



Hydrogeological Assessment Proposed 2-Lot Severance at 287 Kelly Road Foxboro, Ontario

Prepared for:

Charles Kelly
287 Kelly Road
Foxboro, ON
K0K 3E0

Submitted by:

The Greer Galloway Group Inc.
1620 Wallbridge Loyalist Road
Belleville, Ontario
K8N 4Z5

October 2023



**G R E E R
G A L L O W A Y**
CONSULTING
ENGINEERS

1620 Wallbridge Loyalist Road

R.R. #5

Belleville, Ontario

K8N 4Z5

Telephone

(613) 966-3068

October 19, 2023

Project 23-3-8491

Charles Kelly
287 Kelly Road
Foxboro, Ontario
K0K 3E0

Via email: kellychuck62@gmail.com

Hydrogeological Assessment for Proposed 2-Lot Severance at 287 Kelly Road in Foxboro, Ontario

Dear Charles,

We are pleased to submit this hydrogeological assessment in support of your proposed 2-lot severance in Foxboro, Ontario. The tested wells on the proposed lots were found to have adequate yield for normal residential requirements and acceptable water quality. Some interference between the two wells was observed, but this is to be expected given their proximity, and any risks from this could be mitigated with supplementary water storage.

We trust that this report is complete and sufficient for your requirements. Please don't hesitate to contact us if you have any questions about the report or our conclusions.

Yours very truly,

**THE GREER GALLOWAY GROUP INC.
CONSULTING ENGINEERS**

Kirby Magee-Dittburner, E.I.T.
Junior Hydrogeologist



Consulting
Engineers
of Ontario



Professional Engineers
Ontario

Table of Contents

1. INTRODUCTION	2
2. INVESTIGATION METHODS.....	2
2.1 Well Records Search and Survey.....	2
2.2 Water Supply Assessment	2
2.3 Water Quality Assessment	3
3. SUMMARIZED FINDINGS	3
3.1 Site Description.....	3
3.2 Climate and Water Balance	3
3.3 Geology	4
3.4 Hydrogeology.....	5
3.5 Water Availability	6
3.6 Water Quality	6
3.7 Potential for Well Interference	8
3.8 Onsite Sewage Treatment.....	9
4. SUMMARY	10
5. REFERENCES	12

Drawings (appended after text)

Drawing 1: Site plan showing property location

Drawing 2: Site plan showing well locations

Tables

Table 1: Estimated infiltration factors

Table 2: Summary of well depths and yields within a 300 m radius of the property

Table 3: Summary of pumping test results

Tables 4-5: Summary of analytical results

Table 6: Summary of well interference during testing

Table 7: Minimum clearances for distribution piping

Appendices

APPENDIX A MECP Water Well Records

APPENDIX B Hydrographs

APPENDIX C Laboratory Certificate of Analysis

APPENDIX D Cooper-Jacob Time-Drawdown Analysis

1. Introduction

The Greer Galloway Group (Greer Galloway) was retained by Charles Kelly to complete a hydrogeological assessment supporting a proposed 2-lot severance from the property located at 287 Kelly Road in Foxboro, Ontario.

The purpose of the work was to assess the soil and groundwater conditions at the site to demonstrate that individual septic systems and the existing water supply wells will be suitable for supporting residential development on the proposed severances in accordance with Provincial standards and without significantly impacting surrounding private water sources.

2. Investigation Methods

The assessment was carried out in general accordance with the Ministry of the Environment, Conservation, and Parks (MECP) procedures D-5-4 (Individual On-Site Sewage Systems) and D-5-5 (Private Well: Well Assessment).

The investigation included a review of water well records, a review of available geologic and hydrogeologic information for the area, an inventory of water supply wells within a reasonable distance of the subject property, a pumping test on the existing wells on the subject property along with chemical and bacteriological analysis, and monitoring water level responses in observation wells prior, during, and after the pumping tests. The investigation methods are described further in the following subsections.

2.1 Well Records Search and Survey

Information about nearby wells was obtained from available MECP water well records on the MECP wells database using a search radius of 300 m from the subject property. MECP Water Well Record sheets for the searched area are provided in Appendix A.

In July 2023, a door-to-door well survey was carried out for neighbouring wells within a 300 m radius of the subject property. A total of 3 homeowners were successfully contacted during the survey.

2.2 Water Supply Assessment

The water supply assessment was based on pumping tests of the drilled wells A368689 on the northern severance and A368655 on the southern severance.

A368689 is a 150 mm diameter drilled well with a depth of 25.6 m below ground surface (bgs), a casing depth of 22.3 m bgs, and a measured static water level of 6.10 m bgs at the time of testing. The well record for this well indicates driller-reported recommended pumping rate of 15 L/min.

A368655 is a 150 mm diameter drilled well with a depth of 21.6 m bgs, a casing depth of 18.9 m bgs, and a measured static water level of 6.50 m bgs at the beginning of the test. The well record indicates a driller-reported recommended pumping rate of 19 L/min. Both wells source water from bedrock fractures.

The 6-hour pumping tests were performed on July 31 – August 1, 2023 using a submersible pump with the discharge routed through a flow restriction valve corresponding to the desired pumping rate.

Discharge water was directed away from the pumped well a distance of approximately 30 m downgradient of the well.

Data-logging pressure transducers (Solinst Model 3001) were installed in the tested wells and in a abandoned well which is to be decommissioned. All dataloggers were synchronized prior to the testing and were set to record at 10-second intervals in the tested wells and at 20-second intervals in the monitoring well. Hydrographs created from the captured data are provided in Appendix B.

2.3 Water Quality Assessment

A groundwater sample was obtained during the last hour of the pumping test. The sample was placed into a variety of laboratory-prepared sample containers that were sealed, placed into a cooler with ice packs to maintain a temperature of approximately 4 °C, and transported to Caduceon Laboratories in Kingston, Ontario. Analytical parameters included E. coli and Total Coliform bacteria and a variety of additional parameters including Alkalinity, pH, Conductivity, Colour, Turbidity, Fluoride, Chloride, Nitrite and Nitrate, Sulphate, TKN, Ammonia, Organic Nitrogen, DOC, Tannins and Lignins, Hardness, Calcium, Iron, Magnesium, Manganese, Potassium, Silica, Sodium, and Zinc (refer to the Laboratory Certificate of Analysis in Appendix C).

3. Summarized Findings

3.1 Site Description

The subject property covers an area of approximately 7.2 ha and is located at the southeastern corner of Clearview Road and Kelly Road near Foxboro, Ontario. Mr. Kelly wishes to sever two parcels, each with an area of approximately 0.65 ha. The northern of the two proposed severances is referred to as “Severance A”, and the southern is referred to as “Severance B”. Both proposed severances and the retained lands are currently used agriculturally. Local land use is Rural (RU-19). Maps of the property and its surroundings are provided in Drawings 1 and 2 (appended after text).

Topography of the property is rolling and generally declines towards the southeast. Drainage is predominately in a southeastern direction, following local topography. The elevation of the property is about 140 m above mean sea level (mASL) at the southern edge of the property and about 156 mASL at the northern edge of the property. A slight hill rising to about 154 mASL passes through the middle of the property, roughly along the tree line seen in Drawing 2.

No major surface water bodies were identified within 500 m of the subject property. Municipal servicing is not available in the area, so drinking water and sewage servicing must be handled by individual water supply wells and septic systems.

3.2 Climate and Water Balance

The area is characterized by mild winters and relatively cool humid summers. Snow typically occurs during 5 months of the year from December to April. Annual precipitation is approximately 911 mm/a (Environment Canada, 2020) with an average annual evapotranspiration (ET) of roughly 500 mm based on the site location (Statistics Canada, 2017)

Mapping shows primarily thin surficial soils classified as thin soils over Paleozoic bedrock in the Surficial Geology of Southern Ontario (OGS, 2011). The infiltration factors for the area were calculated as per the Ontario Ministry of the Environment 1995 Hydrogeological Technical Information Requirements for Land Development Applications.

It is based on three sub-factors which are:

- Topography sub-factor
- Soil sub-factor
- Cover sub-factor

Table 1 presents infiltration factors based on the details of the ground cover factors for the area under current conditions:

Table 1: Estimated infiltration factors

Site Characteristic	Infiltration Factor
<u>Topography</u>	
Flat Land	0.3
Rolling Land	0.2
Hilly Land	0.1
<u>Soils</u>	
Tight impervious clay	0.1
Medium combinations of clay and loam	0.2
Open Sandy loam	0.4
<u>Cover</u>	
Cultivated Land	0.1
Woodland	0.2
Sum of Infiltration Factors	0.5

Given an average annual moisture surplus (P-ET) of approximately 410 mm, and an infiltration factor of 0.5, we estimate an average annual infiltration of about 205 mm, or roughly 5,620 L/day per hectare for the purposes of MECP Guideline D-5-4 nitrate dilution calculations. We note that we have used the more current guidance from Chapter 22 of the 2008 Design Guidelines for Sewage Works (MECP, 2008) for nitrate loading. This guideline calls for the use of a standard 250 mm/a for groundwater recharge.

3.3 Geology

The Ontario Soil Report #27 classifies soils in this area as Bondhead sandy loam in the stony phase. Surficial soils are stony, brown to dark brown sandy loam with a crumb texture. Underlying the surficial soils is a layer of grey loam to clay loam which slows drainage. These soils contain an abundance of limestone fragments.

The Ontario Geological Survey (2011) has described the bedrock as interbedded limestone and shale belonging to the Verulam Formation of the Simcoe Group. Well records in the vicinity of the subject property indicate that bedrock occurs at depths of between 6.1 m and 18.9 m, with a median depth to bedrock of 11.1 m.

3.4 Hydrogeology

A search of the Ministry of Environment, Conservation and Parks (MECP) Well Record Database returned six wells within a 300 m radius of the site (see Drawing 2, appended). Of the six wells identified, one of them was abandoned for an unspecified reason. The remaining five Well Records are summarized in Table 2. The well records suggest the groundwater table in the area is encountered primarily within the overburden, with a median well yield of 15 L/min. The subject lands are located outside any mapped WHPA.

Table 2: Summary of well depths and yields within a 300 m radius of the property

Well Number	Water Found (m)	Static Level (m)	Yield (L/min)	Overburden Depth (m)	Hole Depth (m)	Water Type	Aquifer
2903948	Dry	Dry	Dry	11.0	-	-	-
2909159	12.2	12.2	8	18.6	28.6	Fresh	Overburden
7157134	Multiple	0.9	23	11.1	31.4	Untested	Overburden
A368655	18.9	6.2	19	6.1	21.6	Untested	Bedrock
A368689	19.5	5.2	15	18.9	25.6	Untested	Overburden

Based on the recorded static levels and the topographic setting, the dominant local groundwater flow direction is in a southern direction.

Hydraulic conductivity values were estimated using the Dupuit-Forchheimer formula for unconfined aquifers, using the following equation:

$$K = \frac{Q \ln(R_2/R_1)}{\pi(H_2^2 - H_1^2)}$$

Where,

- K = Horizontal hydraulic conductivity (m/sec)
- Q = Flow rate at quasi-steady state (m³/sec)
- R₁ = Radius of pumping well (m)
- R₂ = Distance to monitoring well (m)
- H₁ = Head in pumping well (m)
- H₂ = Head in monitoring well (m)

Average estimated horizontal hydraulic conductivity values using the Dupuit-Forchheimer method are 4.7x10⁻⁶ m/s for A368689 and 2.8x10⁻⁶ m/s for A368655. The Ontario Soil Report #27 and well records in the area report clay loam in the overburden, so these values were compared with hydraulic conductivity values using the Cooper-Jacob Time-Drawdown method for confined aquifers. Estimated horizontal hydraulic conductivity values using the Cooper-Jacob method are 4.8x10⁻⁷ m/s for A368689 and 5.8x10⁻⁷ m/s for A368655. The time-drawdown graphs for the pump tests are included in Appendix D.

The estimated hydraulic conductivity values are within the expected range for the given bedrock type at the subject property, but we note that fractured bedrock aquifers do not behave in the same way as an ideal porous medium that is assumed for the purpose of calculating hydraulic conductivity.

3.5 Water Availability

6-hour pumping tests were completed on wells A368689 and A368655 (Severance A and Severance B, respectively). The test on well A368689 took place on July 31, 2023 at 10:54 AM, and the test on A368655 took place on August 1, 2023 at 8:15 AM. A brief description of the test results is summarized in Table 3. Refer to Appendix B for hydrographs of each of the tests.

Table 3: Summary of pumping test results

Well Tag #	Lot ID	Date of Test	Pumping Rate (L/min)	Duration of Test	Volume Pumped (L)	Static Water Level (m bgs)	Maximum Drawdown (m)	Remaining Water Column (m)
A368689	Severance A	July 31, 2023	28 at start. Rate reduced to 20 after 86 minutes.	387 minutes	8,200	6.1	13.3	6.2
A368655	Severance B	August 1, 2023	20 for full test.	427 minutes	8,500	6.5	11.7	2.9

During the pumping test of A368655, the flow briefly stopped twice while adjusting the flow restriction valve, causing the water level to increase temporarily. For both wells, 70% recovery was observed to occur within an hour following the end of the pumping test, with full recovery occurring after about 10 hours.

According to MECP Guideline D-5-5, the per-person water requirement is 450 L/day (though recent data shows that actual per-person usage in Ontario is approximately 225 L/day), with peak demand occurring for a period of 120 minutes each day. Based on a 4-bedroom household with an occupancy of 5 persons, this is equivalent to a peak demand of 18.7 L/min. Both wells were able to support, over 6 hours of pumping, a rate exceeding the estimated peak demand.

Given the sustainable pumping rate observed and the rapid recovery of the water column, we conclude that there is sufficient water availability to support the proposed severance. The tested yield is considered to be representative, and the well is expected to be able to meet normal residential water demand even during the dry summer months.

3.6 Water Quality

A groundwater sample was obtained from each of the two tested wells during the last hour of the pumping test, and each was analyzed at Caduceon Laboratories Ltd. in Kingston, Ontario. Key results are summarized in Tables 4 and 5, with exceedances being formatted in bold. The full results of this testing are included with the Laboratory Certificates of Analysis in Appendix C.

Table 4: Summary of Key Analytical Results (A368689)

Units		RL	July 31, 2023	August 18, 2023	August 29, 2023	ODWS
Bacteriological Parameters						
Total Coliform	cfu/100mL	1	NDOGT	NDOGN	0	0 (5)
E coli	cfu/100mL	1	NDOGT¹	NDOGN ²	0	0
Fecal Coliform	cfu/100mL	1	-	0	-	N/A
Background	cfu/100mL	1	NDOGT	-	-	N/A
Physical/Chemical parameters with Health-related Criteria						
Turbidity	NTU	0.1	6.8	-	-	5

	Units	RL	July 31, 2023	August 18, 2023	August 29, 2023	ODWS
Nitrite (N)	mg/L	0.1	<0.05	-	-	1
Nitrate (N)	mg/L	0.1	0.09	-	-	10
Fluoride	mg/L	0.1	0.3	-	-	2.4
Physical/Chemical parameters with Aesthetic Criteria/Operational Guidelines						
Alkalinity (as CaCO ₃)	mg/L	5	258	-	-	500 ^{OG}
pH @25°C	pH Units	-	7.94	-	-	6.5 – 8.5 ^{OG}
Colour	TCU	2	<2	-	-	5 ^{OG}
Chloride	mg/L	0.5	4.1	-	-	250 ^{AO}
Sulphate	mg/L	1	19	-	-	500 ^{AO}
Dissolved Organic Carbon	mg/L	0.2	2.0	-	-	5 ^{AO}
Sulphide	mg/L	0.01	0.01	-	-	0.05 ^{AO}
Hardness (as CaCO ₃)	mg/L	1	263	-	-	100 ^{OG}
Iron	mg/L	0.005	0.163	-	-	0.3 ^{AO}
Manganese	mg/L	0.001	0.026	-	-	0.05 ^{AO}
Sodium	mg/L	0.2	9.5	-	-	200 ^{AO}

- 1) Reported E. coli reflects the plate overgrown with target bacteria. Actual E. Coli bacteria may or may not be present.
- 2) Reflects plate overgrown with non-target bacteria. Actual E. Coli bacteria may or may not be present.

Table 5: Summary of Key Analytical Results (A368655)

	Units	RL	August 1, 2023	ODWS
Bacteriological Parameters				
Total Coliform	cfu/100mL	1	0	0 (5)
E coli	cfu/100mL	1	0	0
Fecal Coliform	cfu/100mL	1	-	N/A
Background	cfu/100mL	1	0	N/A
Physical/Chemical parameters with Health-related Criteria				
Turbidity	NTU	0.1	9.5	5
Nitrite (N)	mg/L	0.1	<0.05	1
Nitrate (N)	mg/L	0.1	0.32	10
Fluoride	mg/L	0.1	0.3	2.4
Physical/Chemical parameters with Aesthetic Criteria/Operational Guidelines				
Alkalinity (as CaCO ₃)	mg/L	5	277	500 ^{OG}
pH @25°C	pH Units		7.89	6.5 – 8.5 ^{OG}
Colour	TCU	2	<2	5 ^{OG}
Chloride	mg/L	0.5	4.5	250 ^{AO}
Sulphate	mg/L	1	22	500 ^{AO}
Dissolved Organic Carbon	mg/L	0.2	2.0	5 ^{AO}
Sulphide	mg/L	0.01	<0.01	0.05 ^{AO}
Hardness (as CaCO ₃)	mg/L	1	292	100 ^{OG}
Iron	mg/L	0.005	0.560	0.3 ^{AO}
Manganese	mg/L	0.001	0.027	0.05 ^{AO}
Sodium	mg/L	0.2	8.8	200 ^{AO}

The sample taken from A368689 (on Severance A) at the end of the pumping test was found to have an exceedance for Turbidity. Bacteriological results were not quantifiable because the plate was overgrown with target bacteria. It is assumed that E. Coli was present although this cannot be

confirmed. After receiving the results, the well was chlorinated to a free chlorine residual exceeding 50 mg/L and resampled after several days, after confirming that the residual concentration of free chlorine was below the detection limit of our free chlorine colorimeter. The results of the resample were inconclusive due to overgrowth with non-target bacteria. The well was chlorinated again and resampled after several days, after confirming no detectible chlorine residual. Subsequent results were found to be within the ODWS guidelines. A slight aesthetic exceedance for Hardness was observed, though this is not a health risk and is readily treatable.

The sample taken from A368655 (on Severance B) at the end of the pumping test was found to have an exceedance for Turbidity. The Turbidity observed in both wells is believed to be the result of fine sand being pulled into the well through fractures in the bedrock and is expected to dissipate under normal usage of the well. Slight aesthetic exceedances for Hardness and Iron were also observed, though these are readily treatable and are not health risks.

The groundwater was found to be moderately hard (which is typical for water obtained from limestone bedrock aquifers), but of generally good quality. According to the results of neighbour surveys and observations during the pumping test, the groundwater is free of any objectionable odour, taste, or colour.

3.7 Potential for Well Interference

The radius of influence (r, metres) between a pumped well and the neighbouring properties may be estimated using the estimated value for Q (i.e., the average amount pumped per day in litres) and the average recharge (R, mm per year) to the aquifer according to:

$$Q = \frac{R\pi r^2}{365}$$

This calculation yields a zone of influence distance of about 25 m based on a shallow bedrock well, pumping at a rate of 1,125 L/day (5 people x 225 L/day) over the course of a year for A368689 and A368655.

The radii of influence for A368689 and A368655 intersect, indicating that interference between the two wells is likely. During each of the pumping tests, the other testing well and the decommissioned well on the subject property were monitored for interference. Drawdown in both monitored wells was observed during both tests, as expected. Full details of the interference observed are provided in Table 6.

Table 6: Summary of well interference during testing

Well	Distance from Test Well (m)	Drawdown at End of Test (m)	Percentage of Drawdown in Test Well (%)
Test of well A368689 (on Severance A)			
A368689	0	13.3	100%
A368655	40	8.3	62%
Decom. Well	30	8.0	60%
Test of well A368655 (on Severance B)			
A368689	40	5.8	50%
A368655	0	11.7	100%
Decom. Well	35	5.4	46%

Supplementary water storage is recommended for both proposed severances so that instantaneous peak water demand can be reduced, thereby mitigating the risk of both wells pumping at peak demand simultaneously.

3.8 Onsite Sewage Treatment

Neither municipal water supply nor sewage servicing is available in the vicinity of the subject property. As such, servicing for the proposed severances will be through private water supply wells and private individual septic systems.

The concentration of nitrate at the property boundary, in accordance with MECP Guideline D-5-4 for individual onsite sewage systems, is calculated as follows:

$$C_T = \frac{(Q_O \times C_O) + (Q_O \times C_{bk}) + (Q_R \times C_R)}{Q_R + Q_O}$$

Where:

- C_T = Nitrate concentration at property boundary (mg/L as N)
- Q_O = Sewage Effluent Volume (L/day)
- C_O = Nitrate concentration of sewage effluent (mg/L as N)
- C_{bk} = Nitrate concentration in background groundwater (mg/L as N)
- Q_R = Groundwater recharge or precipitation infiltration (L/day)
- C_R = Nitrate concentration of groundwater recharge (mg/L as N)

These parameters are discussed as follows:

Q_O – Daily sewage flows will be dependent on the number of persons at each residence. Based on a typical 3–4 bedroom household, the daily flow is 1 m³/day (1,000 L/day).

C_O – For conventional sewage systems for residential developments, an effluent nitrate flux of 40 mg/L per building lot is typically assumed for residential developments.

C_{bk} – Background nitrate concentrations of 0.09 mg/L and 0.32 mg/L were detected in A368689 and A368655, respectively.

Q_R – An annual groundwater recharge rate of 250 mm and an area of 0.65 ha yields a groundwater recharge of 4,450 L/day for each of the two proposed severances.

C_R – Nitrate levels in groundwater recharge are ignored since precipitation does not typically contain detectable levels of nitrate.

C_T - The calculated groundwater nitrate at the property boundary.

These values yield the following calculated Nitrate concentrations at the property boundaries of the proposed severances.

$$C_T = \frac{(1,000 \text{ L} \times 40 \text{ mg/L}) + (1,000 \text{ L} \times 0.09 \text{ mg/L}) + (4,450 \text{ L} \times 0 \text{ mg/L})}{4,450 + 1,000 \text{ L}} = 7.3 \text{ mg/L for Severance A}$$

$$C_T = \frac{(1,000 \text{ L} \times 40 \text{ mg/L}) + (1,000 \text{ L} \times 0.32 \text{ mg/L}) + (4,450 \text{ L} \times 0 \text{ mg/L})}{4,450 + 1,000 \text{ L}} = 7.4 \text{ mg/L for Severance B}$$

We note that the proposed lots also meet the 10 mg/L criterion when using the site-specific recharge estimated based on the MECP D-5-4 methodology.

Site conditions are considered suitable for the construction of a private septic system. Any such system must be constructed in accordance with Section 8 of the Ontario Building Code and must meet the setback distances outlined in Table 6.

Table 6: Minimum clearances for distribution piping

Object	Minimum Setback (m)
Structure	5
Well with a watertight casing to a depth of 6 m	15
Any other well	30
Pond	15
Stream	15
Property Line	3

4. Summary

The purpose of the work was to determine soil and groundwater conditions at the site and to demonstrate that the proposed severance can be serviced by groundwater and an individual septic system in accordance with Provincial standards without adversely affecting surrounding private water sources.

Our assessment found the following:

1. Both existing wells (A368689 and A368655) have sufficient yield to meet normal water demand for a typical 3–4-bedroom residential dwelling. Neighbouring residences are serviced by existing water supply wells, none of which have reported concerns about their water quantity.
2. Well testing demonstrated that some interference occurs between the two tested wells as a result of them being close together. Supplemental water storage is recommended to offset mutual interference effects.
3. Water quality testing showed some bacterial contamination in the initial sample, but subsequent resamples were acceptable after chlorination. Some turbidity was observed, though this is expected to dissipate when the wells function under normal usage. The well is considered suitable as a potable water supply, though ultraviolet sterilization (as a minimum) is still recommended as in-home water treatment. Filtration is also recommended to improve the effectiveness of the UV unit and mitigate any residual turbidity as the well develops.
4. The proposed severances are considered large enough to accommodate a Class 4 septic system to meet projected design flows for a typical 3-4 bedroom residential dwelling. Nitrate dilution calculations demonstrate that the proposed lots are large enough to meet MECP Guideline D-5-4 requirements with respect to Nitrate in groundwater leaving the property.

We trust that this report will satisfy your current requirements. If you have any questions about our assessment or our conclusions, please don't hesitate to contact us.

All of which is respectfully submitted.

**THE GREER GALLOWAY GROUP INC.
CONSULTING ENGINEERS**



Kirby Magee-Dittburner, E.I.T.
Junior Hydrogeologist



Charles Mitz, M.Eng., Ph.D., P.Geo
Senior Project Manager

5. References

Environment Canada, 2020

https://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?stnID=4859&autofwd=1

Experimental Farms Service, 1947: Soil Map of Prince Edward County, Ontario. Soil Survey Report No. 10, Scale 1:63 360.

MECP (Ministry of Environment Conservation and Parks) 1996: D-5-5 Private Wells: Water Supply Assessment, updated March 15, 2016.

MECP (Ministry of Environment Conservation and Parks) 1996: D-5-4 Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment, updated April 14, 2016.

MECP (Ministry of Environment Conservation and Parks) 2008: Design Guidelines For Sewage Works, updated May 6, 2023.

Ontario Geological Survey 2011. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV

Stats Canada, 2017 <https://www150.statcan.gc.ca/n1/pub/16-201-x/2017000/sec-2/m-c/m-c-2.5-eng.htm>



GREER GALLOWAY
CONSULTING ENGINEERS
PETERBOROUGH
BELLEVILLE
KINGSTON
1620 WALLBRIDGE LOYALIST ROAD
BELLEVILLE, ONTARIO, K8N 4Z5
PHONE: 613-966-3068
FAX: 613-966-3087

NOTES:

- 1) Base drawing and information obtained from Google Earth.

LEGEND:

● Property Location



PROJECT 2338579:
HYDROGEOLOGICAL ASSESSMENT
287 KELLY ROAD
FOXBORO, ONTARIO

DRAWING 1:
SITE PLAN SHOWING PROPERTY LOCATION



GREER GALLOWAY
CONSULTING ENGINEERS
PETERBOROUGH
BELLEVILLE
KINGSTON
1620 WALLBRIDGE LOYALIST ROAD
BELLEVILLE, ONTARIO, K8N 4Z5
PHONE: 613-966-3068
FAX: 613-966-3087

NOTES:

- 1) Base drawing and information obtained from City of Belleville GIS:
<https://bellevillegis.maps.arcgis.com/apps/webappviewer/index.html?id=2df21d93f8cf481c890c912a1185d961>
- 2) Setback distances are met. Septic beds not to scale.

LEGEND:

- Property boundary
- Test Well
- Monitoring Well
- MECP Well Record
- Class 4 Septic Bed



PROJECT 2338579:
HYDROGEOLOGICAL ASSESSMENT
287 KELLY ROAD
FOXBORO, ONTARIO

DRAWING 2:
SITE PLAN SHOWING WELL LOCATION

Appendix A

MECP Water Well Records

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name Last Name/Organization

Charles

Kelly

E-mail Address

☐ Well Constructed
by Well Owner

Mailing Address (Street Number/Name)

287 Kelly Rd.

Municipality

Stirling

Province

Ontario

Postal Code

K0K 3E0

Telephone No. (inc. area code)

Well Location

Address of Well Location (Street Number/Name)

Kelly Rd.

Township

Thurlow

Lot

5

Concession

IX

County/District/Municipality

Hastings

City/Town/Village

City of Belleville

Province

Ontario

Postal Code

UTM Coordinates: Zone Easting Northing

NAD 83 18

305311

Northing

4910480

Municipal Plan and Sublot Number

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)	
				From	To
Brown	Clay Till		Packed	0	30
Grey	Clay Till		Packed	30	42
Grey	Limestone		Broken	42	62
Grey	Limestone		Hard	62	71

Annular Space			Volume Placed (m ³ /ft ³)
Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	
20	0	Bentonite	5.5

Method of Construction		Well Use		
<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Diamond	<input type="checkbox"/> Public	<input type="checkbox"/> Commercial	<input type="checkbox"/> Not used
<input type="checkbox"/> Rotary (Conventional)	<input type="checkbox"/> Jetting	<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Municipal	<input type="checkbox"/> Dewatering
<input type="checkbox"/> Rotary (Reverse)	<input type="checkbox"/> Driving	<input type="checkbox"/> Livestock	<input type="checkbox"/> Test Hole	<input type="checkbox"/> Monitoring
<input type="checkbox"/> Boring	<input type="checkbox"/> Digging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling & Air Conditioning	
<input type="checkbox"/> Air percussion		<input type="checkbox"/> Industrial		
<input type="checkbox"/> Other, specify		<input type="checkbox"/> Other, specify		

Construction Record - Casing				Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From To	<input checked="" type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify <input type="checkbox"/> Other, specify	
6.25	Steel	.188	+2 62		

Construction Record - Screen				Status of Well	
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From To		

Water Details		Hole Diameter	
Water found at Depth 62 (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Depth (m/ft) From To	Diameter (cm/in)
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify	0 20	8"
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	20 71	6"
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify		
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested		
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify		

Well Contractor and Well Technician Information

Business Name of Well Contractor

Chalk Well Drilling Ltd.

Well Contractor's Licence No.

1 5 0 7

Business Address (Street Number/Name)

31 Johnsons Side Rd.

Municipality

Napanee

Province

Ontario

Postal Code

K7R 3L1

Business E-mail Address

chalkwel kos.net

Bus. Telephone No. (inc. area code)

613-388-2809

Name of Well Technician (Last Name, First Name)

Chalk, Jeremy

Well Technician's Licence No.

3 6 2 3

Signature of Technician and/or Contractor

[Signature]

Date Submitted

2023 Y 06 M 01 D

Comments:

South Lot

Well owner's information package delivered

☒ Yes☐ No

Date Package Delivered

Y Y Y Y M M D D

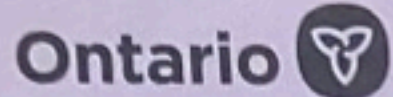
Date Work Completed

2023 Y 06 M 01 D

Ministry Use Only

Audit No. Z408396

Received



Ministry of the Environment,
Conservation and Parks

Well Tag No. (Place Sticker and/or Print Below)

A368689

Tag#:A368689

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page _____ of _____

Well Owner's Information

First Name: Charles Last Name/Organization: Kelly E-mail Address: _____
Mailing Address (Street Number/Name): 287b Kelly Rd. Municipality: Stirling Province: Ontario Postal Code: K0K 1B0 Telephone No. (inc. area code): _____
☐ Well Constructed by Well Owner

Well Location

Address of Well Location (Street Number/Name): Kelly Rd. Township: Thurlow Lot: 5 Concession: IX
County/District/Municipality: Hastings City/Town/Village: City of Belleville Province: Ontario Postal Code: _____
Municipal Plan and Sublot Number: _____ Other: _____
UTM Coordinates Zone: 18 Easting: 805330 Northing: 4910465

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)	
				From	To
<u>Brown</u>	<u>Clay Till</u>	<u>Boulders</u>	<u>Packed</u>	<u>0</u>	<u>30</u>
<u>Grey</u>	<u>Clay Till</u>		<u>Packed</u>	<u>30</u>	<u>42</u>
<u>Grey</u>	<u>Limestone</u>		<u>Broken</u>	<u>42</u>	<u>64</u>
<u>Grey</u>	<u>Limestone</u>		<u>Hard</u>	<u>64</u>	<u>84</u>

Annular Space			Volume Placed (m³/ft³)
Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	
<u>25</u>	<u>0</u>	<u>Bentonite</u>	<u>10.0</u>
<u>62</u>	<u>25</u>	<u>Clean peastone</u>	<u>15.5</u>

Method of Construction		Well Use	
<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Diamond	<input type="checkbox"/> Public	<input type="checkbox"/> Commercial
<input checked="" type="checkbox"/> Rotary (Conventional)	<input type="checkbox"/> Jetting	<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Municipal
<input type="checkbox"/> Rotary (Reverse)	<input type="checkbox"/> Driving	<input type="checkbox"/> Livestock	<input type="checkbox"/> Test Hole
<input type="checkbox"/> Boring	<input type="checkbox"/> Digging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling & Air Conditioning
<input checked="" type="checkbox"/> Air percussion		<input type="checkbox"/> Industrial	
<input type="checkbox"/> Other, specify _____		<input type="checkbox"/> Other, specify _____	

Construction Record - Casing			Depth (m/ft)		Status of Well
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	From	To	
<u>6.25</u>	<u>Steel</u>	<u>.188</u>	<u>+2</u>	<u>64</u>	<input checked="" type="checkbox"/> Water Supply
					<input type="checkbox"/> Replacement Well
					<input type="checkbox"/> Test Hole
					<input type="checkbox"/> Recharge Well
					<input type="checkbox"/> Dewatering Well
					<input type="checkbox"/> Observation and/or Monitoring Hole
					<input type="checkbox"/> Alteration (Construction)
					<input type="checkbox"/> Abandoned, Insufficient Supply
					<input type="checkbox"/> Abandoned, Poor Water Quality
					<input type="checkbox"/> Abandoned, other, specify _____
					<input type="checkbox"/> Other, specify _____

Construction Record - Screen			Depth (m/ft)		Status of Well
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	From	To	
					<input type="checkbox"/> Water Supply
					<input type="checkbox"/> Replacement Well
					<input type="checkbox"/> Test Hole
					<input type="checkbox"/> Recharge Well
					<input type="checkbox"/> Dewatering Well
					<input type="checkbox"/> Observation and/or Monitoring Hole
					<input type="checkbox"/> Alteration (Construction)
					<input type="checkbox"/> Abandoned, Insufficient Supply
					<input type="checkbox"/> Abandoned, Poor Water Quality
					<input type="checkbox"/> Abandoned, other, specify _____
					<input type="checkbox"/> Other, specify _____

Water Details		Hole Diameter	
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Depth (m/ft) From	To
<u>64</u>	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	<u>0</u>	<u>62</u>
<u>62</u>	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	<u>62</u>	<u>84</u>
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____		

Well Contractor and Well Technician Information

Business Name of Well Contractor: Chalk Well Drilling Ltd. Well Contractor's Licence No.: 1 5 0 7

Business Address (Street Number/Name): 31 Johnsons Side Rd. Municipality: Napanee

Province: Ontario Postal Code: K7R 3L1 Business E-mail Address: chalkwel.kos.net

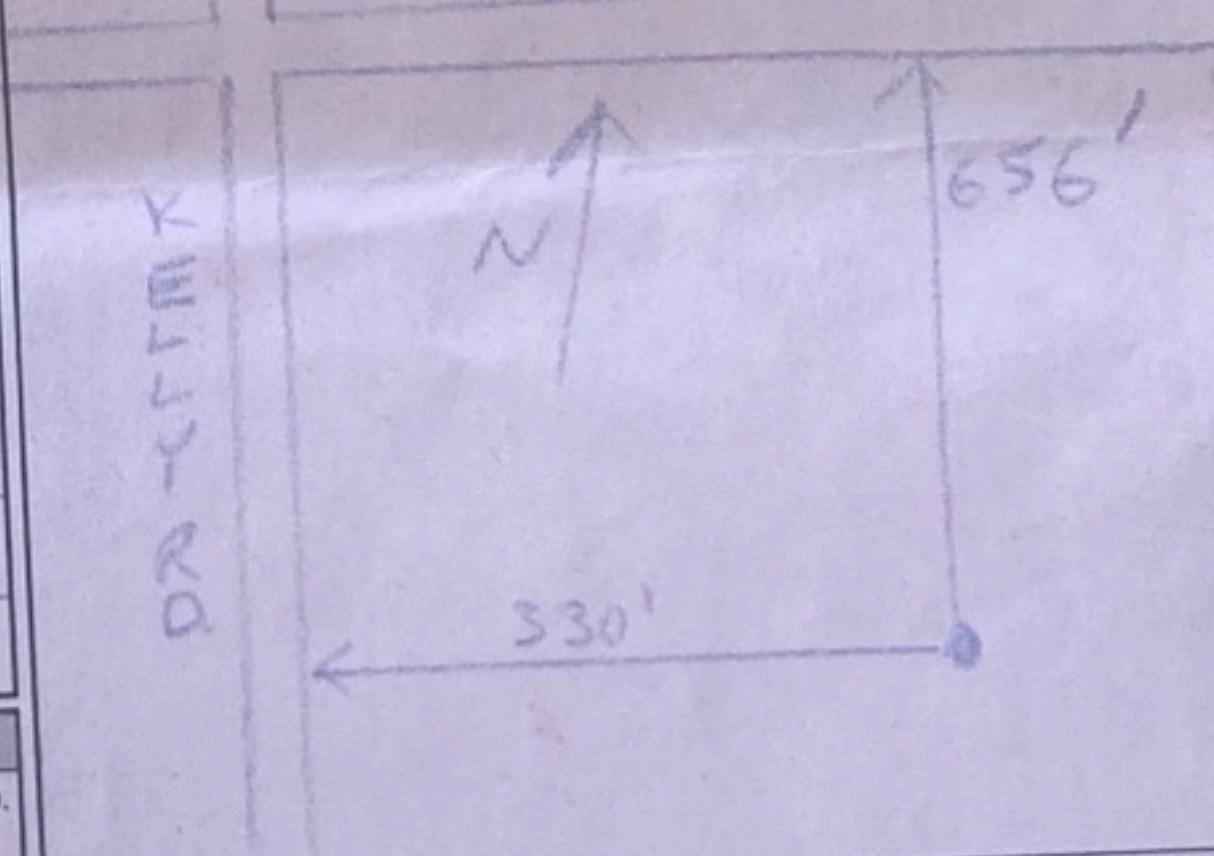
Bus. Telephone No. (inc. area code): 418-388-2809 Name of Well Technician (Last Name, First Name): Chalk, Kevin

Well Technician's Licence No.: 0 6 2 7 Signature of Technician and/or Contractor: _____ Date Submitted: 2023 Y 06 M 09 D

Results of Well Yield Testing			
After test of well yield, water was:		Draw Down	
<input checked="" type="checkbox"/> Clear and sand free		Time (min)	Water Level (m/ft)
<input type="checkbox"/> Other, specify _____		Static Level	<u>16.9</u>
If pumping discontinued, give reason:		1	<u>20.9</u>
Pump intake set at (m/ft)		2	<u>22.1</u>
<u>81</u>		3	<u>23.7</u>
Pumping rate (l/min / GPM)		4	<u>26.1</u>
<u>7 gpm</u>		5	<u>28.6</u>
Duration of pumping		10	<u>33.0</u>
<u>1 hrs + 0 min</u>		15	<u>40.6</u>
Final water level end of pumping (m/ft)		20	<u>43.6</u>
<u>60.3</u>		25	<u>47.4</u>
If flowing give rate (l/min/GPM)		30	<u>51.7</u>
Recommended pump depth (m/ft)		40	<u>54.7</u>
<u>81</u>		50	<u>47.6</u>
Recommended pump rate (l/min/GPM)		60	<u>60.3</u>
<u>4 gpm</u>			
Well production (l/min/GPM)			
<u>4 gpm</u>			
Disinfected?			
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			

Map of Well Location

Please provide a map below following instructions on the back.



Comments: NORTH LOT

Ministry Use Only	
Audit No. <u>2408395</u>	Received
Well owner's information package delivered <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered: <u>2023 Y 06 M 09 D</u>
	Date Work Completed: <u>2023 Y 06 M 09 D</u>

LOT 4

LOT 5

LOT 6

HUNTING DON

THURLOW

0.25 mi. 00'

Con



The Ontario Water Resources Act

WATER WELL RECORD

31C/6W

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

11

2909159

MUNICIP.
29.010

CON.
GAW

b/

COUNTY OR DISTRICT H. T.	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Huntingdon	CON. BLOCK, TRACT, SURVEY 1	LOT 005	15-27
DATE COMPLETED 48-53			DAY 24 MO 08 YR 79	
RC CODE 10 503577		ELEVATION 5 0525	BASIN CODE 5 24	

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
			Boulders & Clay	0	29
grey			Hardpan small pebbles & Boulders	29	42
			gravel med-	42	44
grey			Hardpan & gravel layers	44	59
grey			Limestone	59	94

31	0029 805	0042 14 12 3	0044 30	0059 2 14 1 74	0094 2 5
32					

WATER RECORD

WATER FOUND AT - FEET		KIND OF WATER	
0-10 10-13	1 <input checked="" type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	
	2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	
15-18	1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	
	2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	
20-23	1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	
	2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	
25-28	1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	
	2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	
30-33	1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	
	2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	

CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES		MATERIAL		WALL THICKNESS INCHES		DEPTH - FEET	
						FROM	TO
10-11 6-7 06	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input checked="" type="checkbox"/> OPEN HOLE	12	158 W		0 (006)	13-16	
17-18	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input checked="" type="checkbox"/> OPEN HOLE	19			61 94	20-23	0094
24-25	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	26				27-30	

PLUGGING & SEALING RECORD

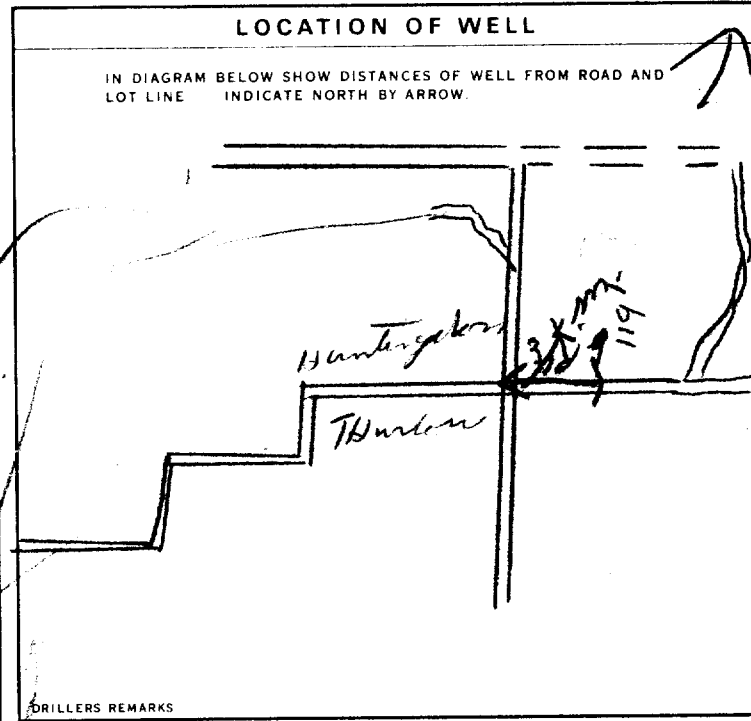
DEPTH SET - FEET		MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
FROM	TO	
10-13	14-17	
18-21	22-25	
26-29	30-33	80

PUMPING TEST

<div style="border: 1px solid black; padding: 2px; display: inline-block;">71</div>	PUMPING TEST METHOD		10	PUMPING RATE		11-14	DURATION OF PUMPING	
	1 <input checked="" type="checkbox"/> PUMP 2 <input type="checkbox"/> BAILER			0002		GPM	01	15-16 HOURS 00
	17-18 MINS							
STATIC LEVEL		WATER LEVEL END OF PUMPING		25	WATER LEVELS DURING			
19-21 04.0		22-24 [Signature]		15 MINUTES 26-28		30 MINUTES 29-31		45 MINUTES 32-34
FEET		FEET		FEET		FEET		60 MINUTES 35-37
IF FLOWING GIVE RATE		38-41		PUMP INTAKE SET AT		WATER AT END OF TEST		42
		GPM		FEET		1 <input checked="" type="checkbox"/> CLEAR 2 <input type="checkbox"/> CLOUDY		
RECOMMENDED PUMP TYPE		RECOMMENDED PUMP SETTING		43-45 089		RECOMMENDED PUMPING RATE		46-49 0002
<input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP				FEET				GPM

LOCATION OF WELL

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



**FINAL
STATUS
OF WELL**

1 ☒ WATER SUPPLY 5 ☐ ABANDONED, INSUFFICIENT SUPPLY
2 ☐ OBSERVATION WELL 6 ☐ ABANDONED POOR QUALITY
3 ☐ TEST HOLE 7 ☐ UNFINISHED
4 ☐ RECHARGE WELL

WATER USE

1 ☐ DOMESTIC
2 ☒ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER

5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING

1 ☐ CABLE TOOL 6 ☐ BORING
2 ☐ ROTARY (CONVENTIONAL) 7 ☐ DIAMOND
4 ☐ ROTARY (REVERSE) 8 ☐ JETTING
4 ☒ ROTARY (AIR) 9 ☐ DRIVING
5 ☐ AIR PERCUSSION

CONTRACTOR

NAME OF WELL CONTRACTOR		LICENCE NUMBER
Manse Donaldson		1805
ADDRESS		
274 Main St. Foptr 20		
NAME OF DRILLER OR BORER		LICENCE NUMBER
Ken Donaldson		1841
SIGNATURE OF CONTRACTOR		SUBMISSION DATE
M. Donaldson		DAY 24 MO 8 YR 79

OFFICE USE ONLY

DATA SOURCE	58 1	CONTRACTOR 59-62 1805	DATE RECEIVED 060979
DATE OF INSPECTION		INSPECTOR	
REMARKS			

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506-4-77

Well Location

Address of Well Location (Street Number/Name) Wilson Rd.		Township Huntingdon	Lot 4	Concession I
County/District/Municipality Hastings		City/Town/Village Centre Hastings	Province Ontario	Postal Code UNK
UTM Coordinates NAD 83	Zone 18	Easting 305144	Northings 4910684	Municipal Plan and Sublot Number
				Other

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Clay	Stones	Packed	0	30
Brown	Sand	Clay, Stones	Loose	30	36.5
Grey	Limestone		Hard	36.5	103

Annular Space			
Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
36.5	12	Peastone	5.7
12	0	Bentonite	

Method of Construction		Well Use	
<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Diamond	<input type="checkbox"/> Public	<input type="checkbox"/> Commercial
<input type="checkbox"/> Rotary (Conventional)	<input type="checkbox"/> Jetting	<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Municipal
<input type="checkbox"/> Rotary (Reverse)	<input type="checkbox"/> Driving	<input type="checkbox"/> Livestock	<input type="checkbox"/> Test Hole
<input type="checkbox"/> Boring	<input type="checkbox"/> Digging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling & Air Conditioning
<input type="checkbox"/> Air percussion		<input type="checkbox"/> Industrial	
<input type="checkbox"/> Other, specify		<input type="checkbox"/> Other, specify	

Construction Record - Casing				Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To	
6.25	Steel	.188	0	36.5	<input checked="" type="checkbox"/> Water Supply
					<input type="checkbox"/> Replacement Well
					<input type="checkbox"/> Test Hole
					<input type="checkbox"/> Recharge Well
					<input type="checkbox"/> Dewatering Well
					<input type="checkbox"/> Observation and/or Monitoring Hole
					<input type="checkbox"/> Alteration (Construction)
					<input type="checkbox"/> Abandoned, Insufficient Supply
					<input type="checkbox"/> Abandoned, Poor Water Quality
					<input type="checkbox"/> Abandoned, other, specify
					<input type="checkbox"/> Other, specify

Construction Record - Screen				
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft)	
			From	To

☐ Insufficient Supply

☐ Abandoned, Poor Water Quality

☐ Abandoned, other, *specify*

☐ Other, *specify*

Water Details		Hole Diameter	
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Depth (m/ft) From	To
36	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify	0	36.5
43	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify	36.5	103
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify		
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify		

Well Contractor and Well Technician Information	
Business Name of Well Contractor Chalk Well Drilling Ltd.	Well Contractor's Licence No. 1 5 0 7
Business Address (Street Number/Name) 31 Johnson's Side Road	Municipality Napanee
Province Ontario	Postal Code K7R 3L1
Business E-mail Address chalkwel kos.net	

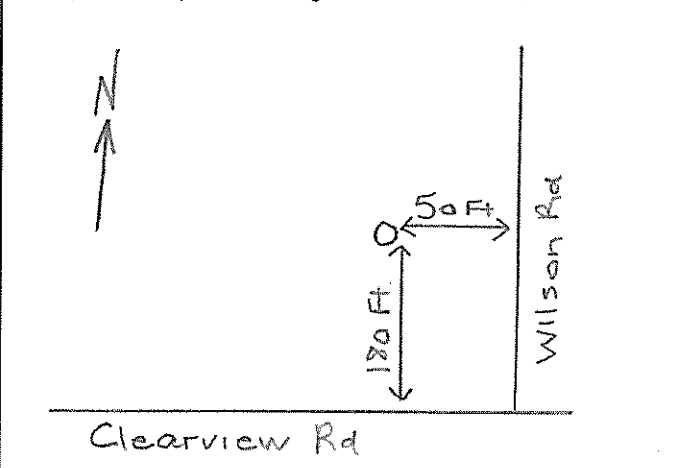
Bus. Telephone No. (inc. area code) 613 888-2809	Name of Well Technician (Last Name, First Name) Chalk, Dan
Well Technician's Licence No. 3 3 0 4	Signature of Technician and/or Contractor Dan Chalk
Date Submitted 2010 07 22	

Results of Well Yield Testing

After test of well yield, water was:		Draw Down		Recovery	
<input checked="" type="checkbox"/> Clear and sand free	<input type="checkbox"/> Other, specify	Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
If pumping discontinued, give reason:		Static Level	3.6		48.6
Pump intake set at (m/ft) 100		1	6.6	1	48.5
Pumping rate (l/min / GPM) 3 g.p.m.		2	7.5	2	47.7
Duration of pumping 4 hrs + 45 min		3	8.6	3	46.9
Final water level end of pumping (m/ft) 48.6		4	9.7	4	46.0
If flowing give rate (l/min / GPM)		5	10.6	5	45.4
Recommended pump depth (m/ft) 100		10	14.9	10	40.7
Recommended pump rate (l/min / GPM) 6 g.p.m.		15	18.5	15	39.5
Well production (l/min / GPM) 3 g.p.m.		20	21.0	20	39.4
Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		25	23.3	25	37.9
		30	25.3	30	36.2
		40	28.1	40	31.2
		50	30.2	50	30.8
		60	31.6	60	30.7

Map of Well Location

Please provide a map below following instructions on the back.



Well owner's information package delivered <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered 2010 07 22	Ministry Use Only Audit No. 2115320 Rece JAN 05 2011
Date Work Completed 2010 07 22		

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (<https://data.ontario.ca/dataset/well-records>) .

[Go Back to Map](#)

Well ID

Well ID Number: 7405820

Well Audit Number: Z373582

Well Tag Number: A312736

This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	
Township	THURLOW TOWNSHIP
Lot	007
Concession	CON 09

County/District/Municipality	HASTINGS
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 305217.00 Northing: 4910434.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed

--	--	--	--

Method of Construction & Well Use

Method of Construction	Well Use	

Status of Well

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To	

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To	

--	--	--	--

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 1507

Results of Well Yield Testing

After test of well yield, water was		
If pumping discontinued, give reason		
Pump intake set at		
Pumping Rate		
Duration of Pumping		
Final water level		
If flowing give rate		
Recommended pump depth		
Recommended pump rate		
Well Production		
Disinfected?		

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
45		45	

50		50	
60		60	

Water Details

Water Found at Depth	Kind	

Hole Diameter

Depth From	Depth To	Diameter	

Audit Number: Z373582**Date Well Completed:** October 09, 2021

Date Well Record Received by MOE: December 14, 2021

Related

How to use a Ministry of the Environment map (<https://www.ontario.ca/page/how-use-ministry-environment-map#wells>)

Technical documentation: Metadata record (<https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77>)

Updated: October 18, 2021

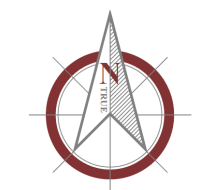
Published: March 20, 2014

Appendix B

Hydrographs

- NOTES:
- 1) Testing carried out on July 31-August 1, 2023
 - 2) On-site pressure and temperature data collected using a Solinst Model 3001 datalogger transducer.
 - 3) Water level data is not corrected for fluctuations in barometric pressure.

Key Plan:

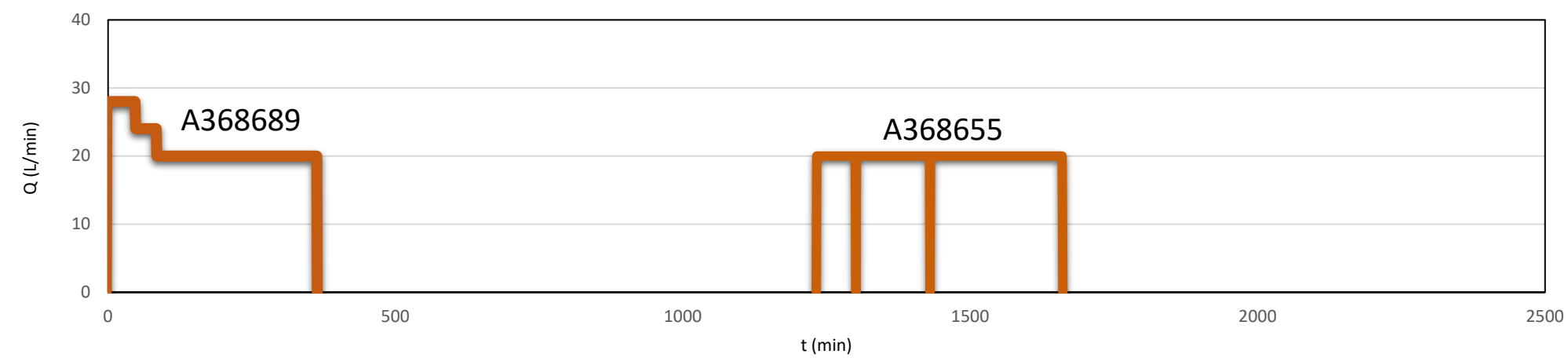
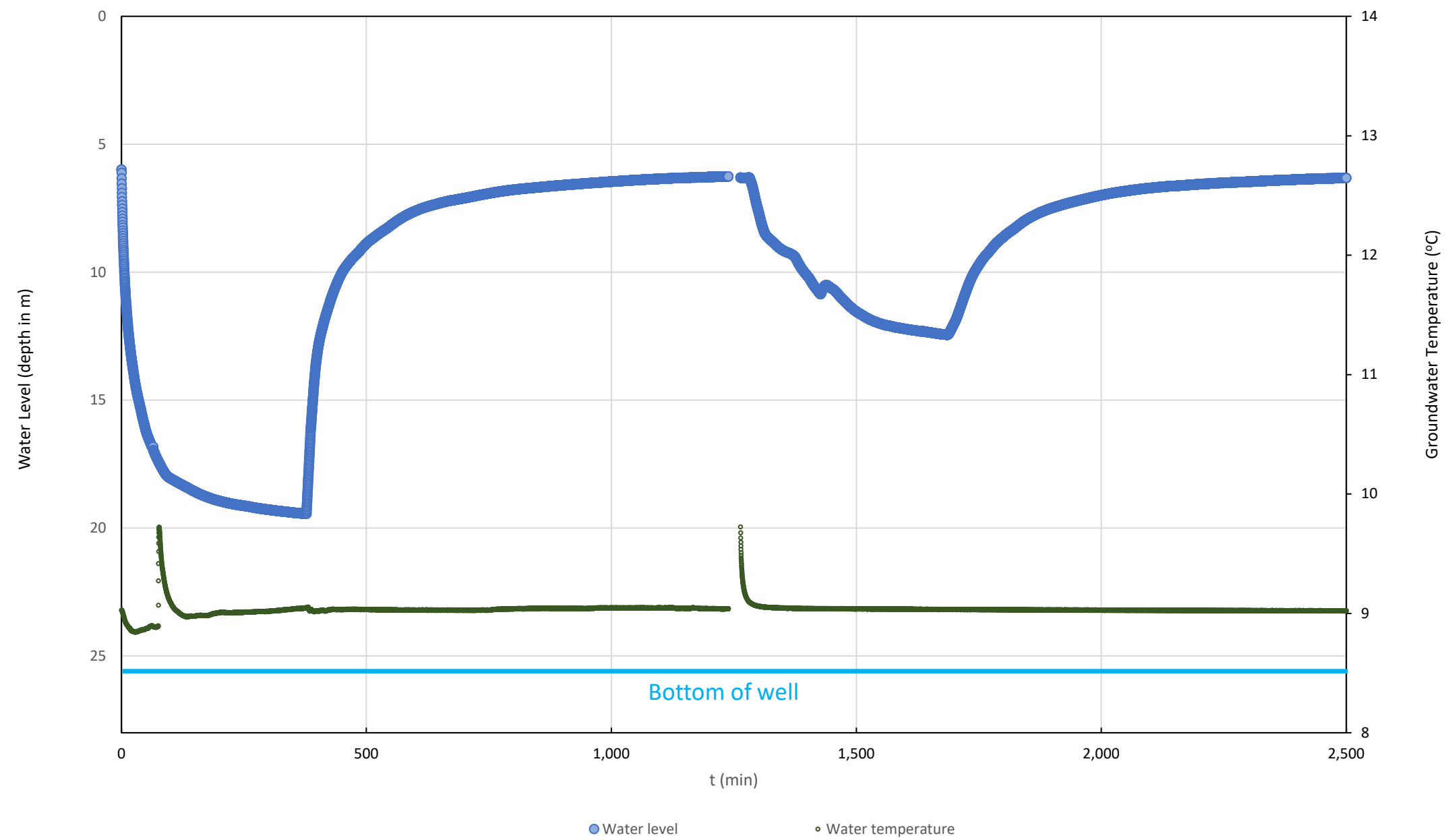


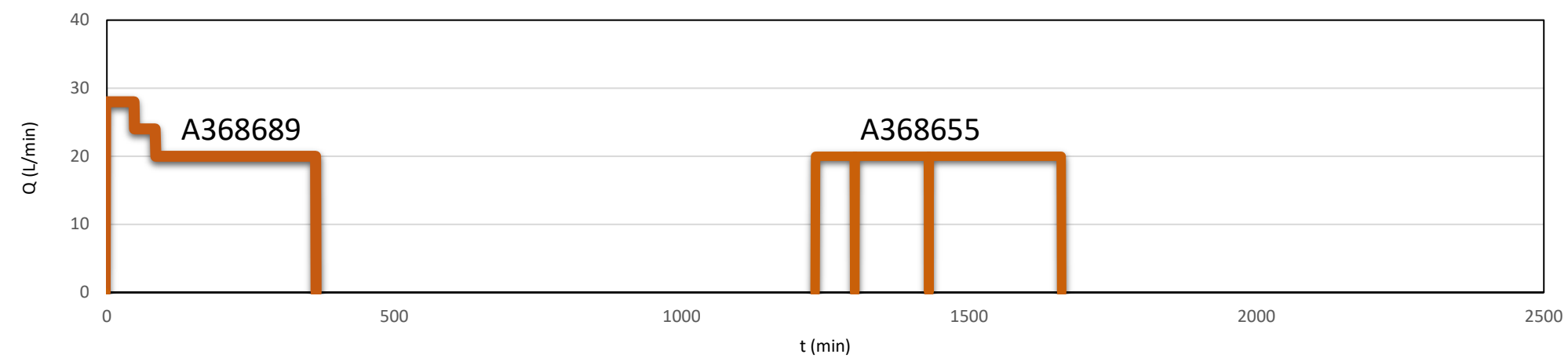
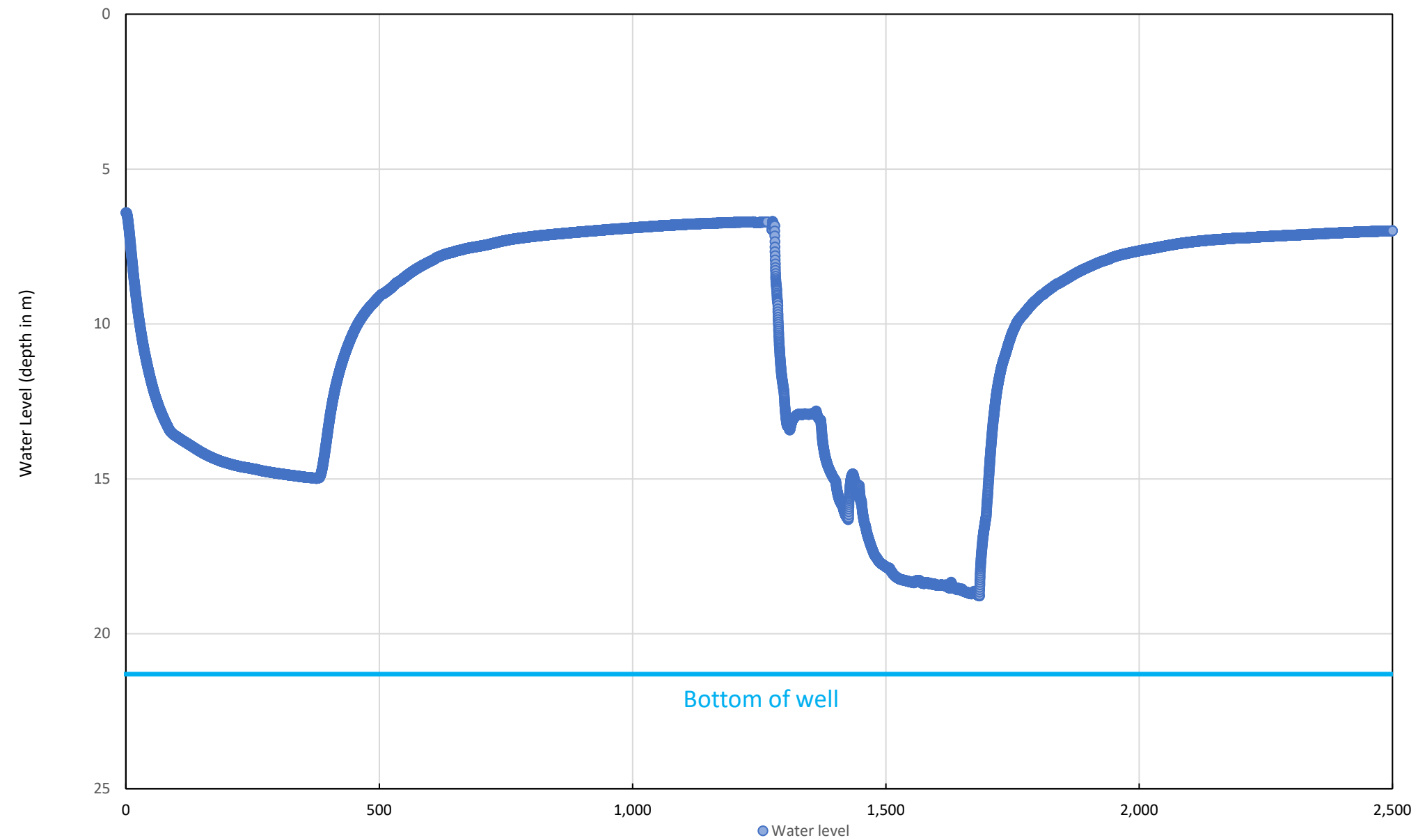
PROJECT 2338579:

HYDROGEOLOGICAL ASSESSMENT
287 KELLY ROAD
FOXBORO, ONTARIO

FIGURE 1:

WELL HYDROGRAPH – A368689 (TW 1)
JULY 31, 2023 – AUGUST 1, 2023

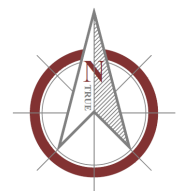




NOTES:

- 1) Testing carried out on July 31-August 1, 2023
- 2) On-site pressure and temperature data collected using a Solinst Model 3001 datalogger transducer.
- 3) Water level data is not corrected for fluctuations in barometric pressure.
- 4) Temperature data for this graph was not accurate and was intentionally excluded.

Key Plan:

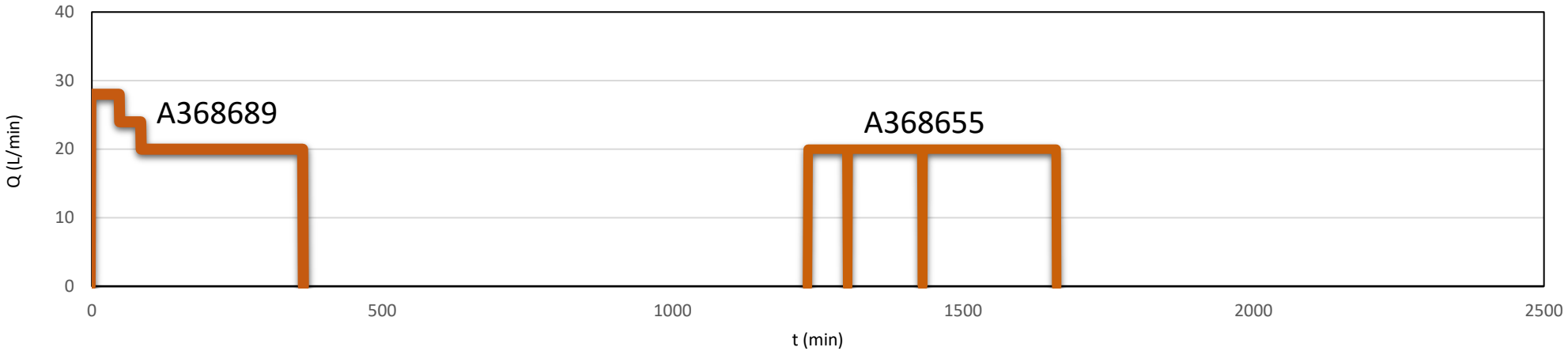
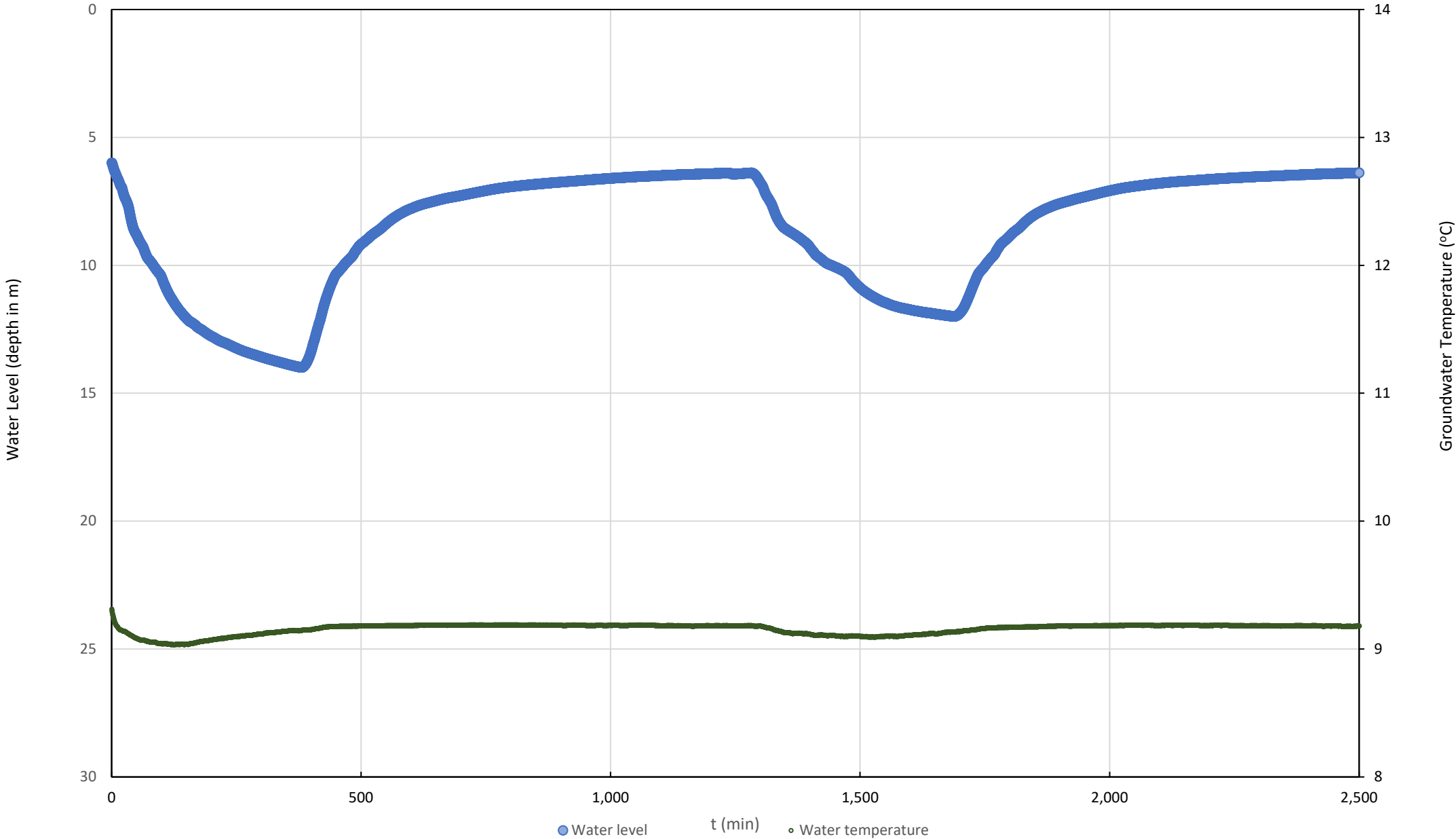


PROJECT 2338579:

HYDROGEOLOGICAL ASSESSMENT
287 KELLY ROAD
FOXBORO, ONTARIO

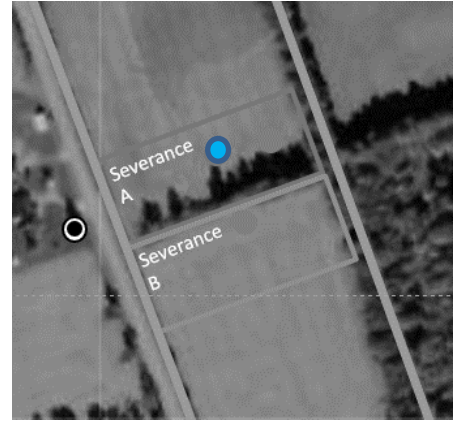
FIGURE 2:

WELL HYDROGRAPH – A368655 (TW 2)
JULY 31, 2023 – AUGUST 1, 2023



- NOTES:**
- 1) Testing carried out on July 31-August 1, 2023
 - 2) On-site pressure and temperature data collected using a Solinst Model 3001 datalogger transducer.
 - 3) Water level data is not corrected for fluctuations in barometric pressure.

Key Plan:



PROJECT 2338579:
HYDROGEOLOGICAL ASSESSMENT
287 KELLY ROAD
FOXBORO, ONTARIO

FIGURE 3:
WELL HYDROGRAPH – DECOM. WELL (MW)
JULY 31, 2023 – AUGUST 1, 2023

Appendix C

Laboratory Certificates of Analysis

C.O.C.: G

REPORT No: 23-019687 - Rev. 0

Report To:

The Greer Galloway Group
1620 Wallbridge-Loyalist Road, RR #5
Belleville, ON K8N 4Z5

CADUCEON Environmental Laboratories

285 Dalton Ave
Kingston, ON K7K 6Z1

Attention: Kirby Magee-Dittburner

DATE RECEIVED: 2023-Aug-01
DATE REPORTED: 2023-Aug-17
SAMPLE MATRIX: Ground Water

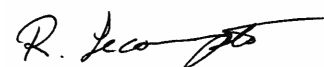
CUSTOMER PROJECT: Kelly HydroG
P.O. NUMBER: 2338579

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Anions (Liquid)	2	OTTAWA	PCURIEL	2023-Aug-03	A-IC-01	SM 4110B
Colour (Liquid)	2	OTTAWA	STAILLON	2023-Aug-04	A-COL-01	SM 2120C
Cond/pH/Alk Auto (Liquid)	2	OTTAWA	SBOUDREAU	2023-Aug-03	COND-02/PH-02/A LK-02	SM 2510B/4500H/ 2320B
Coliforms - DC Media (Liquid)	2	KINGSTON	BBURTCH	2023-Aug-02	ECTC-001	MECP E3407
DOC/DIC (Liquid)	2	OTTAWA	VKASYAN	2023-Aug-08	C-OC-01	EPA 415.2
Ion Balance (Calc)	2	OTTAWA	STAILLON		CP-028	MECP E3196
ICP/OES (Liquid)	2	OTTAWA	NHOGAN	2023-Aug-08	D-ICP-01	SM 3120B
Ammonia (Liquid)	2	KINGSTON	KDIBBITS	2023-Aug-08	NH3-001	SM 4500NH3
Organic Nitrogen (Liquid)	2	KINGSTON	KDIBBITS	2023-Aug-10	TPTKN-001	MECP E3516.2
Sulphide (Liquid)	2	KINGSTON	KWELCH	2023-Aug-03	H2S-001	SM 4500-S2
Tannins (Liquid)	2	KINGSTON	EHINCH	2023-Aug-08	TAN-001	SM 5550
TP & TKN (Liquid)	2	KINGSTON	KDIBBITS	2023-Aug-03	TPTKN-001	MECP E3516.2
Turbidity (Liquid)	2	OTTAWA	MDON	2023-Aug-03	A-TURB-01	SM 2130B

R.L. = Reporting Limit

NC = Not Calculated

Test methods may be modified from specified reference method unless indicated by an *



Richard Lecompte
Laboratory Supervisor

CADUCEON Environmental Laboratories Certificate of Analysis

Final Report
REPORT No: 23-019687 - Rev. 0

			Client I.D.	TW1	TW2
			Sample I.D.	23-019687-1	23-019687-2
			Date Collected	2023-07-31	2023-08-01
Parameter	Units	R.L.		-	-
Total Coliform (DC Media)	CFU/100mL	1		NDOGT	0
E coli (DC Media)	CFU/100mL	1		NDOGT	0
Background (DC Media)	CFU/100mL	1		NDOGT	0
Alkalinity(CaCO3) to pH4.5	mg/L	5		258	277
pH @25°C	pH units	-		7.94	7.89
Conductivity @25°C	uS/cm	1		523	575
Colour	TCU	2		<2	<2
Turbidity	NTU	0.1		6.8	9.5
Fluoride	mg/L	0.1		0.3	<0.1
Chloride	mg/L	0.5		4.1	4.5
Nitrate (N)	mg/L	0.05		0.09	0.32
Nitrite (N)	mg/L	0.05		<0.05	<0.05
Sulphate	mg/L	1		19	22
Total Kjeldahl Nitrogen	mg/L	0.1		0.1	<0.1
Ammonia (N)-Total (NH3+NH4)	mg/L	0.05		0.05	<0.05
Organic Nitrogen	mg/L	0.1		<0.1	<0.1
Dissolved Organic Carbon	mg/L	0.2		2.0	2.0
Tannin & Lignin	mg/L	0.5		<0.5	<0.5
Sulphide	mg/L	0.01		0.01	<0.01
Hardness (as CaCO3)	mg/L as CaCO3	0.02		263	292
Calcium	mg/L	0.02		71.8	81.6



Richard Lecompte
Laboratory Supervisor

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

CADUCEON Environmental Laboratories Certificate of Analysis

Final Report
REPORT No: 23-019687 - Rev. 0

			Client I.D.	TW1	TW2
			Sample I.D.	23-019687-1	23-019687-2
			Date Collected	2023-07-31	2023-08-01
Parameter	Units	R.L.		-	-
Copper	mg/L	0.002		<0.002	0.009
Iron	mg/L	0.005		0.163	0.560
Magnesium	mg/L	0.02		20.2	21.3
Manganese	mg/L	0.001		0.026	0.027
Potassium	mg/L	0.1		2.4	2.1
Silica	mg/L	2		11	10
Sodium	mg/L	0.2		9.5	8.8
Zinc	mg/L	0.005		<0.005	0.010
Anion Sum	meq/L	-		5.69	6.14
Cation Sum	meq/L	-		5.73	6.29
% Difference	%	-		0.379	1.24
TDS (Ion Sum Calc)	mg/L	1		283	308
Conductivity Calc	µmho/cm	-		521	564



Richard Lecompte
Laboratory Supervisor

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

C.O.C.: Kelly H.G-TW1

REPORT No: 23-021573 - Rev. 0

Report To:

The Greer Galloway Group
1620 Wallbridge-Loyalist Road, RR #5
Belleville, ON K8N 4Z5

CADUCEON Environmental Laboratories

285 Dalton Ave
Kingston, ON K7K 6Z1

Attention: Kirby Magee-Dittburner

DATE RECEIVED: 2023-Aug-18
DATE REPORTED: 2023-Aug-22
SAMPLE MATRIX: Ground Water

CUSTOMER PROJECT: Kelly HydroG
P.O. NUMBER: 2338579

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Coliforms - DC Media (Liquid)	1	KINGSTON	BBURTCH	2023-Aug-18	ECTC-001	MECP E3407
Fecal Coliforms (Liquid)	1	KINGSTON	BBURTCH	2023-Aug-18	FC-001	SM 9222D

R.L. = Reporting Limit

NC = Not Calculated

Test methods may be modified from specified reference method unless indicated by an *

Client I.D.	Sample I.D.	Date Collected	Parameter	Total Coliform (DC Media)	E coli (DC Media)	Fecal Coliform
			Units	CFU/100mL	CFU/100mL	CFU/100mL
			R.L.	1	1	1
				-	-	-
TW1 Resample	23-021573-1	2023-Aug-17		NDOGN	NDOGN	0

NDOGN - No Data Overgrown with Non-Target Bacteria



Brandon Burtch
Microbiology Supervisor

C.O.C.: Kelly HydroG

REPORT No: 23-023040 - Rev. 0

Report To:

The Greer Galloway Group
1620 Wallbridge-Loyalist Road, RR #5
Belleville, ON K8N 4Z5

CADUCEON Environmental Laboratories

285 Dalton Ave
Kingston, ON K7K 6Z1

Attention: Kirby Magee-Dittburner

DATE RECEIVED: 2023-Aug-31
DATE REPORTED: 2023-Sep-05
SAMPLE MATRIX: Ground Water

CUSTOMER PROJECT: Kelly HydroG
P.O. NUMBER: 2338579

Analyses	Qty	Site Analyzed	Authorized	Date Analyzed	Lab Method	Reference Method
Coliforms - DC Media (Liquid)	1	KINGSTON	BBURTCH	2023-Aug-31	ECTC-001	MECP E3407

R.L. = Reporting Limit

NC = Not Calculated

Test methods may be modified from specified reference method unless indicated by an *

Client I.D.	Sample I.D.	Date Collected	Parameter	Total Coliform (DC Media)	E coli (DC Media)
			Units	CFU/100mL	CFU/100mL
			R.L.	1	1
				-	-
Resample	23-023040-1	2023-Aug-29		0	0



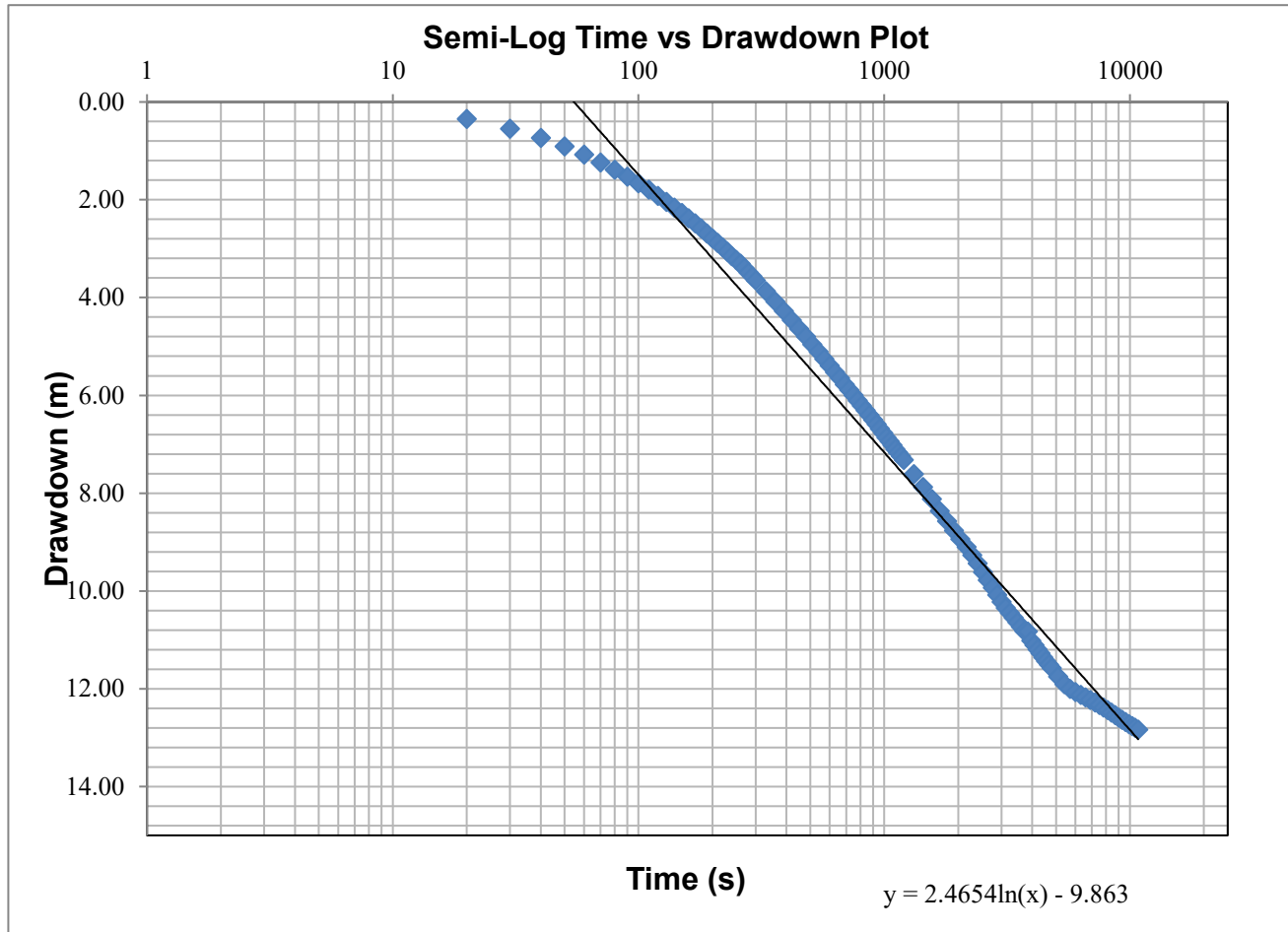
Brandon Burtch
Microbiology Supervisor

Appendix D

Cooper-Jacob Time-Drawdown Analysis

Cooper-Jacob Time Drawdown Analysis

Location : 287 Kelly Road
Client : Charles Kelly
Date of Test : July 31, 2023
Well ID : A368689



$$s = \frac{2.3Q}{4\pi T} \log_{10}\left(\frac{2.25Tt}{r^2S}\right)$$

$$T = \frac{2.3Q}{4\pi \Delta s}$$

Where:

s = drawdown at observation well (m)

Q = flow rate out of pumping well (m³/sec)

T = Transmissivity of the aquifer (m²/sec)

r = Distance from pumping well to observation well (m)

t = Elapsed time since start of pumping (sec)

S = Storativity of the aquifer (unitless)

Δs = Amount of drawdown over one log cycle (m).

Transmissivity (m²/day)

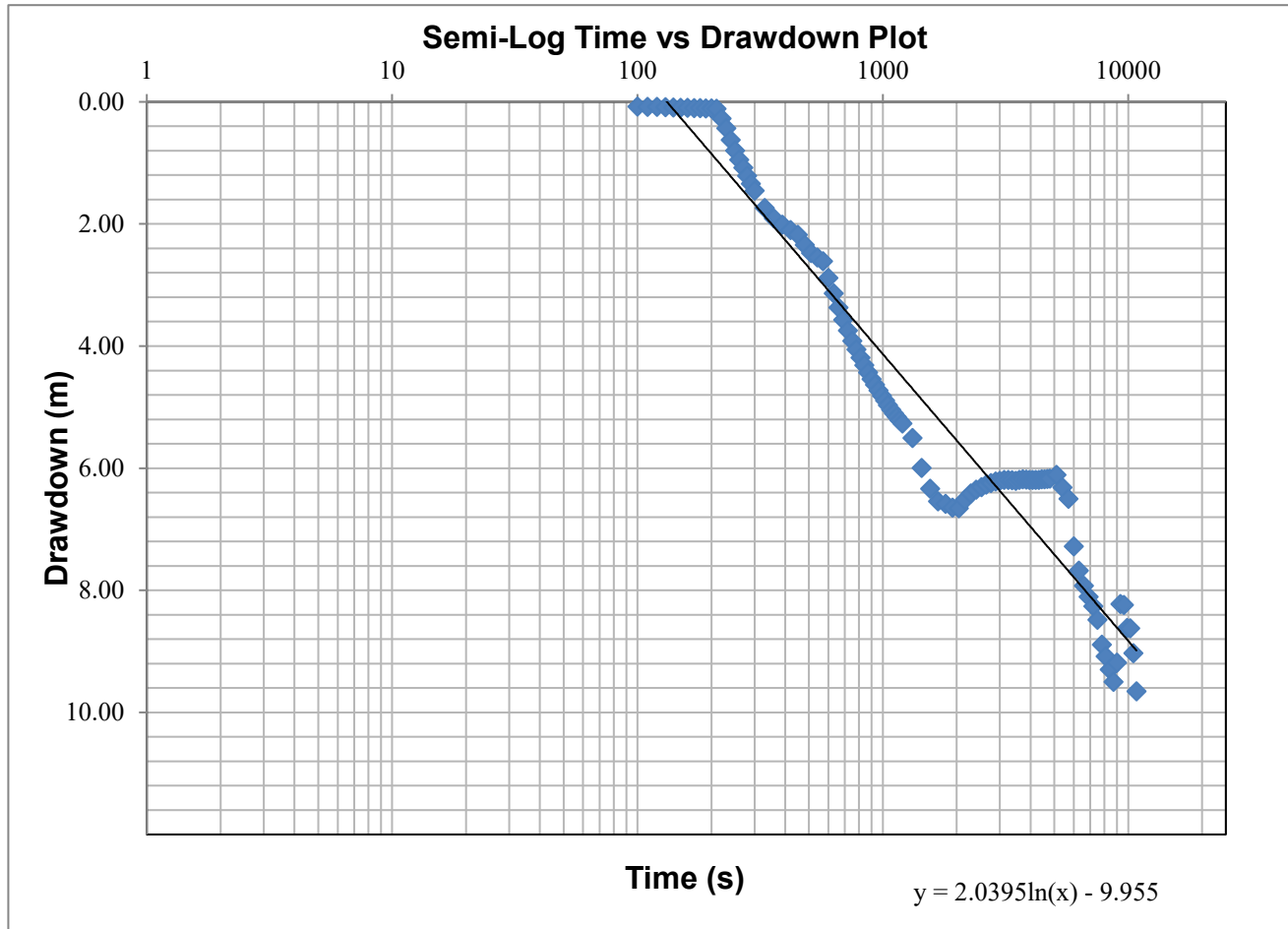
1.03

Horz. Hydraulic Conductivity (m/s)

4.79E-07

Cooper-Jacob Time Drawdown Analysis

Location : 287 Kelly Road
Client : Charles Kelly
Date of Test : August 1, 2023
Well ID : A368655



$$s = \frac{2.3Q}{4\pi T} \log_{10} \left(\frac{2.25Tt}{r^2S} \right)$$

$$T = \frac{2.3Q}{4\pi \Delta s}$$

Where:

s = drawdown at observation well (m)

Q = flow rate out of pumping well (m³/sec)

T = Transmissivity of the aquifer (m²/sec)

r = Distance from pumping well to observation well (m)

t = Elapsed time since start of pumping (sec)

S = Storativity of the aquifer (unitless)

Transmissivity (m²/day)

1.26

Horz. Hydraulic Conductivity (m/s)

5.81E-07