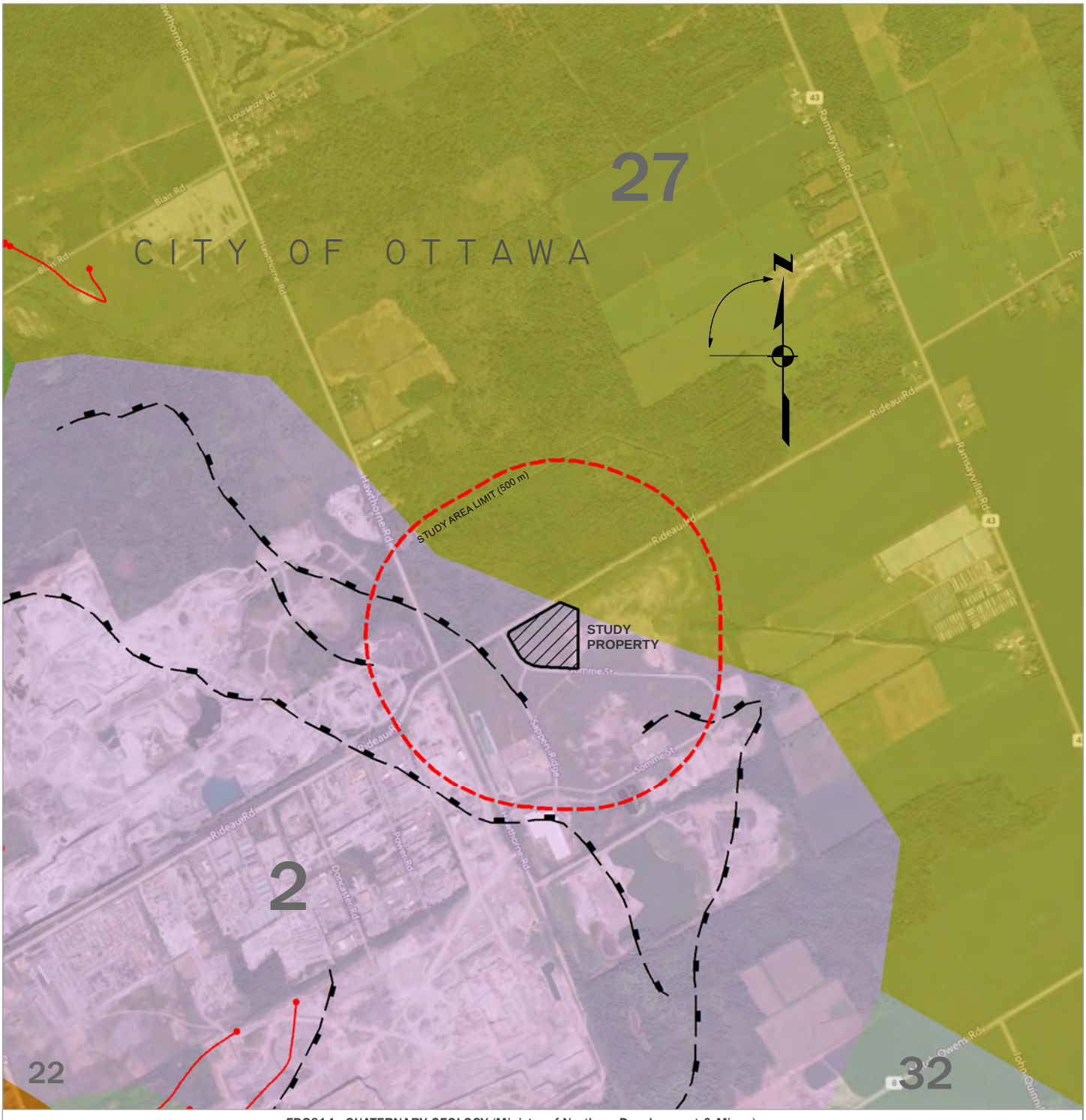

LEGEND

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

EDS014 - QUATERNARY GEOLOGY (Ministry of Northern Development & Mines)

32 Organic deposits:
peat, muck and marl

27 Glaciomarine and marine deposits:
sand, gravelly sand and gravel nearshore and beach deposits

22 Glaciofluvial ice-contact deposits:
gravel and sand minor till includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits

2 Bedrock:
undifferentiated carbonate and clastic sedimentary rock, exposed at surface or covered by a discontinuous, thin layer of drift

NAD83, MTM Zone 9
1 cm : 200 meters
Meters
0 220 440 880

ATTRIBUTION STATEMENTS

- EDS014-REV. Ontario Geological Survey, 1997. Quaternary geology, seamless coverage of the province of Ontario: Ontario Geological Survey, Data Set 14.
- Produced by GHD Limited under Licence with the Ontario Ministry of Natural Resources and Forestry© Queen's Printer for Ontario, 2020 (2020).

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Consolidated Fastfrate (Ottawa) Holdings Inc.

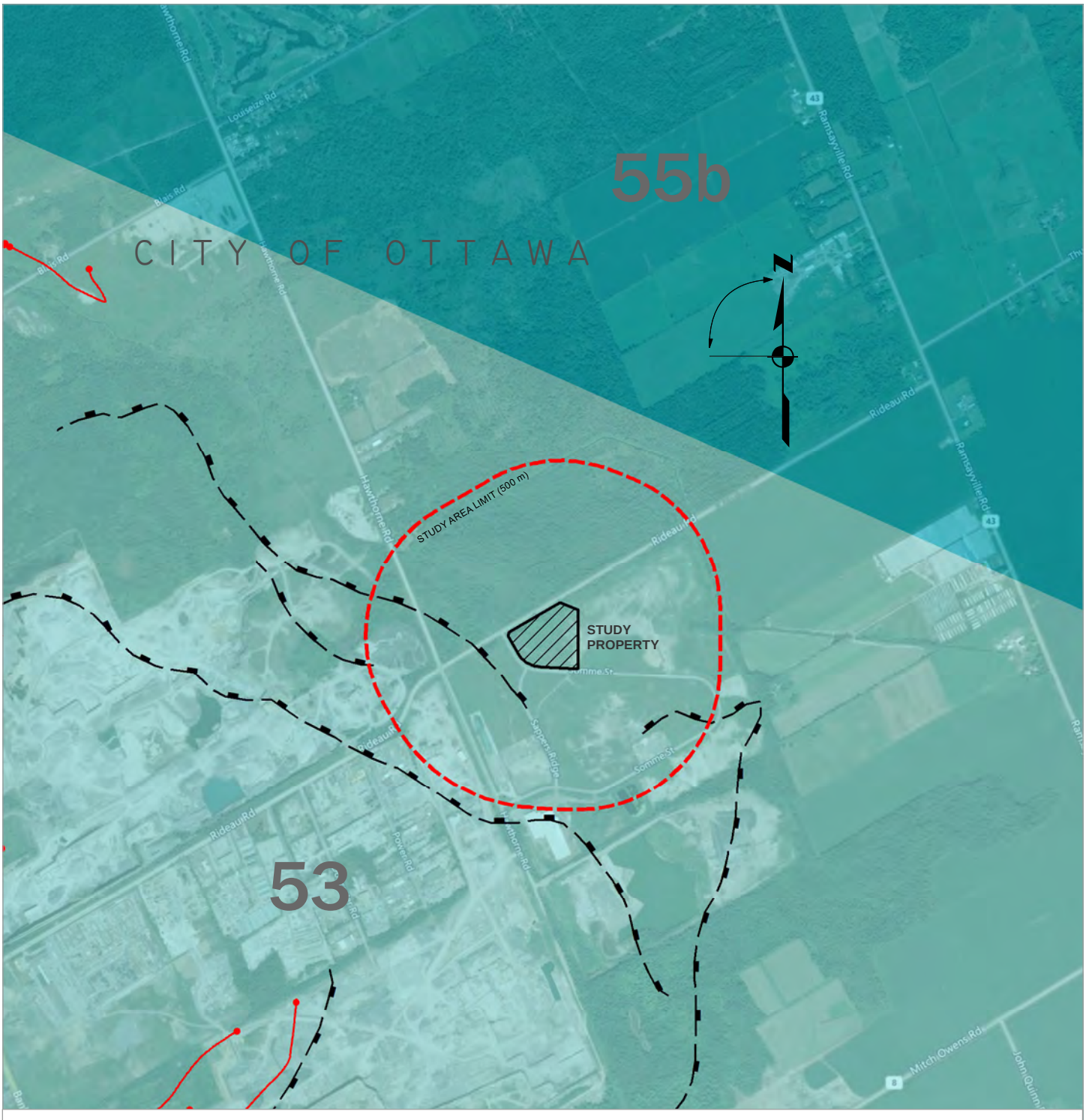
RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
QUATERNARY GEOLOGY

Project No. 11220832
Revision No. -
Date Jan 2021

FIGURE 7

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

53 **Dolostone, sandstone:** Beekmantown Gp.

NAD83, MTM Zone 9
1 cm : 200 meters
Meters
0 220 440 880

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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Consolidated Fastfrate (Ottawa) Holdings Inc.

RIDEAU ROAD & SOMME STREET
CITY OF OTTAWA
ONTARIO

HYDROGEOLOGY ASSESSMENT
BEDROCK GEOLOGY

Project No. 11220832
Revision No. -
Date Jan. 2021

FIGURE 8

Created by: Will Pridham

Appendix A
Photographs

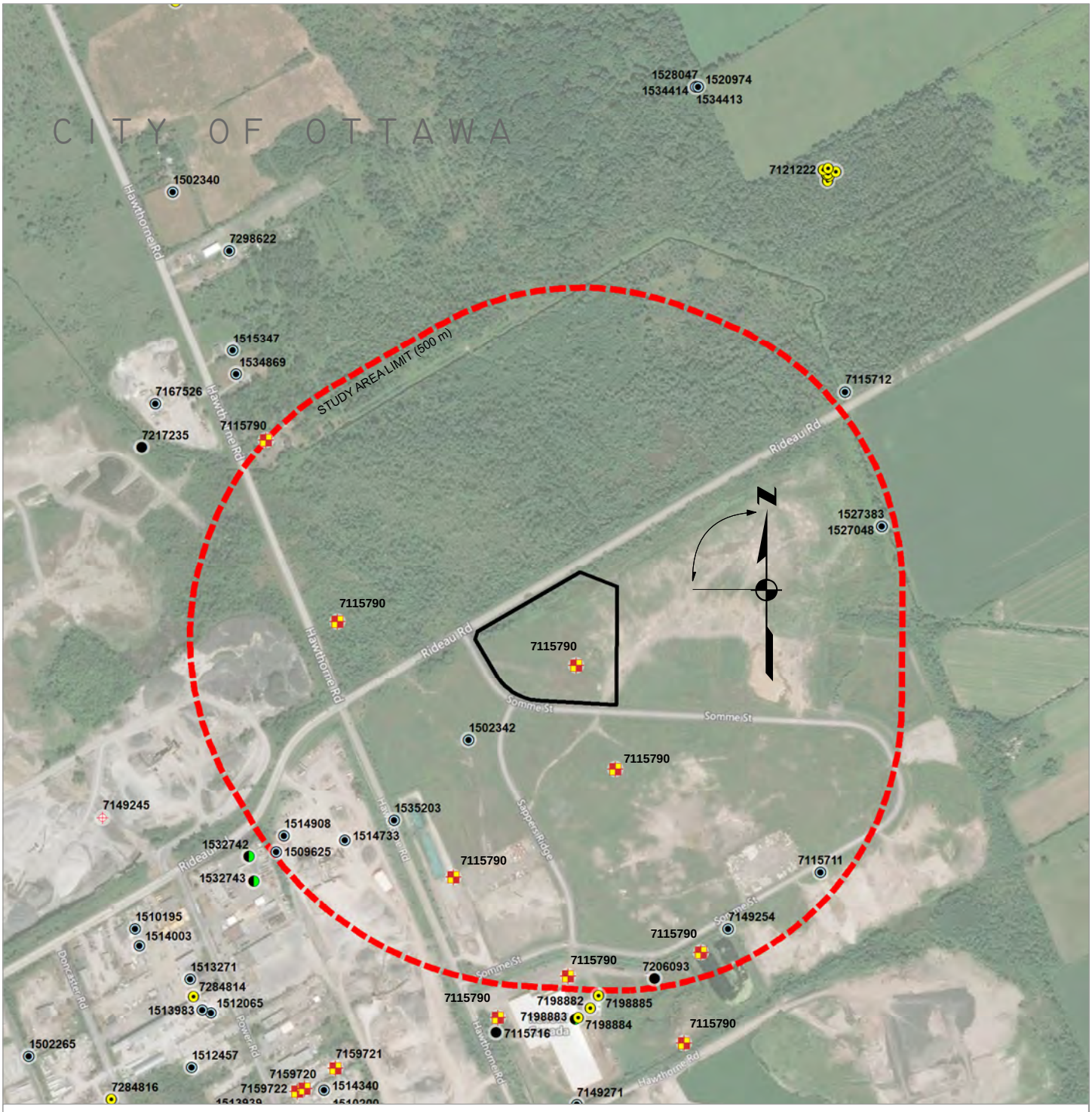
Photo 1 - View of drilled test well on the Site used during pumping test.

Photo 2 - View of discharge area looking across the Site.

Site Photographs

Photo 3 - Example of observation well (ID A305146) used during pumping test for monitoring of potential interference effects.

Appendix B
MECP Well Records



LEGEND

- Study Property Limit
- 500 m Radius

MECP Well, Final Status

- Abandoned Monitoring and Test Hole
- Abandoned-Other
- Abandoned-Quality
- Abandoned-Supply
- Alteration
- Dewatering
- Monitoring and Test Hole
- Observation Wells
- Recharge Well
- Replacement Well
- Test Hole
- Unfinished
- Water Supply
- Other Status
- No Data
- Not A Well

NAD83, MTM Zone 9
1 cm : 100 meters

Meters: 0 | 110 | 220 | 440

ATTRIBUTION STATEMENTS

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

HYDROGEOLOGY ASSESSMENT
MECP WATER WELLS

Project No. 11220832
Revision No. -
Date Jan 21

APPENDIX B

Created by: Will Pridham

WELL RECORD LISTINGS

Ministry of the Environment Conservation & Parks (MECP)

Database Currency: 2020-04-30

Date Accessed: 2020-11-13

Project ID: 11220832 **Office:** Peterborough, ON

Lot: LOT 27
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street: 35 SAPPERS RIDGE
City: Ottawa
Site:
Elevation: 89.57 *masl.*
UTM: 18 E 456749 N 5016668 **Long/Lat:** -75.552 , 45.302

Well ID: 7206093
Borehole ID: 1004500104
Completion Date: 7/18/2013
Received Date: 8/12/2013
Tag: A089801
Audit No: Z103282
Contractor License: 3749

DETAILS

Primary Use: Public **Secondary Use:** Public **Final Status:**

Well Depth: 47.2 m **Depth to Bedrock:** 0 m **Static Level:** 7.6 m **Well Type:**

Pump Rate: 10 GPM **Boring Method:** Rotary (Convent.)

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top**	**Bottom**
STEEL	14.29	12.19	-0.61

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top**	**Bottom**
	LIMESTONE	7.32	47.24
	FILL	0.00	2.44
GREY	CLAY	2.44	7.32

Lot: LOT 27
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa
Site:
Elevation: 90.95 *masl.*

Well ID: 7115790
Borehole ID: 1002782554
Completion Date: 7/7/2008
Received Date: 11/26/2008
Tag: A074584
Audit No: M02897
Contractor License: 1844

UTM: 18 E 456598 N 5016675 **Long/Lat:** -75.554 , 45.302

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 1 m **Well Type:**

Pump Rate: **Boring Method:** H.S.A.

CASING DETAILS DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	FILL	0.27		1.43
GREY	SAND	1.43		1.83
BROWN	TILL	1.83		2.32
GREY	FINE SAND	0.00		0.27

Lot: LOT 27
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa
Site:
Elevation: 94.41 *masl.*
UTM: 18 E 456831 N 5016712 **Long/Lat:** -75.551 , 45.303

Well ID: 7115790
Borehole ID: 1002782518
Completion Date: 7/7/2008
Received Date: 11/26/2008
Tag: A074584
Audit No: M02897
Contractor License: 1844

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 1.3 m **Well Type:**

Pump Rate: **Boring Method:** H.S.A.

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	15.86	-0.45	6.40

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
GREY	SANDSTONE	1.30	9.10
BROWN	TOPSOIL	0.00	1.30

Lot: LOT 27
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street: TW#7 HOAWTHORNE RD.
City: GLOUCESTER
Site:
Elevation: 88.61 *masl.*
UTM: 18 E 456879 N 5016752 **Long/Lat:** -75.550 , 45.303

Well ID: 7149254
Borehole ID: 1003262503
Completion Date: 5/25/2010
Received Date: 8/4/2010
Tag: A082844
Audit No: Z101832
Contractor License: 1558

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Water Supply

Well Depth: 29.9 m **Depth to Bedrock:** 0 m **Static Level:** 4.4 m **Well Type:**

Pump Rate: 27.3 LPM **Boring Method:** Rotary (Reverse)

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	15.86	-0.45	6.40

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
GREY	SANDSTONE	1.30	9.10
BROWN	TOPSOIL	0.00	1.30

Lot:	LOT 26	**Well ID:**	7115790
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	1001905211
Township:	GLOUCESTER	**Completion Date:**	7/14/2008
County:	OTTAWA-CARLETON	**Received Date:**	11/26/2008
Street:	HAWTHORNE ROAD AT RIDEAU ROAD	**Tag:**	A074584
City:	Ottawa	**Audit No:**	M02897
Site:		**Contractor License:**	1844
Elevation:	89.13 *masl.*		
UTM:	18 E 456400 N 5016852 **Long/Lat:** -75.556 , 45.304		

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 7.6 m **Depth to Bedrock:** 0 m **Static Level:** 1.7 m **Well Type:**

Pump Rate: **Boring Method:** H.S.A.

CASING DETAILS DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	FINE SAND	0.00		0.27
BROWN	FILL	0.27		1.43
BROWN	TILL	1.83		2.32
GREY	SAND	1.43		1.83

Lot:	LOT 27	**Well ID:**	7115711
Con:	CON 6 FROM RIDEAU RIVER	**Borehole ID:**	1001904894
Township:	GLOUCESTER	**Completion Date:**	9/26/2008
County:	OTTAWA-CARLETON	**Received Date:**	12/2/2008
Street:	TW #5	**Tag:**	A068335
City:	GLOUCESTER	**Audit No:**	Z84410
Site:		**Contractor License:**	1558

Elevation: 87.38 *masl.*

UTM: 18 E 457043 N 5016848 **Long/Lat:** -75.548 , 45.304

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 29.9 m **Depth to Bedrock:** 0 m **Static Level:** 6.8 m **Well Type:** Bedrock

Pump Rate: 180 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
STEEL	25.40		5.49
OPEN HOLE	22.86		58.52

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
BROWN	SANDSTONE	0.00	15.85
GREY	QUARTZITE	15.85	21.95
WHITE	SANDSTONE	21.95	48.77
GREY	SANDSTONE	48.77	58.52

Lot: LOT 26 **Well ID:** 1509625

Con: CON 5 FROM RIDEAU RIVER **Borehole ID:** 10031657

Township: GLOUCESTER **Completion Date:** 5/4/1968

County: OTTAWA-CARLETON **Received Date:** 6/12/1968

Street: **Tag:**

City: **Audit No:**

Site: **Contractor License:** 3002

Elevation: 103.27 *masl.*

UTM: 18 E 456091 N 5016902 **Long/Lat:** -75.560 , 45.304

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 58.5 m **Depth to Bedrock:** 0 m **Static Level:** 11 m **Well Type:** Bedrock

Pump Rate: 180 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
OPEN HOLE	22.86		58.52

STEEL	25.40	5.49

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
BROWN	SHALE	0.61	3.05
BROWN	TOPSOIL	0.00	0.61
GREY	LIMESTONE	3.05	35.36

Lot: LOT 26
Con: CON 5 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street:
City:
Site:
Elevation: 99.42 *masl.*
UTM: 18 E 456211 N 5016920 **Long/Lat:** -75.559 , 45.304

Well ID: 1514733
Borehole ID: 10036703
Completion Date: 4/15/1975
Received Date: 7/8/1975
Tag:
Audit No:
Contractor License: 1517

DETAILS

Primary Use: Commerical **Secondary Use:** Commerical **Final Status:** Water Supply

Well Depth: 35.4 m **Depth to Bedrock:** 0.6 m **Static Level:** 12. m **Well Type:** Bedrock

Pump Rate: 10 GPM **Boring Method:** Cable Tool

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
OPEN HOLE	12.70		35.36
STEEL	12.70		5.49

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
BROWN	TOPSOIL	0.00	0.61
BROWN	SHALE	0.61	3.05
GREY	LIMESTONE	3.05	35.36

Lot: LOT 26
Con: CON 5 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON

Well ID: 1514908
Borehole ID: 10036875
Completion Date: 8/15/1975
Received Date: 9/11/1975

Street: 3500 RIDEAU ROAD **Tag:** A018916
City: GLOUCESTER **Audit No:** Z19099
Site: **Contractor License:** 1119
Elevation: 90.37 *masl.*
UTM: 18 E 456105 N 5016929 **Long/Lat:** -75.560 , 45.304

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 75.6 m **Depth to Bedrock:** 0 m **Static Level:** 12. m **Well Type:** Bedrock

Pump Rate: 75.71 LPM **Boring Method:** Air Percussion

CASING DETAILS		DEPTH IN METERS	
Material	**Diameter (cm)**	**Top** -	**Bottom**
OPEN HOLE		6.09	42.67
STEEL	15.88	0.00	6.70

FORMATION DETAILS		DEPTH IN METERS	
Colour	**Material**	**Top** -	**Bottom**
GREY	LIMESTONE	10.68	13.01
GREY	SANDSTONE	0.37	10.68
	GRAVEL	0.00	0.37

Lot: <null> **Well ID:** 1535203
Con: **Borehole ID:** 11172955
Township: GLOUCESTER **Completion Date:** 10/27/2004
County: OTTAWA-CARLETON **Received Date:** 11/26/2004
Street: 3500 RIDEAU ROAD **Tag:** A018916
City: GLOUCESTER **Audit No:** Z19099
Site: **Contractor License:** 1119
Elevation: 90.37 *masl.*
UTM: 18 E 456298 N 5016953 **Long/Lat:** -75.557 , 45.305

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 42.7 m **Depth to Bedrock:** 1.2 m **Static Level:** 14. m **Well Type:** Bedrock

Pump Rate: 75.71 LPM **Boring Method:** Air Percussion

CASING DETAILS DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS		DEPTH IN METERS		
Colour	Material	Top	-	Bottom
GREY	FINE SAND	0.00		0.27
GREY	SAND	1.43		1.83
BROWN	TILL	1.83		2.32
BROWN	FILL	0.27		1.43

Lot: LOT 26
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa
Site:
Elevation: 85.10 *masl.*
UTM: 18 E 456687 N 5017036 **Long/Lat:** -75.552 , 45.305

Well ID: 7115790
Borehole ID: 1002782572
Completion Date: 7/15/2008
Received Date: 11/26/2008
Tag: A074584
Audit No: M02897
Contractor License: 1844

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 3 m **Well Type:**

Pump Rate: **Boring Method:**

CASING DETAILS DEPTH IN METERS

H.S.A.

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS		DEPTH IN METERS		
Colour	Material	Top	-	Bottom
BROWN	TILL	1.83		2.32
BROWN	FILL	0.27		1.43
GREY	SAND	1.43		1.83

GREY	FINE SAND	0.00	0.27

Lot: LOT 26
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street:
City:
Site:
Elevation: 87.74 *masl.*
UTM: 18 E 456431 N 5017092 **Long/Lat:** -75.556 , 45.306

Well ID: 1502342
Borehole ID: 10024385
Completion Date: 11/30/1950
Received Date: 12/6/1951
Tag:
Audit No:
Contractor License: 3504

DETAILS

Primary Use: Livestock **Secondary Use:** Livestock **Final Status:** Water Supply

Well Depth: 17.4 m **Depth to Bedrock:** 8.2 m **Static Level:** 4 m **Well Type:** Bedrock

Pump Rate: 1 GPM **Boring Method:** Cable Tool

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	12.70			8.23
OPEN HOLE	12.70			17.37

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
	PREV. DRILLED	0.00		8.23
	SANDSTONE	8.23		17.37

Lot: LOT 26
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa
Site:
Elevation: 84.01 *masl.*
UTM: 18 E 456622 N 5017219 **Long/Lat:** -75.553 , 45.307

Well ID: 7115790
Borehole ID: 1002782563
Completion Date: 7/14/2008
Received Date: 11/26/2008
Tag: A074584
Audit No: M02897
Contractor License: 1844

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 3.6 m **Well Type:**

Pump Rate: **Boring Method:** H.S.A.

CASING DETAILS DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom

FORMATION DETAILS DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	FINE SAND	0.00		0.27
BROWN	TILL	1.83		2.32
BROWN	FILL	0.27		1.43
GREY	SAND	1.43		1.83

Lot: LOT 25
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street: HAWTHORNE ROAD AT RIDEAU ROAD
City: Ottawa
Site:
Elevation: 84.01 *masl.*
UTM: 18 E 456206 N 5017303 **Long/Lat:** -75.559 , 45.308

Well ID: 7115790
Borehole ID: 1002782590
Completion Date: 7/15/2008
Received Date: 11/26/2008
Tag: A074584
Audit No: M02897
Contractor License: 1844

DETAILS

Primary Use: Monitoring **Secondary Use:** Monitoring **Final Status:** Test Hole

Well Depth: 0 m **Depth to Bedrock:** 0 m **Static Level:** 1.6 m **Well Type:**

Pump Rate: **Boring Method:**

CASING DETAILS DEPTH IN METERS

H.S.A.

Material	Diameter (cm)	Top	-	Bottom
OPEN HOLE	15.24			30.48
STEEL	15.24			11.89

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
GREY	SANDSTONE	8.53		30.48
GREY	HARDPAN	1.52		8.53
BROWN	SAND	0.00		1.52

Lot: LOT 26
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street:
City:
Site:
Elevation: 82.18 *masl.*
UTM: 18 E 457162 N 5017453 **Long/Lat:** -75.546 , 45.309

Well ID: 1527383
Borehole ID: 10049033
Completion Date: 8/16/1993
Received Date: 9/21/1993
Tag:
Audit No: 135946
Contractor License: 1558

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 30.5 m **Depth to Bedrock:** 8.5 m **Static Level:** 2.1 m **Well Type:** Bedrock

Pump Rate: 20 GPM **Boring Method:** Air Percussion

CASING DETAILS — DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
STEEL	15.24			11.89
OPEN HOLE	15.24			30.48

FORMATION DETAILS — DEPTH IN METERS

Colour	Material	Top	-	Bottom
BROWN	SAND	0.00		1.52

GREY	HARDPAN	1.52	8.53
GREY	SANDSTONE	8.53	30.48

Lot: LOT 26
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street:
City:
Site:
Elevation: 82.18 *masl.*
UTM: 18 E 457162 N 5017453 **Long/Lat:** -75.546 , 45.309

Well ID: 1527048
Borehole ID: 10048727
Completion Date: 4/19/1993
Received Date: 5/6/1993
Tag:
Audit No: 130025
Contractor License: 1558

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 41.1 m **Depth to Bedrock:** 0 m **Static Level:** 9.4 m **Well Type:** Bedrock

Pump Rate: 15 GPM **Boring Method:** Air Percussion

CASING DETAILS / DEPTH IN METERS

Material	Diameter (cm)	Top	-	Bottom
OPEN HOLE	15.24			22.86
STEEL	15.24			9.45
OPEN HOLE	15.24			41.15

FORMATION DETAILS / DEPTH IN METERS

Colour	Material	Top	-	Bottom
WHITE	SANDSTONE	10.06		41.15
GREY	HARDPAN	2.74		4.57
BROWN	CLAY	0.00		2.74
GREY	LIMESTONE	4.57		10.06

Lot: LOT 26
Con: CON 6 FROM RIDEAU RIVER
Township: GLOUCESTER
County: OTTAWA-CARLETON
Street:
City:
Site:

Well ID: 1527384
Borehole ID: 10049034
Completion Date: 8/16/1993
Received Date: 9/21/1993
Tag:
Audit No: 135944
Contractor License: 1558

Elevation: 82.18 *masl.*

UTM: 18 E 457162 N 5017453 **Long/Lat:** -75.546 , 45.309

DETAILS

Primary Use: Domestic **Secondary Use:** Domestic **Final Status:** Water Supply

Well Depth: 30.5 m **Depth to Bedrock:** 0 m **Static Level:** 6.7 m **Well Type:** Bedrock

Pump Rate: 15 GPM **Boring Method:** Air Percussion

CASING DETAILS		DEPTH IN METERS		
Material	**Diameter (cm)**	**Top**	-	**Bottom**
STEEL	15.24			6.71
OPEN HOLE	15.24			30.48

FORMATION DETAILS		DEPTH IN METERS		
Colour	**Material**	**Top**	-	**Bottom**
GREY	SANDSTONE	0.00		30.48

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 — 1527383 — MUNICIP 15002 — CON. CON. K6

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	[redacted]ucester	6	26

[redacted] Box 4208 stn. "E" Ottawa, Ontario K1S 5B2 — DATE COMPLETED: DAY 16 MO 8 YR 93

RC — ELEVATION — RC — BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Sand	Stone		0	5
Gray	Hardpan	Boulders		5	28
Gray	Sandstone		Hard	28	100

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
58	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
88	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
NOT TESTED	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6 1/4	1 ☐ STEEL 2 ☒ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	39
5 15/16	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		39	100
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
37.5	0	Cement - Grouted

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☒ PUMP 2 ☐ BAILER	20 GPM	1 HOURS ____ MINS

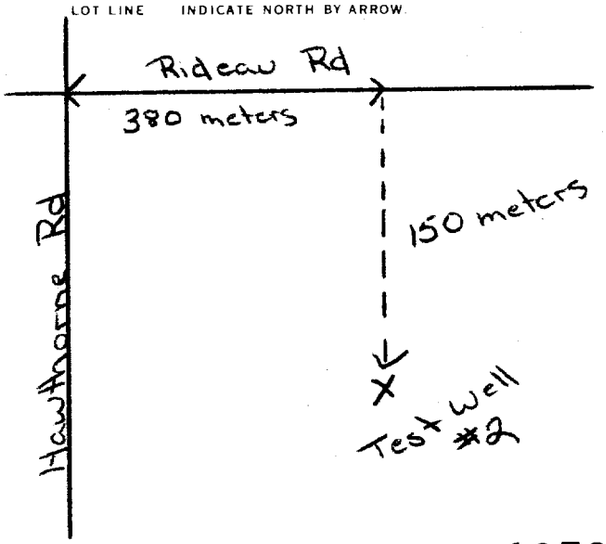
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
7'6" FEET	14'6" FEET		13'11" FEET	14 FEET	14'4" FEET	14'6" FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	FEET	1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	50 FEET	5 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS: 135946

FINAL STATUS OF WELL	WATER USE	METHOD OF CONSTRUCTION
1 ☒ WATER SUPPLY	1 ☒ DOMESTIC	1 ☐ CABLE TOOL
2 ☐ OBSERVATION WELL	2 ☐ STOCK	2 ☐ ROTARY (CONVENTIONAL)
3 ☐ TEST HOLE	3 ☐ IRRIGATION	3 ☐ ROTARY (REVERSE)
4 ☐ RECHARGE WELL	4 ☐ INDUSTRIAL	4 ☐ ROTARY (AIR)
5 ☐ ABANDONED, INSUFFICIENT SUPPLY	5 ☐ COMMERCIAL	5 ☒ AIR PERCUSSION
6 ☐ ABANDONED, POOR QUALITY	6 ☐ MUNICIPAL	6 ☐ BORING
7 ☐ UNFINISHED	7 ☐ PUBLIC SUPPLY	7 ☐ DIAMOND
☐ DEWATERING	8 ☐ COOLING OR AIR CONDITIONING	8 ☐ JETTING
	9 ☐ NOT USED	9 ☐ DRIVING
	☐ OTHER	☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Capital Water Supply Ltd.	1558

ADDRESS: Box 490 Stittsville, Ontario K2S 1A6

NAME OF WELL TECHNICIAN	WELL TECHNICIAN'S LICENCE NUMBER
S.Miller/T. Harrison	T0097/T2251

SIGNATURE OF TECHNICIAN/CONTRACTOR: [signature] — SUBMISSION DATE: DAY 18 MO 8 YR 93

OFFICE USE ONLY

DATA SOURCE	CONTRACTOR	DATE RECEIVED
	1558	SEP 21 1993

DATE OF INSPECTION: — INSPECTOR: — REMARKS:

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Appendix C
Certificates of Analysis – Water Supply

PARACEL LABORATORIES LTD.

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RESPONSIVE.
RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

GHD Limited (Kingston)

1225 Gardiners Rd.
Kingston, ON K7P 0G3
Attn: Scott Wallis

Client PO: 73522033 - Scott Wallis
Project: 11220832
Custody: 50734

Report Date: 25-Nov-2020
Order Date: 19-Nov-2020

Order #: 2047521

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

Paracel ID	Client ID
2047521-01	TW2-1hr

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	23-Nov-20	23-Nov-20
Ammonia, as N	EPA 351.2 - Auto Colour	20-Nov-20	20-Nov-20
Anions	EPA 300.1 - IC	20-Nov-20	20-Nov-20
Colour, apparent	SM2120 - Spectrophotometric	20-Nov-20	20-Nov-20
Conductivity	EPA 9050A- probe @25 °C	23-Nov-20	23-Nov-20
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	20-Nov-20	20-Nov-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	20-Nov-20	20-Nov-20
pH	EPA 150.1 - pH probe @25 °C	23-Nov-20	23-Nov-20
Phenolics	EPA 420.2 - Auto Colour, 4AAP	25-Nov-20	25-Nov-20
Hardness	Hardness as CaCO3	20-Nov-20	20-Nov-20
Sulphide	SM 4500SE - Colourimetric	20-Nov-20	20-Nov-20
Tannin/Lignin	SM 5550B - Colourimetric	23-Nov-20	23-Nov-20
Total Dissolved Solids	SM 2540C - gravimetric, filtration	20-Nov-20	23-Nov-20
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	20-Nov-20	20-Nov-20
Turbidity	SM 2130B - Turbidity meter	20-Nov-20	20-Nov-20

Certificate of Analysis

Client: GHD Limited (Kingston)

Client PO: 73522033 - Scott Wallis

Report Date: 25-Nov-2020

Order Date: 19-Nov-2020

Project Description: 11220832

	Client ID:	TW2-1hr	-	-	-
	Sample Date:	19-Nov-20 12:00	-	-	-
	Sample ID:	2047521-01	-	-	-
	MDL/Units	Water	-	-	-
General Inorganics					
Alkalinity, total	5 mg/L	269	-	-	-
Ammonia as N	0.01 mg/L	0.25	-	-	-
Dissolved Organic Carbon	0.5 mg/L	2.4	-	-	-
Colour, apparent	2 ACU	67	-	-	-
Conductivity	5 uS/cm	1390	-	-	-
Hardness	0.824 mg/L	633	-	-	-
pH	0.1 pH Units	7.8	-	-	-
Phenolics	0.001 mg/L	<0.001	-	-	-
Total Dissolved Solids	10 mg/L	930	-	-	-
Sulphide	0.02 mg/L	<0.02	-	-	-
Tannin & Lignin	0.1 mg/L	<0.1	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.3	-	-	-
Turbidity	0.1 NTU	10.0	-	-	-
Anions					
Chloride	1 mg/L	91	-	-	-
Fluoride	0.1 mg/L	0.3	-	-	-
Nitrate as N	0.1 mg/L	<0.1	-	-	-
Nitrite as N	0.05 mg/L	<0.05	-	-	-
Sulphate	1 mg/L	378	-	-	-
Metals					
Calcium	100 ug/L	154000	-	-	-
Iron	100 ug/L	739	-	-	-
Magnesium	200 ug/L	60600	-	-	-
Manganese	5 ug/L	176	-	-	-
Potassium	100 ug/L	9550	-	-	-
Sodium	200 ug/L	69200	-	-	-

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour, apparent	ND	2	ACU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
Metals									
Calcium	ND	100	ug/L						
Iron	ND	100	ug/L						
Magnesium	ND	200	ug/L						
Manganese	ND	5	ug/L						
Potassium	ND	100	ug/L						
Sodium	ND	200	ug/L						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	93.6	1	mg/L	91.4			2.3	10	
Fluoride	0.33	0.1	mg/L	0.33			1.5	10	
Nitrate as N	ND	0.1	mg/L	ND			NC	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Sulphate	352	1	mg/L	378			7.1	10	
General Inorganics									
Alkalinity, total	302	5	mg/L	265			13.0	14	
Ammonia as N	9.63	0.20	mg/L	8.78			9.1	18	
Dissolved Organic Carbon	3.2	0.5	mg/L	3.9			20.4	37	
Colour, apparent	67	2	ACU	67			0.0	12	
Conductivity	904	5	uS/cm	921			1.9	5	
pH	7.9	0.1	pH Units	7.9			0.4	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	566	10	mg/L	570			0.7	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	ND	0.1	mg/L	ND			NC	11	
Total Kjeldahl Nitrogen	5.22	0.2	mg/L	5.40			3.3	16	
Turbidity	8.6	0.1	NTU	8.1			5.9	10	
Metals									
Calcium	31700	100	ug/L	31000			2.2	20	
Iron	ND	100	ug/L	ND			NC	20	
Magnesium	8220	200	ug/L	8150			0.9	20	
Manganese	ND	5	ug/L	ND			NC	20	
Potassium	1820	100	ug/L	1810			0.4	20	
Sodium	15400	200	ug/L	15300			0.7	20	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	100	1	mg/L	91.4	85.8	77-123			
Fluoride	1.18	0.1	mg/L	0.33	85.2	79-121			
Nitrate as N	1.02	0.1	mg/L	ND	102	79-120			
Nitrite as N	0.952	0.05	mg/L	ND	95.2	84-117			
Sulphate	9.24	1	mg/L	ND	92.4	86-114			
General Inorganics									
Ammonia as N	0.390	0.01	mg/L	0.126	106	81-124			
Dissolved Organic Carbon	15.1	0.5	mg/L	3.9	112	60-133			
Phenolics	0.021	0.001	mg/L	ND	83.6	69-132			
Total Dissolved Solids	90.0	10	mg/L	ND	90.0	75-125			
Sulphide	0.46	0.02	mg/L	ND	93.0	79-115			
Tannin & Lignin	0.9	0.1	mg/L	ND	89.9	71-113			
Total Kjeldahl Nitrogen	1.99	0.1	mg/L	ND	99.4	81-126			
Metals									
Calcium	10600	100	ug/L	ND	106	80-120			
Iron	2130	100	ug/L	ND	84.5	80-120			
Magnesium	9570	200	ug/L	ND	95.7	80-120			
Manganese	48.4	5	ug/L	ND	94.6	80-120			
Potassium	10900	100	ug/L	1810	91.2	80-120			
Sodium	9510	200	ug/L	ND	95.1	80-120			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

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Certificate of Analysis

GHD Limited (Kingston)

1225 Gardiners Rd.
Kingston, ON K7P 0G3
Attn: Scott Wallis

Client PO: 73522033 - Robert Neck
Project: 11220832
Custody: 57054

Report Date: 18-Jan-2021
Order Date: 19-Nov-2020

Revised Report

Order #: 2047519

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

Paracel ID	Client ID
2047519-01	TW2-END

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 18-Jan-2021

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Robert Neck

Project Description: 11220832

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	23-Nov-20	23-Nov-20
Ammonia, as N	EPA 351.2 - Auto Colour	20-Nov-20	20-Nov-20
Anions	EPA 300.1 - IC	20-Nov-20	20-Nov-20
Colour, apparent	SM2120 - Spectrophotometric	20-Nov-20	20-Nov-20
Conductivity	EPA 9050A- probe @25 °C	23-Nov-20	23-Nov-20
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	20-Nov-20	20-Nov-20
Hardness	Hardness as CaCO3	20-Nov-20	20-Nov-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	20-Nov-20	20-Nov-20
pH	EPA 150.1 - pH probe @25 °C	23-Nov-20	23-Nov-20
Phenolics	EPA 420.2 - Auto Colour, 4AAP	25-Nov-20	25-Nov-20
Sulphide	SM 4500SE - Colourimetric	20-Nov-20	20-Nov-20
Tannin/Lignin	SM 5550B - Colourimetric	23-Nov-20	23-Nov-20
Total Dissolved Solids	SM 2540C - gravimetric, filtration	20-Nov-20	23-Nov-20
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	20-Nov-20	20-Nov-20
Turbidity	SM 2130B - Turbidity meter	20-Nov-20	20-Nov-20

Certificate of Analysis

Report Date: 18-Jan-2021

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Robert Neck

Project Description: 11220832

	Client ID:	TW2-END	-	-	-
	Sample Date:	19-Nov-20 15:30	-	-	-
	Sample ID:	2047519-01	-	-	-
	MDL/Units	Water	-	-	-
General Inorganics					
Alkalinity, total	5 mg/L	267	-	-	-
Hardness	mg/L	632	-	-	-
Ammonia as N	0.01 mg/L	0.25	-	-	-
Dissolved Organic Carbon	0.5 mg/L	2.2	-	-	-
Colour, apparent	2 ACU	68	-	-	-
Conductivity	5 uS/cm	1380	-	-	-
pH	0.1 pH Units	7.7	-	-	-
Phenolics	0.001 mg/L	<0.001	-	-	-
Total Dissolved Solids	10 mg/L	940	-	-	-
Sulphide	0.02 mg/L	<0.02	-	-	-
Tannin & Lignin	0.1 mg/L	<0.1	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.4	-	-	-
Turbidity	0.1 NTU	9.5	-	-	-
Anions					
Chloride	1 mg/L	94	-	-	-
Fluoride	0.1 mg/L	0.3	-	-	-
Nitrate as N	0.1 mg/L	<0.1	-	-	-
Nitrite as N	0.05 mg/L	<0.05	-	-	-
Sulphate	1 mg/L	389	-	-	-
Metals					
Calcium	100 ug/L	153000	-	-	-
Iron	100 ug/L	699	-	-	-
Magnesium	200 ug/L	60900	-	-	-
Manganese	5 ug/L	180	-	-	-
Potassium	100 ug/L	9770	-	-	-
Sodium	200 ug/L	68600	-	-	-

Certificate of Analysis

Report Date: 18-Jan-2021

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Robert Neck

Project Description: 11220832

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour, apparent	ND	2	ACU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
Metals									
Calcium	ND	100	ug/L						
Iron	ND	100	ug/L						
Magnesium	ND	200	ug/L						
Manganese	ND	5	ug/L						
Potassium	ND	100	ug/L						
Sodium	ND	200	ug/L						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	93.6	1	mg/L	91.4			2.3	10	
Fluoride	0.33	0.1	mg/L	0.33			1.5	10	
Nitrate as N	ND	0.1	mg/L	ND			NC	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Sulphate	352	1	mg/L	378			7.1	10	
General Inorganics									
Alkalinity, total	302	5	mg/L	265			13.0	14	
Ammonia as N	9.63	0.20	mg/L	8.78			9.1	18	
Dissolved Organic Carbon	3.2	0.5	mg/L	3.9			20.4	37	
Colour, apparent	67	2	ACU	67			0.0	12	
Conductivity	904	5	uS/cm	921			1.9	5	
pH	7.9	0.1	pH Units	7.9			0.4	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	566	10	mg/L	570			0.7	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	ND	0.1	mg/L	ND			NC	11	
Total Kjeldahl Nitrogen	5.22	0.2	mg/L	5.40			3.3	16	
Turbidity	8.6	0.1	NTU	8.1			5.9	10	
Metals									
Calcium	31700	100	ug/L	31000			2.2	20	
Iron	ND	100	ug/L	ND			NC	20	
Magnesium	8220	200	ug/L	8150			0.9	20	
Manganese	ND	5	ug/L	ND			NC	20	
Potassium	1820	100	ug/L	1810			0.4	20	
Sodium	15400	200	ug/L	15300			0.7	20	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	100	1	mg/L	91.4	85.8	77-123			
Fluoride	1.18	0.1	mg/L	0.33	85.2	79-121			
Nitrate as N	1.02	0.1	mg/L	ND	102	79-120			
Nitrite as N	0.952	0.05	mg/L	ND	95.2	84-117			
Sulphate	9.24	1	mg/L	ND	92.4	86-114			
General Inorganics									
Ammonia as N	0.390	0.01	mg/L	0.126	106	81-124			
Dissolved Organic Carbon	15.1	0.5	mg/L	3.9	112	60-133			
Phenolics	0.021	0.001	mg/L	ND	83.6	69-132			
Total Dissolved Solids	90.0	10	mg/L	ND	90.0	75-125			
Sulphide	0.46	0.02	mg/L	ND	93.0	79-115			
Tannin & Lignin	0.9	0.1	mg/L	ND	89.9	71-113			
Total Kjeldahl Nitrogen	1.99	0.1	mg/L	ND	99.4	81-126			
Metals									
Calcium	10600	100	ug/L	ND	106	80-120			
Iron	2130	100	ug/L	ND	84.5	80-120			
Magnesium	9570	200	ug/L	ND	95.7	80-120			
Manganese	48.4	5	ug/L	ND	94.6	80-120			
Potassium	10900	100	ug/L	1810	91.2	80-120			
Sodium	9510	200	ug/L	ND	95.1	80-120			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision 1 - Hardness is now included in this report.

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

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Certificate of Analysis

GHD Limited (Kingston)

1225 Gardiners Rd.
Kingston, ON K7P 0G3
Attn: Scott Wallis

Client PO: 73522033 - Scott Wallis
Project: 11220832
Custody: 57054

Report Date: 25-Nov-2020
Order Date: 19-Nov-2020

Order #: 2047519

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

Paracel ID	Client ID
2047519-01	TW2-END

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
E. coli	MOE E3407	20-Nov-20	20-Nov-20
Fecal Coliform	SM 9222D	20-Nov-20	20-Nov-20
Heterotrophic Plate Count	SM 9215C	21-Nov-20	21-Nov-20
Total Coliform	MOE E3407	20-Nov-20	20-Nov-20

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

	Client ID:	TW2-END	-	-	-
	Sample Date:	19-Nov-20 15:30	-	-	-
	Sample ID:	2047519-01	-	-	-
	MDL/Units	Water	-	-	-
Microbiological Parameters					
E. coli	1 CFU/100 mL	<10 [1]	-	-	-
Fecal Coliforms	1 CFU/100 mL	<10 [1]	-	-	-
Total Coliforms	1 CFU/100 mL	<10 [1]	-	-	-
Heterotrophic Plate Count	10 CFU/mL	<10	-	-	-

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL						
Fecal Coliforms	ND	1	CFU/100 mL						
Total Coliforms	ND	1	CFU/100 mL						
Heterotrophic Plate Count	ND	10	CFU/mL						

Certificate of Analysis

Client: GHD Limited (Kingston)

Client PO: 73522033 - Scott Wallis

Report Date: 25-Nov-2020

Order Date: 19-Nov-2020

Project Description: 11220832

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Microbiological Parameters									
E. coli	ND	10	CFU/100 mL	ND			NC	30	BAC13
Fecal Coliforms	ND	10	CFU/100 mL	ND			NC	30	BAC13
Total Coliforms	ND	10	CFU/100 mL	ND			NC	30	BAC13
Heterotrophic Plate Count	ND	10	CFU/mL	ND			NC	30	

Qualifier Notes:

Sample Qualifiers :

1 : Bacteria reporting limits are raised due to dilutions based on expected elevated concentrations based on source of water sample.

QC Qualifiers :

BAC13 : Bacteria reporting limits are raised due to dilutions based on expected elevated concentrations based on source of water sample.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

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

Project : 11220832-01 Ottawa

15-December-2020

GHD Limited - 735
Attn : Jason Geraldi

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

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

Date Rec. : 10 December 2020
LR Report: **CA15152-DEC20**
Reference: PO:73522265,
11220832-01 Jason Geraldi

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Completed Date	4: Analysis Completed Time	5: MAC	6: TW-2
Sample Date & Time						10-Dec-20
Temp Upon Receipt [°C]	---	---	---	---	---	9.0
Total Coliform [cfu/100mL]	10-Dec-20	16:05	14-Dec-20	11:02		0
Ecoli [cfu/100mL]	10-Dec-20	16:05	14-Dec-20	11:02		0
Fecal Coliform [cfu/100mL]	10-Dec-20	16:05	14-Dec-20	11:02		0

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: 9 degrees C
Cooling Agent Present:Yes
Custody Seal Present:YEs

Chain of Custody Number:011447

Jill Campbell

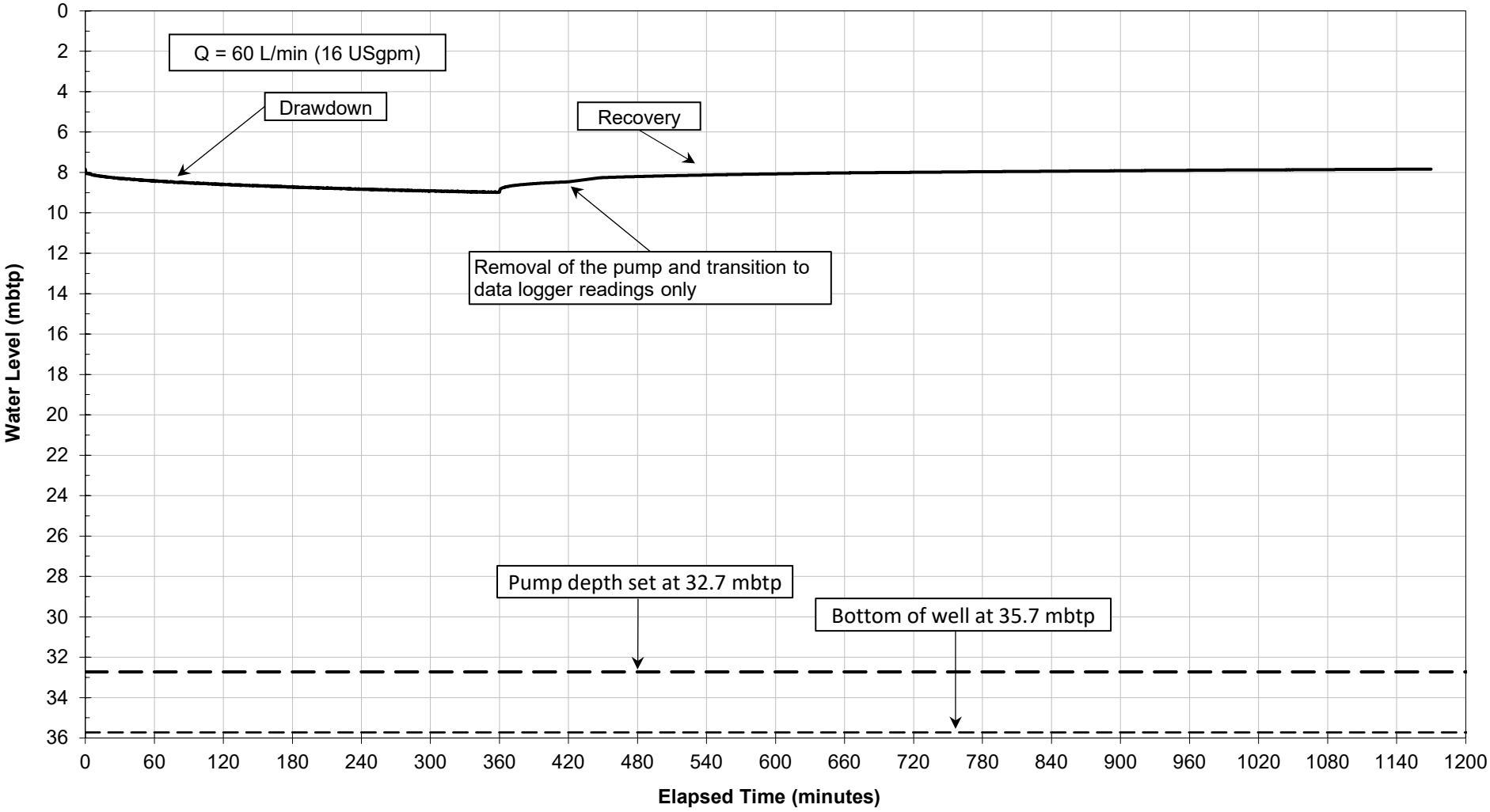
Jill Campbell, B.Sc.,GISAS
Project Specialist, Environment, Health & Safety

OnLine LIMS

0002350752

Appendix D
Aquifer Performance Testing Data

PUMP HISTORY CURVE
TW-2: November 19-20, 2020



PUMP HISTORY CURVE

Drilled Test Well (TW-2)
MECP Well ID: 1527383
Static Level = 7.83 mbtp (6.90 mbgs)

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

DATE: JANUARY 2021

LOCATION: Rideau & Somme St, Ottawa, ON

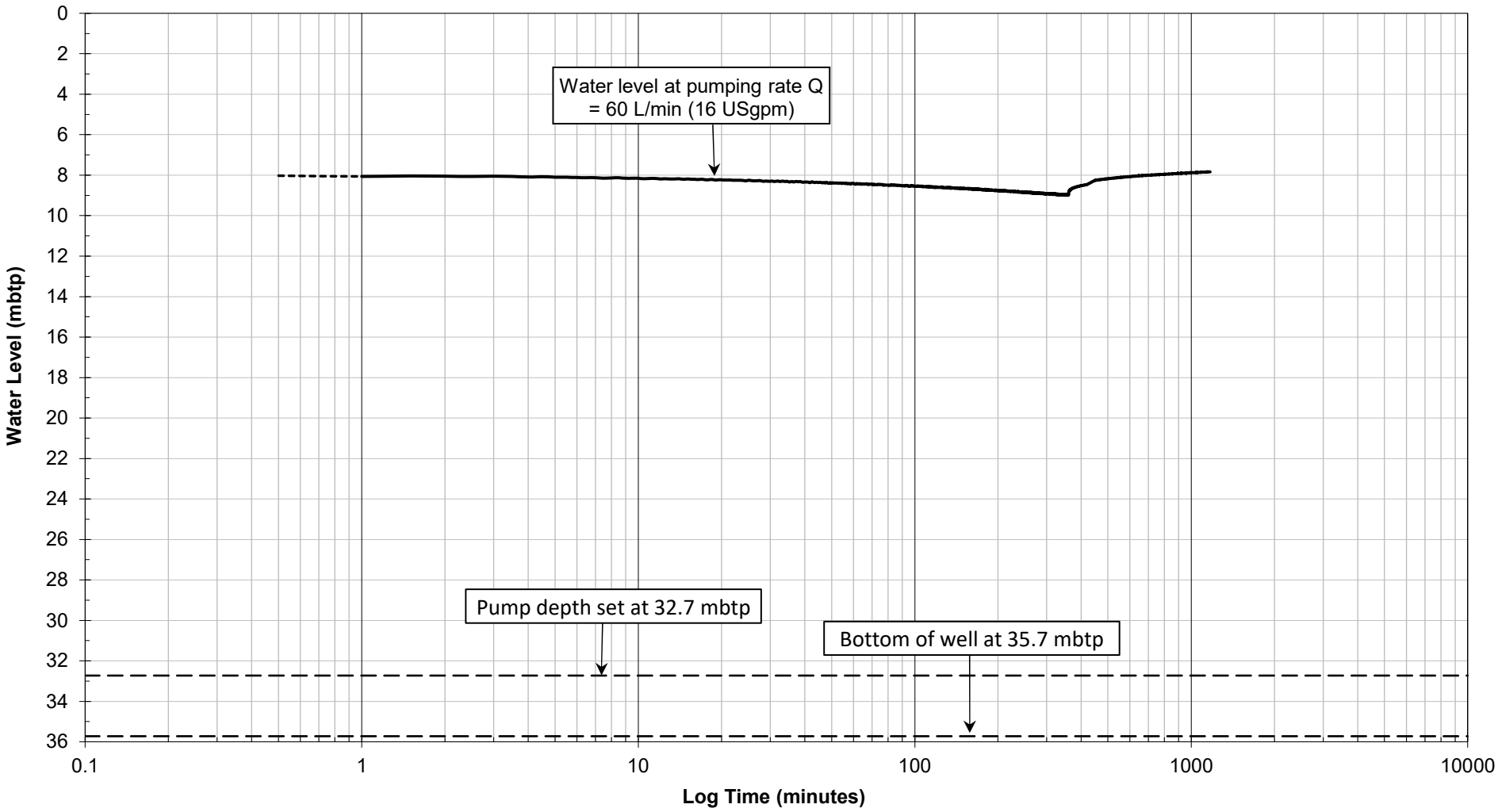
JOB NUMBER: 11220832-01

DRAWING NUMBER: D-1

GHD

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 www.ghd.com

CONSTANT RATE TEST: WATER LEVEL vs LOG TIME
TW-2: November 19-20, 2020



CONSTANT RATE

Drilled Test Well (TW-2)
MECP Well ID: 1527383
Static Level = 7.83 mbtp (6.90 mbgs)

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

DATE: JANUARY 2021

LOCATION: Rideau & Somme St, Ottawa, ON

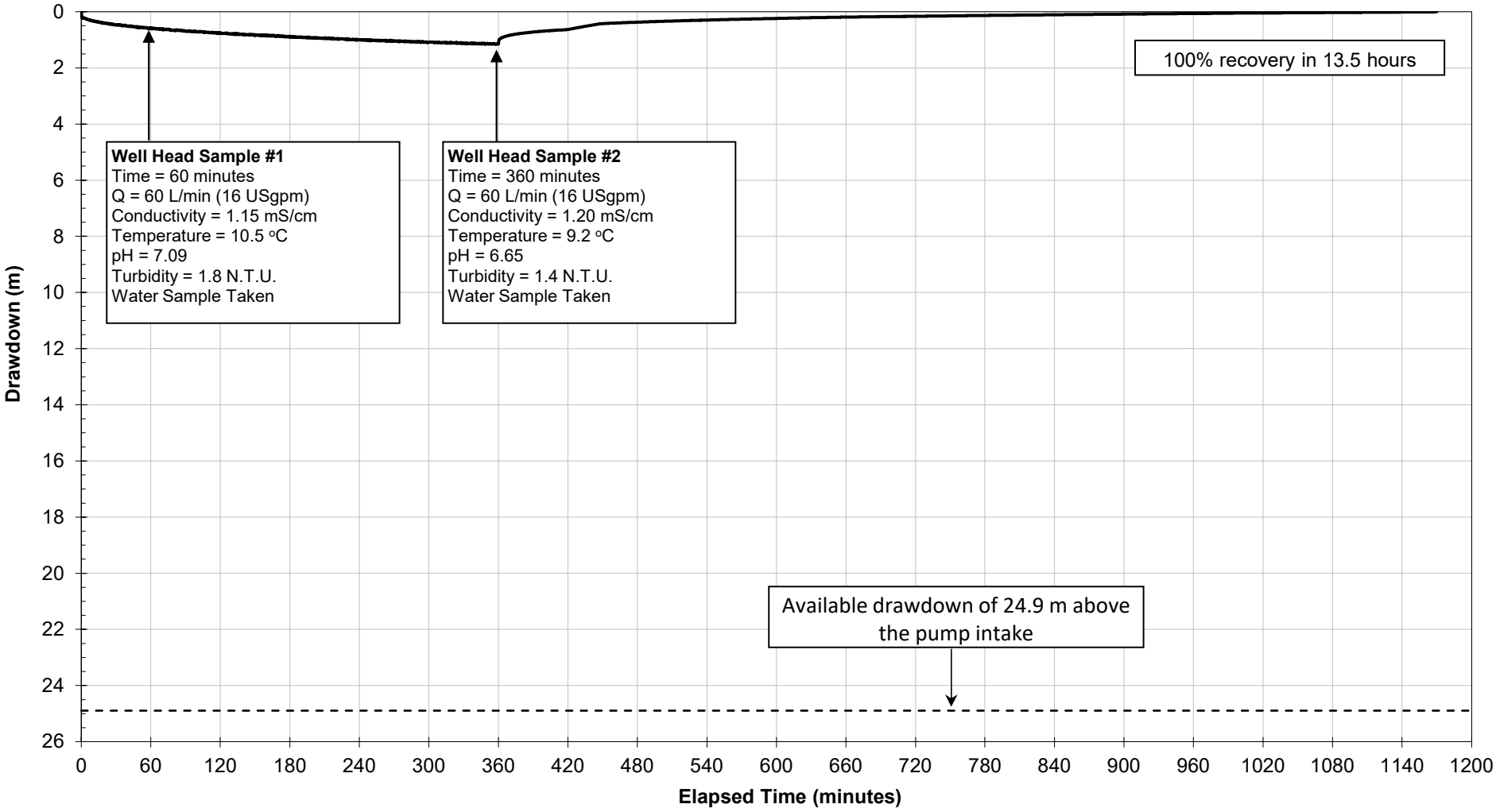
JOB NUMBER: 11220832-01

DRAWING NUMBER: D-2

GHD

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 www.ghd.com

CONSTANT RATE DRAWDOWN, RECOVERY AND TESTING DETAILS
TW-2: November 19-20, 2020



CONSTANT RATE DRAWDOWN

Drilled Test Well (TW-2)
MECP Well ID: 1527383
Static Level = 7.83 mbtp (6.90 mbgs)

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

DATE: JANUARY 2021

LOCATION: Rideau & Somme St, Ottawa, ON

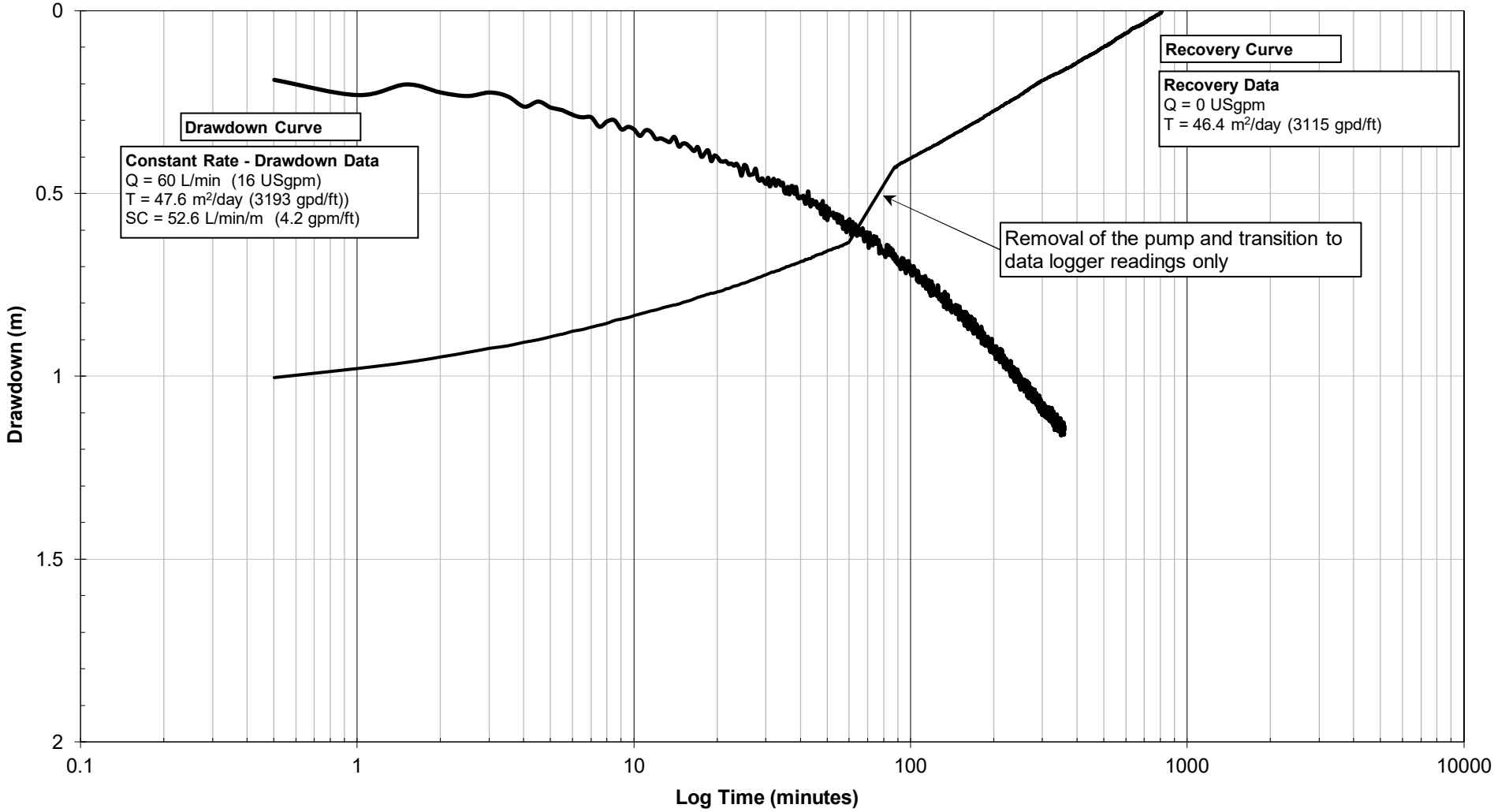
JOB NUMBER: 11220832-01

DRAWING NUMBER: D-3

GHD

347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 www.ghd.com

CONSTANT RATE: DRAWDOWN and RECOVERY VS LOG TIME
TW-2: November 19-20, 2020



TRANSMISSIVITY

Drilled Test Well (TW-2)
MECP Well ID: 1527383
Static Level = 7.83 mbtp (6.90 mbgs)

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

DATE: JANUARY 2021

LOCATION: Rideau & Somme St., Ottawa ON

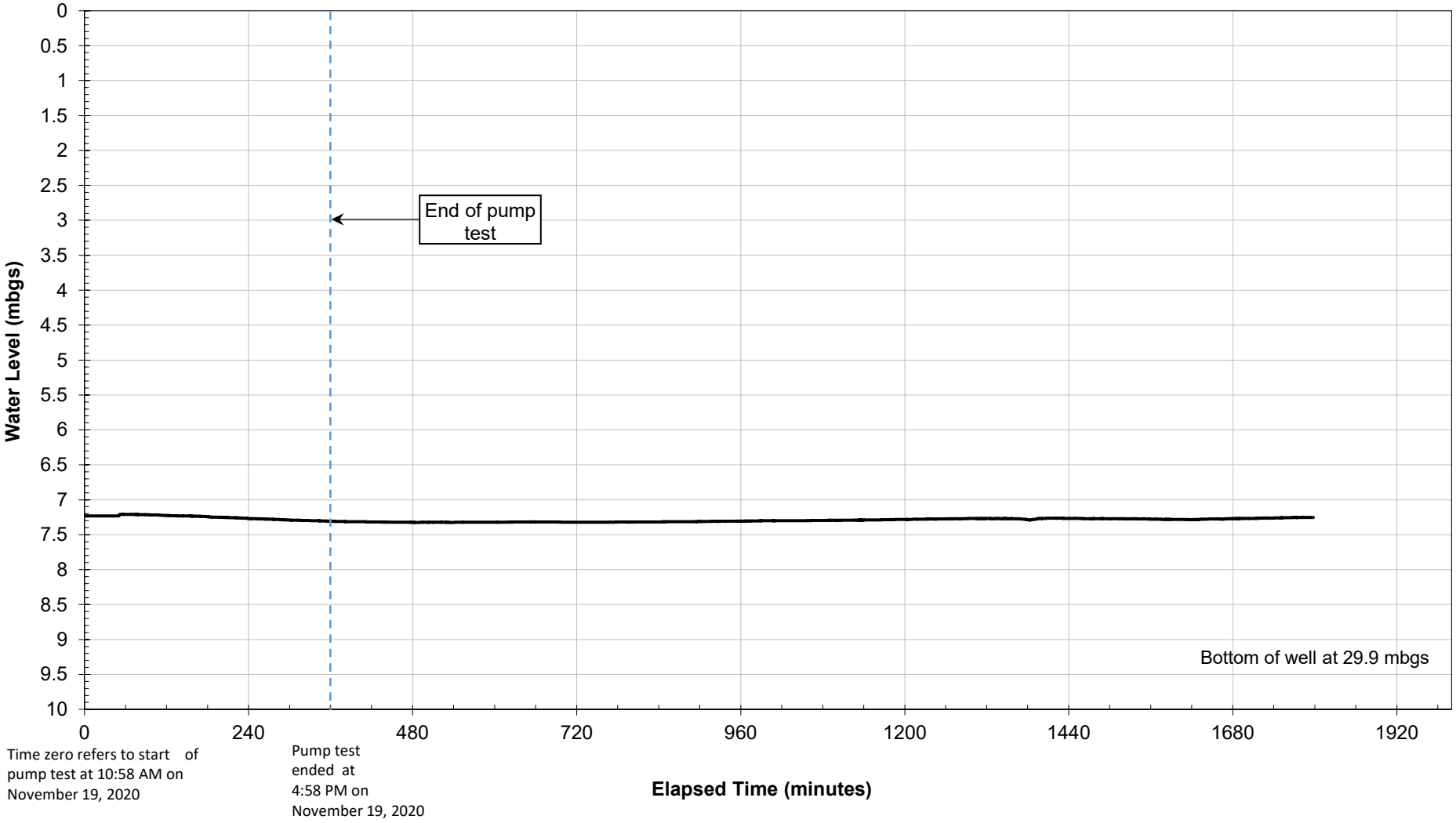
JOB NUMBER: 11220832-01

DRAWING NUMBER: B-4

GHD
347 PIDO ROAD, UNIT 29
PETERBOROUGH, ON K9J 6X7
(705) 749-3317 www.ghd.com

Appendix E
Observation Well Monitoring Data

TW-5
OBSERVATION WELL
November 19 - 20, 2020



OBSERVATION WELL

Drilled Observation Well - TW-5
MECP Well Tag No. A295342
Static Level = 7.2 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021

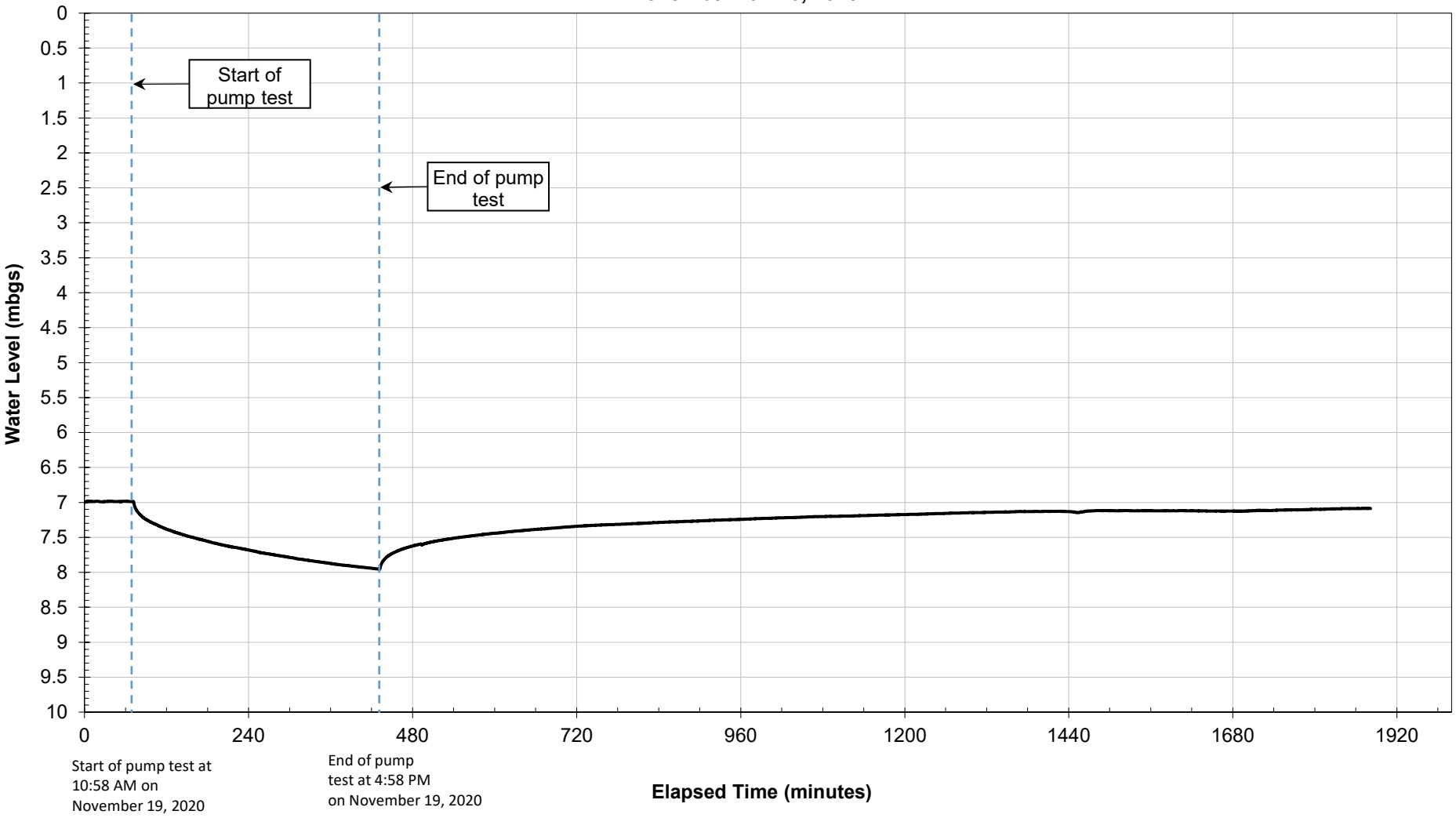
LOCATION: Rideau Rd. & Somme St., Ottawa, ON

PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-1

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

A305146
OBSERVATION WELL
November 19 - 20, 2020



OBSERVATION WELL

Drilled Well
MECP Well Tag No. A305146
Static Level = 7.0 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021

LOCATION: Rideau Rd. & Somme St., Ottawa, ON

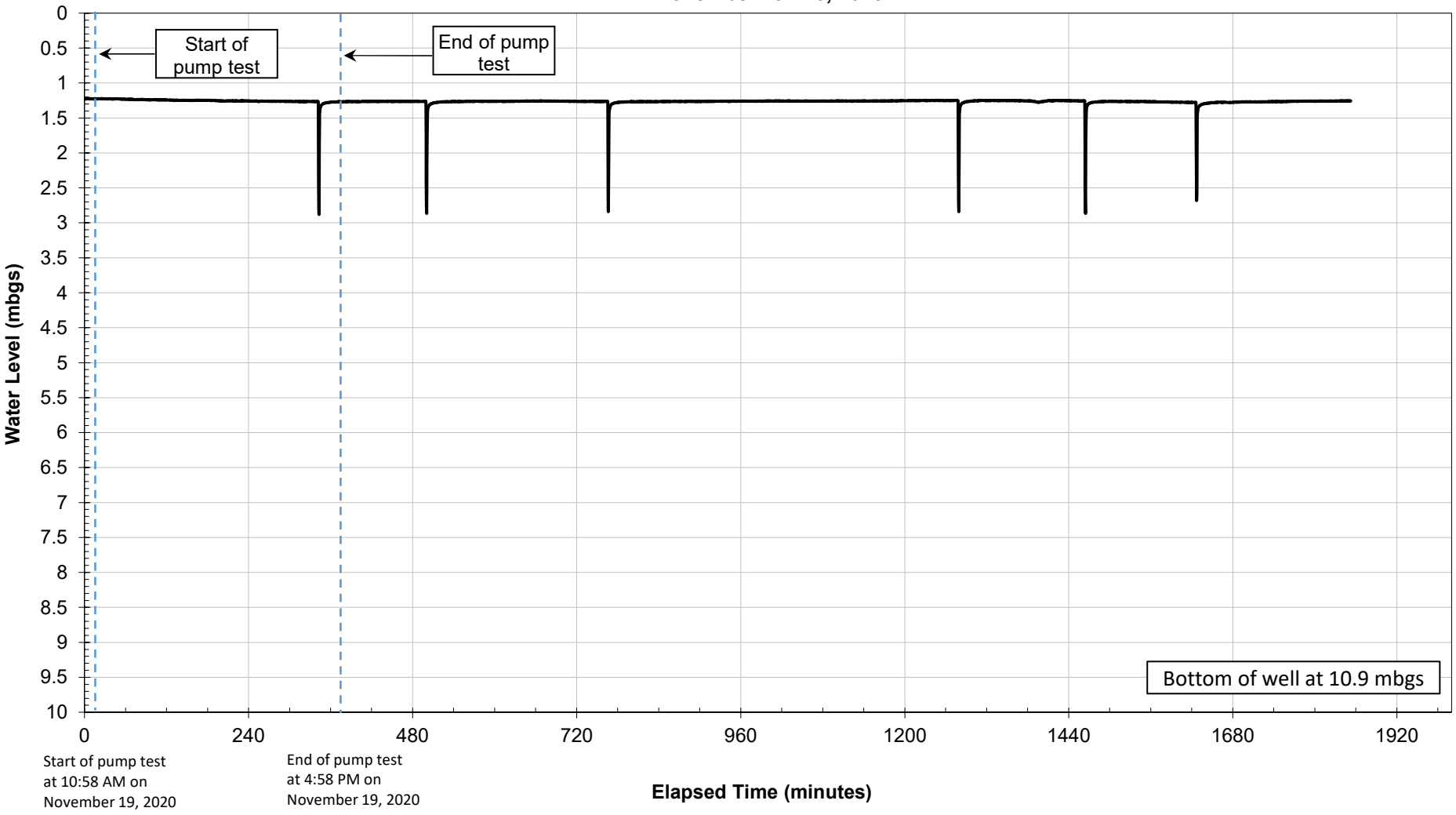
PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-2

GHD

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

4885 HAWTHORNE ROAD
DOMESTIC WELL
November 19 - 20, 2020



DOMESTIC WELL

Drilled Domestic Well
4885 Hawthorne Road, Ottawa, ON
Static Level = 1.2 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021

LOCATION: Rideau Rd. & Somme St., Ottawa, ON

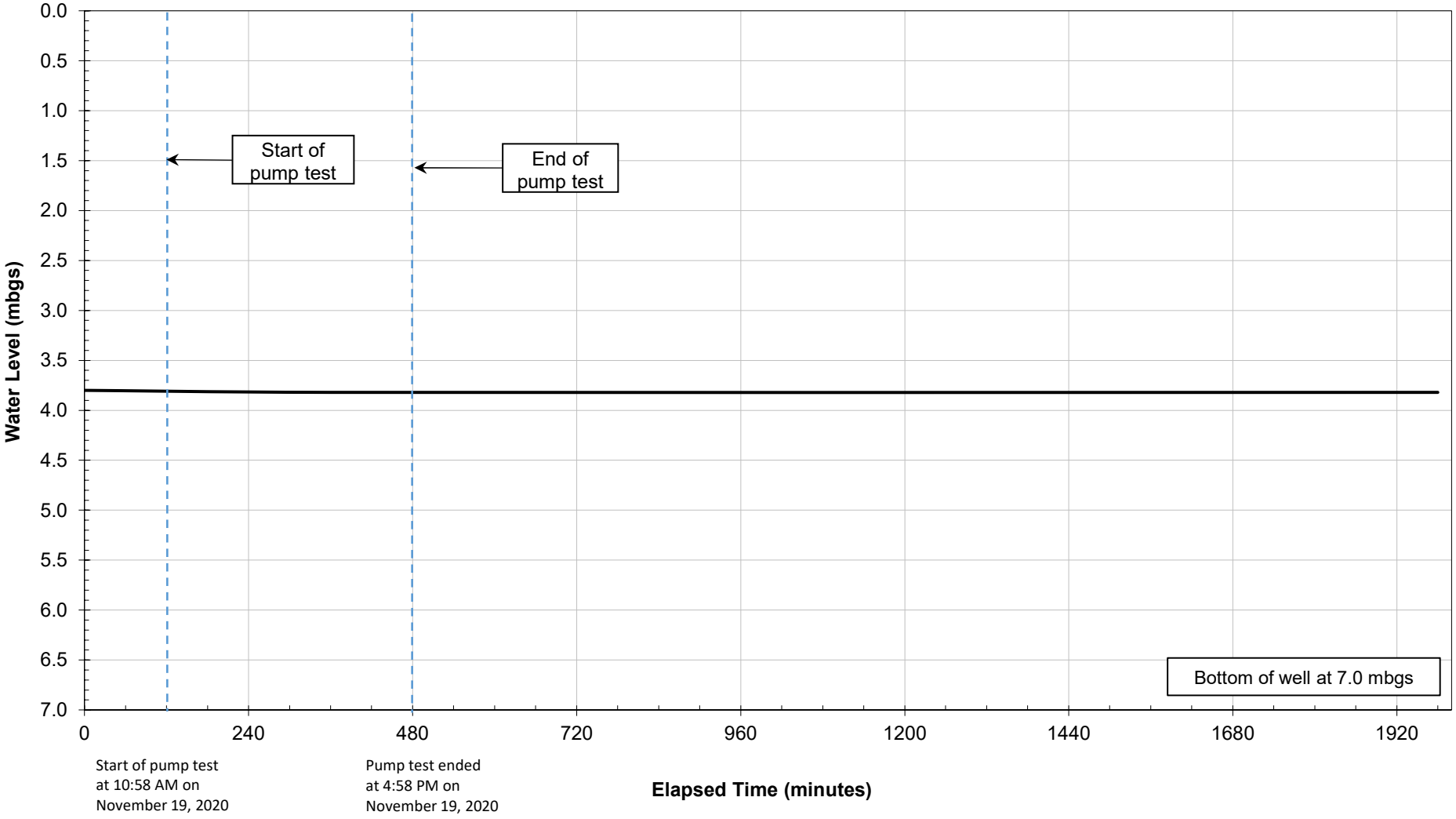
PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-3

GHD

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

MW1-20
OBSERVATION WELL
November 19 - 20, 2020



OBSERVATION WELL

Observation Well - MW1-20
MECP Well Tag No. A290162
Static Level = 3.8 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021

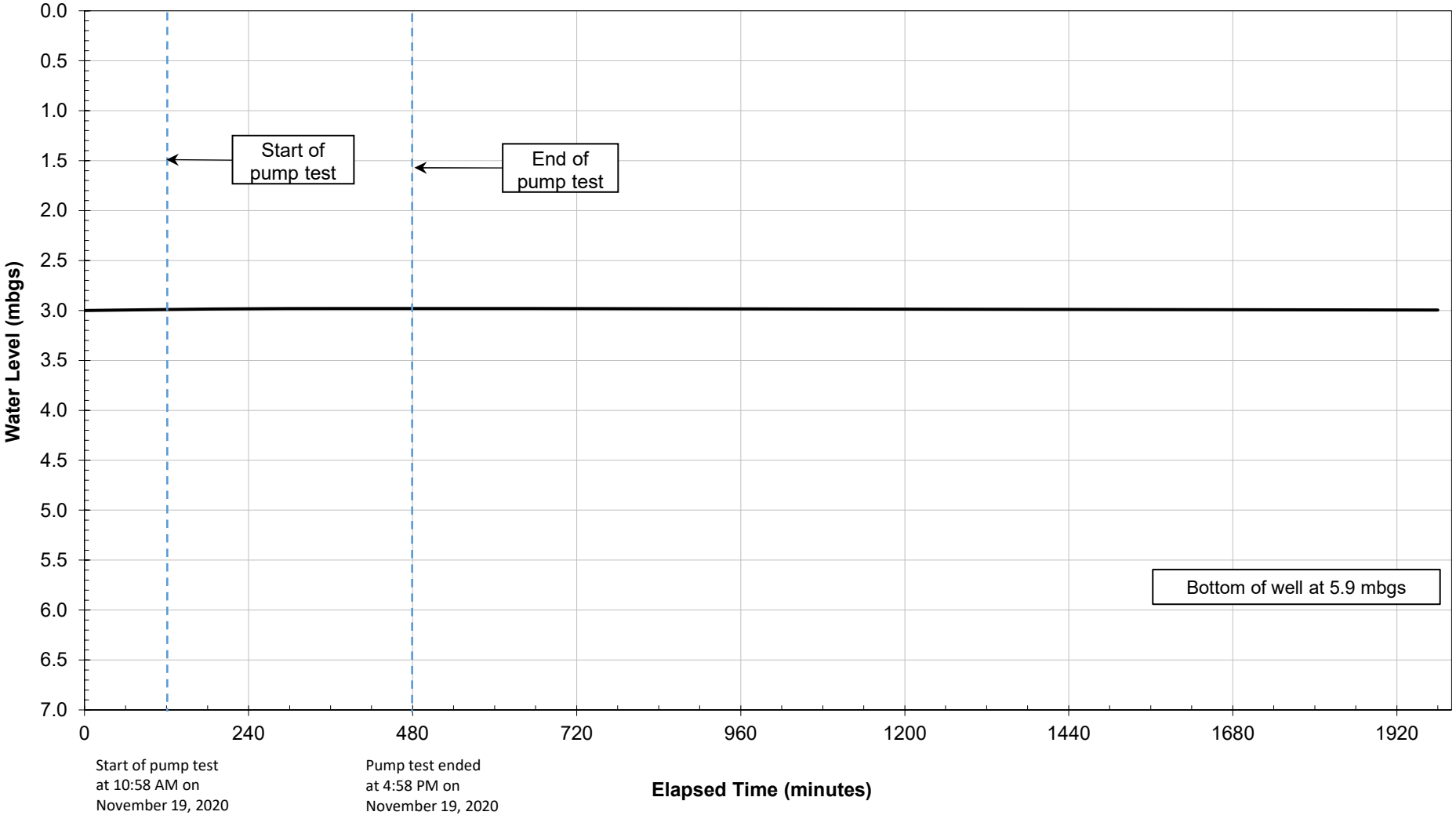
LOCATION: Rideau Rd. & Somme St., Ottawa, ON

PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-4

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

MW7-08
OBSERVATION WELL
November 19 - 20, 2020



OBSERVATION WELL

Observation Well - MW7-08
Static Level = 3.0 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021

LOCATION: Rideau Rd. & Somme St., Ottawa, ON

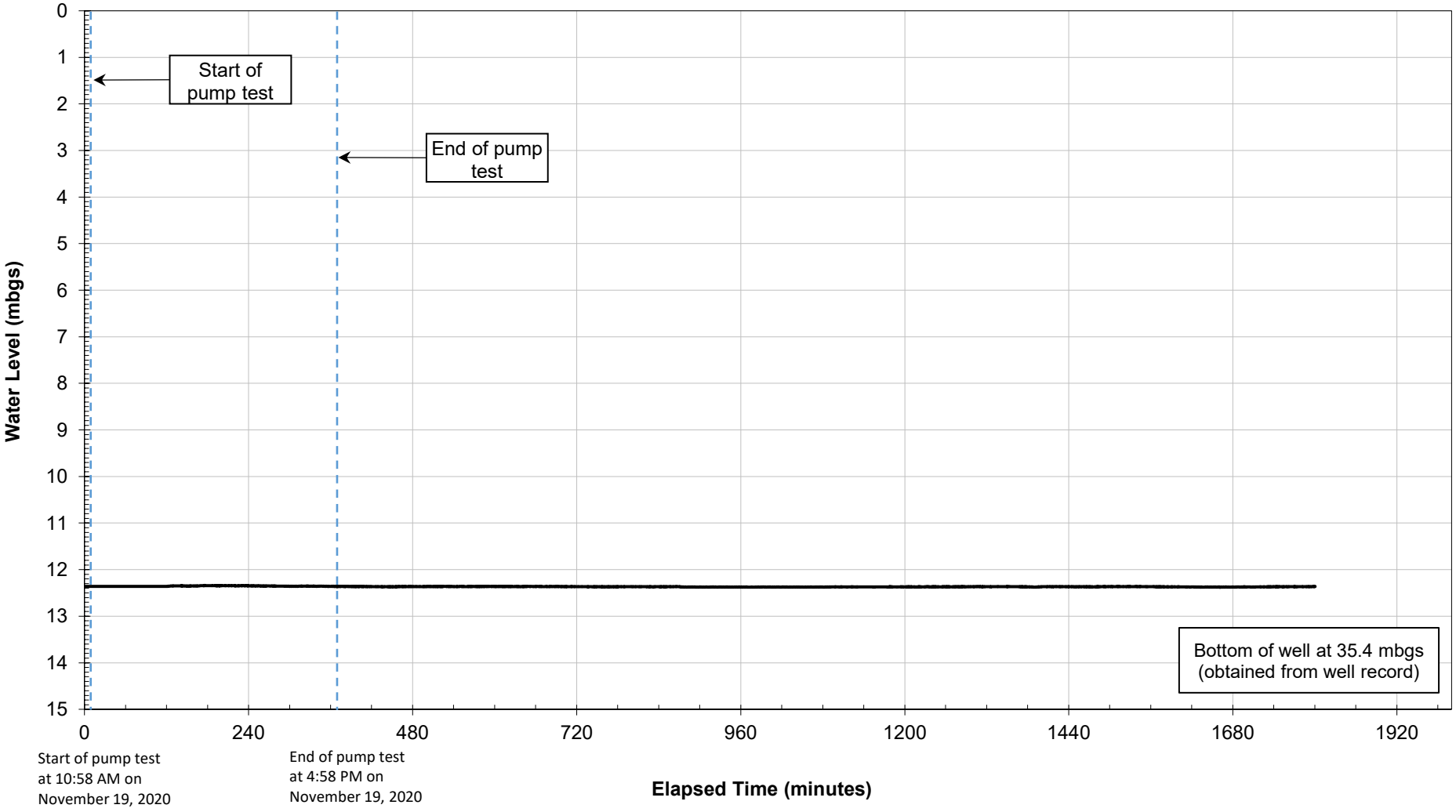
PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-5

GHD

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

TOMLINSON QUARRY - WELL 1514733
OBSERVATION WELL
November 19 - 20, 2020



OBSERVATION WELL

Drilled Well - Tomlinson Quarry
MECP Well ID 1514733
Static Level = 12.4 mbgs

Note: mbgs = metres below ground surface

DATE: JANUARY 2021

LOCATION: Rideau Rd. & Somme St., Ottawa, ON

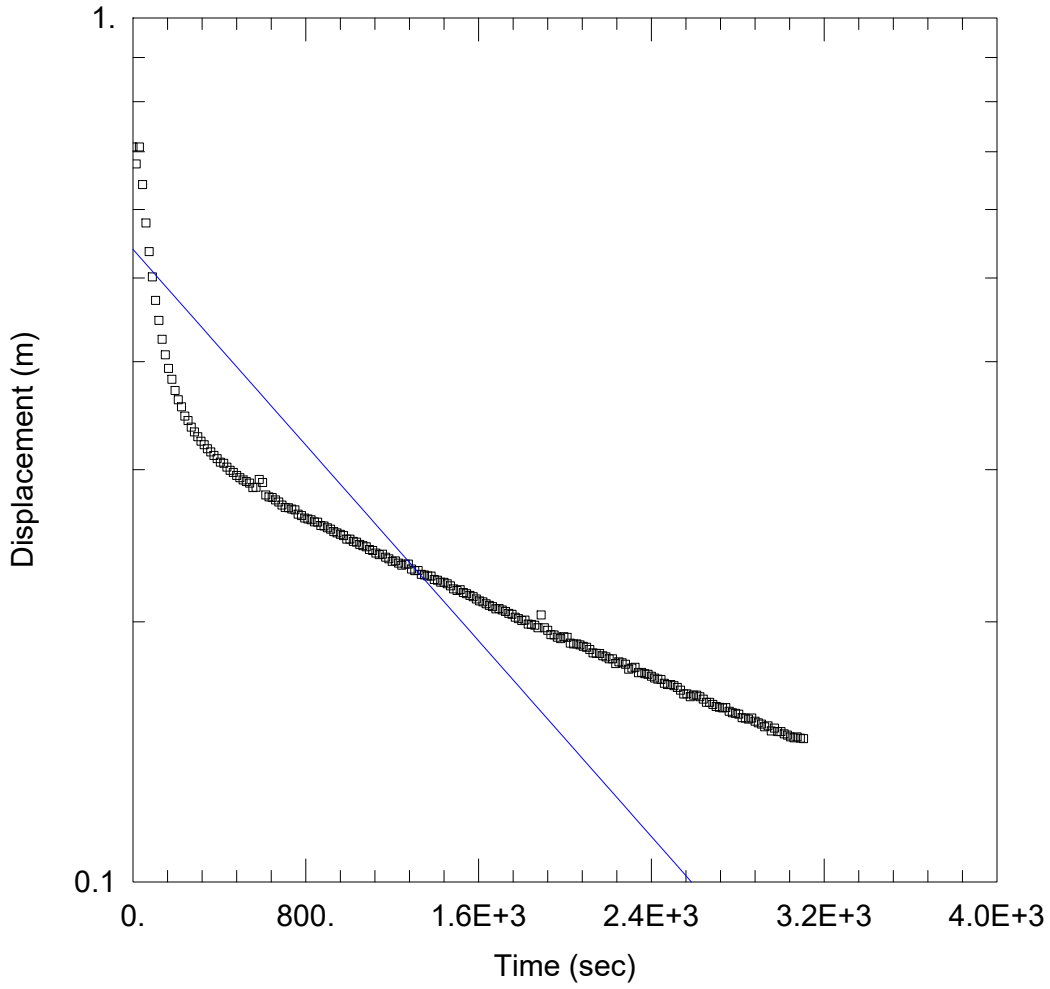
PROJECT NUMBER: 11220832-01

DRAWING NUMBER: E-6

GHD

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

Appendix F
Single Well Response Testing



MW1-20 FALLING HEAD TEST

Data Set: G:\662\11220832\Tech\Field\slug test\BH1-20 Falling Head Test.aqt
Date: 12/08/20 Time: 14:41:47

PROJECT INFORMATION

Company: GHD
Client: Consolidated Fastrate (Ottawa)
Project: 11220832-01
Location: Rideau St and Somme St, Ottawa
Test Well: BH1-20
Test Date: November 23, 2020

AQUIFER DATA

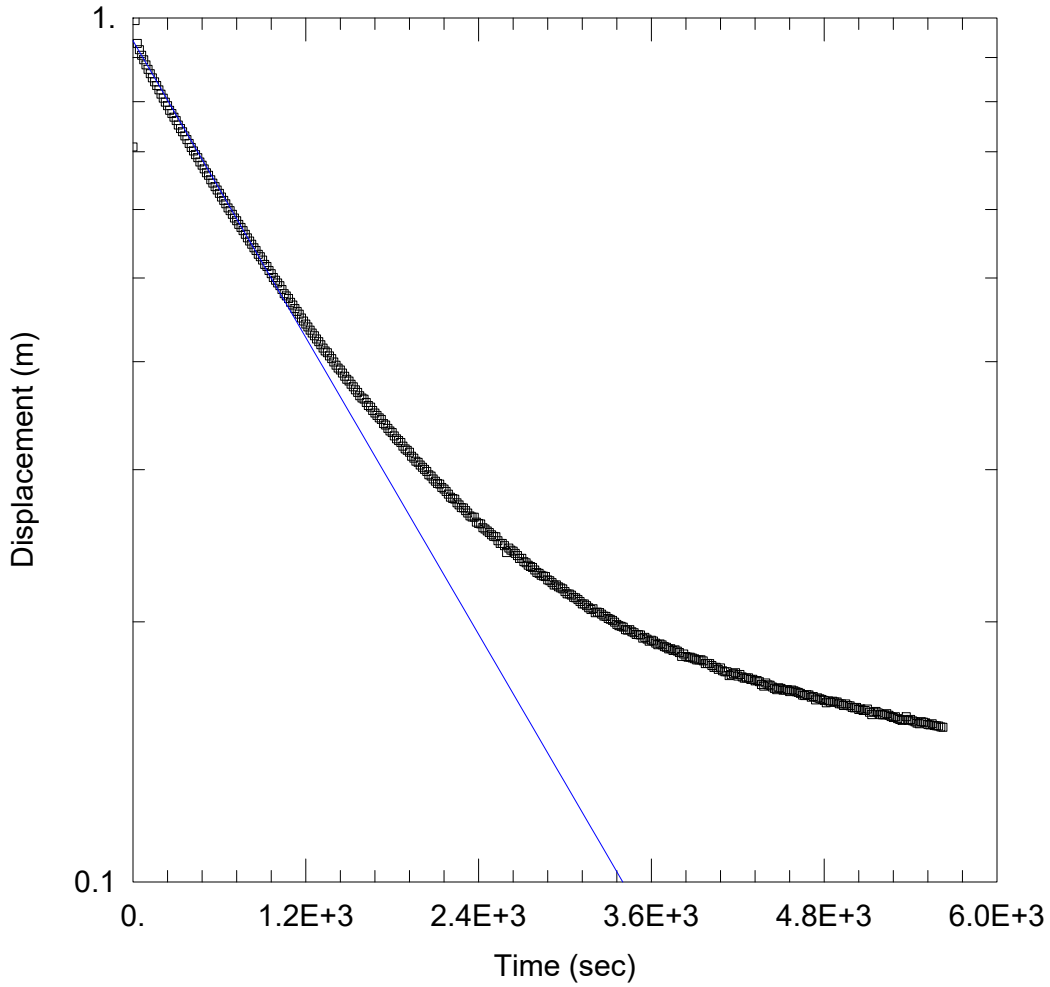
Saturated Thickness: 3.15 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH1-20)

Initial Displacement: 0.7091 m
Total Well Penetration Depth: 6.99 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.15 m
Screen Length: 1.52 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.632E-5 cm/sec
y0 = 0.5397 m



MW1-20 RISING HEAD TEST

Data Set: G:\662\11220832\Tech\Field\slug test\BH1-20 Rising Head Test.aqt
Date: 12/08/20 Time: 14:42:19

PROJECT INFORMATION

Company: GHD
Client: Consolidated Fastrate (Ottawa)
Project: 11220832-01
Location: Rideau St and Somme St, Ottawa
Test Well: BH1-20
Test Date: November 23, 2020

AQUIFER DATA

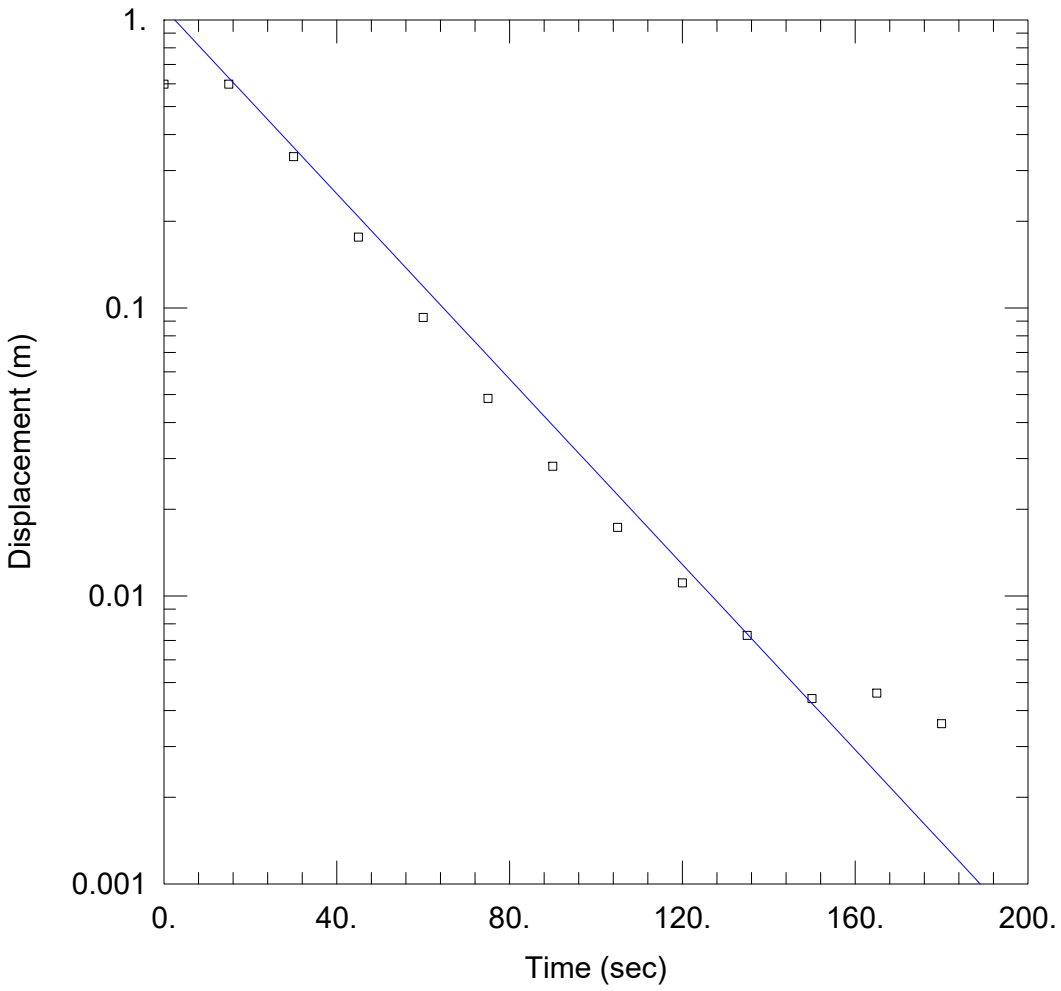
Saturated Thickness: 3.15 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH1-20)

Initial Displacement: 0.7091 m
Total Well Penetration Depth: 6.99 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.15 m
Screen Length: 1.52 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 5.694E-5 cm/sec
y0 = 0.941 m



MW7-08 FALLING HEAD TEST

Data Set: G:\662\11220832\Tech\Field\slug test\BH7-08 Falling Head Test.aqt
Date: 12/08/20 Time: 14:56:02

PROJECT INFORMATION

Company: GHD
Client: Consolidated Fastrate (Ottawa)
Project: 11220832-01
Location: Rideau St and Somme St, Ottawa
Test Well: BH7-08
Test Date: November 23, 2020

AQUIFER DATA

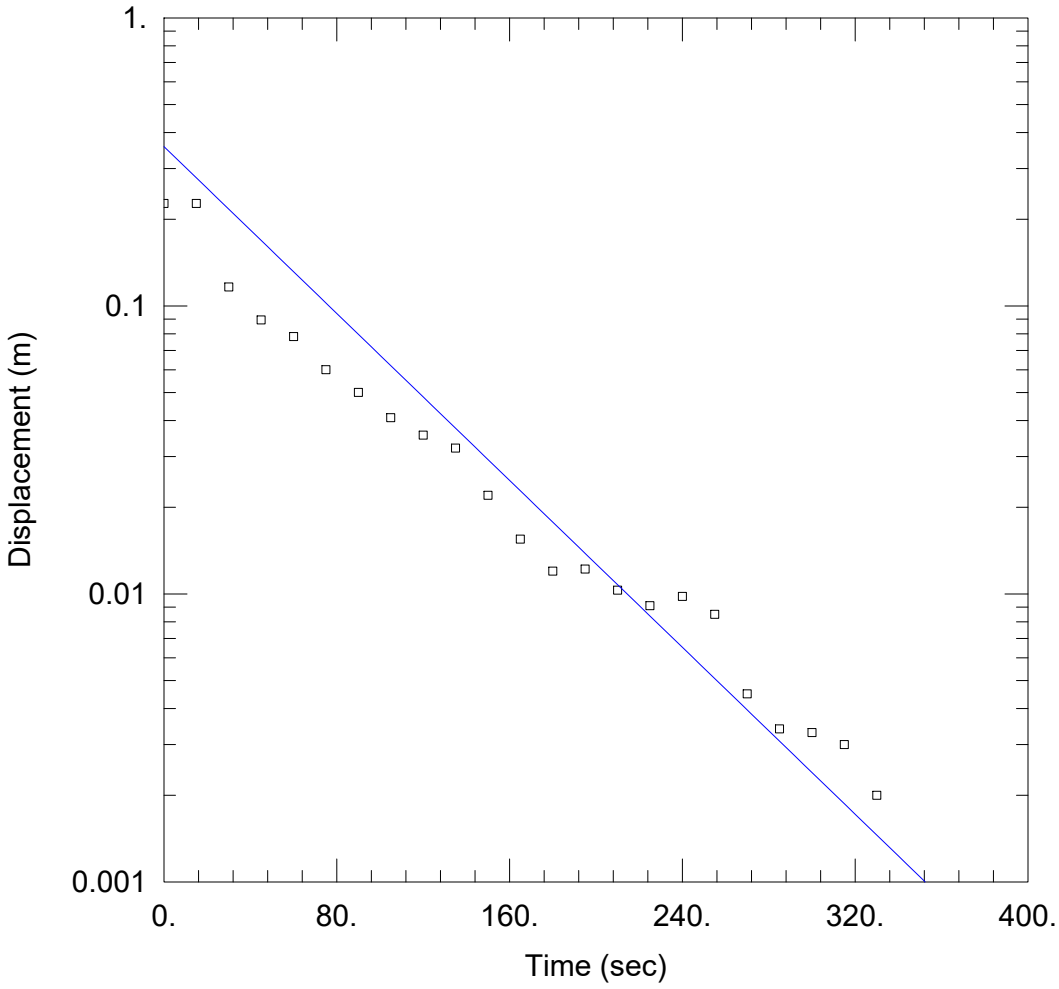
Saturated Thickness: 3.09 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH7-08)

Initial Displacement: 0.5981 m
Total Well Penetration Depth: 6.1 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.09 m
Screen Length: 1.52 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.003138 cm/sec
y0 = 1.097 m



MW7-08 RISING HEAD TEST

Data Set: G:\662\11220832\Tech\Field\slug test\BH7-08 Rising Head Test.aqt
Date: 12/08/20 Time: 15:03:09

PROJECT INFORMATION

Company: GHD
Client: Consolidated Fastrate (Ottawa)
Project: 11220832-01
Location: Rideau St and Somme St, Ottawa
Test Well: BH7-08
Test Date: November 23, 2020

AQUIFER DATA

Saturated Thickness: 3.09 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH7-08)

Initial Displacement: 0.2268 m
Total Well Penetration Depth: 6.1 m
Casing Radius: 0.0254 m
Static Water Column Height: 3.09 m
Screen Length: 1.52 m
Well Radius: 0.0254 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.001413 cm/sec
y0 = 0.3575 m

Appendix G
Certificates of Analysis – Construction Dewatering

Appendix G: Summary of Groundwater Sampling for Construction Dewatering

Storm Sewer
ByLaw 2003-514
Schedule A Table 2

Parameter	Units	Limit		MW7-08
Biochemical Oxygen Demand	mg/L	25		<6
Cyanide (total)	mg/L	0.02		<0.01
Phenolics (4AAP)	mg/L	0.008		<0.001
Phosphorous (total)	mg/L	0.4		**1.83**
Suspended Solids (total)	mg/L	15		**1030**
pH		6-9		7.4
Arsenic (total)	mg/L	0.02		**0.03**
Cadmium (total)	mg/L	0.008		<0.001
Chromium (total)	mg/L	0.08		0.08
Copper (total)	mg/L	0.04		**0.191**
Lead (total)	mg/L	0.12		0.066
Manganese (total)	mg/L	0.05		**9.34**
Mercury (total)	mg/L	0.0004		<0.0001
Nickel (total)	mg/L	0.08		**0.099**
Selenium (total)	mg/L	0.02		0.007
Silver (total)	mg/L	0.12		<0.001
Zinc (total)	mg/L	0.04		**0.33**
Benzene	mg/L	0.002		<0.0005
Chloroform	mg/L	0.002		<0.0005
1,2.Dichlorobenzene / o	mg/L	0.0056		<0.0005
1,4-Dichlorobenzene / p	mg/L	0.0068		<0.0005
cis-1,2-dichloroethylene	mg/L	0.0056		<0.0005
trans-1,2-dichloroethylene	mg/L	0.0056		<0.0005
Ethylbenzene	mg/L	0.002		<0.0005
Methylene Chloride	mg/L	0.0052		<0.005
1,1,2,2-Tetrachloroethane	mg/L	0.017		<0.0005
Tetrachloroethylene	mg/L	0.0044		<0.0005
Toluene	mg/L	0.002		<0.0005
Trichloroethylene	mg/L	0.0076		<0.0005
Xylene (total)	mg/L	0.0044		<0.0005

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Certificate of Analysis

GHD Limited (Kingston)

1225 Gardiners Rd.
Kingston, ON K7P 0G3
Attn: Scott Wallis

Client PO: 73522033 - Scott Wallis
Project: 11220832
Custody: 55735

Report Date: 25-Nov-2020
Order Date: 19-Nov-2020

Order #: 2047520

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

Paracel ID	Client ID
2047520-01	MW7-08

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CBOD	SM 5210B - DO Probe	20-Nov-20	20-Nov-20
Cyanide, total	MOE E3015 - Auto Colour	20-Nov-20	20-Nov-20
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	20-Nov-20	20-Nov-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	20-Nov-20	20-Nov-20
Ottawa - Storm: VOCs	EPA 624 - P&T GC-MS	20-Nov-20	22-Nov-20
pH	EPA 150.1 - pH probe @25 °C	23-Nov-20	23-Nov-20
Phenolics	EPA 420.2 - Auto Colour, 4AAP	25-Nov-20	25-Nov-20
Phosphorus, total, water	EPA 365.4 - Auto Colour, digestion	20-Nov-20	20-Nov-20
Total Suspended Solids	SM 2540D - Gravimetric	20-Nov-20	20-Nov-20

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

	Client ID:	MW7-08	-	-	-
	Sample Date:	19-Nov-20 10:00	-	-	-
	Sample ID:	2047520-01	-	-	-
	MDL/Units	Water	-	-	-
General Inorganics					
CBOD	2 mg/L	<6 [1]	-	-	-
Cyanide, total	0.01 mg/L	<0.01	-	-	-
pH	0.1 pH Units	7.4	-	-	-
Phenolics	0.001 mg/L	<0.001	-	-	-
Phosphorus, total	0.01 mg/L	1.83	-	-	-
Total Suspended Solids	2 mg/L	1030	-	-	-
Metals - Total					
Arsenic	0.01 mg/L	0.03	-	-	-
Cadmium	0.001 mg/L	<0.001	-	-	-
Chromium	0.05 mg/L	0.08	-	-	-
Copper	0.005 mg/L	0.191	-	-	-
Lead	0.001 mg/L	0.066	-	-	-
Manganese	0.05 mg/L	9.34	-	-	-
Mercury	0.0001 mg/L	<0.0001	-	-	-
Nickel	0.005 mg/L	0.099	-	-	-
Selenium	0.005 mg/L	0.007	-	-	-
Silver	0.001 mg/L	<0.001	-	-	-
Zinc	0.02 mg/L	0.33	-	-	-
Volatiles					
Benzene	0.0005 mg/L	<0.0005	-	-	-
Chloroform	0.0005 mg/L	<0.0005	-	-	-
1,2-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	-
1,4-Dichlorobenzene	0.0005 mg/L	<0.0005	-	-	-
cis-1,2-Dichloroethylene	0.0005 mg/L	<0.0005	-	-	-
trans-1,3-Dichloropropylene	0.0005 mg/L	<0.0005	-	-	-
Ethylbenzene	0.0005 mg/L	<0.0005	-	-	-
Methylene Chloride	0.005 mg/L	<0.005	-	-	-
1,1,2,2-Tetrachloroethane	0.0005 mg/L	<0.0005	-	-	-
Tetrachloroethylene	0.0005 mg/L	<0.0005	-	-	-
Toluene	0.0005 mg/L	<0.0005	-	-	-
Trichloroethylene	0.0005 mg/L	<0.0005	-	-	-
Xylenes, total	0.0005 mg/L	<0.0005	-	-	-
4-Bromofluorobenzene	Surrogate	93.1%	-	-	-
Dibromofluoromethane	Surrogate	119%	-	-	-
Toluene-d8	Surrogate	127%	-	-	-

Certificate of Analysis

Report Date: 25-Nov-2020

Client: GHD Limited (Kingston)

Order Date: 19-Nov-2020

Client PO: 73522033 - Scott Wallis

Project Description: 11220832

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
CBOD	ND	2	mg/L						
Cyanide, total	ND	0.01	mg/L						
Phenolics	ND	0.001	mg/L						
Phosphorus, total	ND	0.01	mg/L						
Total Suspended Solids	ND	2	mg/L						
Metals - Total									
Arsenic	ND	0.01	mg/L						
Cadmium	ND	0.001	mg/L						
Chromium	ND	0.05	mg/L						
Copper	ND	0.005	mg/L						
Lead	ND	0.001	mg/L						
Mercury	ND	0.0001	mg/L						
Manganese	ND	0.05	mg/L						
Nickel	ND	0.005	mg/L						
Selenium	ND	0.005	mg/L						
Silver	ND	0.001	mg/L						
Zinc	ND	0.02	mg/L						
Volatiles									
Benzene	ND	0.0005	mg/L						
Chloroform	ND	0.0005	mg/L						
1,2-Dichlorobenzene	ND	0.0005	mg/L						
1,4-Dichlorobenzene	ND	0.0005	mg/L						
cis-1,2-Dichloroethylene	ND	0.0005	mg/L						
trans-1,3-Dichloropropylene	ND	0.0005	mg/L						
Ethylbenzene	ND	0.0005	mg/L						
Methylene Chloride	ND	0.005	mg/L						
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L						
Tetrachloroethylene	ND	0.0005	mg/L						
Toluene	ND	0.0005	mg/L						
Trichloroethylene	ND	0.0005	mg/L						
Xylenes, total	ND	0.0005	mg/L						
Surrogate: 4-Bromofluorobenzene	*0.0948*		*mg/L*		*119*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0656*		*mg/L*		*82.0*	*50-140*			
Surrogate: Toluene-d8	*0.0863*		*mg/L*		*108*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
CBOD	ND	6	mg/L	ND			NC	20	BOD01
Cyanide, total	ND	0.01	mg/L	ND			NC	11	
pH	7.9	0.1	pH Units	7.9			0.4	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Phosphorus, total	ND	0.01	mg/L	ND			NC	15	
Total Suspended Solids	6.0	2	mg/L	6.0			0.0	10	
Metals - Total									
Arsenic	ND	0.01	mg/L	ND			NC	20	
Cadmium	ND	0.001	mg/L	ND			NC	20	
Chromium	ND	0.05	mg/L	ND			NC	20	
Copper	0.007	0.005	mg/L	0.007			0.1	20	
Lead	0.003	0.001	mg/L	0.003			0.5	20	
Mercury	ND	0.0001	mg/L	ND			NC	20	
Manganese	4.14	0.05	mg/L	4.16			0.4	20	
Nickel	0.012	0.005	mg/L	0.013			1.5	20	
Selenium	ND	0.005	mg/L	ND			NC	20	
Silver	ND	0.001	mg/L	ND			NC	20	
Zinc	0.023	0.02	mg/L	0.023			0.6	20	
Volatiles									
Benzene	ND	0.0005	mg/L	ND			NC	30	
Chloroform	ND	0.0005	mg/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.0005	mg/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.0005	mg/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.0005	mg/L	ND			NC	30	
Ethylbenzene	ND	0.0005	mg/L	ND			NC	30	
Methylene Chloride	ND	0.005	mg/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.0005	mg/L	ND			NC	30	
Tetrachloroethylene	ND	0.0005	mg/L	ND			NC	30	
Toluene	ND	0.0005	mg/L	ND			NC	30	
Trichloroethylene	ND	0.0005	mg/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*0.0952*		*mg/L*		*119*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0763*		*mg/L*		*95.4*	*50-140*			
Surrogate: Toluene-d8	*0.0852*		*mg/L*		*107*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
CBOD	109	2	mg/L	ND	54.6	62-129			QS-02
Cyanide, total	0.090	0.01	mg/L	ND	90.0	53-130			
Phenolics	0.021	0.001	mg/L	ND	83.6	69-132			
Phosphorus, total	0.492	0.01	mg/L	ND	98.4	80-120			
Total Suspended Solids	24.0	2	mg/L	ND	120	75-125			
Metals - Total									
Arsenic	50.5	0.01	mg/L	0.472	100	80-120			
Cadmium	41.8	0.001	mg/L	0.035	83.5	80-120			
Chromium	55.7	0.05	mg/L	0.946	110	80-120			
Copper	48.6	0.005	mg/L	0.727	95.8	80-120			
Lead	43.8	0.001	mg/L	0.268	87.0	80-120			
Mercury	0.0031	0.0001	mg/L	ND	103	70-130			
Manganese	453	0.05	mg/L	416	75.1	80-120			QM-4X
Nickel	50.0	0.005	mg/L	1.27	97.6	80-120			
Selenium	40.0	0.005	mg/L	0.126	79.7	80-120			QM-01
Silver	40.1	0.001	mg/L	0.032	80.2	80-120			
Zinc	44.9	0.02	mg/L	2.25	85.2	80-120			
Volatiles									
Benzene	0.043	0.0005	mg/L	ND	107	60-130			
Chloroform	0.040	0.0005	mg/L	ND	98.8	60-130			
1,2-Dichlorobenzene	0.040	0.0005	mg/L	ND	100	60-130			
1,4-Dichlorobenzene	0.041	0.0005	mg/L	ND	103	60-130			
cis-1,2-Dichloroethylene	0.046	0.0005	mg/L	ND	115	60-130			
trans-1,3-Dichloropropylene	0.041	0.0005	mg/L	ND	102	60-130			
Ethylbenzene	0.035	0.0005	mg/L	ND	86.8	60-130			
Methylene Chloride	0.045	0.005	mg/L	ND	112	60-130			
1,1,2,2-Tetrachloroethane	0.036	0.0005	mg/L	ND	90.4	60-130			
Tetrachloroethylene	0.040	0.0005	mg/L	ND	100	60-130			
Toluene	0.035	0.0005	mg/L	ND	87.7	60-130			
Trichloroethylene	0.042	0.0005	mg/L	ND	105	60-130			
Surrogate: 4-Bromofluorobenzene	*0.0961*		*mg/L*		*120*	*50-140*			
Surrogate: Dibromofluoromethane	*0.0945*		*mg/L*		*118*	*50-140*			
Surrogate: Toluene-d8	*0.0724*		*mg/L*		*90.5*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

1 : Raised Reporting Limits for BOD due to dilutions based on preliminary COD screening results.

QC Qualifiers :

BOD01 : Raised Reporting Limits for BOD due to dilutions based on preliminary COD screening results.

QM-01 : The spike recovery for this QC sample is outside of established control limits due to sample matrix interference.

QM-4X : The spike recovery was outside of QC acceptance limits due to elevated analyte concentration.

QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
NC: Not Calculated

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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