

HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



Project No.: CCO-20-0203

Prepared for:

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EXECUTIVE SUMMARY

McIntosh Perry (MP) was retained by 1384341 Ontario Limited (Cavanagh Construction) to conduct a Hydrogeological Assessment and Terrain Analysis at Gardiner's Shore in the Township of Beckwith, Ontario (the Site) (Figure 1). The site is bounded by 9th Line Road and 10th Line Road, east of Gardiner's Shore Road and is located within the community development zone of Blacks Corners in Beckwith Township. An outline of the Site, showing the neighbouring portions of Beckwith is presented on Figure 2. At the present time, the Site consists primarily of agricultural fields.

The Site is relatively flat, with the land generally sloping downward to the north side of the property. The elevation ranges between 136 and 148.5 metres above sea level (m asl), with the majority of the site at an elevation between 140 and 144 metres above sea level (m asl).

McIntosh Perry supervised the installation of seven on-site water wells, as well as ten on-site test pits. Wells were used for groundwater quality and quantity testing, and all test well locations were slotted for eventual domestic use when the Site is developed. Test pit data were collected for purposes of soil classification and overburden thickness. A summary of the test wells and test pit locations is illustrated on Figure 2.

All test wells were pumped for at least six hours and were sampled twice during this time, per Ministry of Environment, Conservation and Parks (MECP) Procedure D-5-5. Analytical data and pumping test results from all test wells suggests that on-site water supply aquifer is of high yield and good quality.

Test pit excavations revealed on-site shallow overburden to consist of either a thin continuous layer of silty sand to sand with gravel, or shallow bedrock overlain by topsoil. Bedrock was found at a maximum depth of approximately 2.4 metres below ground surface (m bgs) and generally consists of dolostone and sandstone based on Ontario Geological Survey (OGS) and MECP Water Well Information System (WWIS) records (2020).

The site appears to be suitable for the proposed development, from a hydrogeological perspective.

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1.0 INTRODUCTION

McIntosh Perry (MP) was retained by 1384341 Ontario Limited (Cavanagh Construction) to conduct a Hydrogeological Assessment and Terrain Analysis at a property located immediately east of Gardiner Shore Road, between 9th Line Road and 10th Line Road in the Township of Beckwith, Ontario (the Site) (Figure 1). This study has been prepared in support of an application for the approval of a proposed 118-lot subdivision at the Site, which currently consists primarily of agricultural fields.

This work was conducted in general accordance with Ministry of Environment, Conservation and Parks (MECP) guidance as follows:

- Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment (August 1996); and
- Procedure D-5-4: Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment (August 1996).

This work was initiated by McIntosh Perry in late 2020 with a Site reconnaissance to observe surface conditions and select drilling locations. The work presented herein involved the following:

- Topographic survey (completed by Cavanagh Construction);
- Hydrogeological assessment (for evaluating water supply); and
- Terrain Analysis (for evaluating existing conditions for private sewage treatment).

The property is owned by Cavanagh Construction and is legally described as follows:

LT 7 CON 9 BECKWITH; NE1/2 LT 8 CON 9 BECKWITH; SW1/2 LT 8 CON 9 BECKWITH EXCEPT PT 1, 27R2704, PT 1, 27R7971, PARTS 1 TO 4, 27R221, RS83491, RS111170, PART 1 ON 27R9778 AND PART 1 ON 27R10784 BECKWITH TOWNSHIP.

A full Preliminary Concept Plan is included as Appendix A.

This report considers the development potential of the entire land holding, which includes a total of 118 lots over a total area of approximately 84 hectares. The Hydrogeological Assessment and Terrain Analysis address the following:

- General Site setting information;
- Geological and hydrogeological background;
- Site-specific conditions;
- Soils evaluation; and
- Contaminant attenuation.

2.0 INVESTIGATION

2.1 Site Setting

The Site is located within the Township of Beckwith in central Eastern Ontario, south of the Town of Carleton Place (Figure 1).

While the Site is currently primarily used for agricultural purposes, a rural-residential severance with a single detached residence, as well as associated garages, sheds, and agricultural structures exists on the southern portion of the Site, along 9th Line Road. There are residentially developed lands immediately west of the Site, along Mississippi Lake, otherwise the surrounding land use is predominately rural agriculture or vacant/forested.

This region is characterized by thin overburden overlying Paleozoic bedrock (OGS, 2020; MECP, 2020). The climate is humid continental with cool winters and warm summers. The 1981-2010 mean annual precipitation is approximately 943.4 mm with 223.5 cm as snow, and the mean daily temperature is 6.4 °C (Environment Canada Climate Normals for Ottawa MacDonald-Cartier Int'l Airport, ON).

The Site currently consists of agricultural fields and has likely never been contemporarily developed. On-site elevation ranges between 136 and 148.5 metres above sea level (m asl), with the majority of the site at an elevation between 140 and 144 metres above sea level (m asl). The topography of the Site is generally flat and slopes downwards slightly to the west.

2.2 Neighbouring Properties and Land Uses

The property is bounded to the north by 10th Line Road, undeveloped forest and rural residential to the east, 9th Line Road to the south, and Gardiner Shore Road and residential properties to the west.

Based on a review of MECP Well Record Information System (WWIS) records, it appears that all residences in the area are privately serviced with wells and septic systems.

The surrounding properties are designated as rural areas in the Township of Beckwith's Official Plan. The Township's Official Plan – Schedule A is included as Appendix H.

2.3 Hydrology

The Site is relatively flat and appears to be well-drained. McGibbon Bay (part of the Mississippi River system) is the closest permanent waterbody to the Site and is located approximately 150 m west of the Site at its closest point. On a local scale, shallow groundwater flow is interpreted to reflect local topography and flow to the west.

2.4 Background Geology and Hydrology

2.4.1 *Surficial and Bedrock Geology*

According to Ontario Geological Survey (OGS) regional mapping, surficial overburden at the Site is thin, and is characterized by Paleozoic bedrock (OGS, 2020). This classification is consistent with on-site observations made by McIntosh Perry. Based on OGS 2020 data, the underlying bedrock is classified as quartz sandstone of the Nepean Formation and crystalline dolostone of the Oxford Formation, which is consistent with MECP WWIS Records (MECP 2020).

Well records for on-site test wells indicate an average overburden thickness of approximately 1.3 m (median 0.6 m), with only one record indicating an overburden depth greater than 1.8 m. A review of the MECP Water Well Information System (WWIS) well records within 500 m of the Site showed that the depth to bedrock ranges from 0 – 8.2 m bgs, with an average depth of approximately 1.1 m bgs. Where noted in the well records, bedrock is typically referred to as either “sandstone” or “limestone” by the driller (Appendix H).

2.4.2 *Recharge and Discharge Areas*

A review of topographic data, geological maps, and Site visits show that the property slopes down to the west, towards the Mississippi River. Shallow groundwater and surface water likely drain in this direction. Shallow groundwater in the southern portion of the site may move toward what appears to be a large wetland complex, McGibbon Creek, located approximately 150 m from the Site at its closest point. Overall, the Site appears to be well-drained.

2.4.3 *Hydrogeologically Sensitive Areas*

The underlying bedrock appears to be continuous across the property, at an average depth of 1.3 m bgs. While much of the Site is considered to have shallow bedrock, no outcrops or areas exhibiting karst topography were observed during fieldwork.

2.4.4 *Potential Sources of Contamination*

A windshield survey of the area was conducted in combination with a review of maps and zoning information. The Site is located in a predominantly forested and agricultural area, with some rural subdivisions and residential-rural properties in the vicinity. None of these uses appear to pose any significant source of potential contamination to the proposed development.

It is expected that since there is no wastewater service available in the area surrounding the Site, there are likely individual on-site sewage systems at nearby residences. There are currently no known services located on the Site, aside from private services assumed to service the single detached residence and associated agricultural buildings along 9th Line Road

A review of the MECP WWIS database indicated 127 water wells located within 500 m of the Site. 121 of these wells are listed for domestic purposes, while the remaining 6 wells have either no listed use or are abandoned. The MECP WWIS records are shown on Figure 2, and data are summarized in Appendix H.

3.0 HYDROGEOLOGICAL ASSESSMENT

3.1 Preamble

McIntosh Perry conducted a detailed hydrogeological investigation at the Site to assess the feasibility of individual private wells for servicing the proposed residential lots. As noted in Section 1, the work generally followed the Guidance of MECP Procedure D-5-5: Technical Guideline for Private Wells – Water Supply Assessment.

3.2 Methodology

Air Rock Drilling Ltd. (Air Rock; Well Contractor’s Licence No.1119) was retained by Cavanagh Construction to drill seven water wells at the Site for testing purposes and eventual domestic use when the property is developed. The drilling was conducted by licensed employees of Air Rock, and McIntosh Perry personnel observed the grouting of each well per O. Reg. 903 (Wells), as amended. The driller also provided and installed a pump for all pumping test activities. A summary of the test well construction based on driller-provided well records is presented in Table 1. The location of all on-site wells is noted on Figure 2.

Table 1: On-Site Test Well Details

| Well ID | Depth (m bgs) | Completion Material ¹ | Driller’s Estimated Yield ² (L/min) |
|---------|---------------|----------------------------------|--|
| TW 1 | 24.4 | Sandstone | 75 |
| TW 2 | 30.8 | Sandstone | 75 |
| TW 3 | 30.5 | Sandstone | 75 |
| TW 4 | 33.5 | Sandstone | 75 |
| TW 5 | 24.7 | Sandstone | 75 |
| TW 6 | 42.7 | Sandstone | 75 |

| | | | |
|------|------|-----------|-----------------|
| TW 7 | 36.6 | Sandstone | 75 ³ |
|------|------|-----------|-----------------|

¹ Bedrock formations as noted on Well Record

² Recommended pumping rate as noted on Well Record

³ Test Well 7 observed to be artesian (flow) at an approximate rate of 3.8 L/min

The initial estimation of the yield and quality of water from the test well was made by the drillers during development, which occurred approximately one week after drilling was completed. The yield determined by this one-hour test is noted in Table 1. MECP water well records are provided in Appendix H.

A minimum six-hour pumping test was conducted at each of the seven test wells by McIntosh Perry staff (December 2020 – January 13, 2021). During each test, a single well was pumped at a rate not less than the driller-recommended pumping rate, and water levels were measured in the pumped well and at other on-site test wells in the vicinity, where possible. Water quality was also monitored and recorded in the field during the tests at all seven locations. Two water samples were collected from each pumped well during their respective tests (one each during the first and last hours of the test) for analysis of the “subdivision supply” suite of parameters, in addition to a select suite of metals. Additional resamples were collected at select wells where necessary, as detailed in subsequent sections of this report.

All samples were collected unfiltered and unchlorinated directly into clean bottles supplied by the analytical laboratory (Eurofins of Ottawa, ON). Prior to each sample collection, a field test for chlorine (disposable testing strips) was completed to ensure no residual chlorine persisted from the initial well shocking. Samples were kept on ice and shipped directly to Eurofins under strict chain of custody procedures. All samples were received by the laboratory within 24 hours of collection. Eurofins is fully accredited by the Standards Council of Canada/Canadian Association for Laboratory Accreditation (SCC/CALA) and has accreditation for Ontario Safe Drinking Water Act (OSDWA) testing.

During all seven pumping tests, water level monitoring consisted of manual readings with a water level tape. Drawdown was measured in the pumped wells and measurements were made until at least 95% recovery was achieved in the pumping well, or 24 hours had passed (whichever came first).

Water level drawdown and recovery data from the pumping tests were plotted and analyzed using the Cooper-Jacob solution, and were used to calculate transmissivity (T) and hydraulic conductivity (K) for the aquifer. Storativity (S) of the aquifer was estimated wherever suitable observation well measurements could be made.

3.3 Results

Drawdown curves and tabular data from the pumping tests are available in Appendix D and Table 3, respectively. A summary of groundwater quality data and the official Laboratory Certificates of Analysis are available in Appendix B.

3.3.1 *Static Conditions*

Prior to the initiation of pumping, water levels were measured in the seven test wells (Table 2, below). The static groundwater elevation ranged between 138.485 – 140.339 m asl at the time of the pumping tests (Figure 4). Static groundwater elevations suggest that on-site bedrock groundwater flow is likely to the southwest, toward Mississippi Lake. On-site wells were completed in a similar geologic unit (listed by the driller as “sandstone”). Well depths are noted in Table 2, below.

Table 2: Test Well Information

| Well ID | Well Depth (m bgs) | Top of Well Casing Elevation (m asl) ¹ | Static Groundwater Level (m btoc) | Static Water Elevation (m asl) |
|---------|--------------------|---|-----------------------------------|--------------------------------|
| TW 1 | 24.38 | 146.12 | 5.781 | 140.339 |
| TW 2 | 30.78 | 143.14 | 4.175 | 138.965 |
| TW3 | 30.48 | 141.21 | 2.725 | 138.485 |
| TW4 | 33.53 | 139.92 | 0.781 | 139.139 |
| TW5 | 24.69 | 139.94 | 1.668 | 138.272 |
| TW6 | 42.67 | 143.27 | 4.274 | 138.996 |
| TW7 | 36.58 | 138.14 | (flowing) | (flowing) |

¹ As measured by McIntosh Perry Surveyors Inc. (January 2021)

3.3.2 *Pumping Tests*

Pumping tests were conducted at each of the seven wells by McIntosh Perry. The pump, hose, and power supply were provided by Air Rock, who installed and removed the pump from each well. The discharged water

was directed away from each pumping well and allowed to flow overland away and downgradient of the Site. At the time of the pumping tests, the weather was approximately between -3 °C and 0 °C, with sun and clouds.

All the water level measurement data are presented in Table 3.

TW 1

TW 1 was drilled to a depth of 24.38 m. The overburden was approximately 0.31 m thick at this location. A 12.8 m long steel casing (including approximately 0.61 m of above-ground stickup) was installed in the hole and sealed with a cement/bentonite grout. The hole was grouted from approximately 12.2 m to the ground surface. The remainder of the well is an open hole in the rock. The driller described the rock as “limestone” from 0.305 – 8.53 m, and “sandstone” from 8.53 – 24.38 m. Water was encountered at 22.86 m bgs.

The driller initially estimated a yield of 91 L/min (20 gal/min), which was also the final recommended pumping rate for this well.

McIntosh Perry undertook a pumping test at this location on January 11, 2021. The well was pumped at a rate of 100 L/min for over six hours. The drawdown stabilized at approximately 0.6 m btoc (~145.477 m asl). Over 95% recovery in water level was achieved within 24 hours of terminating the test.

TW 2

TW 2 was drilled to a depth of 30.78 m. The overburden was approximately 0.31 m thick at this location. A 12.8 m long steel casing (including approximately 0.61 m of above-ground stickup) was installed in the hole and sealed with a cement/bentonite grout. The hole was grouted from approximately 12.2 m to the ground surface. The remainder of the well is an open hole in the rock. The rock was described as “sandstone” from 0.31 – 30.78 m by the driller. Water was encountered at 15.24 m bgs and again at 28.65 m bgs.

The driller initially estimated a yield of 91 L/min (20 gal/min), which was also the final recommended pumping rate for this well.

McIntosh Perry undertook a pumping test at this location on January 12, 2021. The well was pumped at a rate of 90 L/min for over six hours. The drawdown stabilized at approximately 4.2 m btoc (~138.968 m asl). Over 95% recovery in water level was achieved within 24 hours of terminating the test.

TW 3

TW 3 was drilled to a depth of 30.48 m. The overburden was approximately 0.31 m thick at this location. A 12.8 m long steel casing (including approximately 0.61 m of above-ground stickup) was installed in the hole and sealed with a cement/bentonite grout. The hole was grouted from approximately 12.2 m to the ground surface. The remainder of the well is an open hole in the rock. The driller described the rock as “limestone” from 0.31 – 6.71 m, and “sandstone” from 6.71 – 30.48 m. Water was encountered at 28.65 m bgs.

The driller initially estimated a yield of 91 L/min (20 gal/min), which was also the final recommended pumping rate for this well.

McIntosh Perry undertook a pumping test at this location on January 13, 2021. The well was pumped at a rate of 93 L/min for over six hours. The drawdown stabilized at approximately 0.8 m btoc (~140.399 m asl). Over 95% recovery in water level was achieved within 24 hours of terminating the test.

TW 4

TW 4 was drilled to a depth of 33.53 m. The overburden was approximately 4.57 m thick at this location. A 12.8 m long steel casing (including approximately 0.61 m of above-ground stickup) was installed in the hole and sealed with a cement/bentonite grout. The hole was grouted from approximately 12.2 m to the ground surface. The remainder of the well is an open hole in the rock. The rock was described as “sandstone” from 4.57 – 33.53 m by the driller. Water was encountered at 26.82 m bgs, 29.26 m bgs, and again at 31.70 m bgs.

The driller initially estimated a yield of 91 L/min (20 gal/min), which was also the final recommended pumping rate for this well.

McIntosh Perry undertook a pumping test at this location on December 22, 2020. The well was pumped at a rate of 109 L/min for over six hours. The drawdown stabilized at approximately 1.4 m btoc (~138.513 m asl). Over 95% recovery in water level was achieved within 24 hours of terminating the test.

TW 5

TW 5 was drilled to a depth of 24.69 m. The overburden was approximately 0.61 m thick at this location. A 12.8 m long steel casing (including approximately 0.61 m of above-ground stickup) was installed in the hole and sealed with a cement/bentonite grout. The hole was grouted from approximately 12.2 m to the ground surface. The remainder of the well is an open hole in the rock. The rock was described as “sandstone” from 0.61 – 24.69 m by the driller. Water was encountered at 18.59 m bgs and again at 22.56 m bgs.

The driller initially estimated a yield of 91 L/min (20 gal/min), which was also the final recommended pumping rate for this well.

McIntosh Perry undertook a pumping test at this location on January 6, 2021. The well was pumped at a rate of 100 L/min for over six hours. The drawdown stabilized at approximately 1.8 m btoc (~138.092 m asl). Over 95% recovery in water level was achieved within 24 hours of terminating the test.

TW 6

TW 6 was drilled to a depth of 42.67 m. The overburden was approximately 1.22 m thick at this location. A 12.8 m long steel casing (including approximately 0.61 m of above-ground stickup) was installed in the hole and sealed with a cement/bentonite grout. The hole was grouted from approximately 12.2 m to the ground surface. The remainder of the well is an open hole in the rock. The driller described the rock as “limestone” from 1.22

– 12.20 m and “sandstone” from 12.20 – 42.67 m. Water was encountered at 16.76 m bgs and again at 39.62 m bgs.

The driller initially estimated a yield of 91 L/min (20 gal/min), which was also the final recommended pumping rate for this well.

McIntosh Perry undertook a pumping test at this location on January 7, 2021. The well was pumped at a rate of 100 L/min for over six hours. The drawdown stabilized at approximately 0.3 m btoc (~142.928 m asl). Over 95% recovery in water level was achieved within 24 hours of terminating the test.

TW 7

TW 7 was drilled to a depth of 36.58 m. The overburden was approximately 1.83 m thick at this location. A 12.8 m long steel casing (including approximately 0.61 m of above-ground stickup) was installed in the hole and sealed with a cement/bentonite grout. The hole was grouted from approximately 12.2 m to the ground surface. The remainder of the well is an open hole in the rock. The rock was described as “sandstone” from 1.83 – 36.58 m by the driller. Water was encountered at 22.25 m bgs and again at 34.75 m bgs.

The driller initially estimated a yield of 91 L/min (20 gal/min), which was also the final recommended pumping rate for this well. Both the driller and McIntosh Perry staff noted that the well was flowing (artesian) at the time of drilling and the six-hour pumping test.

McIntosh Perry undertook a pumping test at this location on December 21, 2020. The well was pumped at a rate of 109 L/min for over six hours. The drawdown stabilized at approximately 0.3 m btoc (~137.875 m asl). Over 95% recovery in water level was achieved within 24 hours of terminating the test.

Table 3: Summary of Pump Tests

| Test Well ID | Final Pumping Rate (L/min) | Maximum Drawdown in Pumping Well (m) | Observation Well ID | Max Drawdown in Observation Well (m) | Approximate Distance between Pumping Well and Observation Well (m) |
|--------------|----------------------------|--------------------------------------|---------------------|--------------------------------------|--|
| TW 1 | 100 | 0.643 | TW6 | 0.013 | 705 |
| | | | TW2 | Minimal drawdown observed | 425 |
| TW 2 | 90 | 4.172 | TW3 | Minimal drawdown observed | 375 |
| TW 3 | 97 | 0.811 | TW2 | 0.034 | 375 |
| TW 4 | 109 | 1.407 | TW5 | 0.414 | 380 |
| | | | TW6 | 0.084 | 225 |
| TW 5 | 100 | 1.848 | TW4 | 0.369 | 375 |
| | | | TW2 | 0.119 | 618 |
| TW 6 | 100 | 0.342 | TW2 | 0.056 | 440 |
| | | | TW4 | 0.092 | 220 |
| TW 7 | 109 | 0.265 | TW4 | 0.092 | 500 |
| | | | TW6 | 0.08 | 530 |

3.3.3 *Well Yield*

The testing and development undertaken by the driller immediately after well installation provided a reasonable indication of the yield of each well. All test wells were demonstrated to have yields suitable for supplying single family homes. During McIntosh Perry’s pumping tests at the seven test wells, at least 32,400 L of water was pumped from each well. This volume exceeds the daily demand for water for a typical home (1,800 L) and the minimum volume for a 6-hour pumping test (4,932 L), as specified in the Guideline Procedure D-5-5 Private Wells: Water Supply Assessment. At each location, at least 95% recovery was achieved between 0 and 1,440 minutes (24 hours) after the cessation of pumping.

The seven test wells were spaced 225 m apart at minimum, and thus only minimal drawdown was measured at observation wells during each of the 6-hour pumping tests. Observation wells were monitored during the 6-hour pumping tests, as noted in Table 2. Drawdown in observation wells is predominantly due to pumping,

however a small component may also be attributed to changing atmospheric conditions and/or measurement error.

3.3.4 Transmissivity and Storativity

A summary of the transmissivity values calculated using the Cooper-Jacob method are presented in Table 4. An average transmissivity was calculated for each test well. The calculations for transmissivity and storativity are presented in Appendix E.

Table 4: Transmissivity and Storativity

| Well ID | Transmissivity (m ² /day) | Average Transmissivity (m ² /day) | Storativity |
|----------------------|--------------------------------------|--|---|
| TW 1 Pumping Test | 164.8 | 183.8 | 6.14 x 10 ⁻⁶ |
| TW 1 Recovery | 202.8 | | |
| TW 2 Pump Test | 31.6 | 44.1 | - |
| TW 2 Recovery | 56.5 | | |
| TW 3 Pump Test | 129.5 | 120.7 | 3.37 x 10 ⁻⁴ |
| TW 3 Recovery | 111.8 | | |
| TW 4 Pump Test | 101.0 | 101.0 | 2.52 x 10 ⁻⁶ – 2.46 x 10 ⁻⁴ |
| TW 4 Recovery | (recovery too rapid) | | |
| TW5 Pumping Test | 74.3 | 61.6 | 9.14 x 10 ⁻⁶ – 6.21 x 10 ⁻⁵ |
| TW5 Recovery | 48.8 | | |
| TW6 Pumping Test | 659.2 | 802.9 | 8.61 x 10 ⁻⁵ – 2.74 x 10 ⁻⁴ |
| TW6 Recovery | 976.6 | | |
| TW7 Pumping Test | 738.4 | 738.4 | 5.75 x 10 ⁻⁵ – 7.43 x 10 ⁻⁵ |
| TW7 Recovery | (recovery too rapid) | | |

Transmissivity is calculated using the Cooper-Jacob straight line method:

$$T=2.3 Q / 4\pi \Delta s$$

Storativity is calculated using data from an observation well with the following equation:

$$S=2.25 T t_0 / r^2$$

Where:

- T is the transmissivity (m²/day)
- Q is the pumping rate (m³/day)
- Δs is the change in hydraulic head over one log cycle (drawdown vs. log time)
- S is the storativity
- t₀ is the x-intercept of the observation well drawdown vs. log time line of best fit
- r is the distance between the pumped well and the observation well

The average transmissivity ranged from 44.1 – 802.9 m²/day, as calculated based on water level drawdown and recovery data from pumped test wells.

Storativity was observed to range from 2.52 x 10⁻⁶ – 3.37 x 10⁻⁴, as calculated based on water level drawdown data collected from nearby observation wells during pumping tests.

3.3.5 Hydraulic conductivity

The hydraulic conductivity of each test well was calculated based on the average transmissivity.

Hydraulic conductivity is calculated using the following equation:

$$K=T/b$$

Where:

- K is the hydraulic conductivity (m/s)
- T is the transmissivity (m²/day, the average is used)
- b is the depth of the deepest test well (TW6), used as aquifer thickness (m)

Table 5: Summary of Hydraulic Conductivity Calculations

| Well ID | TW1 | TW2 | TW3 | TW4 | TW5 | TW6 | TW7 |
|------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| Hydraulic Conductivity (m/s) | 4.99 x 10 ⁻⁵ | 1.20 x 10 ⁻⁵ | 3.27 x 10 ⁻⁵ | 2.74 x 10 ⁻⁵ | 1.67 x 10 ⁻⁵ | 2.18 x 10 ⁻⁴ | 2.00 x 10 ⁻⁴ |

The hydraulic conductivity values summarized in Table 4 are generally consistent with higher values for limestone published by Freeze and Cherry (10⁻⁹ to 10⁻⁵).

The calculations for hydraulic conductivity are presented in Appendix E.

3.3.6 Long Term Yield

Long term safe yield describes the amount of water that can safely be withdrawn from an aquifer without negative impact. The long-term safe yield of each well was estimated based on the following factors:

- Observations during six-hour pumping test;
- Driller's recommendation; and
- Calculated properties.

Using the Theis equation theory, the estimated cumulative drawdown across the Site generated by all proposed wells (118) was determined. Using the worst-case data collected during McIntosh Perry's field program ($T = 44 \text{ m}^2/\text{day}$; $S = 6.14 \times 10^{-6}$), the maximum theoretical drawdown across the Site would not exceed approximately 5 m.

Farvolden Method

Utilizing transmissivity values calculated from individual pumping tests (Table 4), the theoretical long-term safe yield for each of the pumping wells was calculated following the Farvolden Method and presented in Table 6. The following Farvolden equation calculates the long term 20-year safe pumping rate (Q_{20}).

$$Q_{20} = 0.68 T H_a S_f$$

Where:

- Q_{20} is the twenty-year safe yield (m^3/day)
- T , is the transmissivity (m^2/day)
- H_a is the available water column height (m)
- S_f is a safety factor

Moell Method

The Moell Method was also used to calculate the theoretical long-term 20-year safe pumping rate for each of the pumping wells. The long-term safe pumping rate (Q_{20}) was calculated using the following equation:

$$(Q_{20}) = (Q H_a S_f) / (s_{100} + 5 \Delta s)$$

Where:

- Q_{20} is the twenty-year safe yield (m^3/day)
- H_a is the available water column height (m)
- S_f is a safety factor
- s_{100} is the drawdown at 100 minutes (semi-log long-term graph)

- Δs is the change in hydraulic head over one log cycle (drawdown vs. log time, see Appendix D)

Based on the above Farvolden and Moell calculations, the estimated pumping rate of each test well that could be sustained for a twenty-year period of continuous pumping is shown in Table 6, below. Long term yield calculations are presented in Appendix E.

Q20 Verification – Cooper-Jacob Graphical Method

It should be noted that long-term projections of drawdown using the Cooper-Jacob method indicate that all test wells can sustain a constant pumping at rates exceeding 13.7 L/min if pumped constantly for 20 years (see Appendix D). The calculated maximum drawdown for all wells when theoretically pumped at a rate of 13.7 L/min was below 0.75 m, with the exception of TW2 which would be expected to have a drawdown of approximately 1.3 m.

Table 6: Summary of Long-Term Yield Calculations

| Well ID | TW1 | TW2 | TW3 | TW4 | TW5 | TW6 | TW7 |
|--|-------|-------|---------|-------|-------|---------|---------|
| Farvolden Method | | | | | | | |
| Long Term Yield (Q ₂₀) (L/min) | 896.6 | 253.5 | 1,096.5 | 954.5 | 498.0 | 7,900.9 | 8,406.2 |
| Moell Method | | | | | | | |
| Long Term Yield (Q ₂₀) (L/min) | 872.8 | 188.8 | 904.2 | 778.7 | 402.7 | 5,334.7 | 6,045.0 |
| Tested Pumping Rate | | | | | | | |
| (L/min) | 100 | 90 | 97 | 109 | 100 | 100 | 109 |
| Driller-Recommended Pumping Rate | | | | | | | |
| (L/min) | 75.7 | 75.7 | 75.7 | 75.7 | 75.7 | 75.7 | 75.7 |

The calculation and consideration of long-term yield estimations is inherently conservative; wells are typically not pumped continuously for long periods of time, and a safety factor is incorporated into the calculations. In all cases, both the tested pumping rates and the driller-recommended pumping rates are considerably lower than the estimated long-term Q₂₀ values. Data collected from the Site indicate a highly productive aquifer.

Accordingly, McIntosh Perry is of the opinion that the aquifer is capable of supplying water at a flow rate which is greater than the minimum flow rate of 13.7 L/min as outlined in Procedure D-5-5.

3.3.7 *Water Quality*

Laboratory Certificates of Analysis for all on-site groundwater testing are presented in Appendix B. A summary of results from the testing of the seven water wells (TW1, TW2, TW3, TW4, TW5, TW6, and TW7) is presented in Appendix B. Samples were taken twice during the six-hour test at all test well locations; pre-test samples are denoted by a '-1' (e.g. TW1-1), while post-test samples are denoted by a '-2' (e.g. TW1-2).

Maximum Acceptable Concentrations (MAC), were exceeded in total coliforms in samples TW1-1, TW1-2, TW2-1, and TW2-2. Accordingly, microbiological parameters were resampled at TW1 and TW2 on January 19, 2021. Resample results for the sample taken at TW1 (TW1-3) indicated no total coliforms, however results for the sample taken at TW2 (TW2-3) indicated the presence of total coliforms. As such, TW2 was shocked with

chlorine by Air Rock, and a fourth resample was subsequently collected. Prior to sample collection, Air Rock re-developed the well and McIntosh Perry personnel conducted a chlorine residual test using disposable testing strips. Following re-development and chlorine residual testing (showing no residual), TW2-4 was collected; data from this final sample indicated no presence of total coliforms.

Based on the overall test results, the water quality will be acceptable in terms of health-related and most aesthetic parameters.

Laboratory-noted exceedances of non-health related standards were as follows:

- Operational Guidelines (OG) for hardness were exceeded in all tested samples.
- Aesthetic Objectives (AO) for iron were exceeded in samples TW3-1, TW7-1, and TW7-2.
- Aesthetic Objectives (AO) for manganese were exceeded in samples TW3-1 and TW3-2.
- Aesthetic Objects (AO) for laboratory-reported turbidity were exceeded in TW7-1, and TW7-2. It should be noted that field measurements of turbidity were all below 1.0 NTU during the 6-hour pump test, except for the turbidity reading of 1.3 NTU at 360 minutes. Laboratory results for turbidity are typically considered exaggerated due to the precipitation of iron and other low-solubility solids with changes in temperature and pH. As such, field measurements of turbidity were treated as a more accurate indicator of water quality and were compared to the AO of 1.0 NTU as set out in Procedure D-5-5.

3.4 Water Well Record Review

From the 127 well records identified from the MECP's WWIS database, data were available for 30 water wells that are located within 500 m of the Site. All wells are listed for domestic purposes, with the exception of one 'unused' well, which is assumed abandoned. The MECP WWIS records are shown on Figure 2, and data are summarized in Appendix H.

Most wells were completed in either limestone or sandstone, with isolated records listing either "granite", "unknown rock type", or "stones". After removing obviously erroneous records, the total depths of the wells ranged from 7.9 – 30.5 m, with an average depth of 18.9 m. Static water levels averaged at approximately 3.4 m bgs (MECP 2020).

4.0 TERRAIN ANALYSIS

4.1 Preamble

A terrain analysis was conducted by evaluating soils cross the property. Assessment of the soils was conducted by the following (see Figure 7):

- Test pits 1 through 10, and 13 were dug with a backhoe while on site (February 22, 2021).
- Test pits 11 and 12 were dug using a hand shovel (April 9, 2021).

4.2 General Soils Evaluations

The following presents a summary of soil characteristics on the site based on the terrain analysis:

- Overburden consists of:
- Topsoil (depths range between 0.15 to 0.4 m bgs), with heterogeneous organic content.
- Silty Sand to Sand with Gravel (depth range between 0.15 to 2.2 m bgs)
- Gravel until end of hole (thickness of 2.2 m to 2.4 m bgs)
- Bedrock was encountered in all of the test well locations. Overburden thickness varies from approximately 0.3m to 4.6m based on the well records from Test Well 1 to 7.

Table 7: Summary of Test Pits

| Test Pit ID | Total Depth (m) | Depth to Water (m) | Soil Characteristics | Notes |
|-------------|-----------------|--------------------|---|-------|
| TP-1 | 0.55 | - | Sandy topsoil to brown silty sand underlain by bedrock | Loose |
| TP-2 | 0.20 | - | Sandy topsoil with thin layer of brown silty sand underlain by bedrock | - |
| TP-3 | 1.05 | - | Sandy topsoil to brown silty sand with gravel underlain by bedrock | Loose |
| TP-4 | 0.65 | - | Sandy topsoil to brown silty sand with gravel underlain by bedrock | Loose |
| TP-5 | 0.70 | - | Sandy topsoil to brown silty sand underlain by bedrock | Loose |
| TP-6 | 0.25 | - | Sandy topsoil over bedrock | - |
| TP-7 | 1.90 | 1.30 | Sandy topsoil / brown silty sand / brown silty sand with gravel / medium brown silty sand until bedrock | Loose |

| Test Pit ID | Total Depth (m) | Depth to Water (m) | Soil Characteristics | Notes |
|-------------|-----------------|--------------------|---|------------|
| TP-8 | 2.40 | | Sandy topsoil / brown silty sand with gravel / medium brown silty sand to thin layer of dense silt and gravel until bedrock | Loose Sand |
| TP-9 | 2.10 | - | Sandy topsoil / brown silty sand with gravel / medium brown silty sand underlain by bedrock | Loose |
| TP-10 | 0.70 | - | Sandy topsoil into brown silty sand until bedrock | Loose |
| TP-11 | 0.22 | - | Sandy topsoil over bedrock | - |
| TP-12 | 0.28 | - | Sandy topsoil over bedrock | - |
| TP-13 | 0.10 | - | Sandy topsoil over bedrock | - |

4.3 Contaminant Attenuation

As part of the subdivision application process as sewage system (septic) impact assessment was completed as per MECP requirements. The MECP Procedure D-5-4 (Technical Guideline for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment) outlines the following steps to be completed as part of the impact assessment:

- Step 1 – Lot Size Consideration
- Step 2 – System Isolation Consideration
- Step 3 – Contaminant Attenuation Considerations

The following outlines the results of the sewage system impact assessment undertaken by McIntosh Perry.

Step 1 - Lot Size Consideration

The proposed new subdivision consists of lots that are on average approximately 0.61 hectares each in size, which together create a combined area of 84 ha in size, when accounting for roads and other undeveloped blocks. Accordingly, McIntosh Perry considers that there does not exist enough spatial area to naturally attenuate nitrate-nitrogen to acceptable concentration based on MECP Procedure D-5-4, as the average size of the lots created would not be greater than 1 hectare. Due to this, a review of Step 2 – System Isolation Consideration was undertaken.

Step 2 - System Isolation Consideration

As previously outlined, the lots to be created through the subject consent are in the order of approximately 0.61 hectares in size (total combined area ~84 ha), therefore McIntosh Perry assessed whether System Isolation

Considerations were applicable to the proposed residential subdivision. If it can be demonstrated that the sewage system effluent is hydrogeologically isolated from the existing or potential drinking water supply aquifer, then the risk to groundwater is considered to be low. The system isolation review needs to account for lands that extend up to 500 metres from the Site.

Based on a review of available geological information and mapping, in conjunction with site observations made during the Terrain Analysis and McIntosh Perry's past experience on neighbouring properties, the Site cannot be determined to be hydrogeologically isolated and, as such, the consideration for system isolation of sewage system effluent from the groundwater supply aquifer is not applicable to this site.

Step 3 – Contaminant Attenuation Considerations

Since neither lot size or system isolation considerations apply to the proposed severances, a predictive nitrate-nitrogen attenuation assessment was undertaken to determine if sufficient attenuation of nitrate-nitrogen could be achieved on the subject site.

The Thornthwaite Water Balance method, in conjunction with local climatic data available from Environment Canada for Ottawa's MacDonald-Cartier Internal Airport station (Site Climate ID: 6106000), was used to estimate the net potential infiltration for the proposed residential subdivision.

The nitrate concentration at the site boundaries was calculated assuming a standard domestic strength sewage nitrate-nitrogen concentration (C_e) of 40 mg/L at the point of subsurface discharge as per procedure D-5-4.

Please see below for information regarding other inputs/parameters used in the analysis (refer to Appendix G for more information):

- A water surplus (W_s) value of **333.87 mm/yr** was calculated based on 1981-2010 Climate Normal data for Ottawa's MacDonald -Cartier Int'l A (YOW) station (Site Climate ID: 6106000);
- An infiltration factor (I_f) of **0.545** was calculated as per Table 2 of MECP's document titled "MOEE Hydrogeological Technical Requirements for Land Development Applications", dated April 1995. The factors used to calculate the Infiltration Factor (I_f) and the associated rationale for selection are presented below:
 - A topographic factor of 0.136 was used as average slope on site is 1.6% (16 m per km). The factor represents an interpolation between the factor of 0.20 for rolling land (0.28-0.38% slope) and the factor of 0.10 for hilly land (2.8-4.7% slope).
 - A soil factor of 0.309 was used. This factor represents a weighted average of the soil conditions on-site, with site consisting of approximately 35% of the site consisting of topsoil over shallow bedrock (infiltration factor of 0.10), with the remaining 65% of the site consisting of sandy soil (infiltration factor 0.40) having a minimum depth of 0.30 m..

- A cover factor of 0.10 was used as the site consists of primarily cultivated land.
- Available infiltration (I) was calculated by multiplying the water surplus (Ws) by the infiltration factor (If). This yielded an infiltration value of **0.187 m/yr**.
- The infiltration area (A) was determined to be 84.00456 ha (840,045 m²).
- The dilution water (D_w) available was calculated as 157,266 m³/yr (430,866 L/day) by multiplying the infiltration area (A) with the available infiltration (I).
- Background nitrate concentration (C_b) of 1.526 mg/L was used, which represents the average concentration in all samples collected (refer to Appendix B). A concentration of 0.05 mg/L was used when laboratory results were below the method detection limit as this represents half of the laboratory's lowest method reporting limit (MRL) of 0.1 mg/L for the analysis of that parameter.

Based on the above-noted information, in order to maintain the nitrate concentration at the downgradient property boundary (C_w) below the Ontario Drinking Water Objective (ODWO) of 10 mg/L for nitrate-nitrogen, the maximum number of lots in the proposed residential subdivision would be as follows:

- Assuming standard domestic strength sewage nitrate-nitrogen concentration (C_e) of 40 mg/L at the point of subsurface discharge: N = **118.29 severed lots**.

As can be seen above, the property can accommodate a subdivision of up to 118 lots to proceed while ensuring the Ontario Drinking Water Objective (ODWO) of 10 mg/L for nitrate-nitrogen is not exceeded. The proposed 118 lots residential subdivision yields a calculated nitrate-nitrogen concentration of **9.983 mg/L** at the property limit.

5.0 SUMMARY OF CONDITIONS

5.1 Preamble

The Site is located within the Township of Beckwith in central Eastern Ontario, south of the Town of Carleton Place (Figure 1).

The property is bounded to the north by 10th Line Road, undeveloped forest and rural residential to the east, 9th Line Road to the south, and Gardiner Shore Road and residential properties to the west. A single detached residence lies to the north of the Site along with a small area of forested land.

This region is characterized by thin overburden overlying Paleozoic bedrock (OGS, 2020; MECP, 2020). The climate is humid continental with cool winters and warm summers. The 1981-2010 mean annual precipitation is approximately 943.4 mm with 223.5 cm as snow, and the mean daily temperature is 6.4 °C (Environment Canada Climate Normals for Ottawa MacDonald-Cartier Int'l Airport, ON).

The Site currently consists of agricultural fields and has likely never been contemporarily developed. On-site elevation ranges between 136 and 148.5 metres above sea level (m asl), with the majority of the site at an elevation between 140 and 144 metres above sea level (m asl). The topography of the Site is generally flat and slopes downwards slightly to the west.

5.2 Regional Hydrogeology

The Site is relatively flat and appears to be well-drained. McGibbon Bay (part of the Mississippi River system) is the closest permanent waterbody to the Site, and is located approximately 150 m west of the Site at its closest point.

On a local scale, shallow groundwater flow is interpreted to reflect local topography and flow to the west.

According to Ontario Geological Survey (OGS) regional mapping, surficial overburden in the vicinity of the Site is thin, and is characterized by Paleozoic bedrock (OGS, 2020). This classification is consistent with on-site observations made by McIntosh Perry. Based on OGS 2020 data, the underlying bedrock in the area is classified as sandstone and dolostone (commonly interchanged with dolostone), which is consistent with MECP WWIS Records (MECP 2020).

5.3 Site Hydrogeology

A review of topographic data, geological maps, and Site visits show that the property slopes down to the west, towards the Mississippi River. Shallow groundwater and surface water likely drain in this direction. Shallow groundwater in the southern portion of the site may move toward what appears to be a large wetland complex, McGibbon Creek, located approximately 200 m from the Site at its closest point. Overall, the Site appears to be well-drained. On-site overburden groundwater flow is likely closely tied to surface topography.

Underlying bedrock at the Site is classified as quartz sandstone of the Nepean Formation and crystalline dolostone of the Oxford Formation (OGS, 2020), which is consistent with MECP WWIS Records (MECP 2020).

MECP WWIS Records indicate that most wells were predominantly completed in either limestone or sandstone, with isolated records listing either “granite”, “unknown rock type”, or “stones”. After removing obviously erroneous records, the total depths of the wells ranged from 7.9 – 30.5 m, with an average depth of 18.9 m. Static water levels averaged at approximately 3.4 m bgs (MECP 2020).

The bedrock aquifer was found to have high yield and exhibited good recovery during pumping tests. There was very little groundwater level movement observed in observation wells during the pumping tests, showing minimal well interference across the Site. As noted above, TW7 is a flowing artesian well.

5.4 Water Supply

Groundwater testing at the site showed that the water yield and water quality is good. Based on calculations following the Farvolden and Moell methods, on-site test wells could theoretically supply a twenty-year safe yield ranging from 188.8 – 8,400+ L/min, as shown in Table 6.

No Maximum Allowable Concentrations, as outlined by the Ontario Drinking Water Standards (MACs), were exceeded in final samples taken from the seven on-site test wells. Field-measured turbidity was noted to be below 1.0 NTU at all wells during the pumping tests, with the exception of marginal and isolated exceedances in field and laboratory-reported data.

Several additional ODWS Aesthetic Objectives (AO) were exceeded. These exceedances were noted for hardness, laboratory-reported turbidity, iron, and manganese. Exceedances of these Aesthetic Objectives is considered normal for the region, and are considered treatable.

Escherichia Coli, Faecal Coliform, and Total Coliform counts were reported as 0 ct/100 mL in the final samples collected from all test wells.

It has been shown that the bedrock aquifer is suitable for supplying the needs of 118 lots in the proposed development in terms of both quantity and quality when incorporating standard on-site sewage systems to service the individual lots.

Based on typical residential demand, it is not expected that the subdivision will cause any water supply issues for the surrounding private wells that exist in the vicinity.

6.0 RECOMMENDATIONS

6.1 Water Supply

Well Construction

- The seven newly installed test wells (TW1, TW2, TW3, TW4, TW5, TW6, and TW7) are suitable for supplying groundwater for domestic use at the Site. All future wells should adhere to the requirements of O. Reg. 903 (Wells), as amended, with regards to casing length, positive drainage, stickup height, etc.
- The test wells should be maintained prior to domestic use.

Water Quality and Treatment

- Water generally meets all applicable health-related standards at the present time.
- Aesthetic parameters such as hardness, iron, and manganese can be readily treated.
- Due to the low turbidity observed in the fully developed test wells, a UV system may be used as a precaution against bacteriological impacts.
- If water softening is desired, the use of potassium salts (i.e. KCl) is recommended.

6.2 Wastewater Treatment

Private Sewage Systems

- Approval for individual on-site sewage systems will be governed by the OBC as it is understood that the Daily Design Flow proposed system will be less than 10,000 litres per day/lot.
- Based on the general characterization of overburden in the vicinity of the proposed sewage systems, imported fill materials may be necessary to provide the required vertical separation from groundwater or bedrock/impervious layer.
- The proposed lot sizes are sufficient to meet the requirements of Procedure D-5-4, assuming that each lot is serviced by a OBC-approved Class 4 sewage system.
- Any septic systems must be constructed with all appropriate setbacks, treatment units and stipulations as per applicable Ontario Regulations.

7.0 LIMITATIONS

This report has been prepared and the work referred to in this report has been undertaken by McIntosh Perry Consulting Engineers Ltd. for 1384341 Ontario Ltd. It is intended for the sole, and exclusive use of 1384341 Ontario Ltd., its affiliated companies and partners and their respective insurers, agents, employees, advisors, and reviewers (collectively, "Cavanagh"). The report may not be relied upon by any other person or entity without the express written consent (Reliance Letter) of McIntosh Perry Consulting Engineers Ltd.

Any use which a third party makes of this report, or any reliance on decisions made based on it, without a reliance letter are the responsibility of such third parties. McIntosh Perry Consulting Engineers Ltd. accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The investigation undertaken by McIntosh Perry Consulting Engineers Ltd. with respect to this report and any conclusions or recommendations made in this report reflect McIntosh Perry Consulting Engineers Ltd. judgment based on the site conditions observed at the time of the site inspection on the date(s) set out in this report and on information available at the time of the preparation of this report.

This report has been prepared for specific application to this site and it is based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific chemical parameters and materials during a specific time interval, all as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, portions of the site which were unavailable for direct investigation, subsurface locations which were not investigated directly, or chemical parameters, materials or analysis which were not addressed. Substances other than those addressed by the investigation described in this report may exist within the site, substances addressed by the investigation may exist in areas of the site not investigated and concentrations of substances addressed which are different than those reported may exist in areas other than the locations from which samples were taken.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions and recommendations in this report may be necessary.

We trust that this information is satisfactory for your present requirements. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,

McIntosh Perry Consulting Engineers Ltd.



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Ref.: U:\Perth\MPCE JOBS\MPCE Projects\2020\CCO-20-0203-Tweedsmuir-Gardiner Property\Hydro G\Report\CCO-20-0203_Gardiners Hydro G Assessment_Draft_06June2021.docx

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HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



FIGURES

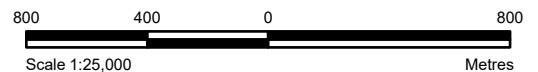


LEGEND

-  Site Location
-  Local Road
-  Major Road
-  Watercourse
-  Waterbody
-  Wooded Area

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2021.



| | | | |
|-------------------------|----------------|-------------------------------|----------|
| CLIENT: | | CAVANAGH CONSTRUCTION | |
| PROJECT: | | GARDINER PROPERTY SUBDIVISION | |
| TITLE: | | SITE LOCATION | |
| PROJECT NO: CCO-20-0203 | | FIGURE: | 1 |
| Date | Apr., 01, 2021 | | |
| GIS | EU | | |
| Checked By | MB | | |

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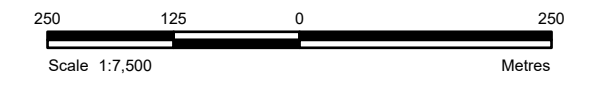
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- LEGEND
- Test Well Location
 - Approximate Property Boundary
 - Watercourse
 - Unevaluated Wetland

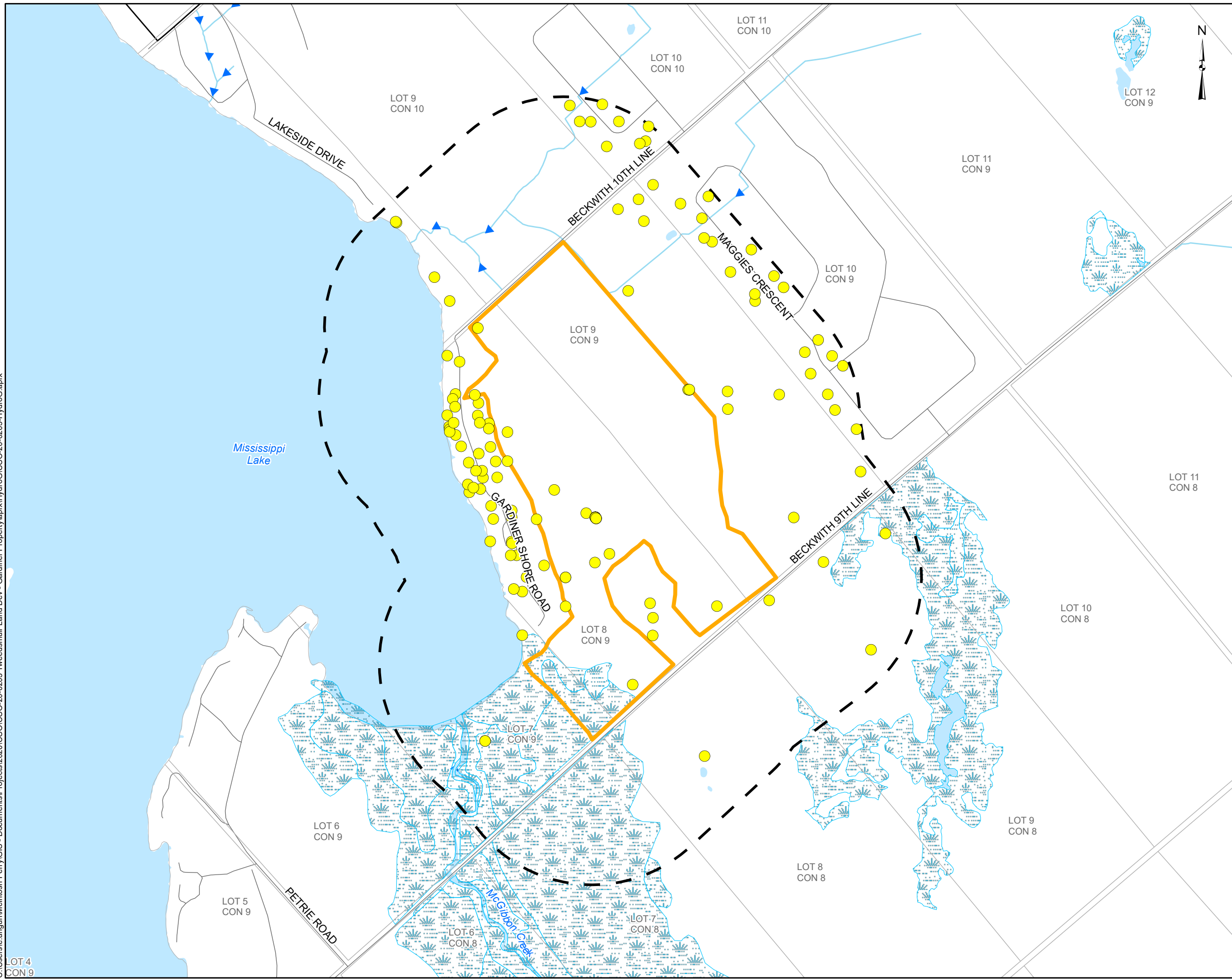
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| CLIENT: | | CAVANAGH CONSTRUCTION | |
| PROJECT: | | GARDINER PROPERTY SUBDIVISION | |
| TITLE: | | SITE LAYOUT | |
| <p>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com</p> | PROJECT NO: CCO-20-0203 | FIGURE: | |
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| | GIS | EU | |
| Checked By | MB | | |

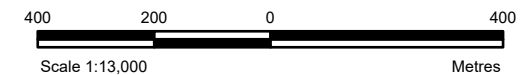
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LEGEND

- MECP Well Location
- 500m Radius
- Approximate Property Boundary
- Lot & Concession
- Local Road
- Major Road
- ▶ Watercourse
- Waterbody
- Unevaluated Wetland

REFERENCE
 GIS data provided by the Ontario Ministry of Natural Resources and Ontario Ministry of the Environment, Conservation and Parks 2021.



| | | | |
|---|-------------------------|--------------------------------------|----------|
| CLIENT: | | CAVANAGH CONSTRUCTION | |
| PROJECT: | | GARDINER PROPERTY SUBDIVISION | |
| TITLE: | | MECP WWIS SUMMARY | |
| McINTOSH PERRY <small>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com</small> | PROJECT NO: CCO-20-0203 | FIGURE: | 3 |
| | Date | Apr., 01, 2021 | |
| | Checked By | MB | |

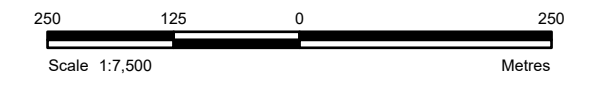
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LEGEND

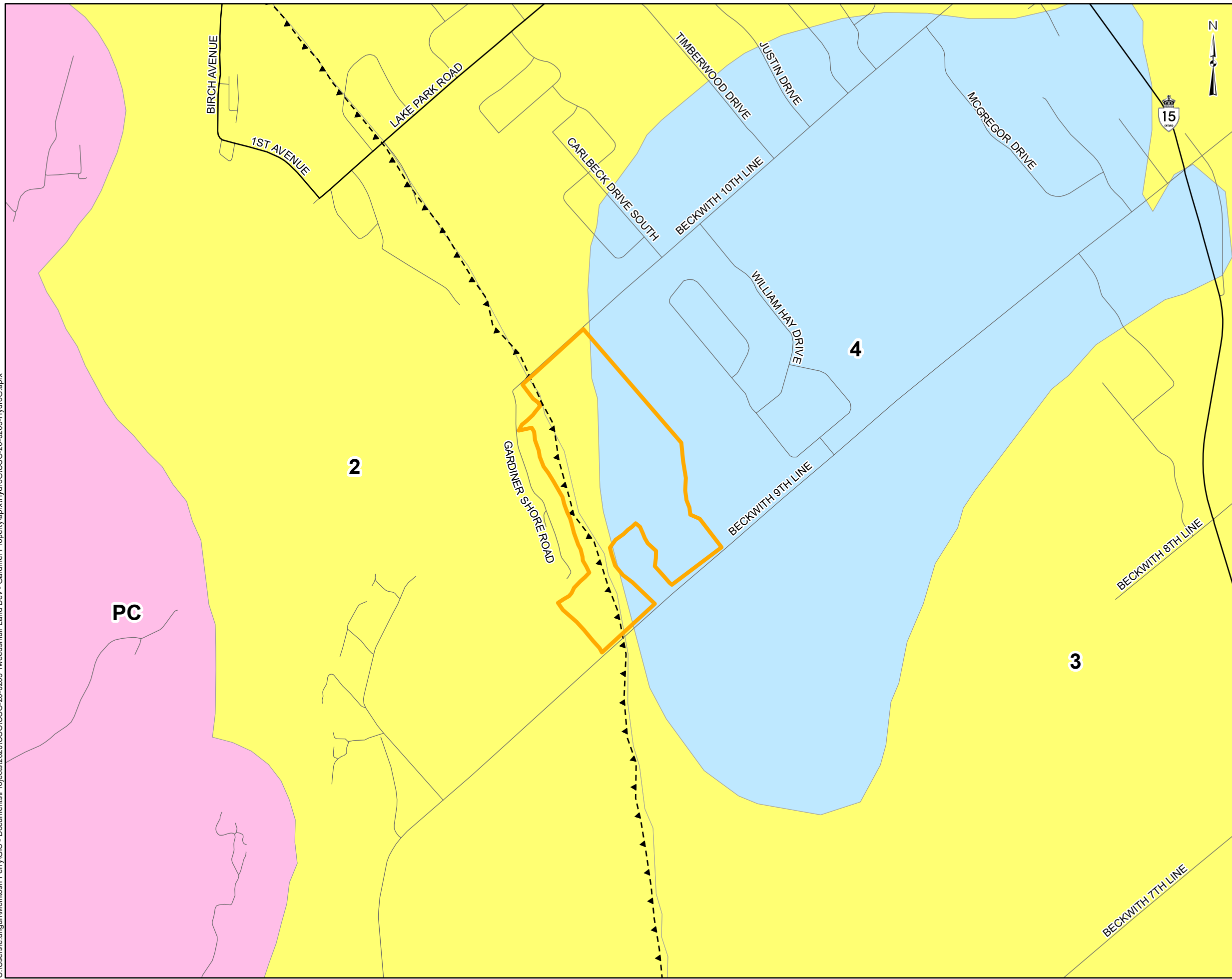
- Test Well Location
- Approximate Property Boundary
- Watercourse
- Unevaluated Wetland
- Groundwater Flow Direction
- 138.996 Groundwater Elevation (masl)

REFERENCE
 GIS data provided by the Ontario Ministry of Natural Resources, 2021.



| | | | |
|---|-------------|-------------------------------|---------|
| CLIENT: | | CAVANAGH CONSTRUCTION | |
| PROJECT: | | GARDINER PROPERTY SUBDIVISION | |
| TITLE: | | GROUNDWATER FLOW | |
| McINTOSH PERRY <small>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com</small> | PROJECT NO: | CCO-20-0203 | FIGURE: |
| | Date | Apr., 19, 2021 | 4 |
| | Checked By | MB | |

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LEGEND

- Approximate Property Boundary
- Local Road
- Major Road
- Fault

Bedrock Geology

Upper Ordovician

- 13 Queenston Formation: Red to light greenish grey siltstone and shale, with interbeds of silty bioclastic limestone in lower part
- 12 Carlsbad Formation: Interbedded dark grey shale, fossiliferous calcareous siltstone, and silty bioclastic limestone
- 11 Billings Formation: Dark brown to black shale, with laminations of calcareous siltstone, and silty bioclastic limestone
- 10 Eastview Formation: Interbedded sublithographic to fine crystalline limestone and dark brown to dark grey shale

Middle to Upper Ordovician

- 9 Lindsay Formation: Sublithographic to fine crystalline limestone, nodular in part, with interbeds of calcarenite and shale
- 8 Verulam Formation: Interbedded bioclastic limestone, sublithographic to fine crystalline limestone
- 7 Bobcaygeon Formation: Interbedded silty dolomite, lithographic to fine crystalline limestone, oolitic limestone, shale, and fine-grained calcareous quartz sandstone
- 6 Gull River Formation: Interbedded silty dolomite, lithographic to fine crystalline limestone, oolitic limestone, shale, and fine-grained calcareous quartz sandstone
- 5 Rockliffe Formation: Interbedded fine-grained light greenish grey quartz sandstone, shaley limestone and shale, locally conglomerate at base, interbeds of calcarenite and silty dolostone in upper part

Lower Ordovician

- 4 Oxford Formation: Sublithographic to fine crystalline dolostone
- 3 March Formation: Interbedded quartz sandstone, sandy dolostone, and dolostone

Cambrio Ordovician

- 2 Nepean Formation: Fine to coarse grained quartz sandstone, partially calcareous in upper part
- 1 Covey Hill Formation: Noncalcareous feldspathic, fine to coarse grained quartz sandstone and quartz pebbly conglomerate

Precambrian

- PC Precambrian Formation: Undifferentiate metamorphic and igneous rocks

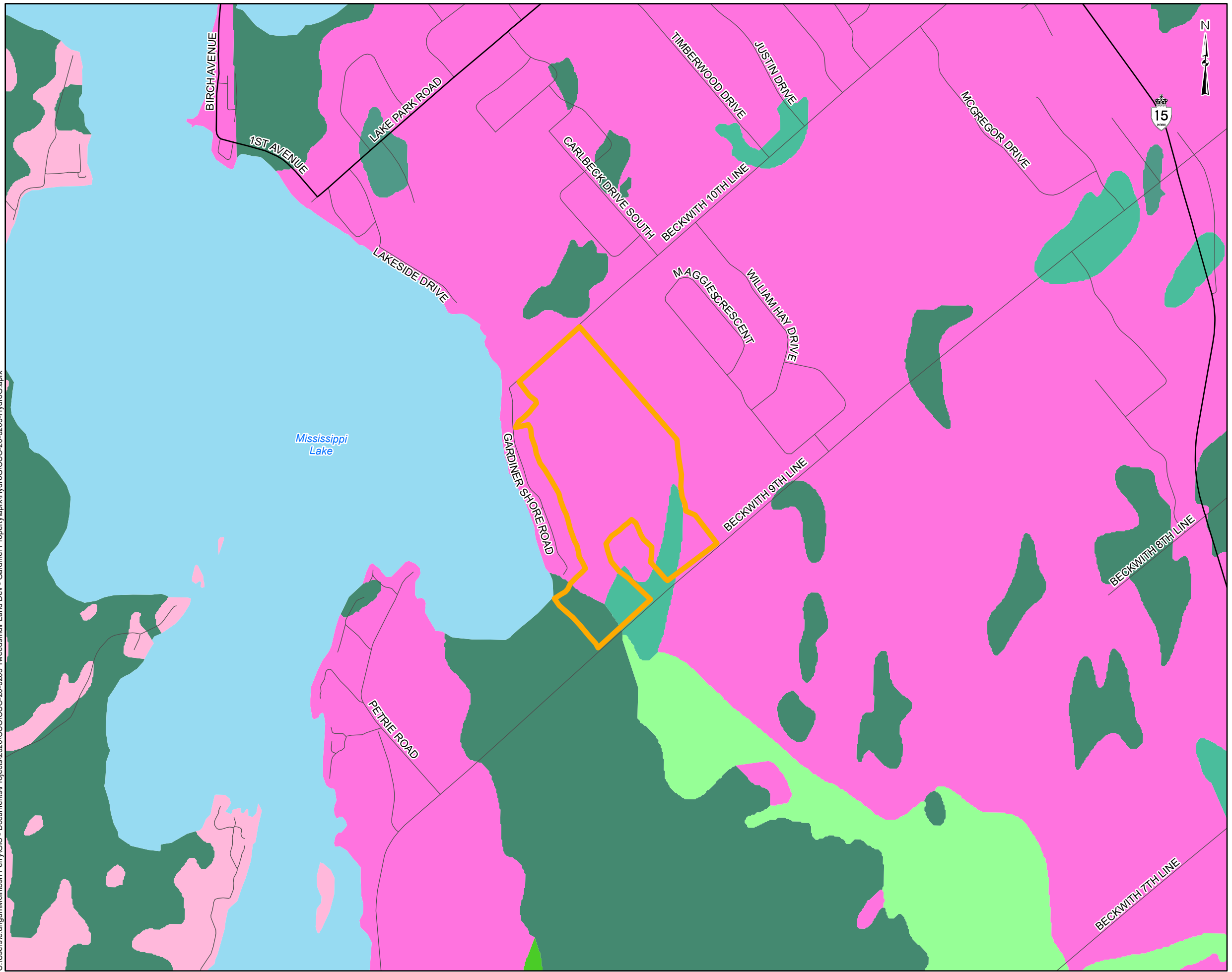
REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2021.

Urban Geology of the National Capital Area, Bélanger, R; Geological Survey of Canada, Open File 5311, 2008

500 250 0 500
 Metres
 Scale 1:20,000

| | | |
|---|-------------------------------|----------------|
| CLIENT: | CAVANAGH CONSTRUCTION | |
| PROJECT: | GARDINER PROPERTY SUBDIVISION | |
| TITLE: | REGIONAL BEDROCK FORMATION | |
| 115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com | PROJECT NO: CCO-20-0203 | FIGURE: |
| | Date | Apr., 19, 2021 |
| | GIS | EU |
| | Checked By | MB |
| | | 5 |



LEGEND

- Approximate Property Boundary
- Local Road
- Major Road

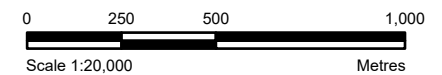
Surficial geology

Description

- Organic Deposits
- Sand Dunes
- Floodplains, sand, silt, clay
- Fluvial Terraces, sand, silt
- Reworked Marine Sediments
- Beach Formations
- Sand, reworked glaciofluvial
- Deltaic and Estuarine Deposits
- Marine Deposits, clay, silt
- Erosional Terraces
- Glaciofluvial Deposits
- Till, plain
- Till, drumlinized
- Till, hummocky to rolling
- Paleozoic Bedrock
- Precambrian Bedrock
- Water

REFERENCE

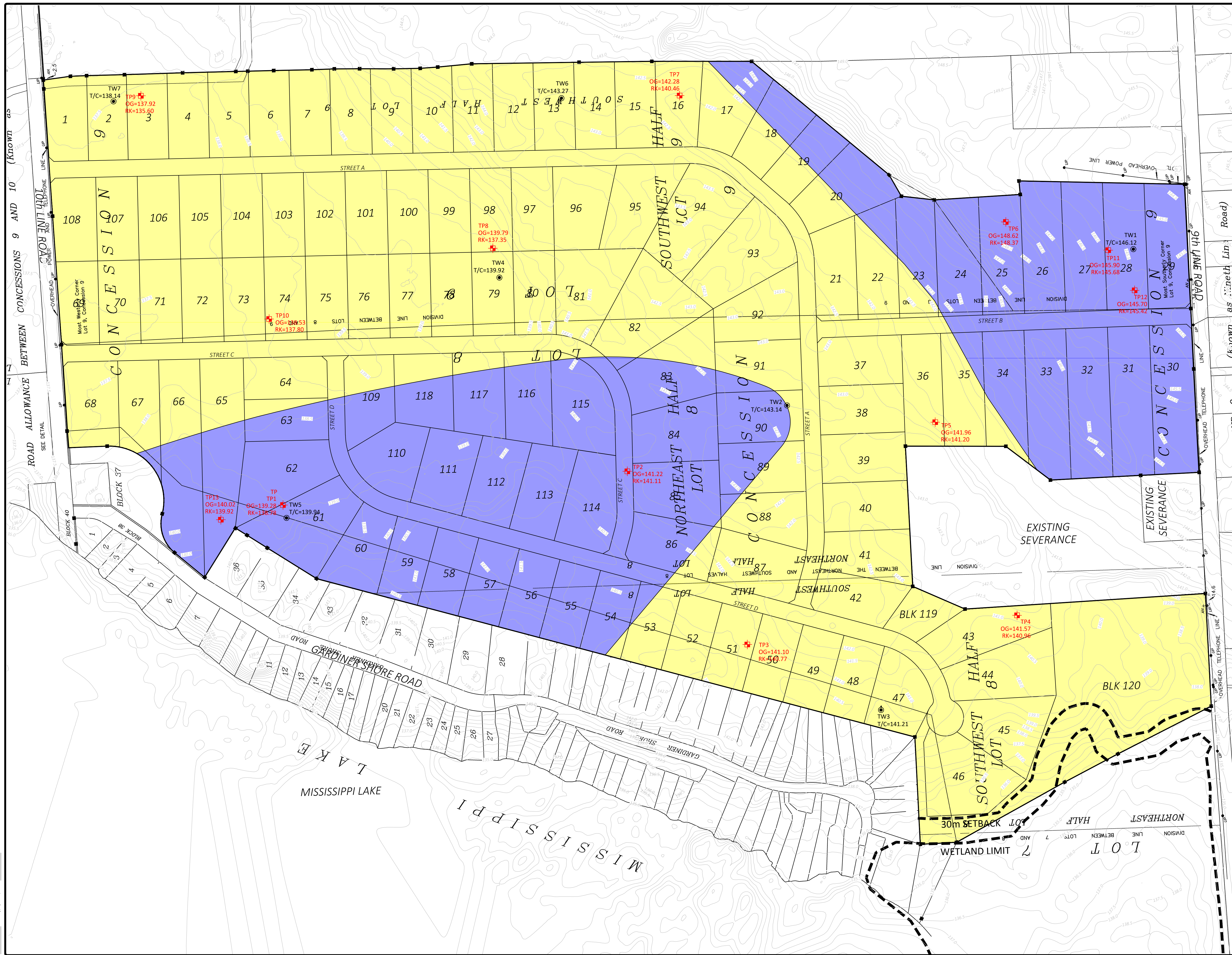
GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2021.
 Surficial Geology of Southern Ontario provided by the Ontario Geological Survey, Miscellaneous Release - Data 128 - Revised



| | | |
|---|--------------------------------------|----------------|
| CLIENT: | CAVANAGH CONSTRUCTION | |
| PROJECT: | GARDINER PROPERTY SUBDIVISION | |
| TITLE: | REGIONAL SURFICIAL GEOLOGY | |
| McINTOSH PERRY <small>115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com</small> | PROJECT NO: CCO-20-0203 | FIGURE: |
| | Date | Apr., 19, 2021 |
| | GIS | EU |
| | Checked By | MB |
| | | 6 |

C:\Users\le.ungun\McIntosh_Perry\GIS - Documents\Projects\2020\CCO\CCO-20-0203 Tweedsmuir Land Dev - Gardiner Property\aprx\Hydro\GIS\20-0203-HydroG.aprx

PROJECT: GARDINER PROPERTY SUBDIVISION; DRAWING NO.: CONCEPT DWG/05 - SUPERIMPOSED/CD/20-0203 - TWEEDMUIR-GARDINER PROPERTY CONCEPT TP LOCATION PLAN
 LAST SAID TO: Monday, April 12, 2021, LAST SAID BY: GARDINER
 LAST PLOTTED: Monday, April 12, 2021, CTR FILE: 0505...



LEGEND:

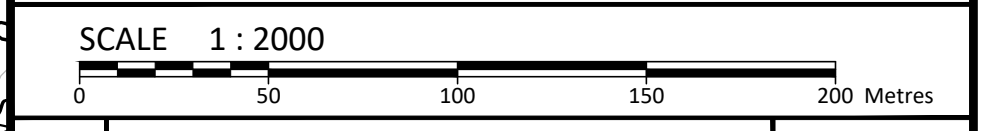
- + TEST PIT (INCL. APPROXIMATE EXISTING GRADE AND REFUSAL ELEVATIONS)
- TEST WELL
- APPROXIMATE EXTENT OF SHALLOW OVERBURDEN (<0.30m DEPTH)
- APPROXIMATE EXTENT OF SANDY OVERBURDEN (>0.3m DEPTH)

NOTE:
 THIS CONCEPT PLAN WAS PREPARED USING THE FOLLOWING RESOURCES:
 1. GIS MAPPING FOR BECKWITH TOWNSHIP
 2. MNR ONLINE MAPPING
 3. DRAPE IMAGERY

BOUNDARIES SHOWN ON THIS SITE PLAN ARE COMPILED FROM THE SOURCES RECITED ABOVE. FOR THE PURPOSES OF CREATING A CONCEPTUAL SUBDIVISION LAYOUT ONLY. MCINTOSH PERRY DOES NOT CERTIFY THAT THE BOUNDARIES OR CONSTRAINTS OF THE PROPERTY SHOWN ON THIS PLAN ARE ACCURATE WITHIN THE MEANING OF THE SURVEYS ACT. PROPER LEGAL SURVEY RE-ESTABLISHMENT OF ANY BOUNDARY LOCATIONS OF PROPERTIES ON THIS PLAN MUST BE COMPLETED BY AN ONTARIO LAND SURVEYOR WORKING WITHIN THE SURVEYS ACT, SURVEYOR'S ACT, AND LAND TITLES OR REGISTRY ACT AND REGULATIONS MADE THEREUNDER.

LOT LAYOUT MEETS:

- MINIMUM LOT FRONTAGE=45m
- MINIMUM AREA = 4000m²
- AVERAGE LOT AREA=6070m² (1.50 acres)



| No. | Revision/Issue | Date |
|-----|----------------|------|
| | | |
| | | |

Check and verify all dimensions before proceeding with the work. Do not scale drawings.

McINTOSH PERRY
 3240 Drummond Conc. 5A, R.R. #7, Perth, ON K7H 3C9
 Tel: 613-267-6524 Fax: 613-267-7992
 www.mcintoshperry.com

North:

Stamp:

Client:

GARDINER PROPERTY SUBDIVISION

BECKWITH TWP ONTARIO

Drawing Title:
TEST PIT LOCATION PLAN

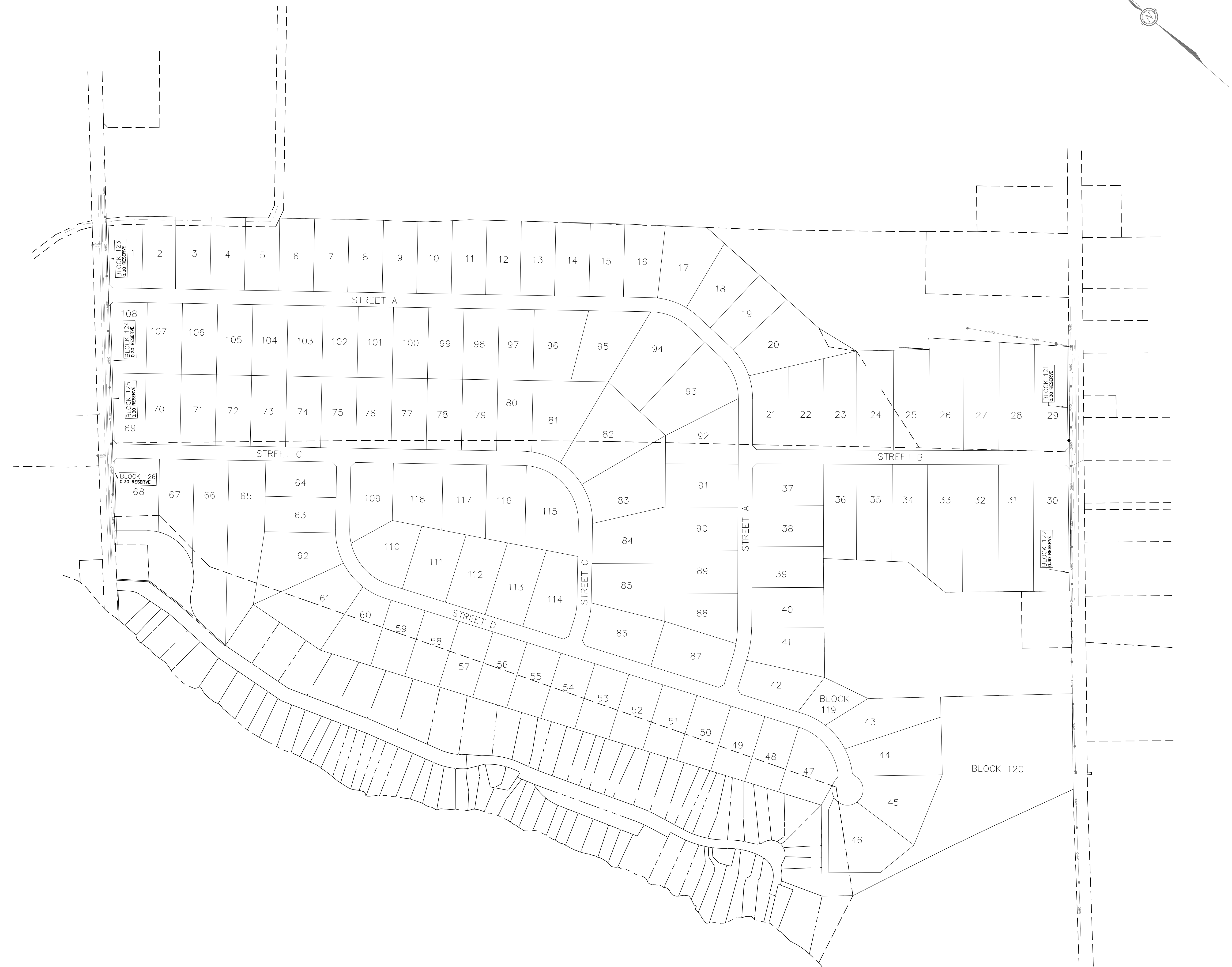
| | |
|-----------------|-----------------------------|
| Scale: 1:2000 | Project Number: PCP-20-0203 |
| Drawn by: SH | Drawing Number: 07 |
| Checked By: AO | |
| Designed By: PL | |

HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



APPENDIX A – PRELIMINARY CONCEPT PLAN

FILENAME: W:\Projects\0203\0203_Preliminary Drawings\0203-0203-1\12-Dwg\107 - Preliminary Drawing\CCO-20-0203-1-TreeStimul-Gardiner Property - Preliminary.dwg
 LAST SAVED: Wednesday, May 26, 2021 1:45:54 PM
 LAST SAVED BY: M.M.
 LAST PLOTTED: Thursday, June 03, 2021 5:18:15 PM
 PLOT FILE USED: ...



LEGEND

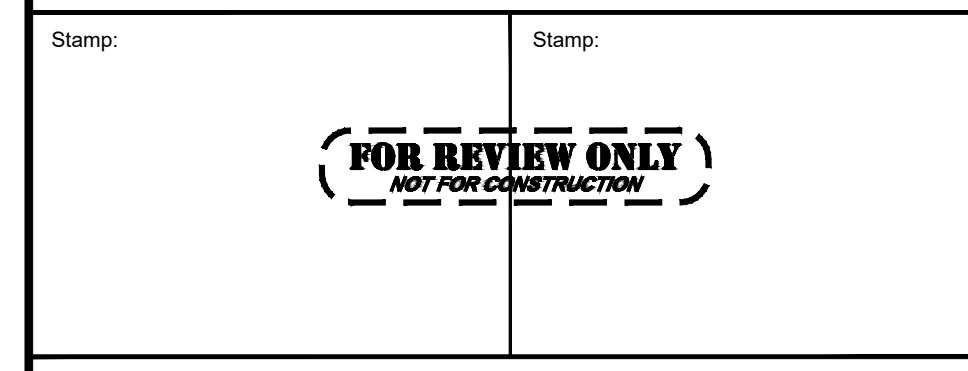
| | |
|-------------------|-------|
| PROPERTY BOUNDARY | --- |
| LEGAL BOUNDARY | ---- |
| OFF SITE LEGAL | ----- |
| EX. ASPHALT | |
| EX. GRAVEL | |
| EX. DITCH | |
| EX. FENCE | xxx |
| PROPOSED LOT LINE | --- |



| | | |
|-----|-------------------|------------|
| 00 | ISSUED FOR REVIEW | XX/XX/XXXX |
| No. | Revision/Issue | Date |

Check and verify all dimensions before proceeding with the work. Do not scale drawings.

McINTOSH PERRY
 1-1329 Gardiners Road Kingston, ON K7P 0L8
 Tel: 613-542-3788 Fax: 613-542-7583
 www.mcintoshperry.com



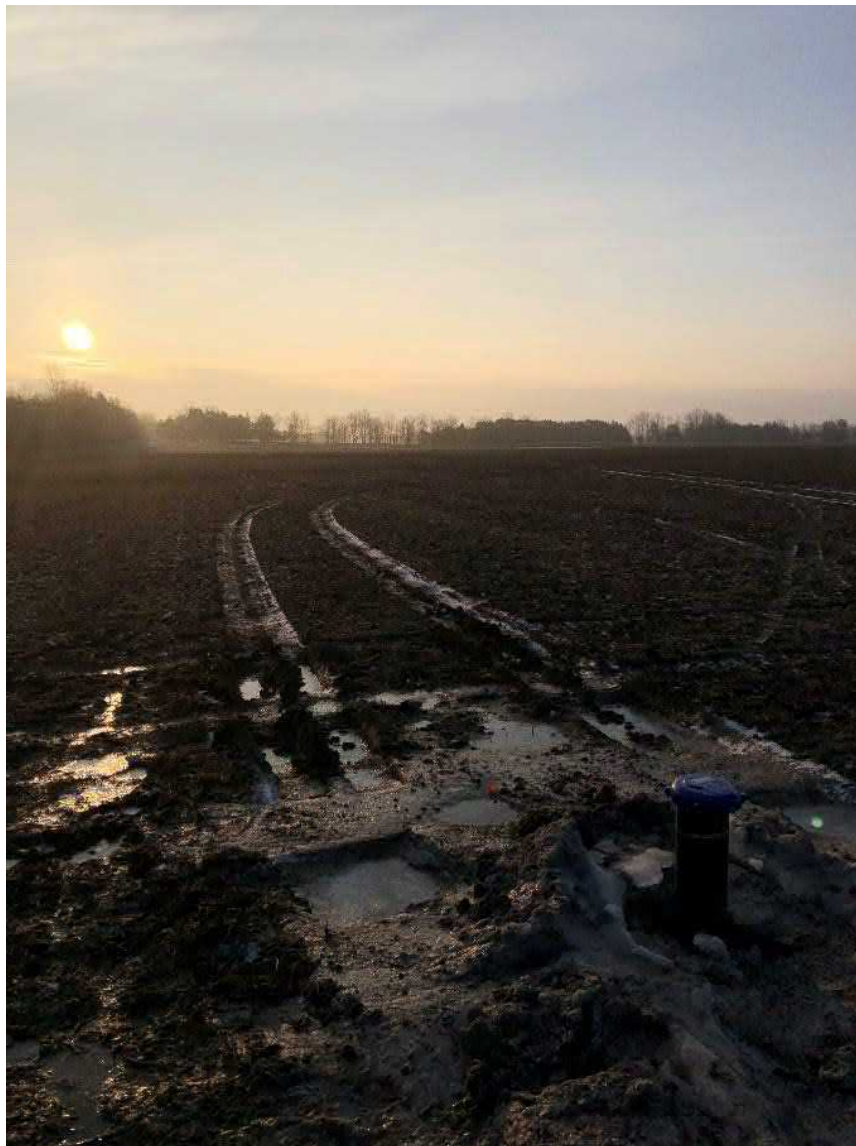
Client:
GARDINER'S GROVE INC.
 48 WILSON ST WEST
 PERTH, ONTARIO, K7H 2N4

Project:
GARDINER'S GROVE
 BECKWITH ONTARIO

Drawing Title:
PRELIMINARY CONCEPT PLAN

| | |
|-------------------|-----------------------------|
| Scale: 1:2500 | Project Number: CCO-20-0203 |
| Drawn by: M.M. | |
| Checked by: | Drawing Number: |
| Designed by: J.P. | 01 |

HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



APPENDIX B – LABORATORY RESULTS AND LABORATORY CERTIFICATES OF ANALYSIS

Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946063
Date Submitted: 2021-01-11
Date Reported: 2021-01-13
Project: 20-0203
COC #: 212328

Page 1 of 2

Dear Monica Black:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Jason
Kennedy
2021.01.13
14:37:26
-05'00'



APPROVAL: _____

Jason Kennedy, Project Manager

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <http://www.cala.ca/scopes/2602.pdf>.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946063
 Date Submitted: 2021-01-11
 Date Reported: 2021-01-13
 Project: 20-0203
 COC #: 212328

| Group | Analyte | MRL | Units | Guideline | Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. | 1537599 GW 2021-01-11 TW1-1 | 1537600 GW 2021-01-11 TW1-2 |
|--------------|---------------------------|-----|----------|-----------|--|--------------------------------------|--------------------------------------|
| Microbiology | Escherichia Coli | 0 | ct/100mL | MAC 0 | | 0 | 0 |
| | Faecal Coliforms | 0 | ct/100mL | | | 0 | 0 |
| | Faecal Streptococcus | 0 | ct/100mL | | | 0 | 0 |
| | Heterotrophic Plate Count | 0 | ct/1mL | | | 55 | 51 |
| | Total Coliforms | 0 | ct/100mL | MAC 0 | | 9* | 8* |

Guideline = ODWSOG

* = Guideline Exceedence

Results relate only to the parameters tested on the samples submitted.
 Analytical Method: AMBCOLM1
 additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.


Report Number: 1946066
Date Submitted: 2021-01-11
Date Reported: 2021-01-18
Project: 20-0203
COC #: 212328

Page 1 of 6

Dear Monica Black:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Sarah
Horner
 2021.01.18
16:06:16
-05'00'

APPROVAL:

Sarah Horner, Inorganics Technician

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <http://www.cala.ca/scopes/2602.pdf>.

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Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946066
 Date Submitted: 2021-01-11
 Date Reported: 2021-01-18
 Project: 20-0203
 COC #: 212328

| Group | Analyte | MRL | Units | Guideline | Lab I.D. | 1537603 | 1537604 |
|-------------------|-------------------------|-------|-------|---------------|---------------|------------|---------|
| | | | | | Sample Matrix | GW | GW |
| | | | | Sample Type | 2021-01-11 | 2021-01-11 | |
| | | | | Sampling Date | TW1-1 | TW1-2 | |
| | | | | Sample I.D. | | | |
| Anions | Cl | 1 | mg/L | AO 250 | | 30 | 33 |
| | F | 0.10 | mg/L | MAC 1.5 | | <0.10 | <0.10 |
| | N-NO2 | 0.10 | mg/L | MAC 1.0 | | <0.10 | <0.10 |
| | N-NO3 | 0.10 | mg/L | MAC 10.0 | | 4.54 | 4.70 |
| | SO4 | 1 | mg/L | AO 500 | | 12 | 15 |
| General Chemistry | Alkalinity as CaCO3 | 5 | mg/L | OG 500 | | 226 | 233 |
| | Colour | 2 | TCU | | | 3 | 4 |
| | Conductivity | 5 | uS/cm | | | 555 | 575 |
| | DOC | 0.5 | mg/L | AO 5 | | 2.2 | 2.2 |
| | pH | 1.00 | | 6.5-8.5 | | 8.04 | 7.98 |
| | S2- | 0.05 | mg/L | AO 0.05 | | <0.05 | <0.05 |
| | TDS | 10 | mg/L | AO 500 | | 320 | 330 |
| | Turbidity | 0.1 | NTU | AO 5.0 | | 1.0 | 0.2 |
| Hardness | Hardness as CaCO3 | 1 | mg/L | OG 100 | | 267* | 272* |
| Indices/Calc | Ion Balance | 0.01 | | | | 1.02 | 1.06 |
| Metals | Ca | 1 | mg/L | | | 69 | 71 |
| | Fe | 0.03 | mg/L | AO 0.3 | | 0.06 | <0.03 |
| | K | 1 | mg/L | | | 1 | 1 |
| | Mg | 1 | mg/L | | | 23 | 23 |
| | Mn | 0.01 | mg/L | AO 0.05 | | <0.01 | <0.01 |
| Nutrients | Na | 2 | mg/L | AO 200 | | 16 | 18 |
| | N-NH3 | 0.010 | mg/L | | | <0.010 | <0.010 |
| | Total Kjeldahl Nitrogen | 0.100 | mg/L | | | 0.172 | 0.160 |
| Subcontract-Inorg | Phenols | 0.001 | mg/L | | | <0.001 | <0.001 |
| | Tannin & Lignin | 0.1 | mg/L | | | <0.1 | <0.1 |

Guideline = ODWSOG
*** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946066
 Date Submitted: 2021-01-11
 Date Reported: 2021-01-18
 Project: 20-0203
 COC #: 212328

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|---|-------------|----------|-----------|
| Run No 394945 Analysis/Extraction Date 2021-01-12 Analyst SKH Method EPA 350.1 | | | |
| N-NH3 | <0.010 mg/L | 108 | 80-120 |
| Run No 394979 Analysis/Extraction Date 2021-01-12 Analyst SKH Method EPA 351.2 | | | |
| Total Kjeldahl Nitrogen | <0.100 mg/L | 115 | 70-130 |
| Run No 394985 Analysis/Extraction Date 2021-01-13 Analyst SKH Method C SM2120C | | | |
| Colour | <2 TCU | 93 | 90-110 |
| Run No 395019 Analysis/Extraction Date 2021-01-13 Analyst AET Method SM2320,2510,4500H/F | | | |
| Alkalinity (CaCO3) | <5 mg/L | 100 | 90-110 |
| Conductivity | <5 uS/cm | 97 | 90-110 |
| F | <0.10 mg/L | 102 | 90-110 |
| pH | | 101 | 90-110 |
| Run No 395058 Analysis/Extraction Date 2021-01-14 Analyst H_D Method C SM2130B | | | |
| Turbidity | <0.1 NTU | 101 | 70-130 |

Guideline = ODWSOG
*** = Guideline Exceedence**

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946066
 Date Submitted: 2021-01-11
 Date Reported: 2021-01-18
 Project: 20-0203
 COC #: 212328

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|-------------|----------|-----------|
| Run No 395060 Analysis/Extraction Date 2021-01-14 Analyst Z_S | | | |
| Method M SM3120B-3500C | | | |
| Calcium | <1 mg/L | 102 | 90-110 |
| Potassium | <1 mg/L | 95 | 87-113 |
| Magnesium | <1 mg/L | 100 | 76-124 |
| Sodium | <2 mg/L | 96 | 82-118 |
| Run No 395069 Analysis/Extraction Date 2021-01-14 Analyst SKH | | | |
| Method SM 4110 | | | |
| Chloride | <1 mg/L | 100 | 90-110 |
| N-NO2 | <0.10 mg/L | 106 | 90-110 |
| N-NO3 | <0.10 mg/L | 107 | 90-110 |
| SO4 | <1 mg/L | 100 | 90-110 |
| Run No 395088 Analysis/Extraction Date 2021-01-18 Analyst SKH | | | |
| Method C SM2540 | | | |
| TDS | <10 mg/L | 100 | 90-110 |
| Run No 395091 Analysis/Extraction Date 2021-01-14 Analyst AET | | | |
| Method SUBCONTRACT P-INORG | | | |
| Phenols | <0.001 mg/L | 76 | 69-132 |
| Tannin & Lignin | <0.1 mg/L | 110 | |

Guideline = ODWSOG
*** = Guideline Exceedence**

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946066
 Date Submitted: 2021-01-11
 Date Reported: 2021-01-18
 Project: 20-0203
 COC #: 212328

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|---|------------|----------|-----------|
| Run No 395092 Analysis/Extraction Date 2021-01-15 Analyst AET Method C SM2340B | | | |
| Hardness as CaCO3 | | | |
| Ion Balance | | | |
| Run No 395095 Analysis/Extraction Date 2021-01-15 Analyst SKH Method EPA 200.8 | | | |
| Iron | <0.03 mg/L | 101 | 80-120 |
| Manganese | <0.01 mg/L | 117 | 80-120 |
| Run No 395105 Analysis/Extraction Date 2021-01-15 Analyst SKH Method SM 4110 | | | |
| N-NO3 | <0.10 mg/L | 104 | 90-110 |
| Run No 395115 Analysis/Extraction Date 2021-01-15 Analyst AET Method SM 5310B | | | |
| DOC | <0.5 mg/L | 97 | 80-120 |
| Run No 395117 Analysis/Extraction Date 2021-01-15 Analyst AET Method C SM4500-S2-D | | | |
| S2- | <0.01 mg/L | 99 | 80-120 |

Guideline = ODWSOG
*** = Guideline Exceedence**

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MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946066
Date Submitted: 2021-01-11
Date Reported: 2021-01-18
Project: 20-0203
COC #: 212328

Sample Comment Summary

| | | |
|--------------------|-------|--|
| Sample ID: 1537603 | TW1-1 | Holding time for turbidity analysis was exceeded. S2- MRL elevated due to matrix interference (dilution was done). |
| Sample ID: 1537604 | TW1-2 | Holding time for turbidity analysis was exceeded. S2- MRL elevated due to matrix interference (dilution was done). |

Guideline = ODWSOG

*** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946321
Date Submitted: 2021-01-13
Date Reported: 2021-01-15
Project: 20-0203
COC #: 212329

Page 1 of 2

Dear Monica Black:**Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).**

Report Comments:

Steven
Tosh
2021.01.15
13:27:22
-05'00'



APPROVAL: _____

Steven Tosh, Operations Manager

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946321
 Date Submitted: 2021-01-13
 Date Reported: 2021-01-15
 Project: 20-0203
 COC #: 212329

| Group | Analyte | MRL | Units | Guideline | Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. | 1538197 GW 2021-01-13 TW2-1 | 1538198 GW 2021-01-13 TW2-2 |
|--------------|---------------------------|-----|----------|-----------|--|--------------------------------------|--------------------------------------|
| Microbiology | Escherichia Coli | 0 | ct/100mL | MAC 0 | | 0 | 0 |
| | Faecal Coliforms | 0 | ct/100mL | | | 0 | 0 |
| | Faecal Streptococcus | 0 | ct/100mL | | | 0 | 0 |
| | Heterotrophic Plate Count | 0 | ct/1mL | | | 28 | 24 |
| | Total Coliforms | 0 | ct/100mL | MAC 0 | | 4* | 4* |

Guideline = ODWSOG

* = Guideline Exceedence

Results relate only to the parameters tested on the samples submitted.
 Analytical Method: AMBCOLM1
 additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946332
Date Submitted: 2021-01-13
Date Reported: 2021-01-20
Project: 20-0203
COC #: 212329

Page 1 of 5

Dear Monica Black:**Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).**

Report Comments:



Addrine
Thomas
2021.01.20
15:03:47 -05'00'

APPROVAL:

Addrine Thomas, Inorganics Supervisor

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <http://www.cala.ca/scopes/2602.pdf>.

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946332
 Date Submitted: 2021-01-13
 Date Reported: 2021-01-20
 Project: 20-0203
 COC #: 212329

| Group | Analyte | MRL | Units | Guideline | Lab I.D. | 1538209 | 1538210 |
|-------------------|-------------------------|-------|-------|---------------|---------------|------------|---------|
| | | | | | Sample Matrix | GW | GW |
| | | | | Sample Type | 2021-01-13 | 2021-01-13 | |
| | | | | Sampling Date | TW2-1 | TW2-2 | |
| | | | | Sample I.D. | | | |
| Anions | Cl | 1 | mg/L | AO 250 | | 9 | 10 |
| | F | 0.10 | mg/L | MAC 1.5 | | <0.10 | <0.10 |
| | N-NO2 | 0.10 | mg/L | MAC 1.0 | | <0.10 | <0.10 |
| | N-NO3 | 0.10 | mg/L | MAC 10.0 | | 4.70 | 4.91 |
| | SO4 | 1 | mg/L | AO 500 | | 8 | 8 |
| General Chemistry | Alkalinity as CaCO3 | 5 | mg/L | OG 500 | | 288 | 281 |
| | Colour | 2 | TCU | | | <2 | <2 |
| | Conductivity | 5 | uS/cm | | | 568 | 575 |
| | DOC | 0.5 | mg/L | AO 5 | | 2.0 | 1.9 |
| | pH | 1.00 | | 6.5-8.5 | | 8.05 | 8.05 |
| | S2- | 0.01 | mg/L | AO 0.05 | | <0.01 | <0.01 |
| | TDS | 10 | mg/L | AO 500 | | 330 | 340 |
| | Turbidity | 0.1 | NTU | AO 5.0 | | 3.0 | 0.6 |
| Hardness | Hardness as CaCO3 | 1 | mg/L | OG 100 | | 321* | 321* |
| Indices/Calc | Ion Balance | 0.01 | | | | 1.01 | 1.02 |
| Metals | Ca | 1 | mg/L | | | 84 | 84 |
| | Fe | 0.03 | mg/L | AO 0.3 | | 0.07 | 0.04 |
| | K | 1 | mg/L | | | 2 | 2 |
| | Mg | 1 | mg/L | | | 27 | 27 |
| | Mn | 0.01 | mg/L | AO 0.05 | | <0.01 | <0.01 |
| | Na | 2 | mg/L | AO 200 | | 2 | 2 |
| Nutrients | N-NH3 | 0.010 | mg/L | | | <0.010 | <0.010 |
| | Total Kjeldahl Nitrogen | 0.100 | mg/L | | | 0.259 | 0.164 |
| Subcontract-Inorg | Phenols | 0.001 | mg/L | | | <0.001 | <0.001 |
| | Tannin & Lignin | 0.1 | mg/L | | | <0.1 | <0.1 |

Guideline = ODWSOG
*** = Guideline Exceedence**

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 Methods references and/or additional QA/QC information available on request.

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946332
 Date Submitted: 2021-01-13
 Date Reported: 2021-01-20
 Project: 20-0203
 COC #: 212329

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|---|-------------|----------|-----------|
| Run No 395048 Analysis/Extraction Date 2021-01-14 Analyst SKH Method EPA 350.1 | | | |
| N-NH3 | <0.010 mg/L | 104 | 80-120 |
| Run No 395058 Analysis/Extraction Date 2021-01-14 Analyst H D Method C SM2130B | | | |
| Turbidity | <0.1 NTU | 101 | 70-130 |
| Run No 395060 Analysis/Extraction Date 2021-01-14 Analyst Z S Method M SM3120B-3500C | | | |
| Calcium | <1 mg/L | 102 | 90-110 |
| Potassium | <1 mg/L | 95 | 87-113 |
| Magnesium | <1 mg/L | 100 | 76-124 |
| Sodium | <2 mg/L | 96 | 82-118 |
| Run No 395064 Analysis/Extraction Date 2021-01-14 Analyst H D Method EPA 200.8 | | | |
| Iron | <0.03 mg/L | 95 | 80-120 |
| Manganese | <0.01 mg/L | 109 | 80-120 |
| Run No 395088 Analysis/Extraction Date 2021-01-18 Analyst SKH Method C SM2540 | | | |
| TDS | <10 mg/L | 100 | 90-110 |

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*** = Guideline Exceedence**

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946332
 Date Submitted: 2021-01-13
 Date Reported: 2021-01-20
 Project: 20-0203
 COC #: 212329

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|-------------|----------|-----------|
| Run No 395104 Analysis/Extraction Date 2021-01-15 Analyst SKH | | | |
| Method EPA 351.2 | | | |
| Total Kjeldahl Nitrogen | <0.100 mg/L | 110 | 70-130 |
| Run No 395105 Analysis/Extraction Date 2021-01-15 Analyst SKH | | | |
| Method SM 4110 | | | |
| Chloride | <1 mg/L | 100 | 90-110 |
| N-NO2 | <0.10 mg/L | 104 | 90-110 |
| N-NO3 | <0.10 mg/L | 104 | 90-110 |
| SO4 | <1 mg/L | 100 | 90-110 |
| Run No 395114 Analysis/Extraction Date 2021-01-15 Analyst AET | | | |
| Method SM2320,2510,4500H/F | | | |
| Alkalinity (CaCO3) | <5 mg/L | 101 | 90-110 |
| Conductivity | <5 uS/cm | 99 | 90-110 |
| F | <0.10 mg/L | 102 | 90-110 |
| pH | | 102 | 90-110 |
| Run No 395198 Analysis/Extraction Date 2021-01-19 Analyst SKH | | | |
| Method C SM2120C | | | |
| Colour | <2 TCU | 102 | 90-110 |

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946332
 Date Submitted: 2021-01-13
 Date Reported: 2021-01-20
 Project: 20-0203
 COC #: 212329

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|-------------|----------|-----------|
| Run No 395250 Analysis/Extraction Date 2021-01-15 Analyst K_A | | | |
| Method SUBCONTRACT P-INORG | | | |
| Phenols | <0.001 mg/L | 96 | 69-132 |
| Tannin & Lignin | <0.1 mg/L | 100 | |
| Run No 395277 Analysis/Extraction Date 2021-01-15 Analyst AET | | | |
| Method SM 5310B | | | |
| DOC | <0.5 mg/L | 97 | 80-120 |
| Run No 395279 Analysis/Extraction Date 2021-01-20 Analyst AET | | | |
| Method C SM2340B | | | |
| Hardness as CaCO3 | | | |
| Ion Balance | | | |
| Run No 395294 Analysis/Extraction Date 2021-01-20 Analyst AET | | | |
| Method C SM4500-S2-D | | | |
| S2- | <0.01 mg/L | 101 | 80-120 |

Guideline = ODWSOG
*** = Guideline Exceedence**

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Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946203
Date Submitted: 2021-01-12
Date Reported: 2021-01-14
Project: 20-0203
COC #: 212330

Page 1 of 2

Dear Monica Black:**Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).**

Report Comments:

Steven
Tosh
2021.01.1
4 13:47:32
-05'00'



APPROVAL: _____

Steven Tosh, Operations Manager

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946203
 Date Submitted: 2021-01-12
 Date Reported: 2021-01-14
 Project: 20-0203
 COC #: 212330

| Group | Analyte | MRL | Units | Guideline | Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. | 1537912 GW 2021-01-12 TW3-1 | 1537913 GW 2021-01-12 TW3-2 |
|--------------|---------------------------|-----|----------|-----------|--|--------------------------------------|--------------------------------------|
| Microbiology | Escherichia Coli | 0 | ct/100mL | MAC 0 | | 0 | 0 |
| | Faecal Coliforms | 0 | ct/100mL | | | 0 | 0 |
| | Faecal Streptococcus | 0 | ct/100mL | | | 0 | 0 |
| | Heterotrophic Plate Count | 0 | ct/1mL | | | 0 | 0 |
| | Total Coliforms | 0 | ct/100mL | MAC 0 | | 0 | 0 |

Guideline = ODWSOG

* = Guideline Exceedence

Results relate only to the parameters tested on the samples submitted.
 Analytical Method: AMBCOLM1
 additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.


Report Number: 1946189
Date Submitted: 2021-01-12
Date Reported: 2021-01-19
Project: 20-0203
COC #: 212330

Page 1 of 5

Dear Monica Black:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Sarah
Horner
 2021.01.1
9 14:28:19
-05'00'

APPROVAL:

Sarah Horner, Inorganics Technician

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 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946189
 Date Submitted: 2021-01-12
 Date Reported: 2021-01-19
 Project: 20-0203
 COC #: 212330

| Group | Analyte | MRL | Units | Guideline | Lab I.D. | Sample Matrix |
|-------------------|-------------------------|-------|-------|-----------|-------------|---------------|
| | | | | | Sample Type | Sampling Date |
| | | | | | 1537895 | 1537896 |
| | | | | | Water | Water |
| | | | | | 2021-01-12 | 2021-01-12 |
| | | | | | TW3-1 | TW3-2 |
| Anions | Cl | 1 | mg/L | AO 250 | 18 | 18 |
| | F | 0.10 | mg/L | MAC 1.5 | 0.18 | 0.17 |
| | N-NO2 | 0.10 | mg/L | MAC 1.0 | <0.10 | <0.10 |
| | N-NO3 | 0.10 | mg/L | MAC 10.0 | <0.10 | 0.12 |
| | SO4 | 1 | mg/L | AO 500 | 19 | 19 |
| General Chemistry | Alkalinity as CaCO3 | 5 | mg/L | OG 500 | 276 | 272 |
| | Colour | 2 | TCU | | <2 | <2 |
| | Conductivity | 5 | uS/cm | | 579 | 577 |
| | DOC | 0.5 | mg/L | AO 5 | 1.1 | 1.5 |
| | pH | 1.00 | | 6.5-8.5 | 8.08 | 8.12 |
| | S2- | 0.01 | mg/L | AO 0.05 | <0.01 | <0.01 |
| | TDS | 10 | mg/L | AO 500 | 320 | 320 |
| | Turbidity | 0.1 | NTU | AO 5.0 | 2.6 | 3.0 |
| Hardness | Hardness as CaCO3 | 1 | mg/L | OG 100 | 314* | 316* |
| Indices/Calc | Ion Balance | 0.01 | | | 1.05 | 1.07 |
| Metals | Ca | 1 | mg/L | | 86 | 87 |
| | Fe | 0.03 | mg/L | AO 0.3 | 0.32* | 0.29 |
| | K | 1 | mg/L | | 2 | 2 |
| | Mg | 1 | mg/L | | 24 | 24 |
| | Mn | 0.01 | mg/L | AO 0.05 | 0.12* | 0.11* |
| | Na | 2 | mg/L | AO 200 | 10 | 10 |
| Nutrients | N-NH3 | 0.010 | mg/L | | <0.010 | <0.010 |
| | Total Kjeldahl Nitrogen | 0.100 | mg/L | | <0.100 | 0.266 |
| Subcontract-Inorg | Phenols | 0.001 | mg/L | | <0.001 | <0.001 |
| | Tannin & Lignin | 0.1 | mg/L | | <0.1 | <0.1 |

Guideline = ODWSOG
*** = Guideline Exceedence**

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946189
 Date Submitted: 2021-01-12
 Date Reported: 2021-01-19
 Project: 20-0203
 COC #: 212330

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|-------------|----------|-----------|
| Run No 394985 Analysis/Extraction Date 2021-01-13 Analyst SKH | | | |
| Method C SM2120C | | | |
| Colour | <2 TCU | 93 | 90-110 |
| Run No 395019 Analysis/Extraction Date 2021-01-13 Analyst AET | | | |
| Method SM2320,2510,4500H/F | | | |
| Alkalinity (CaCO3) | <5 mg/L | 100 | 90-110 |
| Conductivity | <5 uS/cm | 97 | 90-110 |
| F | <0.10 mg/L | 102 | 90-110 |
| pH | | 101 | 90-110 |
| Run No 395048 Analysis/Extraction Date 2021-01-14 Analyst SKH | | | |
| Method EPA 350.1 | | | |
| N-NH3 | <0.010 mg/L | 104 | 80-120 |
| Run No 395057 Analysis/Extraction Date 2021-01-14 Analyst SKH | | | |
| Method EPA 351.2 | | | |
| Total Kjeldahl Nitrogen | <0.100 mg/L | 93 | 70-130 |
| Run No 395058 Analysis/Extraction Date 2021-01-14 Analyst H_D | | | |
| Method C SM2130B | | | |
| Turbidity | <0.1 NTU | 101 | 70-130 |

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946189
 Date Submitted: 2021-01-12
 Date Reported: 2021-01-19
 Project: 20-0203
 COC #: 212330

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|-------------|----------|-----------|
| Run No 395060 Analysis/Extraction Date 2021-01-14 Analyst Z_S | | | |
| Method M SM3120B-3500C | | | |
| Calcium | <1 mg/L | 102 | 90-110 |
| Potassium | <1 mg/L | 95 | 87-113 |
| Magnesium | <1 mg/L | 100 | 76-124 |
| Sodium | <2 mg/L | 96 | 82-118 |
| Run No 395064 Analysis/Extraction Date 2021-01-14 Analyst H D | | | |
| Method EPA 200.8 | | | |
| Iron | <0.03 mg/L | 95 | 80-120 |
| Manganese | <0.01 mg/L | 109 | 80-120 |
| Run No 395088 Analysis/Extraction Date 2021-01-18 Analyst SKH | | | |
| Method C SM2540 | | | |
| TDS | <10 mg/L | 100 | 90-110 |
| Run No 395091 Analysis/Extraction Date 2021-01-14 Analyst AET | | | |
| Method SUBCONTRACT P-INORG | | | |
| Phenols | <0.001 mg/L | 92 | 69-132 |
| Tannin & Lignin | <0.1 mg/L | 110 | |
| Run No 395105 Analysis/Extraction Date 2021-01-15 Analyst SKH | | | |
| Method SM 4110 | | | |

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
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 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946189
 Date Submitted: 2021-01-12
 Date Reported: 2021-01-19
 Project: 20-0203
 COC #: 212330

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|---|------------|----------|-----------|
| Chloride | <1 mg/L | 100 | 90-110 |
| N-NO2 | <0.10 mg/L | 104 | 90-110 |
| N-NO3 | <0.10 mg/L | 104 | 90-110 |
| SO4 | <1 mg/L | 100 | 90-110 |
| Run No 395115 Analysis/Extraction Date 2021-01-15 Analyst AET Method SM 5310B | | | |
| DOC | <0.5 mg/L | 97 | 80-120 |
| Run No 395117 Analysis/Extraction Date 2021-01-15 Analyst AET Method C SM4500-S2-D | | | |
| S2- | <0.01 mg/L | 99 | 80-120 |
| Run No 395236 Analysis/Extraction Date 2021-01-19 Analyst SKH Method C SM2340B | | | |
| Hardness as CaCO3 | | | |
| Ion Balance | | | |

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*** = Guideline Exceedence**

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Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Jordan Bowman
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945418
Date Submitted: 2020-12-22
Date Reported: 2020-12-24
Project:
COC #: 212250

Page 1 of 2

Dear Jordan Bowman:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Steven Tosh

2020.12.24

15:20:49

-05'00'



APPROVAL: _____

Steven Tosh, Operations Manager

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Jordan Bowman
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945418
 Date Submitted: 2020-12-22
 Date Reported: 2020-12-24
 Project:
 COC #: 212250

| Group | Analyte | MRL | Units | Guideline | Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. | 1535943 Water 2020-12-22 TW4-1 | 1535944 Water 2020-12-22 TW4-2 |
|--------------|---------------------------|-----|----------|-----------|--|---|---|
| Microbiology | Escherichia Coli | 0 | ct/100mL | MAC 0 | | 0 | 0 |
| | Faecal Coliforms | 0 | ct/100mL | | | 0 | 0 |
| | Faecal Streptococcus | 0 | ct/100mL | | | 0 | 2 |
| | Heterotrophic Plate Count | 0 | ct/1mL | | | 0 | 0 |
| | Total Coliforms | 0 | ct/100mL | MAC 0 | | 0 | 0 |

Guideline = ODWSOG

* = Guideline Exceedence

Results relate only to the parameters tested on the samples submitted.
 Analytical Method: AMBCOLM1
 additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Jordan Bowman
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.


Report Number: 1945427
Date Submitted: 2020-12-22
Date Reported: 2021-01-04
Project:
COC #: 212250

Page 1 of 5

Dear Jordan Bowman:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:



Addrine
Thomas
2021.01.04
14:38:23 -05'00'

APPROVAL:

Addrine Thomas, Inorganics Supervisor

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Jordan Bowman
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945427
 Date Submitted: 2020-12-22
 Date Reported: 2021-01-04
 Project:
 COC #: 212250

| Group | Analyte | MRL | Units | Guideline | Lab I.D. | 1535957 |
|-------------------|-------------------------|-------|-------|---------------|---------------|------------|
| | | | | | Sample Matrix | 1535958 |
| | | | | Sample Type | GW | GW |
| | | | | Sampling Date | 2020-12-22 | 2020-12-22 |
| | | | | Sample I.D. | TW4-1 | TW4-2 |
| Anions | Cl | 1 | mg/L | AO 250 | 10 | 10 |
| | F | 0.10 | mg/L | MAC 1.5 | <0.10 | <0.10 |
| | N-NO2 | 0.10 | mg/L | MAC 1.0 | <0.10 | <0.10 |
| | N-NO3 | 0.10 | mg/L | MAC 10.0 | 0.28 | 0.31 |
| | SO4 | 1 | mg/L | AO 500 | 13 | 12 |
| General Chemistry | Alkalinity as CaCO3 | 5 | mg/L | OG 500 | 326 | 319 |
| | Colour | 2 | TCU | | <2 | <2 |
| | Conductivity | 5 | uS/cm | | 594 | 586 |
| | DOC | 0.5 | mg/L | AO 5 | 1.0 | 1.0 |
| | pH | 1.00 | | 6.5-8.5 | 8.10 | 8.12 |
| | S2- | 0.01 | mg/L | AO 0.05 | 0.02 | <0.01 |
| | TDS | 10 | mg/L | AO 500 | 330 | 320 |
| | Turbidity | 0.1 | NTU | AO 5.0 | 2.2 | 0.4 |
| Hardness | Hardness as CaCO3 | 1 | mg/L | OG 100 | 316* | 316* |
| Indices/Calc | Ion Balance | 0.01 | | | 0.91 | 0.93 |
| Metals | Ca | 1 | mg/L | | 72 | 72 |
| | Fe | 0.03 | mg/L | AO 0.3 | 0.07 | 0.05 |
| | K | 1 | mg/L | | <1 | <1 |
| | Mg | 1 | mg/L | | 33 | 33 |
| | Mn | 0.01 | mg/L | AO 0.05 | <0.01 | <0.01 |
| | Na | 2 | mg/L | AO 200 | 3 | 3 |
| Nutrients | N-NH3 | 0.010 | mg/L | | 0.032 | <0.010 |
| | Total Kjeldahl Nitrogen | 0.100 | mg/L | | <0.100 | 0.130 |
| Subcontract | Phenols | 0.001 | mg/L | | <0.001 | <0.001 |
| | Tannin & Lignin | 0.1 | mg/L | | <0.1 | <0.1 |

Guideline = ODWSOG
*** = Guideline Exceedence**

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Jordan Bowman
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945427
 Date Submitted: 2020-12-22
 Date Reported: 2021-01-04
 Project:
 COC #: 212250

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|------------|----------|-----------|
| Run No 394399 Analysis/Extraction Date 2020-12-23 Analyst H D | | | |
| Method C SM2130B | | | |
| Turbidity | <0.1 NTU | 105 | 70-130 |
| Run No 394433 Analysis/Extraction Date 2020-12-23 Analyst Z S | | | |
| Method M SM3120B-3500C | | | |
| Calcium | <1 mg/L | 104 | 90-110 |
| Potassium | <1 mg/L | 94 | 87-113 |
| Magnesium | <1 mg/L | 103 | 76-124 |
| Sodium | <2 mg/L | 95 | 82-118 |
| Run No 394475 Analysis/Extraction Date 2020-12-24 Analyst AET | | | |
| Method SM 5310B | | | |
| DOC | <0.5 mg/L | 80 | 80-120 |
| Run No 394494 Analysis/Extraction Date 2020-12-24 Analyst H D | | | |
| Method EPA 200.8 | | | |
| Iron | <0.03 mg/L | 96 | 80-120 |
| Manganese | <0.01 mg/L | 106 | 80-120 |
| Run No 394503 Analysis/Extraction Date 2020-12-30 Analyst SKH | | | |
| Method C SM2540 | | | |
| TDS | <10 mg/L | 98 | 90-110 |

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Jordan Bowman
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945427
 Date Submitted: 2020-12-22
 Date Reported: 2021-01-04
 Project:
 COC #: 212250

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|-------------|----------|-----------|
| Run No 394519 Analysis/Extraction Date 2020-12-29 Analyst SKH | | | |
| Method EPA 350.1 | | | |
| N-NH3 | <0.010 mg/L | 115 | 80-120 |
| Run No 394526 Analysis/Extraction Date 2020-12-29 Analyst SKH | | | |
| Method SM 4110 | | | |
| Chloride | <1 mg/L | 100 | 90-110 |
| N-NO2 | <0.10 mg/L | 104 | 90-110 |
| N-NO3 | <0.10 mg/L | 103 | 90-110 |
| SO4 | <1 mg/L | 105 | 90-110 |
| Run No 394530 Analysis/Extraction Date 2020-12-29 Analyst SKH | | | |
| Method EPA 351.2 | | | |
| Total Kjeldahl Nitrogen | <0.100 mg/L | 113 | 70-130 |
| Run No 394541 Analysis/Extraction Date 2020-12-29 Analyst H D | | | |
| Method C SM4500-S2-D | | | |
| S2- | <0.01 mg/L | 83 | 80-120 |
| Run No 394556 Analysis/Extraction Date 2020-12-30 Analyst SKH | | | |
| Method C SM2120C | | | |
| Colour | <2 TCU | 107 | 90-110 |

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 Attention: Mr. Jordan Bowman
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 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945427
 Date Submitted: 2020-12-22
 Date Reported: 2021-01-04
 Project:
 COC #: 212250

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|-------------|----------|-----------|
| Run No 394594 Analysis/Extraction Date 2020-12-30 Analyst H_D | | | |
| Method SM2320,2510,4500H/F | | | |
| Alkalinity (CaCO3) | <5 mg/L | 107 | 90-110 |
| Conductivity | <5 uS/cm | 99 | 90-110 |
| F | <0.10 mg/L | 102 | 90-110 |
| pH | | 102 | 90-110 |
| Run No 394600 Analysis/Extraction Date 2020-12-24 Analyst KK | | | |
| Method SUBCONTRACT-A | | | |
| Phenols | <0.001 mg/L | 84 | |
| Tannin & Lignin | <0.1 mg/L | 110 | |
| Run No 394625 Analysis/Extraction Date 2021-01-04 Analyst AET | | | |
| Method C SM2340B | | | |
| Hardness as CaCO3 | | | |
| Ion Balance | | | |

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Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945869
Date Submitted: 2021-01-06
Date Reported: 2021-01-08
Project: 20-0203
COC #: 212172

Page 1 of 2

Dear Monica Black:**Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).**

Report Comments:

Steven
Tosh
2021.01.08
15:54:24
-05'00'



APPROVAL:

Steven Tosh, Operations Manager

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945869
 Date Submitted: 2021-01-06
 Date Reported: 2021-01-08
 Project: 20-0203
 COC #: 212172

| Group | Analyte | MRL | Units | Guideline | Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. | 1537086 GW 2021-01-06 TW5-1 | 1537087 GW 2021-01-06 TW5-2 |
|--------------|---------------------------|-----|----------|-----------|--|--------------------------------------|--------------------------------------|
| Microbiology | Escherichia Coli | 0 | ct/100mL | MAC 0 | | 0 | 0 |
| | Faecal Coliforms | 0 | ct/100mL | | | 0 | 0 |
| | Faecal Streptococcus | 0 | ct/100mL | | | 0 | 0 |
| | Heterotrophic Plate Count | 0 | ct/1mL | | | 4 | 1 |
| | Total Coliforms | 0 | ct/100mL | MAC 0 | | 0 | 0 |

Guideline = ODWSOG

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Analytical Method: AMBCOLM1
 additional QA/QC information available on request.

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Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.


Report Number: 1945852
Date Submitted: 2021-01-06
Date Reported: 2021-01-08
Project: 20-0203
COC #: 212172

Page 1 of 5

Dear Monica Black:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:



Rebecca
Koshy
2021.01.08
17:22:18
-05'00'

APPROVAL:

Rebecca Koshy, Project Manager

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 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945852
 Date Submitted: 2021-01-06
 Date Reported: 2021-01-08
 Project: 20-0203
 COC #: 212172

| Group | Analyte | MRL | Units | Guideline | Lab I.D. | 1537052 | 1537053 |
|-------------------|-------------------------|-------|-------|-----------|---------------|------------|------------|
| | | | | | Sample Matrix | Water | Water |
| | | | | | Sample Type | 2021-01-06 | 2021-01-06 |
| | | | | | Sampling Date | TW5-1 | TW5-2 |
| | | | | | Sample I.D. | | |
| Anions | Cl | 1 | mg/L | AO 250 | | 10 | 9 |
| | F | 0.10 | mg/L | MAC 1.5 | | 0.10 | <0.10 |
| | N-NO2 | 0.10 | mg/L | MAC 1.0 | | <0.10 | <0.10 |
| | N-NO3 | 0.10 | mg/L | MAC 10.0 | | 0.33 | 0.36 |
| | SO4 | 1 | mg/L | AO 500 | | 13 | 13 |
| General Chemistry | Alkalinity as CaCO3 | 5 | mg/L | OG 500 | | 326 | 325 |
| | Colour | 2 | TCU | | | <2 | <2 |
| | Conductivity | 5 | uS/cm | | | 593 | 588 |
| | DOC | 0.5 | mg/L | AO 5 | | 1.2 | 1.2 |
| | pH | 1.00 | | 6.5-8.5 | | 8.09 | 8.03 |
| | S2- | 0.01 | mg/L | AO 0.05 | | <0.01 | <0.01 |
| | TDS | 10 | mg/L | AO 500 | | 340 | 330 |
| | Turbidity | 0.1 | NTU | AO 5.0 | | 1.6 | 0.5 |
| Hardness | Hardness as CaCO3 | 1 | mg/L | OG 100 | | 320* | 322* |
| Indices/Calc | Ion Balance | 0.01 | | | | 0.92 | 0.94 |
| Metals | Ca | 1 | mg/L | | | 72 | 73 |
| | Fe | 0.03 | mg/L | AO 0.3 | | 0.08 | 0.03 |
| | K | 1 | mg/L | | | 1 | 1 |
| | Mg | 1 | mg/L | | | 34 | 34 |
| | Mn | 0.01 | mg/L | AO 0.05 | | <0.01 | <0.01 |
| Nutrients | Na | 2 | mg/L | AO 200 | | 3 | 3 |
| | N-NH3 | 0.010 | mg/L | | | <0.010 | <0.010 |
| | Total Kjeldahl Nitrogen | 0.100 | mg/L | | | 0.111 | <0.100 |
| Subcontract-Inorg | Phenols | 0.001 | mg/L | | | <0.001 | <0.001 |
| | Tannin & Lignin | 0.1 | mg/L | | | <0.1 | <0.1 |

Guideline = ODWSOG
*** = Guideline Exceedence**

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945852
 Date Submitted: 2021-01-06
 Date Reported: 2021-01-08
 Project: 20-0203
 COC #: 212172

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|-------------|----------|-----------|
| Run No 394793 Analysis/Extraction Date 2021-01-07 Analyst H D | | | |
| Method C SM2130B | | | |
| Turbidity | <0.1 NTU | 103 | 70-130 |
| Run No 394797 Analysis/Extraction Date 2021-01-07 Analyst H D | | | |
| Method EPA 200.8 | | | |
| Iron | <0.03 mg/L | 101 | 80-120 |
| Manganese | <0.01 mg/L | 108 | 80-120 |
| Run No 394799 Analysis/Extraction Date 2021-01-07 Analyst Z S | | | |
| Method M SM3120B-3500C | | | |
| Calcium | <1 mg/L | 99 | 90-110 |
| Potassium | <1 mg/L | 97 | 87-113 |
| Magnesium | <1 mg/L | 98 | 76-124 |
| Sodium | <2 mg/L | 100 | 82-118 |
| Run No 394801 Analysis/Extraction Date 2021-01-07 Analyst SKH | | | |
| Method EPA 351.2 | | | |
| Total Kjeldahl Nitrogen | <0.100 mg/L | 105 | 70-130 |
| Run No 394805 Analysis/Extraction Date 2021-01-07 Analyst SKH | | | |
| Method EPA 350.1 | | | |
| N-NH3 | <0.010 mg/L | 119 | 80-120 |

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945852
 Date Submitted: 2021-01-06
 Date Reported: 2021-01-08
 Project: 20-0203
 COC #: 212172

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|------------|----------|-----------|
| Run No 394808 Analysis/Extraction Date 2021-01-07 Analyst SKH | | | |
| Method SM 4110 | | | |
| Chloride | <1 mg/L | 100 | 90-110 |
| N-NO2 | <0.10 mg/L | 104 | 90-110 |
| N-NO3 | <0.10 mg/L | 103 | 90-110 |
| SO4 | <1 mg/L | 100 | 90-110 |
| Run No 394811 Analysis/Extraction Date 2021-01-07 Analyst AET | | | |
| Method SM2320,2510,4500H/F | | | |
| Alkalinity (CaCO3) | <5 mg/L | 105 | 90-110 |
| Conductivity | <5 uS/cm | 101 | 90-110 |
| F | <0.10 mg/L | 103 | 90-110 |
| pH | | 103 | 90-110 |
| Run No 394833 Analysis/Extraction Date 2021-01-08 Analyst SKH | | | |
| Method C SM2120C | | | |
| Colour | <2 TCU | 100 | 90-110 |
| Run No 394837 Analysis/Extraction Date 2021-01-08 Analyst AET | | | |
| Method SM 5310B | | | |
| DOC | <0.5 mg/L | 97 | 80-120 |

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945852
 Date Submitted: 2021-01-06
 Date Reported: 2021-01-08
 Project: 20-0203
 COC #: 212172

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|---|-------------|----------|-----------|
| Run No 394841 Analysis/Extraction Date 2021-01-08 Analyst AET Method C SM2340B | | | |
| Hardness as CaCO3 | | | |
| Ion Balance | | | |
| Run No 394857 Analysis/Extraction Date 2021-01-08 Analyst AET Method C SM2540 | | | |
| TDS | <10 mg/L | 100 | 90-110 |
| Run No 394861 Analysis/Extraction Date 2021-01-08 Analyst AET Method C SM4500-S2-D | | | |
| S2- | <0.01 mg/L | 95 | 80-120 |
| Run No 394883 Analysis/Extraction Date 2021-01-08 Analyst R K Method SUBCONTRACT P-INORG | | | |
| Phenols | <0.001 mg/L | 92 | 69-132 |
| Tannin & Lignin | <0.1 mg/L | 100 | |

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Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.


Report Number: 1945922
Date Submitted: 2021-01-07
Date Reported: 2021-01-11
Project: 20-0203
COC #: 212173

Page 1 of 7

Dear Monica Black:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:


Addrine
Thomas
2021.01.11
15:23:34 -05'00'

APPROVAL:

Addrine Thomas, Inorganics Supervisor

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945922
 Date Submitted: 2021-01-07
 Date Reported: 2021-01-11
 Project: 20-0203
 COC #: 212173

| Group | Analyte | MRL | Units | Guideline | Lab I.D. | 1537250 | 1537251 |
|-------------------|---------------------------|-------------------|----------|---------------|---------------|------------|---------|
| | | | | | Sample Matrix | GW | GW |
| | | | | Sample Type | 2021-01-07 | 2021-01-07 | |
| | | | | Sampling Date | TW6-1 | TW6-2 | |
| | | | | Sample I.D. | | | |
| Anions | Cl | 1 | mg/L | AO 250 | | 21 | 22 |
| | F | 0.10 | mg/L | MAC 1.5 | | <0.10 | <0.10 |
| | N-NO2 | 0.10 | mg/L | MAC 1.0 | | <0.10 | <0.10 |
| | N-NO3 | 0.10 | mg/L | MAC 10.0 | | 0.46 | 0.50 |
| | SO4 | 1 | mg/L | AO 500 | | 22 | 22 |
| General Chemistry | Alkalinity as CaCO3 | 5 | mg/L | OG 500 | | 326 | 326 |
| | Colour | 2 | TCU | | | <2 | <2 |
| | Conductivity | 5 | uS/cm | | | 664 | 667 |
| | DOC | 0.5 | mg/L | AO 5 | | 1.7 | 1.6 |
| | pH | 1.00 | | 6.5-8.5 | | 8.06 | 8.18 |
| | S2- | 0.01 | mg/L | AO 0.05 | | <0.01 | <0.01 |
| | TDS | 10 | mg/L | AO 500 | | 390 | 290 |
| | Turbidity | 0.1 | NTU | AO 5.0 | | 4.4 | 0.8 |
| | Hardness | Hardness as CaCO3 | 1 | mg/L | OG 100 | | 371* |
| Indices/Calc | Ion Balance | 0.01 | | | | 1.02 | 1.03 |
| Metals | Ca | 1 | mg/L | | | 86 | 86 |
| | Fe | 0.03 | mg/L | AO 0.3 | | 0.18 | <0.03 |
| | K | 1 | mg/L | | | 1 | <1 |
| | Mg | 1 | mg/L | | | 38 | 39 |
| | Mn | 0.01 | mg/L | AO 0.05 | | <0.01 | <0.01 |
| | Na | 2 | mg/L | AO 200 | | 8 | 9 |
| Microbiology | Escherichia Coli | 0 | ct/100mL | MAC 0 | | 0 | 0 |
| | Faecal Coliforms | 0 | ct/100mL | | | 0 | 0 |
| | Faecal Streptococcus | 0 | ct/100mL | | | 0 | 0 |
| | Heterotrophic Plate Count | 0 | ct/1mL | | | 27 | 19 |

Guideline = ODWSOG
*** = Guideline Exceedence**

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 Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

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Report Number: 1945922
 Date Submitted: 2021-01-07
 Date Reported: 2021-01-11
 Project: 20-0203
 COC #: 212173

| Group | Analyte | MRL | Units | Guideline | Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. | 1537250 GW 2021-01-07 TW6-1 | 1537251 GW 2021-01-07 TW6-2 |
|-------------------|-------------------------|-------|----------|-----------|--|--------------------------------------|--------------------------------------|
| Microbiology | Total Coliforms | 0 | ct/100mL | MAC 0 | | 0 | 0 |
| Nutrients | N-NH3 | 0.010 | mg/L | | | 0.029 | <0.010 |
| | Total Kjeldahl Nitrogen | 0.100 | mg/L | | | <0.100 | <0.100 |
| Subcontract-Inorg | Phenols | 0.001 | mg/L | | | <0.001 | <0.001 |
| | Tannin & Lignin | 0.1 | mg/L | | | <0.1 | <0.1 |

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QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|------------|----------|-----------|
| Run No 394793 Analysis/Extraction Date 2021-01-07 Analyst H D | | | |
| Method C SM2130B | | | |
| Turbidity | <0.1 NTU | 103 | 70-130 |
| Run No 394797 Analysis/Extraction Date 2021-01-07 Analyst H D | | | |
| Method EPA 200.8 | | | |
| Iron | <0.03 mg/L | 101 | 80-120 |
| Manganese | <0.01 mg/L | 108 | 80-120 |
| Run No 394821 Analysis/Extraction Date 2021-01-08 Analyst DRA | | | |
| Method AMBCOLM1 | | | |
| Escherichia Coli | | | |
| Faecal Coliforms | | | |
| Faecal Streptococcus | | | |
| Heterotrophic Plate Count | | | |
| Total Coliforms | | | |
| Run No 394833 Analysis/Extraction Date 2021-01-08 Analyst SKH | | | |
| Method C SM2120C | | | |
| Colour | <2 TCU | 100 | 90-110 |
| Run No 394849 Analysis/Extraction Date 2021-01-08 Analyst AET | | | |
| Method EPA 350.1 | | | |

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 COC #: 212173

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|---|-------------|----------|-----------|
| N-NH3 | <0.010 mg/L | 100 | 80-120 |
| Run No 394853 Analysis/Extraction Date 2021-01-08 Analyst Z S Method M SM3120B-3500C | | | |
| Calcium | <1 mg/L | 101 | 90-110 |
| Potassium | <1 mg/L | 98 | 87-113 |
| Magnesium | <1 mg/L | 100 | 76-124 |
| Sodium | <2 mg/L | 101 | 82-118 |
| Run No 394857 Analysis/Extraction Date 2021-01-08 Analyst AET Method C SM2540 | | | |
| TDS | <10 mg/L | 100 | 90-110 |
| Run No 394860 Analysis/Extraction Date 2021-01-08 Analyst AET Method EPA 351.2 | | | |
| Total Kjeldahl Nitrogen | <0.100 mg/L | 94 | 70-130 |
| Run No 394861 Analysis/Extraction Date 2021-01-08 Analyst AET Method C SM4500-S2-D | | | |
| S2- | <0.01 mg/L | 95 | 80-120 |
| Run No 394872 Analysis/Extraction Date 2021-01-08 Analyst SKH Method SM 4110 | | | |
| Chloride | <1 mg/L | 100 | 90-110 |

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 COC #: 212173

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|---|-------------|----------|-----------|
| N-NO2 | <0.10 mg/L | 104 | 90-110 |
| N-NO3 | <0.10 mg/L | 104 | 90-110 |
| SO4 | <1 mg/L | 105 | 90-110 |
| Run No 394888 Analysis/Extraction Date 2021-01-08 Analyst AET Method SUBCONTRACT P-INORG | | | |
| Phenols | <0.001 mg/L | 92 | 69-132 |
| Tannin & Lignin | <0.1 mg/L | 100 | |
| Run No 394898 Analysis/Extraction Date 2021-01-11 Analyst AET Method SM 5310B | | | |
| DOC | <0.5 mg/L | 97 | 80-120 |
| Run No 394900 Analysis/Extraction Date 2021-01-11 Analyst AET Method SM2320,2510,4500H/F | | | |
| Alkalinity (CaCO3) | <5 mg/L | 95 | 90-110 |
| Conductivity | <5 uS/cm | 97 | 90-110 |
| F | <0.10 mg/L | 101 | 90-110 |
| pH | | 102 | 90-110 |
| Run No 394905 Analysis/Extraction Date 2021-01-11 Analyst AET Method C SM2340B | | | |
| Hardness as CaCO3 | | | |

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 Date Reported: 2021-01-11
 Project: 20-0203
 COC #: 212173

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|-------------|-------|----------|-----------|
| Ion Balance | | | |

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Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Jordan Bowman
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945361
Date Submitted: 2020-12-21
Date Reported: 2020-12-23
Project: 20-0203
COC #: 212249

Page 1 of 2

Dear Jordan Bowman:**Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).**

Report Comments:

Jason
Kennedy
2020.12.2
3 14:10:18
-05'00'



APPROVAL: _____

Jason Kennedy, Project Manager

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Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Jordan Bowman
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945361
 Date Submitted: 2020-12-21
 Date Reported: 2020-12-23
 Project: 20-0203
 COC #: 212249

| Group | Analyte | MRL | Units | Guideline | Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. | 1535721 Water 2020-12-21 TW7-1 | 1535722 Water 2020-12-21 TW7-2 |
|--------------|---------------------------|-----|----------|-----------|--|---|---|
| Microbiology | Escherichia Coli | 0 | ct/100mL | MAC 0 | | 0 | 0 |
| | Faecal Coliforms | 0 | ct/100mL | | | 0 | 0 |
| | Faecal Streptococcus | 0 | ct/100mL | | | 0 | 0 |
| | Heterotrophic Plate Count | 0 | ct/1mL | | | 7 | 5 |
| | Total Coliforms | 0 | ct/100mL | MAC 0 | | 0 | 0 |

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 Analytical Method: AMBCOLM1
 additional QA/QC information available on request.

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Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Jordan Bowman
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1945350
Date Submitted: 2020-12-21
Date Reported: 2020-12-30
Project: 20-0203
COC #: 212249

Page 1 of 5

Dear Jordan Bowman:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

 Hongyuan Deng
2020.12.30
16:04:45 -05'00'

APPROVAL:

Hongyuan Deng, Inorganics Technician

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Report Number: 1945350
 Date Submitted: 2020-12-21
 Date Reported: 2020-12-30
 Project: 20-0203
 COC #: 212249

| Group | Analyte | MRL | Units | Guideline | Lab I.D. | 1535703 | 1535704 |
|-------------------|-------------------------|-------|-------|---------------|---------------|------------|---------|
| | | | | | Sample Matrix | GW | GW |
| | | | | Sample Type | 2020-12-21 | 2020-12-21 | |
| | | | | Sampling Date | TW7-1 | TW7-2 | |
| | | | | Sample I.D. | | | |
| Anions | Cl | 1 | mg/L | AO 250 | | 18 | 18 |
| | F | 0.10 | mg/L | MAC 1.5 | | 0.16 | 0.17 |
| | N-NO2 | 0.10 | mg/L | MAC 1.0 | | <0.10 | <0.10 |
| | N-NO3 | 0.10 | mg/L | MAC 10.0 | | <0.10 | <0.10 |
| | SO4 | 1 | mg/L | AO 500 | | 21 | 22 |
| General Chemistry | Alkalinity as CaCO3 | 5 | mg/L | OG 500 | | 320 | 318 |
| | Colour | 2 | TCU | | | <2 | 3 |
| | Conductivity | 5 | uS/cm | | | 631 | 623 |
| | DOC | 0.5 | mg/L | AO 5 | | 1.2 | 1.2 |
| | pH | 1.00 | | 6.5-8.5 | | 8.05 | 8.28 |
| | S2- | 0.01 | mg/L | AO 0.05 | | 0.01 | <0.01 |
| | TDS | 10 | mg/L | AO 500 | | 370 | 370 |
| | Turbidity | 0.1 | NTU | AO 5.0 | | 10.3* | 10.5* |
| Hardness | Hardness as CaCO3 | 1 | mg/L | OG 100 | | 323* | 323* |
| Indices/Calc | Ion Balance | 0.01 | | | | 0.92 | 0.92 |
| Metals | Ca | 1 | mg/L | | | 80 | 80 |
| | Fe | 0.03 | mg/L | AO 0.3 | | 0.80* | 0.87* |
| | K | 1 | mg/L | | | 1 | 2 |
| | Mg | 1 | mg/L | | | 30 | 30 |
| | Mn | 0.01 | mg/L | AO 0.05 | | 0.03 | 0.04 |
| Nutrients | Na | 2 | mg/L | AO 200 | | 6 | 6 |
| | N-NH3 | 0.010 | mg/L | | | <0.010 | <0.010 |
| | Total Kjeldahl Nitrogen | 0.100 | mg/L | | | 0.249 | 0.212 |
| Subcontract-Inorg | Phenols | 0.001 | mg/L | | | <0.001 | <0.001 |
| | Tannin & Lignin | 0.1 | mg/L | | | <0.1 | <0.1 |

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Report Number: 1945350
 Date Submitted: 2020-12-21
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 COC #: 212249

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|---|-------------|----------|-----------|
| Run No 394272 Analysis/Extraction Date 2020-12-23 Analyst SKH Method C SM2540 | | | |
| TDS | <10 mg/L | 101 | 90-110 |
| Run No 394297 Analysis/Extraction Date 2020-12-22 Analyst H D Method EPA 200.8 | | | |
| Iron | <0.03 mg/L | 98 | 80-120 |
| Manganese | <0.01 mg/L | 106 | 80-120 |
| Run No 394320 Analysis/Extraction Date 2020-12-22 Analyst SKH Method EPA 350.1 | | | |
| N-NH3 | <0.010 mg/L | 117 | 80-120 |
| Run No 394399 Analysis/Extraction Date 2020-12-23 Analyst H D Method C SM2130B | | | |
| Turbidity | <0.1 NTU | 105 | 70-130 |
| Run No 394433 Analysis/Extraction Date 2020-12-23 Analyst Z S Method M SM3120B-3500C | | | |
| Calcium | <1 mg/L | 104 | 90-110 |
| Potassium | <1 mg/L | 94 | 87-113 |
| Magnesium | <1 mg/L | 103 | 76-124 |
| Sodium | <2 mg/L | 95 | 82-118 |

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 COC #: 212249

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|--|-------------|----------|-----------|
| Run No 394475 Analysis/Extraction Date 2020-12-24 Analyst AET | | | |
| Method SM 5310B | | | |
| DOC | <0.5 mg/L | 80 | 80-120 |
| Run No 394501 Analysis/Extraction Date 2020-12-23 Analyst R K | | | |
| Method SUBCONTRACT P-INORG | | | |
| Phenols | <0.001 mg/L | 100 | 69-132 |
| Tannin & Lignin | <0.1 mg/L | 100 | |
| Run No 394526 Analysis/Extraction Date 2020-12-29 Analyst SKH | | | |
| Method SM 4110 | | | |
| Chloride | <1 mg/L | 100 | 90-110 |
| N-NO2 | <0.10 mg/L | 104 | 90-110 |
| N-NO3 | <0.10 mg/L | 103 | 90-110 |
| SO4 | <1 mg/L | 105 | 90-110 |
| Run No 394530 Analysis/Extraction Date 2020-12-29 Analyst SKH | | | |
| Method EPA 351.2 | | | |
| Total Kjeldahl Nitrogen | <0.100 mg/L | 113 | 70-130 |
| Run No 394541 Analysis/Extraction Date 2020-12-29 Analyst H D | | | |
| Method C SM4500-S2-D | | | |
| S2- | <0.01 mg/L | 83 | 80-120 |

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 Project: 20-0203
 COC #: 212249

QC Summary

| Analyte | Blank | QC % Rec | QC Limits |
|---|------------|----------|-----------|
| Run No 394556 Analysis/Extraction Date 2020-12-30 Analyst SKH Method C SM2120C | | | |
| Colour | <2 TCU | 107 | 90-110 |
| Run No 394594 Analysis/Extraction Date 2020-12-30 Analyst H D Method SM2320,2510,4500H/F | | | |
| Alkalinity (CaCO3) | <5 mg/L | 107 | 90-110 |
| Conductivity | <5 uS/cm | 99 | 90-110 |
| F | <0.10 mg/L | 102 | 90-110 |
| pH | | 102 | 90-110 |
| Run No 394613 Analysis/Extraction Date 2020-12-30 Analyst H D Method C SM2340B | | | |
| Hardness as CaCO3 | | | |
| Ion Balance | | | |

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Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946557
Date Submitted: 2021-01-19
Date Reported: 2021-01-22
Project:
COC #: 212335

Page 1 of 2

Dear Monica Black:**Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).**

Report Comments:



Rebecca Koshy
2021.01.22
09:52:22 -05'00'

APPROVAL: _____

Rebecca Koshy, Project Manager

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <http://www.cala.ca/scopes/2602.pdf>.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1946557
 Date Submitted: 2021-01-19
 Date Reported: 2021-01-22
 Project:
 COC #: 212335

| Group | Analyte | MRL | Units | Guideline | Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D. | 1538777 GW 2021-01-19 TW2-3 | 1538778 GW 2021-01-19 TW1-3 |
|--------------|---------------------------|-----|----------|-----------|--|--------------------------------------|--------------------------------------|
| Microbiology | Escherichia Coli | 0 | ct/100mL | MAC 0 | | 0 | 0 |
| | Faecal Coliforms | 0 | ct/100mL | | | 0 | 0 |
| | Faecal Streptococcus | 0 | ct/100mL | | | 0 | 0 |
| | Heterotrophic Plate Count | 0 | ct/1mL | | | 33 | 0 |
| | Total Coliforms | 0 | ct/100mL | MAC 0 | | 2* | 0 |

Guideline = ODWSOG

*** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
 Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Rd., R.R. #3
Carp, ON
K0A 1L0
Attention: Mr. Monica Black
PO#:
Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1947278
Date Submitted: 2021-02-02
Date Reported: 2021-02-05
Project:
COC #: 212707

Page 1 of 2

Dear Monica Black:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Steven Tosh

2021.02.05

12:31:02

-05'00'



APPROVAL: _____

Steven Tosh, Operations Manager

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: <http://www.cala.ca/scopes/2602.pdf>.

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Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Client: McIntosh Perry Consulting Engineers Ltd.
 115 Walgreen Rd., R.R. #3
 Carp, ON
 K0A 1L0
 Attention: Mr. Monica Black
 PO#:
 Invoice to: McIntosh Perry Consulting Engineers Ltd.

Report Number: 1947278
 Date Submitted: 2021-02-02
 Date Reported: 2021-02-05
 Project:
 COC #: 212707

Lab I.D.
 Sample Matrix
 Sample Type
 Sampling Date
 Sample I.D.

1540720
 GW
 -
 2021-02-02
 TW2-4

| Group | Analyte | MRL | Units | Guideline | |
|--------------|---------------------------|-----|----------|-----------|----|
| Microbiology | Escherichia Coli | 0 | ct/100mL | MAC 0 | 0 |
| | Faecal Coliforms | 0 | ct/100mL | | 0 |
| | Faecal Streptococcus | 0 | ct/100mL | | 0 |
| | Heterotrophic Plate Count | 0 | ct/1mL | | 87 |
| | Total Coliforms | 0 | ct/100mL | MAC 0 | 0 |

Guideline = ODWSOG

* = Guideline Exceedence

Results relate only to the parameters tested on the samples submitted.
 Analytical Method: AMBCOLM1
 additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



APPENDIX C – ON-SITE WATER WELL RECORDS (AIR ROCK DRILLING LTD.)

CERTIFICATE OF WELL COMPLIANCE

(REQUIRED FOR OCCUPANCY INSPECTION ONLY)

I, Jeremy Hanna (License T3632) of AIR ROCK DRILLING CO. LTD. - do hereby certify that I am

Licensed to drill wells in the Province of Ontario and that I have supervised the drilling of a well on the

PROPERTY OF # 1384341 Ontario Limited (Clc Cavanagh Construction)
(Name of Landowner)

LOCATED AT (No Civic) Gardiner Shore, Carleton Place
(Civic Address)


LOT # 7 CON # 9 PLAN # X Test well
1 of 7


IN the TOWNSHIP OF BECKWITH - IN the COUNTY OF LANARK

AND FURTHER THAT I am aware of the well drilling requirements of the Township of Beckwith and the guidelines, recommendations and regulations of the Ministry of the Environment as they govern well installation in the Province of Ontario.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased and cement grouted to the standards required.

Signed this 18th day of December 2020


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


Witness **Debbie Davis**



HYDROLOGIST (Signature / Stamp)

0000959
TAGA313134
James Gardiner +
Harry Gardiner +
Kathryn Chapman

Measurements recorded in: Metric Imperial

A313134

Page ___ of ___

Well Owner's Information

First Name: _____ Last Name/Organization: **1384341 Ontario Limited (c/o Cavanagh Const)** E-mail Address: _____ Well Constructed by Well Owner

Mailing Address (Street Number/Name): **9094 Cavanagh Road** Municipality: **Ashton** Province: **On** Postal Code: **K0A 1B0** Telephone No. (inc. area code): _____

Well Location: Address of Well Location (Street Number/Name): **Gardiner Shore (NO CIVIC)** Township: **Beckwith** Lot: **7** Concession: **9**

County/District/Municipality: **Lanark** City/Town/Village: **Carleton Place** Province: **Ontario** Postal Code: _____

UTM Coordinates: Zone: **18** Easting: **410478** Northing: **4993442** Municipal Plan and Sublot Number: _____ Other: **Test Well # 1 of 7**

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 (mft) |
|----------------|----------------------|-----------------|---------------------|-------------|
| | Sand | Gravel | | 0' - 1' |
| Grey & Black | Limestone | | | 1' - 28' |
| Grey & White | Sandstone | | | 28' - 75' |
| Grey & White | Sandstone | | | 75' - 80' |

** James Gardiner, Harry Gardiner, Kathryn Chapman*

Annular Space

| Depth Set at (mft) | Type of Sealant Used (Material and Type) | Volume Placed (m ³) |
|--------------------|--|---------------------------------|
| 40' - 0' | Neat cement | 10.9 |

Results of Well Yield Testing

After test of well yield, water was:
 Clear and sand free
 Other, specify: **Not tested**

If pumping discontinued, give reason:

| Draw Down | Recovery | | |
|--------------|-------------------|------------|-------------------|
| Time (min) | Water Level (mft) | Time (min) | Water Level (mft) |
| Static Level | 20' | 21.4' | |
| 1 | 21.1 | 1 | 20 |
| 2 | 21.1 | 2 | 20 |
| 3 | 21.1 | 3 | 20 |
| 4 | 21.1 | 4 | 20 |
| 5 | 21.2 | 5 | 20 |
| 10 | 21.2 | 10 | 20 |
| 15 | 21.3 | 15 | 20 |
| 20 | 21.3 | 20 | 20 |
| 25 | 21.3 | 25 | 20 |
| 30 | 21.3 | 30 | 20 |
| 40 | 21.4 | 40 | 20 |
| 50 | 21.4 | 50 | 20 |
| 60 | 21.4 | 60 | 20 |

Pump intake set at (mft): **70**
 Pumping rate (l/min/GPM): **20**
 Duration of pumping: **4 hrs + 9 min**
 Final water level end of pumping (mft): **21.4'**
 If flowing geyse rate (l/min/GPM): _____

Recommended pump depth (mft): **70'**
 Recommended pump rate (l/min/GPM): **20**
 Well production (l/min/GPM): **20**

Disinfected? Yes No

Method of Construction: Rotary (Conventional) Rotary (Reverse) Boring Air percussion Other, specify _____

Well Use: Public Commercial Not used Domestic Municipal Dewatering Livestock Test Hole Monitoring Irrigation Cooling & Air Conditioning Industrial Other, specify _____

| Construction Record - Casing | | | Status of Well | |
|------------------------------|--|---------------------|----------------|--|
| Inside Diameter (cm) | Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) | Well Thickness (cm) | Depth (mft) | |
| 6 1/4" | Steel | 188" | +2' - 40' | <input checked="" type="checkbox"/> Water Supply |
| 6" | Open Hole | | 40' - 80' | <input type="checkbox"/> Replacement Well |

| Construction Record - Screen | | | |
|------------------------------|---------------------------------------|----------|-------------|
| Outside Diameter (cm) | Material (Plastic, Galvanized, Steel) | Slot No. | Depth (mft) |
| | | | |

| Water Details | | Hole Diameter | |
|---------------------------------------|---|--|------------------------------|
| Water found at Depth (mft): 75 | Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Unfiltered <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____ | Depth (mft): From 0 To 40 | Diameter (cm): 9 3/4" |
| Water found at Depth (mft): _____ | Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Unfiltered <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____ | Depth (mft): From 40 To 80 | Diameter (cm): 6" |

Well Contractor and Well Technician Information

Business Name of Well Contractor: **Air Rock Drilling Co. Ltd.** Well Contractor's Licence No.: **7981**

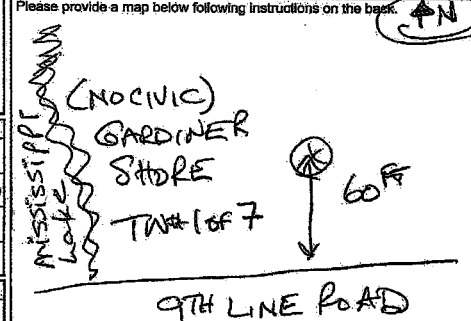
Business Address (Street Number/Name): **8809 Franktown Road** Municipality: **Richmond**

Province: **ON** Postal Code: **K0A 2Z0** Business E-mail Address: **air-rock@sympatico.ca**

Bus. Telephone No. (inc. area code): **613882170** Name of Well Technician (Last Name, First Name): **Hanna, Jeremy**

Well Technician's Licence No.: **13632** Signature of Technician and/or Contractor: _____ Date Submitted: **2021 01 31**

Map of Well Location



Comments: **1/2HP-10GPM Set @ 70'**

| | | |
|---|---|--|
| Well owner's information package delivered: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Date Package Delivered: 2020 12 18 | Ministry Use ONLY: Audit No.: 7355232 |
| Date Work Completed: 2020 12 18 | | Received: _____ |

CERTIFICATE OF WELL COMPLIANCE

(REQUIRED FOR OCCUPANCY INSPECTION ONLY)

I, Jeremy Hanna (License T3632) of AIR ROCK DRILLING CO. LTD. - do hereby certify that I am

Licensed to drill wells in the Province of Ontario and that I have supervised the drilling of a well on the

PROPERTY OF # 1384341 Ontario Limited (Clo Cavanagh Construction)
(Name of Landowner)

LOCATED AT (No Civic) Gardiner Shore, Carleton Place
(Civic Address)


LOT # 7 CON # 9 PLAN # X Test well
2 of 7


IN the TOWNSHIP OF BECKWITH - IN the COUNTY OF LANARK

AND FURTHER THAT I am aware of the well drilling requirements of the Township of Beckwith and the guidelines, recommendations and regulations of the Ministry of the Environment as they govern well installation in the Province of Ontario.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased and cement grouted to the standards required.

Signed this 21st day of December 2020


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


Witness **Debbie Davis**



HYDROLOGIST (Signature / Stamp)

0020960
TAGA313112
James Gardiner +
Harry Gardiner +
Kathryn Chapman

Measurements recorded in: Metric Imperial

A313112

Page of

Well Owner's Information

First Name: Last Name/Organization: **1384341 Ontario Limited (c/o Cavanagh Const)** E-mail Address: Well Constructed by Well Owner

Mailing Address (Street Number/Name): **9094 Cavanagh Road** Municipality: **Ashton** Province: **On** Postal Code: **K0A 1B0** Telephone No. (inc. area code):

Address of Well Location (Street Number/Name): **Gardiner Shore (NO CIVIC)** Township: **Beckwith** Lot: **7** Concession: **9**

City/Town/Village: **Carleton Place** Province: **Ontario** Postal Code: **7**

UTM Coordinates: Zone: **18** Easting: **410072** Northing: **4693631** Municipal Plan and Sublot Number: **Test Well #2 of 7**

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) |
|----------------|----------------------|-----------------|---------------------|--------------|
| | Stones | | | 0' 1' |
| Grey | Sandstone | | | 1' 50' |
| Grey | Sandstone | | | 50' 94' |
| Grey | Sandstone | | | 94' 101' |

** James Gardiner, Harry Gardiner & Kathryn Chapman*

Annular Space

| Depth Set at (m/ft) From | To | Type of Sealant Used (Material and Type) | Volume Placed (m³/ft³) |
|--------------------------|-----|--|------------------------|
| 40' | 30' | Neat cement | 10.9 |
| 30' | 0' | Bentonite slurry | 8.4 |

Results of Well Yield Testing

| After test of well yield, water was: | Draw Down | Recovery |
|---|--------------|--------------------|
| <input type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify Not tested | Time (min) | Water Level (m/ft) |
| If pumping discontinued, give reason: X | Stable Level | 33.5' |
| | 1. | 22' 1 |
| | 2. | 25' 2 |
| | 3. | 28.6' 3 |
| | 4. | 27.6' 4 |
| | 5. | 28.7' 5 |
| Pump intake set at (m/ft): 80 | 6. | 31.1' 10 |
| Pumping rate (l/min/GPM): 20 | 7. | 32' 15 |
| Duration of pumping: 4 hrs + 0 min | 8. | 33' 20 |
| Final water level end of pumping (m/ft): 33.5' | 9. | 33.5' 30 |
| If flowing give rate (l/min/GPM): X | 10. | 33.5' 40 |
| Recommended pump depth (m/ft): 80' | 11. | 33.5' 50 |
| Recommended pump rate (l/min/GPM): 20 | 12. | 33.5' 60 |
| Well production (l/min/GPM): 20 | 13. | 33.5' 60 |
| Did it meet? X Yes <input type="checkbox"/> No | 14. | |

Method of Construction

| | | | | |
|--|----------------------------------|--|---|-------------------------------------|
| <input 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 checked="" type="checkbox"/> Air percussion | | <input type="checkbox"/> Industrial | | |
| <input type="checkbox"/> Other, specify | | <input type="checkbox"/> Other, specify | | |

Construction Record - Casing

| Inside Diameter (cm/IN) | Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) | Well Thickness (cm/IN) | Depth (m/ft) | | Status of Well |
|-------------------------|--|------------------------|--------------|------|--|
| | | | From | To | |
| 6 1/4" | Steel | .188 | +2' | 40' | <input checked="" type="checkbox"/> Water Supply |
| 6" | Open Hole | | 40' | 101' | <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 | | |
| | | | |

Water Details

| Water found at Depth (m/ft) | Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify | Hole Diameter |
|-----------------------------|--|---------------|
| From | To | Depth (m/ft) |
| 50' | | 9 3/4" |
| 94' | | 4" 40' |
| | | 4" 101' |

Well Contractor and Well Technician Information

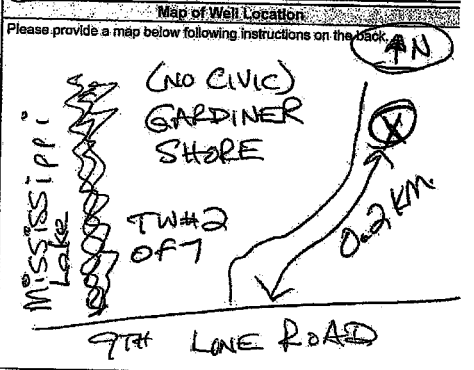
Business Name of Well Contractor: **Air Rock Drilling Co. Ltd.** Well Contractor's Licence No.: **7481**

Business Address (Street Number/Name): **8008 Franktown Road** Municipality: **Richmond**

Province: **ON** Postal Code: **K0A 2Z0** Business E-mail Address: **air-rock@sympatico.ca**

Bus. Telephone No. (inc. area code): **6138362170** Name of Well Technician (Last Name, First Name): **Hanna, Jeremy**

Well Technician's Licence No.: **T3632** Signature of Technician and/or Contractor: *[Signature]* Date Submitted: **2020 01 31**



Comments: **1/2HP-10GPM Set @ 80 FT**

Well owner's information package delivered: **Y 2020 M 10 D 23** Date Work Completed: **2020 12 21**

Ministry Use Only: Audit No.: **2355233**

CERTIFICATE OF WELL COMPLIANCE

(REQUIRED FOR OCCUPANCY INSPECTION ONLY)

I, Jeremy Hanna (License T3632) of AIR ROCK DRILLING CO. LTD. - do hereby certify that I am

Licensed to drill wells in the Province of Ontario and that I have supervised the drilling of a well on the

PROPERTY OF # 1384341 Ontario Limited (C/O Cavanagh Construction)
(Name of Landowner)

LOCATED AT (No Civic) Gardiner Shore, Carleton Place
(Civic Address)


LOT # 7 CON # 9 PLAN # X Test well ~~●~~ # 3 OF 7

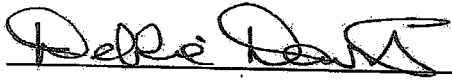
IN the TOWNSHIP OF BECKWITH - IN the COUNTY OF LANARK

AND FURTHER THAT I am aware of the well drilling requirements of the Township of Beckwith and the guidelines, recommendations and regulations of the Ministry of the Environment as they govern well installation in the Province of Ontario.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased and cement grouted to the standards required.

Signed this 18TH day of December 2020.


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


Witness Debbie Davis



HYDROLOGIST (Signature / Stamp)

2020958
TAGA313135
James Gardiner +
Harry Gardiner +
Kathryn Chapman

Measurements recorded in: Metric Imperial

A313135

Page ___ of ___

Well Owner's Information

First Name: _____ Last Name/Organization: **1384341 Ontario Limited (c/o Cavanagh Const)** E-mail Address: _____ Well Constructed by Well Owner

Mailing Address (Street Number/Name): **9094 Cavanagh Road** Municipality: **Ashton** Province: **On** Postal Code: **K0A 1B0** Telephone No. (Inc. area code): _____

Well Location

Address of Well Location (Street Number/Name): **Gardiner Shore (NO CIVIC)** Township: **Beckwith** Lot: **7** Concession: **9**

County/District/Municipality: **Lanark** City/Town/Village: **Carleton Place** Province: **Ontario** Postal Code: _____

UTM Coordinates Zone: **18** Easting: **409959** Northing: **4993321** Municipal Plan and Sublot Number: _____ Other: **Test Well # 3 of 7**

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

| General Colour | Most Common Material | Other Materials | General Description | Depth (m) | |
|----------------|----------------------|-----------------|---------------------|-----------|------|
| | | | | From | To |
| | Sand | Gravel | | 0' | 1' |
| Grey & Black | Limestone | | | 1' | 22' |
| Grey & White | Sandstone | | | 22' | 94' |
| Grey & White | Sandstone | | | 94' | 100' |

James Gardiner, Harry Gardiner, Kathryn Chapman

| Annular Space | | | Volume Placed (m³) |
|------------------|--|--|--------------------|
| Depth Set at (m) | Type of Sealant Used (Material and Type) | | |
| 40' - 30' | Neat cement | | 10.9 |
| 30' - 0' | Bentonite slurry | | 12.6 |

| Results of Well Yield Testing | | | | |
|--|------------|-----------------|------------|-----------------|
| After last of well yield, water was: | Draw Down | Recovery | | |
| <input type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify: Not tested | Time (min) | Water Level (m) | Time (min) | Water Level (m) |
| If pumping discontinued, give reason: _____ | 1 | 10.7 | 1 | 9.9 |
| | 2 | 10.9 | 2 | 9.8 |
| | 3 | 11.1 | 3 | 9.8 |
| | 4 | 11.1 | 4 | 9.8 |
| | 5 | 11.2 | 5 | 9.8 |
| | 10 | 11.3 | 10 | 9.5 |
| If flowing give rate (l/min/GPM) | 15 | 11.4 | 15 | 9.4 |
| | 20 | 11.5 | 20 | 9.4 |
| | 25 | 11.6 | 25 | 9.4 |
| | 30 | 11.6 | 30 | 9.4 |
| | 40 | 11.8 | 40 | 9.4 |
| | 50 | 11.9 | 50 | 9.4 |
| 60 | 11.9 | 60 | 9.4 | |

| Method of Construction | | Well Use | |
|--|----------------------------------|---|---|
| <input type="checkbox"/> Cable Tool | <input type="checkbox"/> Diamond | <input type="checkbox"/> Public | <input type="checkbox"/> Not used |
| <input type="checkbox"/> Rotary (Conventional) | <input type="checkbox"/> Jetting | <input checked="" type="checkbox"/> Domestic | <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"/> 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) | Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) | Wall Thickness (cm) | Depth (m) | <input checked="" type="checkbox"/> Water Supply | <input type="checkbox"/> Replacement Well |
| | | | From To | | |
| 6 1/4" | Steel | 1.98" | +2' 40' | <input type="checkbox"/> Test Hole | <input type="checkbox"/> Recharge Well |
| 6" | Open Hole | | 40' 100' | <input type="checkbox"/> Dewatering Well | <input type="checkbox"/> Observation and/or Monitoring Hole |

| Construction Record - Screen | | | |
|------------------------------|---------------------------------------|----------|-----------|
| Outside Diameter (cm) | Material (Plastic, Galvanized, Steel) | Slot No. | Depth (m) |
| | | | From To |
| [Handwritten scribble] | | | |

| Water Details | | Hole Diameter | |
|--------------------------|--|---------------|---------------|
| Water found at Depth (m) | Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested | Depth (m) | Diameter (cm) |
| 94' | | From To | |
| Water found at Depth (m) | Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested | 3' 40' | 9 3/4" |
| Water found at Depth (m) | Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested | 40' 100' | 6" |

Well Contractor and Well Technician Information

Business Name of Well Contractor: **Air Rock Drilling Co. Ltd.** Well Contractor's Licence No.: **7681**

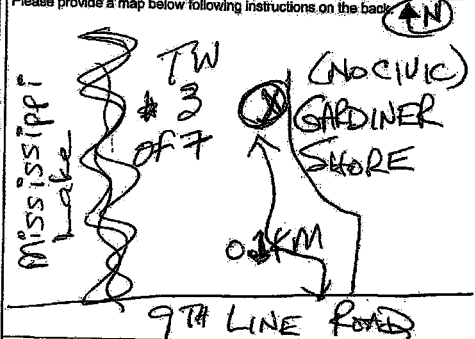
Business Address (Street Number/Name): **6066 Frankton Road** Municipality: **Richmond**

Province: **ON** Postal Code: **K0A 2Z0** Business E-mail Address: **air-rock@sympatico.ca**

Bus. Telephone No. (Inc. area code): **6138382170** Name of Well Technician (Last Name, First Name): **Hanna, Jeremy**

Well Technician's Licence No.: **13634** Signature of Technician and/or Contractor: _____ Date: **2020 11 31**

Map of Well Location



Comments: **1/2 HP 100 GPM @ 80 FT**

| Well owner's information package delivered | Date Package Delivered | Ministry Uses Only |
|--|--|--------------------------|
| <input checked="" type="checkbox"/> Yes | 2020 11 19 | Audit No: 7355234 |
| <input type="checkbox"/> No | Date Work Completed: 2020 12 18 | Received: _____ |

CERTIFICATE OF WELL COMPLIANCE

(REQUIRED FOR OCCUPANCY INSPECTION ONLY)

I, Jeremy Hanna (License T3632) of AIR ROCK DRILLING CO. LTD. - do hereby certify that I am

Licensed to drill wells in the Province of Ontario and that I have supervised the drilling of a well on the

PROPERTY OF # 1384341 Ontario Limited (Clo Gavanagh Construction)
(Name of Landowner)

LOCATED AT (No Civic) Gardiner Shore, Carleton Place
(Civic Address)

LOT # 7 CON # 9 PLAN # X Test well
4 of 7

IN the TOWNSHIP OF BECKWITH - IN the COUNTY OF LANARK

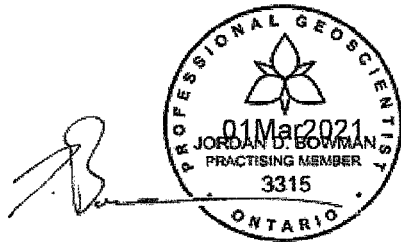
AND FURTHER THAT I am aware of the well drilling requirements of the Township of Beckwith and the guidelines, recommendations and regulations of the Ministry of the Environment as they govern well installation in the Province of Ontario.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased and cement grouted to the standards required.

Signed this 18TH day of December 2020


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


Witness Debbie Davis



HYDROLOGIST (Signature / Stamp)

0020957
TAGA 313138
James Gardiner +
Harry Gardiner +
Kathryn Chapman

Measurements recorded in: Metric Imperial

A313138

Page: ___ of ___

Well Owner's Information

First Name: _____ Last Name/Organization: **1384341 Ontario Limited (c/o Cavanagh Const)** E-mail Address: _____ Well Constructed by Well Owner

Mailing Address (Street Number/Name): **9094 Cavanagh Road** Municipality: **Ashton** Province: **On** Postal Code: **K0A 1B0** Telephone No. (Inc. area code): _____

Address of Well Location (Street Number/Name): **Gardiner Shore (NO CIVIC)** Township: **Beckwith** Lot: **7** Concession: **9**

County/District/Municipality: **Lanark** City/Town/Village: **Carleton Place** Province: **Ontario** Postal Code: _____

UTM Coordinates: Zone: **18** Easting: **409991** Northing: **4994002** Municipal Plan and Sublot Number: _____ Other: **Test Well # 4 of 7**

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) |
|----------------|----------------------|-----------------|---------------------|--------------|
| | Sand | Stones | | 0' - 15' |
| Grey | Sandstone | | | 15' - 88' |
| Grey & Brown | Sandstone | | | 88' - 96' |
| Grey & Brown | Sandstone | | | 96' - 106' |
| Grey & Brown | Sandstone | | | 106' - 110' |

James Gardiner, Henry Gardiner, Kathryn Chapman

Annular Space

| Depth Set at (m/ft) | Type of Sealant Used (Material and Type) | Volume Placed (m³/ft³) |
|---------------------|--|------------------------|
| 40' - 30' | Neat cement | 10.9 |
| 30' - 0' | Bentonite slurry | 16.8 |

Results of Well Yield Testing

| After test of well yield, water was: | Draw Down | Recovery |
|---|---------------------------------|---------------------------------|
| <input type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify Not tested | Time (min) / Water Level (m/ft) | Time (min) / Water Level (m/ft) |
| <input checked="" type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify Not tested If pumping discontinued, give reason: _____ Pump intake set at (m/ft) 100 Pumping rate (l/min / GPM) 20 Duration of pumping 4 hrs + 0 min Final water level end of pumping (m/ft) 12.4' If flowing give rate (l/min/GPM) _____ Recommended pump depth (m/ft) 80' Recommended pump rate (l/min/GPM) 20 Well production (l/min/GPM) 20 Disinfect? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Static Level 5.7' | |
| | 1 - 9.7 | 1 - 8.3 |
| | 2 - 10.5 | 2 - 6.3 |
| | 3 - 10.8 | 3 - 6.2 |
| | 4 - 11 | 4 - 6.2 |
| | 5 - 11.1 | 5 - 6.1 |
| 10 - 11.5 | 10 - 5.8 | |
| 15 - 11.8 | 15 - 5.7 | |
| 20 - 11.7 | 20 - 5.7 | |
| 25 - 11.8 | 25 - 5.7 | |
| 30 - 11.8 | 30 - 5.7 | |
| 40 - 11.9 | 40 - 5.7 | |
| 50 - 12 | 50 - 5.7 | |
| 60 - 12.4 | 60 - 5.7 | |

Method of Construction

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

Construction Record - Casing

| Inside Diameter (cm/ID) | Open Hole OR Material (Galvanized, Fiberglass, Concrete, Plastic, Steel) | Well Thickness (cm/ID) | Depth (m/ft) | Status of Well |
|-------------------------|--|------------------------|--------------|--|
| 6 1/4" | Steel | .188" | +2' - 40' | <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 1/8" | Open Hole | | 40' - 110' | |

Construction Record - Screen

| Outside Diameter (cm/OD) | Material (Plastic, Galvanized, Steel) | Slot No. | Depth (m/ft) |
|--------------------------|---------------------------------------|----------|--------------|
| | | | |

Water Details

| Water found at Depth (m/ft) | Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested | Hole Diameter |
|-----------------------------|--|---------------------------------------|
| 88' (m/ft) | <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____ | Depth (m/ft) From To Diameter (cm/ID) |
| 96' (m/ft) | <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____ | 0' - 40' 9 3/4" |
| 104' (m/ft) | <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____ | 40' - 110' 6 1/8" |

Well Contractor and Well Technician Information

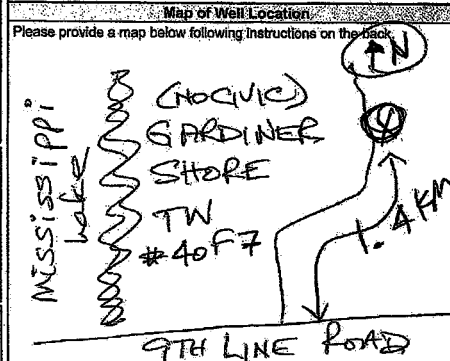
Business Name of Well Contractor: **Air Rock Drilling Co. Ltd.** Well Contractor's Licence No.: **7881**

Business Address (Street Number/Name): **8808 Franktown Road** Municipality: **Richmond**

Province: **ON** Postal Code: **K0A 2Z0** Business E-mail Address: **air-rock@sympatico.ca**

Bus. Telephone No. (inc. area code): **6138382170** Name of Well Technician (Last Name, First Name): **Hanna, Jeremy**

Well Technician's Licence No.: **13632** Signature of Technician and/or Contractor: _____ Date Submitted: **2020 11 31**



Comments: **Yield 10 GPM @ 8 FT**

| Well owner's Information package delivered | Date Package Delivered | Ministry Use Only |
|---|--|---------------------------|
| <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 2020 12 19 | Audit No.: 2355235 |
| | Date Work Completed: 2020 12 18 | Received |

CERTIFICATE OF WELL COMPLIANCE

(REQUIRED FOR OCCUPANCY INSPECTION ONLY)

I, Jeremy Hanna (License T3632) of AIR ROCK DRILLING CO. LTD. - do hereby certify that I am

Licensed to drill wells in the Province of Ontario and that I have supervised the drilling of a well on the

PROPERTY OF # 1384341 Ontario Limited (Clo Cavanagh Construction)
(Name of Landowner)

LOCATED AT (No Civic) Gardiner Shore, Carleton Place
(Civic Address)


LOT # 7 CON # 9 PLAN # X Test well
5 OF 7


IN the TOWNSHIP OF BECKWITH - IN the COUNTY OF LANARK

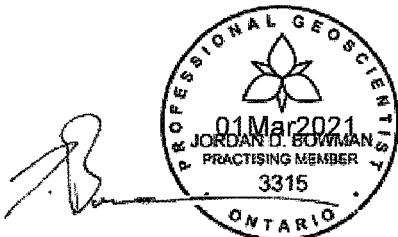
AND FURTHER THAT I am aware of the well drilling requirements of the Township of Beckwith and the guidelines, recommendations and regulations of the Ministry of the Environment as they govern well installation in the Province of Ontario.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased and cement grouted to the standards required.

Signed this 21st day of December 2020


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


Witness Debbie Davis




HYDROLOGIST (Signature / Stamp)

2020961
TAGA 313113
James Gardiner +
Harry Gardiner +
Kathryn Chapman

Measurements recorded in: Metric Imperial

A313113

Page ___ of ___

Well Owner's Information

First Name: _____ Last Name/Organization: **1394341 Ontario Limited (c/o Cavanagh Const)** E-mail Address: _____ Well Constructed by Well Owner

Mailing Address (Street Number/Name): **9094 Cavanagh Road** Municipality: **Ashton** Province: **On** Postal Code: **K0A 1B0** Telephone No. (inc. area code): _____

Well Location: Address of Well Location (Street Number/Name): **Gardiner, Shore (NO CIVIC)** Township: **Beckwith** Lot: **7** Concession: **9**

County/District/Municipality: **Lanark** City/Town/Village: **Carleton Place** Province: **Ontario** Postal Code: _____

UTM Coordinates Zone, Easting, Northing: **NAD 83 18 409601 4994008** Municipal Plan and Sublot Number: _____ Other: **Test Well # 5 of 7**

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 |
|----------------|----------------------|-----------------|---------------------|----------------------|
| | Sand | Broken Rock | | 0' 2' |
| Grey | Sandstone | | | 2' 81' |
| Grey | Sandstone | | | 81' 74' |
| Grey | Sandstone | | | 74' 81' |

James Gardiner, Harry Gardiner & Kathryn Chapman

Angular Space

| Depth Set at (m/ft) From To | Type of Sealant Used (Material and Type) | Volume Placed (m ³ /ft ³) |
|-----------------------------|--|--|
| 40' 30' | Neat cement | 10.9 |
| 30' 0' | Bentonite slurry | 12.6 |

Results of Well-Yield Testing

| After test of well yield, water was: <input type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify Not tested | Draw Down | | Recovery | |
|---|--------------|--------------------|------------|--------------------|
| | Time (min) | Water Level (m/ft) | Time (min) | Water Level (m/ft) |
| If pumping discontinued, give reason: X | Static Level | 7' 8" | | 26' |
| | 1 | 17.6 | 1 | 12.4 |
| | 2 | 16.7 | 2 | 10.7 |
| | 3 | 19.4 | 3 | 9.9 |
| | 4 | 20.6 | 4 | 9 |
| | 5 | 21.7 | 5 | 8.8 |
| Final water level end of pumping (m/ft) 26' | 10 | 22.8 | 10 | 7.8 |
| | 15 | 23.7 | 15 | 7.8 |
| | 20 | 24.6 | 20 | 7.8 |
| | 25 | 25.4 | 25 | 7.8 |
| | 30 | 25.9 | 30 | 7.8 |
| | 40 | 26 | 40 | 7.8 |
| If flowing give rate (l/min/GPM) X | 50 | 26 | 50 | 7.8 |
| | 60 | 26' | 60 | 7.8' |

Method of Construction

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

Construction Record - Casing

| Inside Diameter (cm/ft) | Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) | Wall Thickness (cm/ft) | Depth (m/ft) | | Status of Well |
|-------------------------|--|------------------------|--------------|-----|--|
| | | | From | To | |
| 6 1/4" | Steel | .188" | +2' | 40' | <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" | Open Hole | | 40' | 81' | |

Construction Record - Screen

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

Water Details

| Water found at Depth (m/ft) | Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____ | Hole Diameter |
|-----------------------------|---|---|
| 81' | | Depth (m/ft) From To: 0' 40' Diameter (cm/ft): 9 3/4" |
| 74' | | 40' 81' Diameter (cm/ft): 6" |

Well Contractor and Well Technician Information

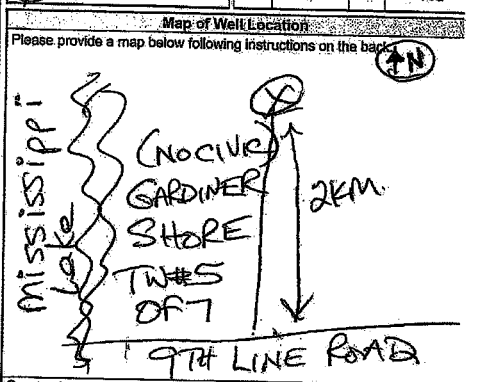
Business Name of Well Contractor: **Air Rock Drilling Co. Ltd.** Well Contractor's Licence No.: **7681**

Business Address (Street Number/Name): **6550 Fairview Road** Municipality: **Richmond**

Province: **ON** Postal Code: **K0A 2Z0** Business E-mail Address: **air-rock@sympatico.ca**

Bus. Telephone No. (inc. area code): **6138382470** Name of Well Technician (Last Name, First Name): **Hanna, Jeremy**

Well Technician's Licence No.: **13632** Signature of Technician and/or Contractor: _____ Date Submitted: **2020 01 31**



Comments: **1/24/20 GPM set @ 60 FT**

Well owner's information package delivered: No

Date Package Delivered: **2020 11 23**

Date Work Completed: **2020 12 21**

Ministry Use Only: Audit No.: **2355236**

Received: _____

CERTIFICATE OF WELL COMPLIANCE

(REQUIRED FOR OCCUPANCY INSPECTION ONLY)

I, Jeremy Hanna (License T3632) of AIR ROCK DRILLING CO. LTD. - do hereby certify that I am

Licensed to drill wells in the Province of Ontario and that I have supervised the drilling of a well on the

PROPERTY OF # 1384341 Ontario Limited (Cloverbrook Construction)
(Name of Landowner)

LOCATED AT (No Civic) Gardiner Shore, Carleton Place
(Civic Address)


LOT # 7 CON # 9 PLAN # X Test well
6 of 7


IN the TOWNSHIP OF BECKWITH - IN the COUNTY OF LANARK

AND FURTHER THAT I am aware of the well drilling requirements of the Township of Beckwith and the guidelines, recommendations and regulations of the Ministry of the Environment as they govern well installation in the Province of Ontario.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased and cement grouted to the standards required.

Signed this 18th day of December 2020


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


Witness Debbie Davis



HYDROLOGIST (Signature / Stamp)

2020956
TAGA 313137
James Gardiner +
Harry Gardiner +
Kathryn Chapman

Measurements recorded in: Metric Imperial

A313137

Page ___ of ___

Well Owner's Information

First Name: _____ Last Name/Organization: **1384341 Ontario Limited (c/o Cavanagh Const)** E-mail Address: _____ Well Constructed by Well Owner

Mailing Address (Street Number/Name): **9094 Cavanagh Road** Municipality: **Ashton** Province: **On** Postal Code: **K0A 1B0** Telephone No. (inc. area code): _____

Well Location: Address of Well Location (Street Number/Name): **Gardiner Shore (NO CIVIC)** Township: **Beckwith** Lot: **7** Concession: **9**

County/District/Municipality: **Lanark** City/Town/Village: **Carleton Place** Province: **Ontario** Postal Code: _____

UTM Coordinates Zone: **18** Easting: **410185** Northing: **4994076** Municipal Plan and Sublot Number: _____ Other: _____

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

| General Colour | Most Common Material | Other Materials | General Description | Depth (m/ft) |
|----------------|----------------------|-----------------|---------------------|--------------|
| | Fill | Rocks + Stones | | 0' 4' |
| Grey | Limestone | | | 4' 40' |
| Grey + Brown | Sandstone | | | 40' 55' |
| Grey + Brown | Sandstone | | | 55' 130' |
| Grey + Brown | Sandstone | | | 130' 140' |

James Gardiner, Harry Gardiner, Kathryn Chapman

| Annular Space | | | Volume Placed (m ³) |
|---------------------|--|--|---------------------------------|
| Depth Set at (m/ft) | Type of Sealant Used (Material and Type) | | |
| 40' / 30' | Neat cement | | 9.36 |
| 30' / 0' | Bentonite slurry | | 8.4 |

| Results of Well Yield Testing | | | |
|--|--------------|--------------------|------------|
| After test of well yield, water was: <input type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify: Not tested | Draw Down | | Recovery |
| | Time (min) | Water Level (m/ft) | Time (min) |
| If pumping discontinued, give reason: ∞ | Static Level | 15'5" | 16'6" |
| | 1. | 16.3 | 1. 15.5 |
| | 2. | 16.3 | 2. 15.5 |
| | 3. | 16.4 | 3. 15.5 |
| | 4. | 16.4 | 4. 15.5 |
| | 5. | 16.5 | 5. 15.5 |
| | 10. | 16.5 | 10. 15.5 |
| | 15. | 16.5 | 15. 15.5 |
| | 20. | 16.5 | 20. 15.5 |
| | 25. | 16.5 | 25. 15.5 |
| 30. | 16.5 | 30. 15.5 | |
| 40. | 16.6 | 40. 15.5 | |
| 50. | 16.6 | 50. 15.5 | |
| 60. | 16.6 | 60. 15.5 | |

| Method of Construction | | Well Use | |
|--|----------------------------------|--|---|
| <input 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"/> Not used |
| <input type="checkbox"/> Rotary (Reverse) | <input type="checkbox"/> Driving | <input type="checkbox"/> Municipal | <input type="checkbox"/> Dewatering |
| <input type="checkbox"/> Boring | <input type="checkbox"/> Digging | <input type="checkbox"/> Livestock | <input type="checkbox"/> Test Hole |
| <input checked="" type="checkbox"/> Air percussion | | <input type="checkbox"/> Irrigation | <input type="checkbox"/> Monitoring |
| <input type="checkbox"/> Other, specify | | <input type="checkbox"/> Industrial | <input type="checkbox"/> Cooling & Air Conditioning |
| | | <input type="checkbox"/> Other, specify | |

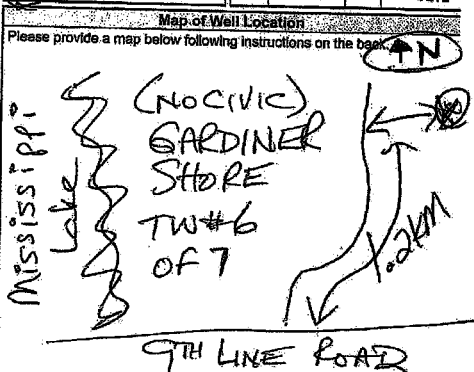
| Construction Record - Casing | | | | Status of Well | |
|------------------------------|--|------------------------|--------------|--|---|
| Inside Diameter (cm/in) | Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) | Wall Thickness (cm/in) | Depth (m/ft) | <input checked="" type="checkbox"/> Water Supply | <input type="checkbox"/> Replacement Well |
| 6 1/4" | Steel | .188" | +2' 40' | | |
| 6" | Open Hole | | 40' 140' | <input type="checkbox"/> Dewatering Well | <input type="checkbox"/> Observation and/or Monitoring Hole |

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

| Water Details | | Hole Diameter | |
|--|--|----------------------|------------------|
| Water found at Depth 55 (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify | Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested | Depth (m/ft) From To | Diameter (cm/in) |
| Water found at Depth 130 (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify | Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested | 0' 40' | 93/4" |
| Water found at Depth (m/ft) <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify | Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested | 40' 140' | 6" |

Well Contractor and Well Technician Information
 Business Name of Well Contractor: **Air Rock Drilling Co. Ltd.** Well Contractor's Licence No.: **7681**
 Business Address (Street Number/Name): **8699 Franktown Road** Municipality: **Richmond**
 Province: **ON** Postal Code: **K0A 2Z0** Business E-mail Address: **air-rock@sympatico.ca**

Bus. Telephone No. (inc. area code): **@138392170** Name of Well Technician (Last Name, First Name): **Hanna, Jeremy**
 Well Technician's Licence No.: **13632** Signature of Technician and/or Contractor: _____ Date Submitted: **2021 04 31**



Comments: **1/2 HP - 10 GPM Set @ 80 FT**
 Well owner's Information package delivered: **Y 2020 14 12 0 10**
 Date Work Completed: **Y 2020 12 18**
 Ministry Use Only: Audit No. **2355237**
 Received: _____

CERTIFICATE OF WELL COMPLIANCE

(REQUIRED FOR OCCUPANCY INSPECTION ONLY)

I, Jeremy Hanna (License T3632) of AIR ROCK DRILLING CO. LTD. - do hereby certify that I am

Licensed to drill wells in the Province of Ontario and that I have supervised the drilling of a well on the

PROPERTY OF # 1384341 Ontario Limited (Clo Cavanagh Construction)
(Name of Landowner)

LOCATED AT (No Civic) Gardiner Shore, Carleton Place
(Civic Address)


LOT # 7 CON # 9 PLAN # X Test Well
~~7~~ OF 7


IN the TOWNSHIP OF BECKWITH - IN the COUNTY OF LANARK

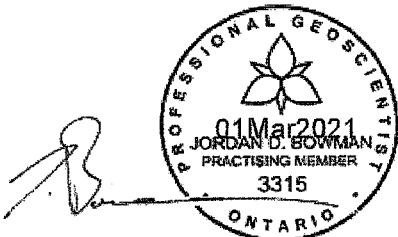
AND FURTHER THAT I am aware of the well drilling requirements of the Township of Beckwith and the guidelines, recommendations and regulations of the Ministry of the Environment as they govern well installation in the Province of Ontario.

AND DO HEREBY CERTIFY THAT the said well has been drilled, cased and cement grouted to the standards required.

Signed this 17TH day of December 2020


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


Witness Debbie Davis



HYDROLOGIST (Signature / Stamp)

2020955
TAGA31314
James Gardiner +
Harry Gardiner +
Kathryn Chapman

Measurements recorded in: Metric Imperial

Well Owner's Information

First Name: Last Name/Organization: **1384341 Ontario Limited (c/o Cavanagh Const)** E-mail Address: Well Constructed by Well Owner

Mailing Address (Street Number/Name): **9094 Cavanagh Road** Municipality: **Ashton** Province: **On** Postal Code: **K0A 1B0** Telephone No. (inc. area code):

Well Location

Address of Well Location (Street Number/Name): **Gardiner Shore (NO CIVIC)** Township: **Beckwith** Lot: **7** Concession: **9**

County/District/Municipality: **Lanark** City/Town/Village: **Carleton Place** Province: **Ontario** Postal Code:

UTM Coordinates Zone: **18** Easting: **409868** Northing: **4904466** 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 |
| | Sand | Clay + Stones | | 0' 6' |
| Grey | Sandstone | | | 6' 73' |
| Grey | Sandstone | | | 73' 114' |
| Grey | Sandstone | | | 114' 120' |

James Gardiner, Terry Gardiner, Kathryn Chapman

Annular Spaces

| Depth Set at (m/ft) | Type of Sealant Used (Material and Type) | Volume Placed (m ³) |
|---------------------|--|---------------------------------|
| 40' / 30' | Neat cement | 10.9 |
| 30' / 0' | Bentonite slurry | 12.6 |

Results of Well Yield Testing

After test of well yield, water was:
 Clear and sand free
 Other, specify **Not tested**

If pumping discontinued, give reason:

| Pump Intake set at (m/ft) | Draw Down | | Recovery | |
|---------------------------|------------|--------------------|------------|--------------------|
| | Time (min) | Water Level (m/ft) | Time (min) | Water Level (m/ft) |
| 80 | 1 | 0.8' | 1 | 0.8' |
| 20 | 2 | 0.8' | 2 | 0.8' |
| 20 | 3 | | 3 | |
| 20 | 4 | | 4 | |
| 20 | 5 | | 5 | |
| 20 | 10 | | 10 | |
| 20 | 15 | | 15 | |
| 20 | 20 | | 20 | |
| 20 | 25 | | 25 | |
| 20 | 30 | | 30 | |
| 20 | 40 | | 40 | |
| 20 | 50 | | 50 | |
| 20 | 60 | | 60 | |

Pumping rate (l/min/GPM): **20**

Duration of pumping: **4 hrs + 0 min**

Final water level end of pumping (m/ft): **0.8'**

If flowing give rate (l/min/GPM): **20**

Recommended pump depth (m/ft): **80'**

Recommended pump rate (l/min/GPM): **20**

Well production (l/min/GPM): **20**

Disinfected? Yes No

Method of Construction

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

Construction Record - Casing

| Inside Diameter (cm/in) | Open Hole OR Material (Galvanized, Fiberglass, Concrete, Plastic, Steel) | Well Thickness (cm/in) | Depth (m/ft) | | Status of Well |
|-------------------------|--|------------------------|--------------|------|--|
| | | | From | To | |
| 6 1/4" | Steel | .188" | +2' | 40' | <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" | Open Hole | | 40' | 120' | |

Construction Record - Screen

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

Water Details

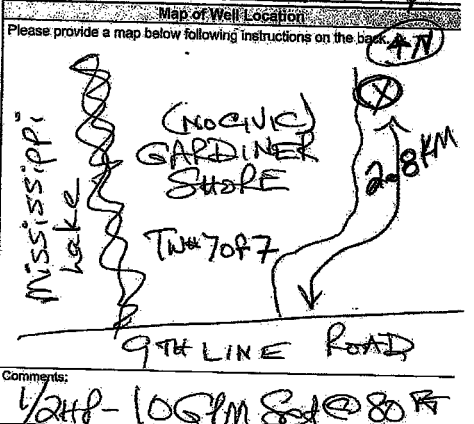
| Water found at Depth (m/ft) | Kind of Water: | Tested | Hole Diameter | |
|-----------------------------|---|--------|---------------|------------------|
| | <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested | | Depth (m/ft) | Diameter (cm/in) |
| | <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify | | From | To |
| 73 (m/ft) | <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested | | 0' 40' | 93/4" |
| 114 (m/ft) | <input type="checkbox"/> Gas <input type="checkbox"/> Other, specify | | 40' 120' | 6" |

Well Contractor and Well Technician Information

Business Name of Well Contractor: **Air Rock Drilling Co. Ltd.** Well Contractor's Licence No.: **7881**

Business Address (Street Number/Name): **8889 Franktown Road** Municipality: **Richmond**

Province: **ON** Postal Code: **K0A 2Z0** Business E-mail Address: **air-rock@sympatico.ca**



Well Technician's Licence No.: **T3632** Name of Well Technician (Last Name, First Name): **Hanna, Jeremy** Date Submitted: **2021 01 31**

Well owner's information package delivered: Yes No

Date Package Delivered: **2020 12 19**

Date Work Completed: **2020 12 17**

Ministry Use Only
Audit No.: **2355238**

HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



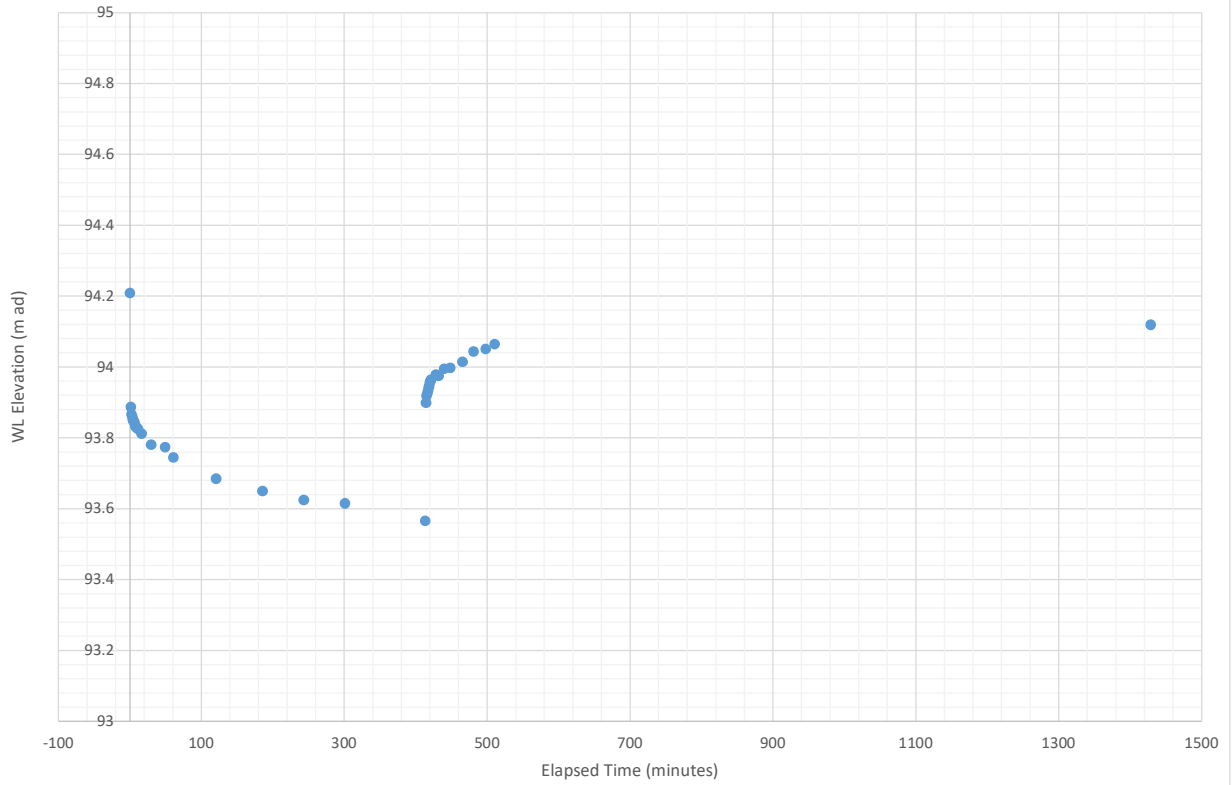
APPENDIX D –HYDRAULIC TESTING ANALYSIS RESULTS (DRAWDOWN CURVES)

**Summary of Water Level Data
Pumping Test - TW1 - January 11, 2021**

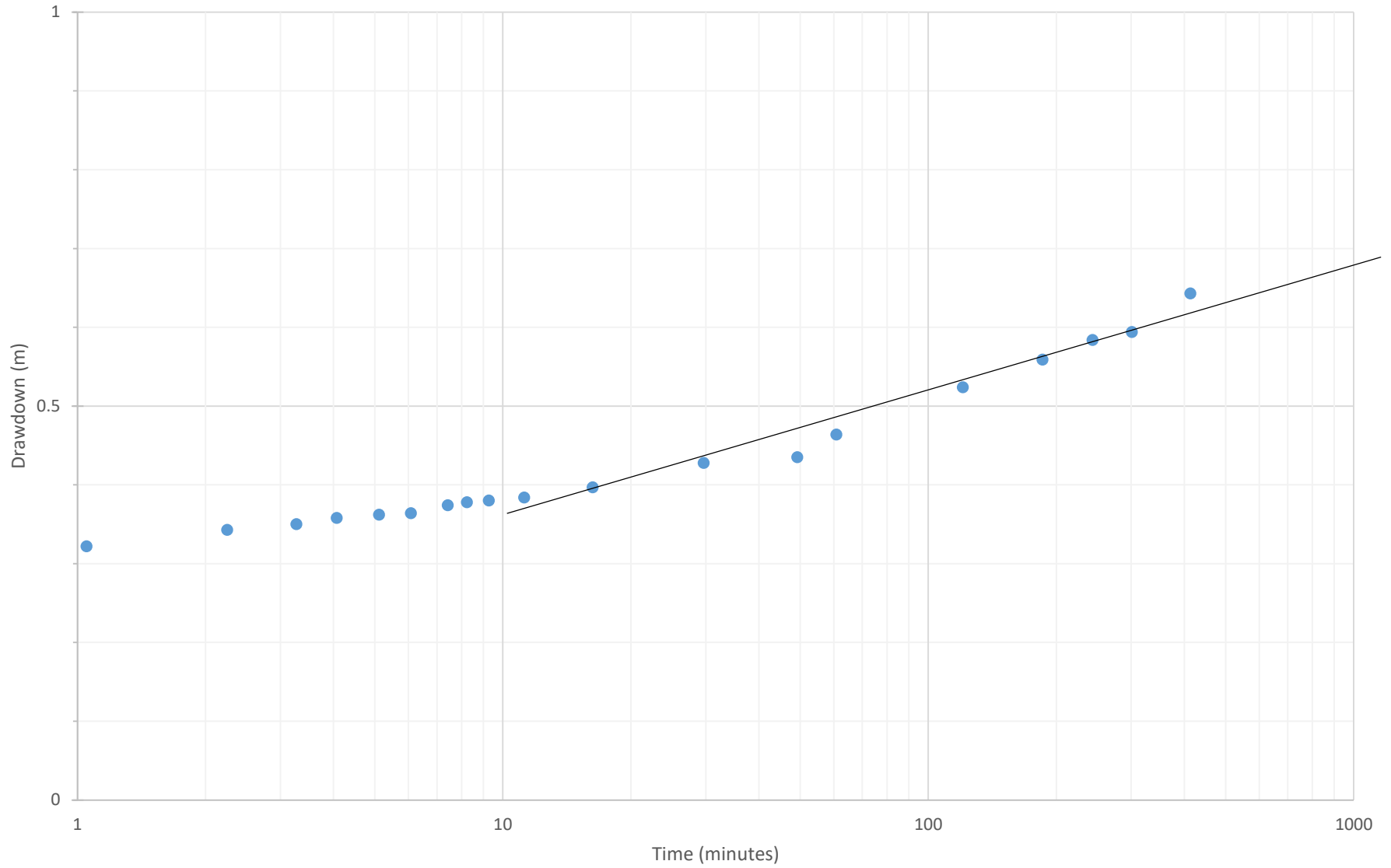
| | |
|--------------------------------|-----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 5.791 m BTOC |
| Static Water Elevation | 94.209 m AD (Above Datum) |
| 95% Recovery | 5.82315 m BTOC |
| | 94.17685 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Turbidity (NTU) | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|----------|-----------------|----------------------|---------------------|--------------|----------------|
| 0 | | | | 5.791 | 94.209 | 0 | Pump on @ 8:30 |
| 1.05 | | | | 6.113 | 93.887 | 0.322 | |
| 2.25 | | | | 6.134 | 93.866 | 0.343 | |
| 3.27 | | | | 6.141 | 93.859 | 0.35 | |
| 4.07 | | | | 6.149 | 93.851 | 0.358 | |
| 5.12 | | | | 6.153 | 93.847 | 0.362 | |
| 6.08 | | | | 6.155 | 93.845 | 0.364 | |
| 7.42 | | | | 6.165 | 93.835 | 0.374 | |
| 8.23 | | | | 6.169 | 93.831 | 0.378 | |
| 9.27 | | | | 6.171 | 93.829 | 0.38 | |
| 11.22 | | | | 6.175 | 93.825 | 0.384 | |
| 16.27 | | | | 6.188 | 93.812 | 0.397 | |
| 29.67 | | | | 6.219 | 93.781 | 0.428 | |
| 49.23 | | | | 6.226 | 93.774 | 0.435 | |
| 60.83 | | | | 6.255 | 93.745 | 0.464 | |
| 120.5 | | | | 6.315 | 93.685 | 0.524 | |
| 185.53 | | | | 6.35 | 93.65 | 0.559 | |
| 243.33 | | | | 6.375 | 93.625 | 0.584 | |
| 300.83 | | | | 6.385 | 93.615 | 0.594 | |
| 413.08 | | | | 6.434 | 93.566 | 0.643 | |
| 414.5 | 1 | 414.5 | | 6.101 | 93.899 | 0.31 | |
| 415.18 | 2 | 207.59 | | 6.081 | 93.919 | 0.29 | |
| 416.27 | 3 | 138.7567 | | 6.073 | 93.927 | 0.282 | |
| 417.13 | 4 | 104.2825 | | 6.066 | 93.934 | 0.275 | |
| 418.5 | 5 | 83.7 | | 6.056 | 93.944 | 0.265 | |
| 419.3 | 6 | 69.88333 | | 6.045 | 93.955 | 0.254 | |
| 420.67 | 7 | 60.09571 | | 6.039 | 93.961 | 0.248 | |
| 421.25 | 8 | 52.65625 | | 6.036 | 93.964 | 0.245 | |
| 428.08 | 15 | 28.53867 | | 6.021 | 93.979 | 0.23 | |
| 432.07 | 19 | 22.74053 | | 6.025 | 93.975 | 0.234 | |
| 439.83 | 26 | 16.91654 | | 6.005 | 93.995 | 0.214 | |
| 448.17 | 35 | 12.80486 | | 6.002 | 93.998 | 0.211 | |
| 465.5 | 52 | 8.951923 | | 5.985 | 94.015 | 0.194 | |
| 480.75 | 67 | 7.175373 | | 5.956 | 94.044 | 0.165 | |
| 497.83 | 84 | 5.926548 | | 5.949 | 94.051 | 0.158 | |
| 510.33 | 97 | 5.261134 | | 5.935 | 94.065 | 0.144 | |
| 1428.67 | 1015 | 1.407557 | | 5.881 | 94.119 | 0.09 | |

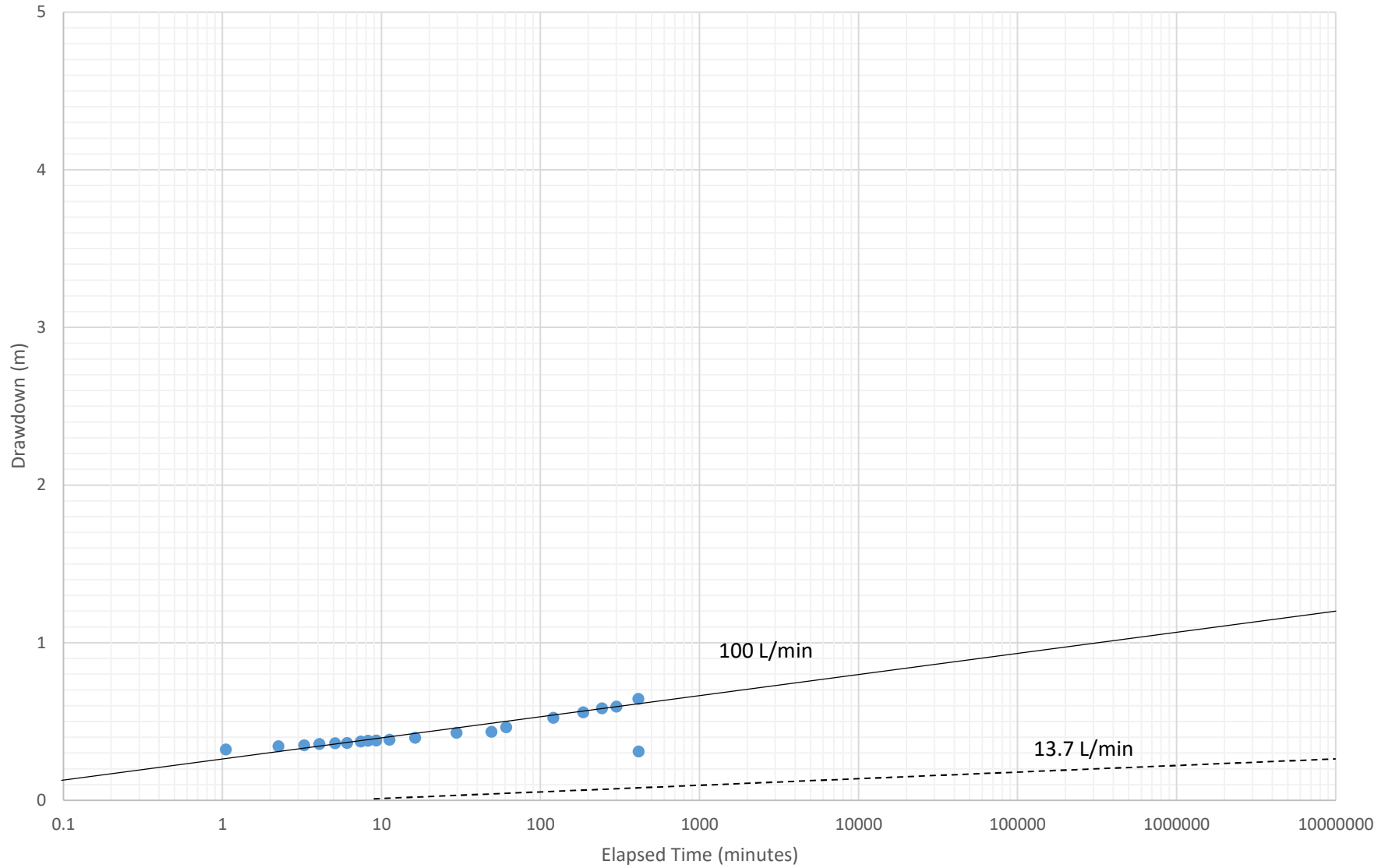
Drawdown vs Time
TW1 Pumping Test (Drawdown), January 11, 2021
Gardiner Shore, Beckwith ON



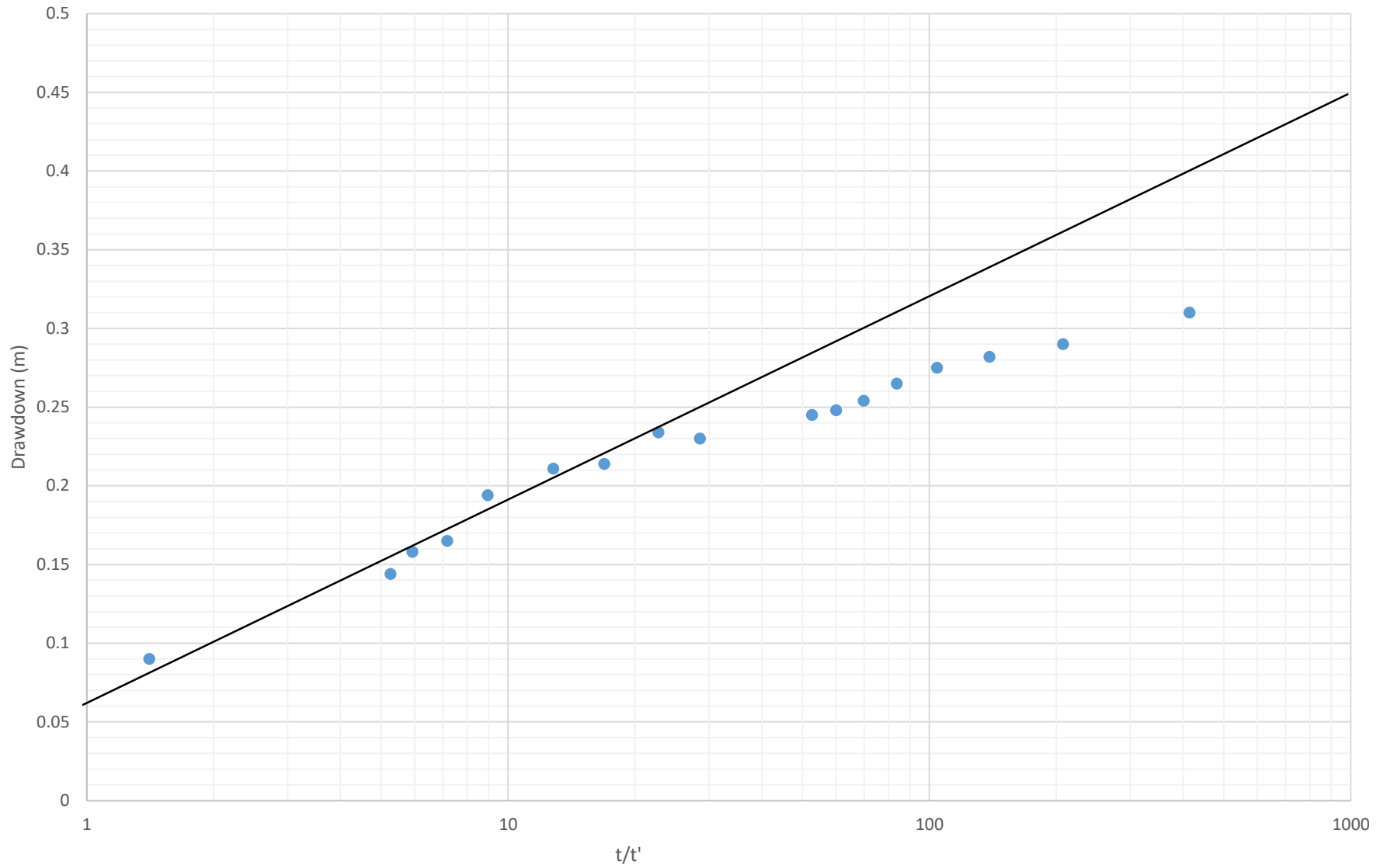
Drawdown vs Log Time
TW1 Pumping Test (Drawdown), January 11, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW1 Pumping Test (Long-Term), January 11, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW1 Pumping Test (Recovery), January 11, 2021
Gardiner Shore, Beckwith ON

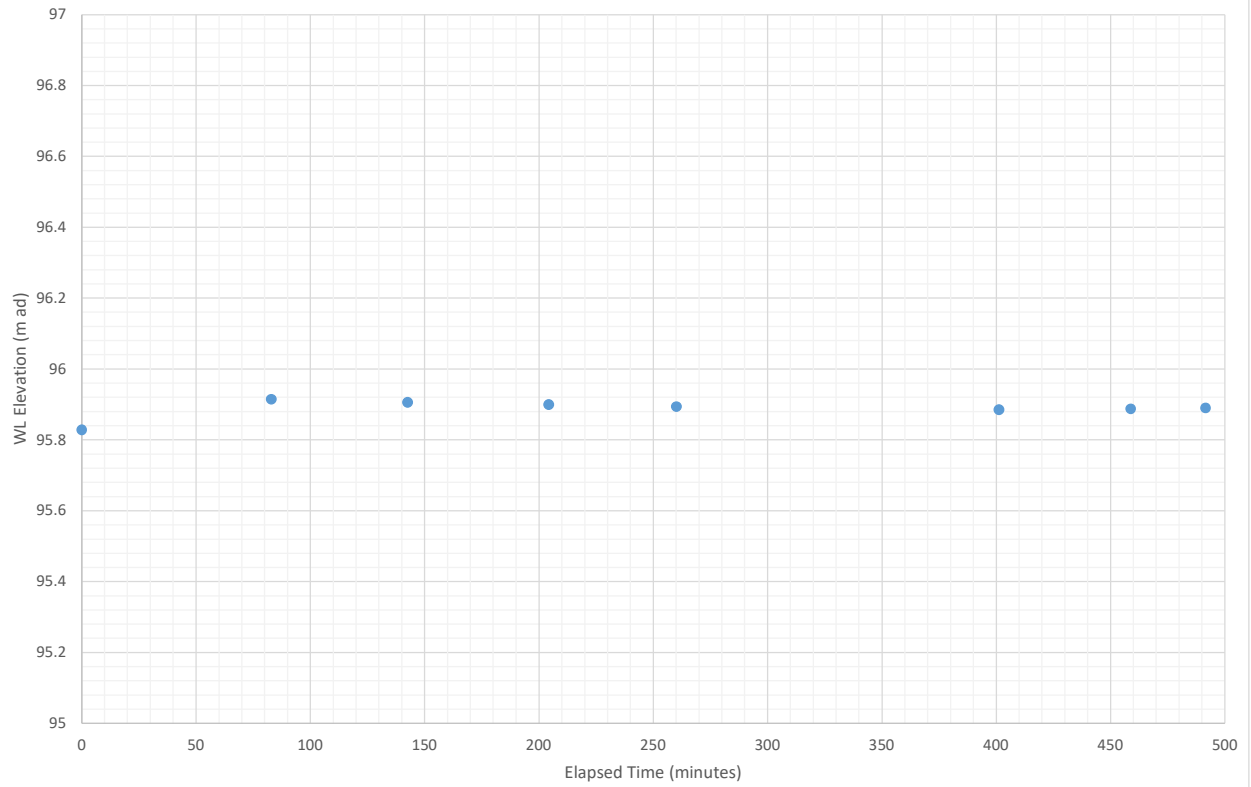


Summary of Water Level Data
Pumping Test - TW1, Observation TW2 - January 11, 2021

| | |
|--------------------------------|---------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 4.172 m BTOC |
| Static Water Elevation | 95.828 m AD (Above Datum) |
| 95% Recovery | 4.172 m BTOC |
| | 95.828 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|-------|
| 0 | | | 4.172 | 95.828 | 0 | |
| 82.83 | | | 4.085 | 95.915 | -0.087 | |
| 142.58 | | | 4.094 | 95.906 | -0.078 | |
| 204.27 | | | 4.1 | 95.9 | -0.072 | |
| 260.12 | | | 4.106 | 95.894 | -0.066 | |
| 401.17 | | | 4.115 | 95.885 | -0.057 | |
| 458.78 | | | 4.112 | 95.888 | -0.06 | |
| 491.5 | | | 4.11 | 95.89 | -0.062 | |
| 1422.08 | | | 4.131 | 95.869 | -0.041 | |

Drawdown vs Time
TW1 Pumping Test, Observation TW2 (Drawdown), January 11, 2021
Gardiner Shore, Beckwith ON

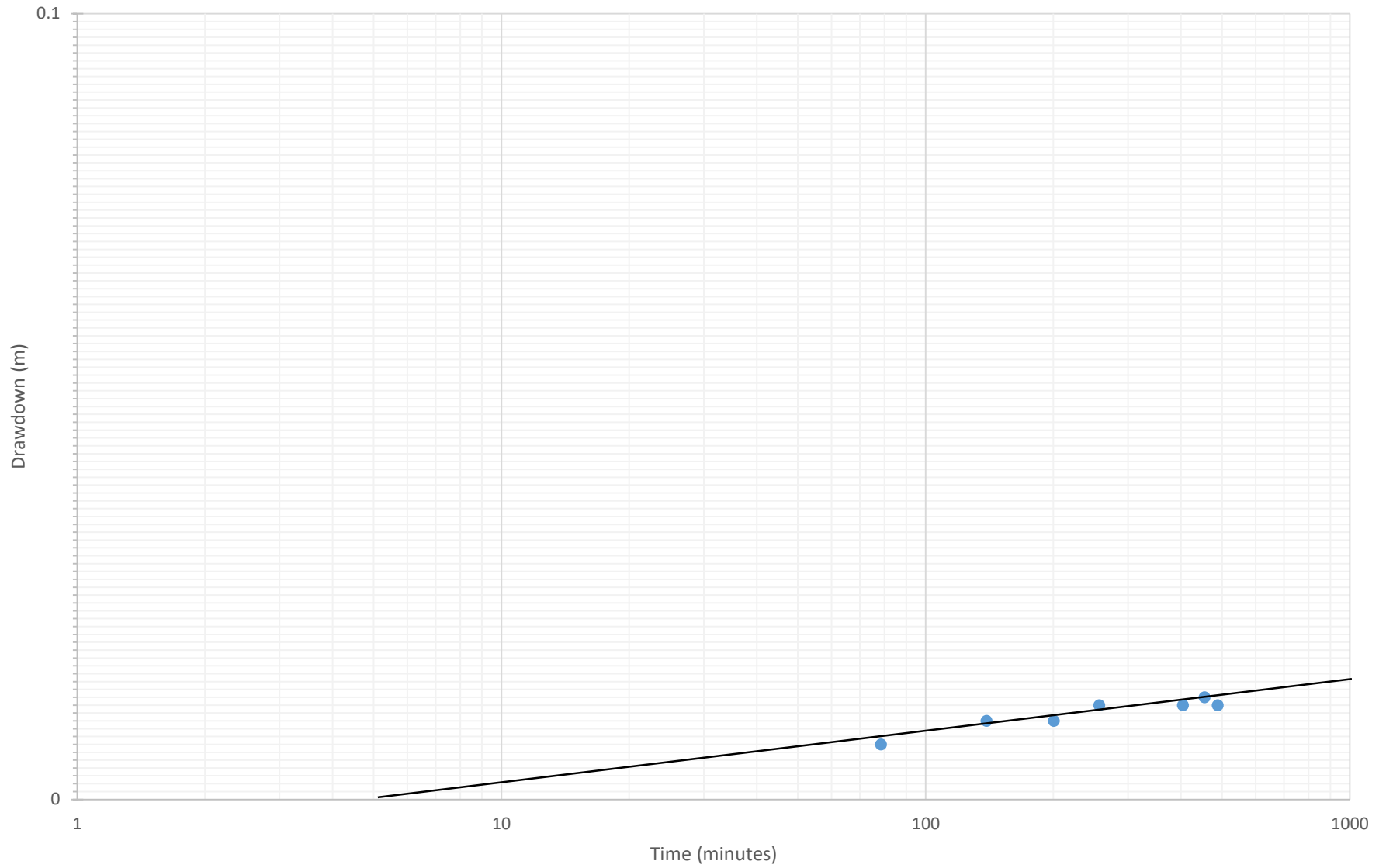


Summary of Water Level Data
Pumping Test - TW1, Observation TW6 - January 11, 2021

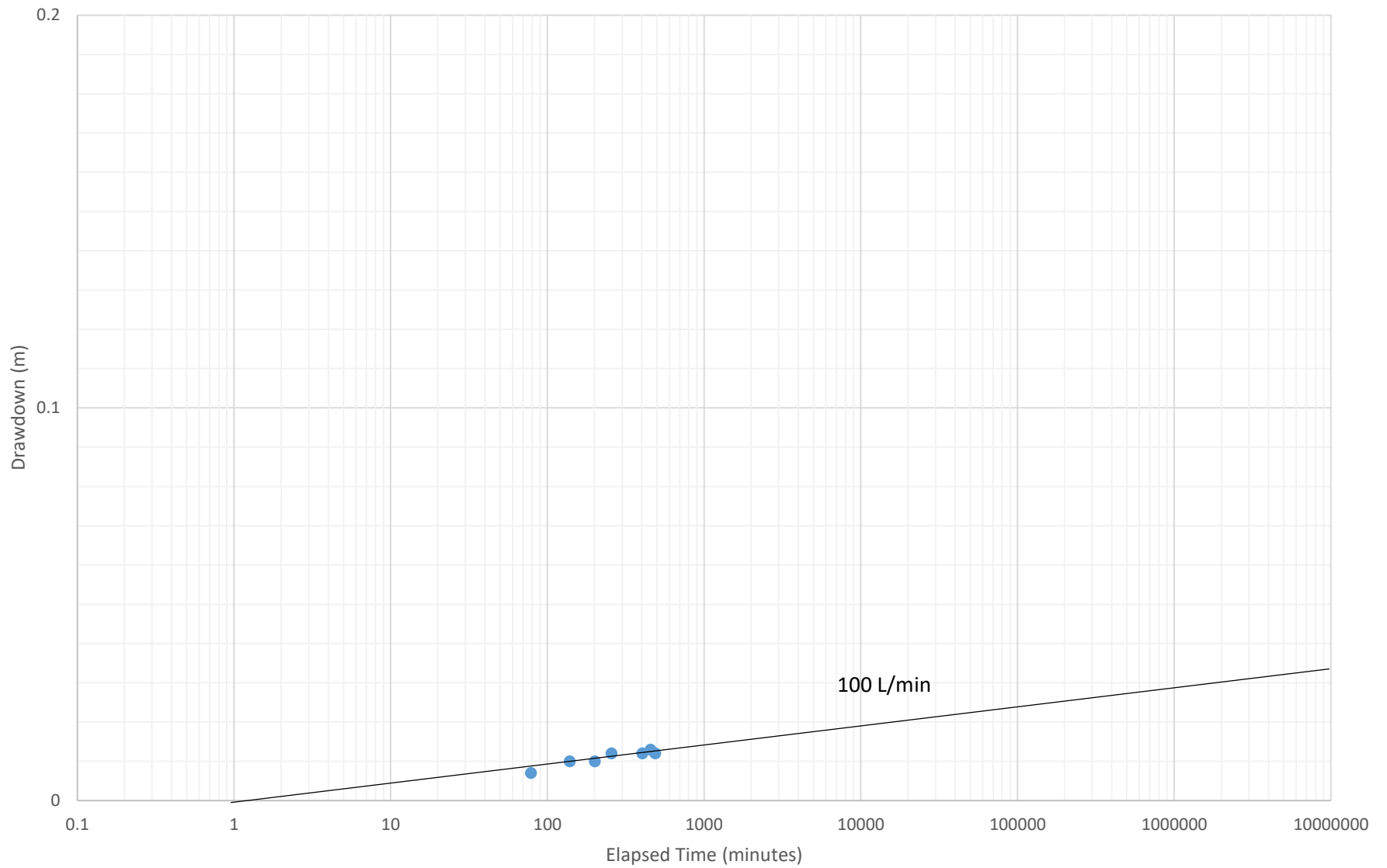
TOC Elevation (assumed) 100 m AD (Above Datum)
Static Water Level 4.469 m BTOC
Static Water Elevation 95.531 m AD (Above Datum)
95% Recovery 4.46965 m BTOC
 95.53035 m AD (Above Datum)

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|----------|----------------------|---------------------|--------------|-----------------|
| 0 | | | 4.469 | 95.531 | 0 | |
| 78.5 | | | 4.476 | 95.524 | 0.007 | |
| 139.17 | | | 4.479 | 95.521 | 0.01 | |
| 200.7 | | | 4.479 | 95.521 | 0.01 | |
| 256.83 | | | 4.481 | 95.519 | 0.012 | |
| 404.02 | | | 4.481 | 95.519 | 0.012 | Pump off at 413 |
| 454.5 | 41 | 11.08537 | 4.482 | 95.518 | 0.013 | |
| 488.17 | 75 | 6.508933 | 4.481 | 95.519 | 0.012 | |
| 1425.75 | 1012 | 1.408844 | 4.516 | 95.484 | 0.047 | |

Drawdown vs Log Time
TW1 Pumping Test, Observation TW6 (Drawdown), January 11, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW1 Pumping Test, Observation TW6 (Long-Term), January 11, 2021
Gardiner Shore, Beckwith ON

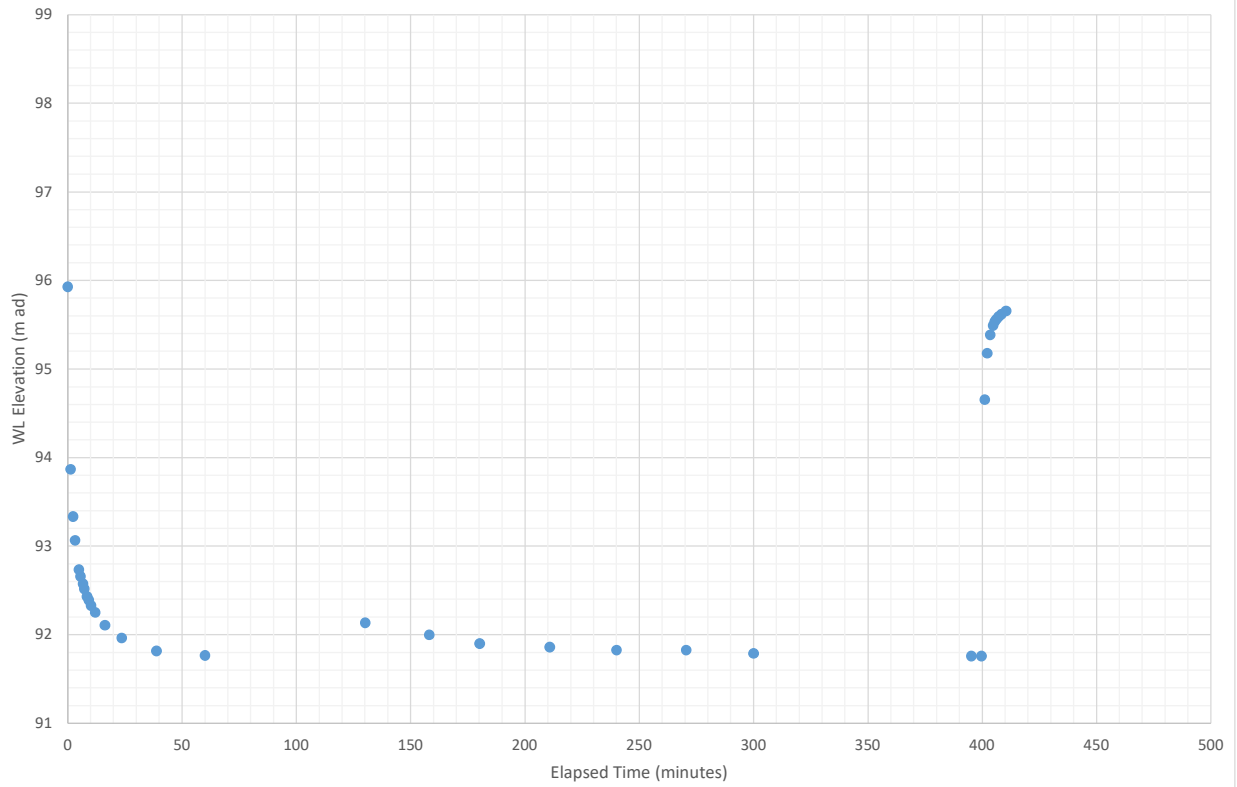


**Summary of Water Level Data
Pumping Test - TW2 - January 13, 2021**

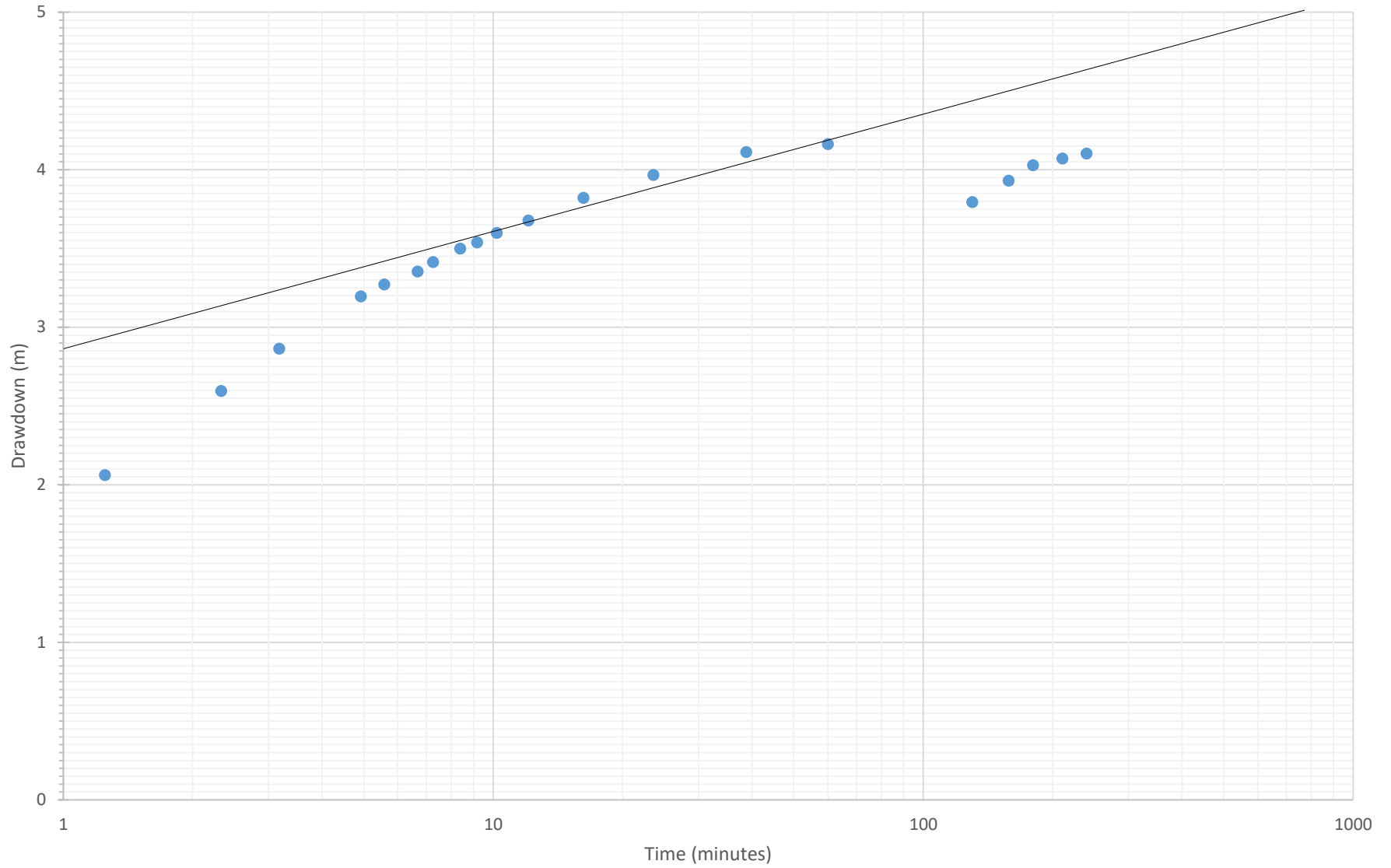
| | |
|--------------------------------|----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 4.07 m BTOC |
| Static Water Elevation | 95.93 m AD (Above Datum) |
| 95% Recovery | 4.2786 m BTOC |
| | 95.7214 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Turbidity (NTU) | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|----------|-----------------|----------------------|---------------------|--------------|--------------------|
| 0 | | | | 4.07 | 95.93 | 0 | |
| 1.25 | | | | 6.131 | 93.869 | 2.061 | |
| 2.33 | | | | 6.665 | 93.335 | 2.595 | |
| 3.18 | | | | 6.934 | 93.066 | 2.864 | |
| 4.92 | | | | 7.266 | 92.734 | 3.196 | |
| 5.58 | | | | 7.342 | 92.658 | 3.272 | |
| 6.67 | | | | 7.424 | 92.576 | 3.354 | |
| 7.25 | | | | 7.483 | 92.517 | 3.413 | |
| 8.38 | | | | 7.569 | 92.431 | 3.499 | |
| 9.17 | | | | 7.608 | 92.392 | 3.538 | |
| 10.2 | | | | 7.669 | 92.331 | 3.599 | |
| 12.07 | | | | 7.747 | 92.253 | 3.677 | |
| 16.22 | | | | 7.892 | 92.108 | 3.822 | |
| 23.57 | | | | 8.036 | 91.964 | 3.966 | |
| 38.77 | | | | 8.182 | 91.818 | 4.112 | |
| 60.07 | | | | 8.233 | 91.767 | 4.163 | generator shut off |
| 130.07 | | | | 7.864 | 92.136 | 3.794 | |
| 158.08 | | | | 8.00 | 92 | 3.93 | |
| 180.17 | | | | 8.099 | 91.901 | 4.029 | |
| 210.83 | | | | 8.141 | 91.859 | 4.071 | |
| 240.03 | | | | 8.172 | 91.828 | 4.102 | |
| 270.5 | | | | 8.173 | 91.827 | 4.103 | |
| 300.03 | | | | 8.21 | 91.79 | 4.14 | |
| 395.17 | | | | 8.242 | 91.758 | 4.172 | |
| 399.6 | | | | 8.242 | 91.758 | 4.172 | |
| 401.08 | 1 | 401.08 | | 5.345 | 94.655 | 1.275 | |
| 402.13 | 2 | 201.065 | | 4.823 | 95.177 | 0.753 | |
| 403.45 | 3 | 134.4833 | | 4.615 | 95.385 | 0.545 | |
| 404.67 | 4 | 101.1675 | | 4.509 | 95.491 | 0.439 | |
| 405.45 | 5 | 81.09 | | 4.466 | 95.534 | 0.396 | |
| 406.2 | 6 | 67.7 | | 4.438 | 95.562 | 0.368 | |
| 407.17 | 7 | 58.16714 | | 4.407 | 95.593 | 0.337 | |
| 408.33 | 8 | 51.04125 | | 4.381 | 95.619 | 0.311 | |
| 410.37 | 10 | 41.037 | | 4.343 | 95.657 | 0.273 | |
| 414.2 | 14 | 29.58571 | | 4.299 | 95.701 | 0.229 | |
| 417.5 | 17 | 24.55882 | | 4.274 | 95.726 | 0.204 | |
| 419.43 | 19 | 22.07526 | | 4.259 | 95.741 | 0.189 | |

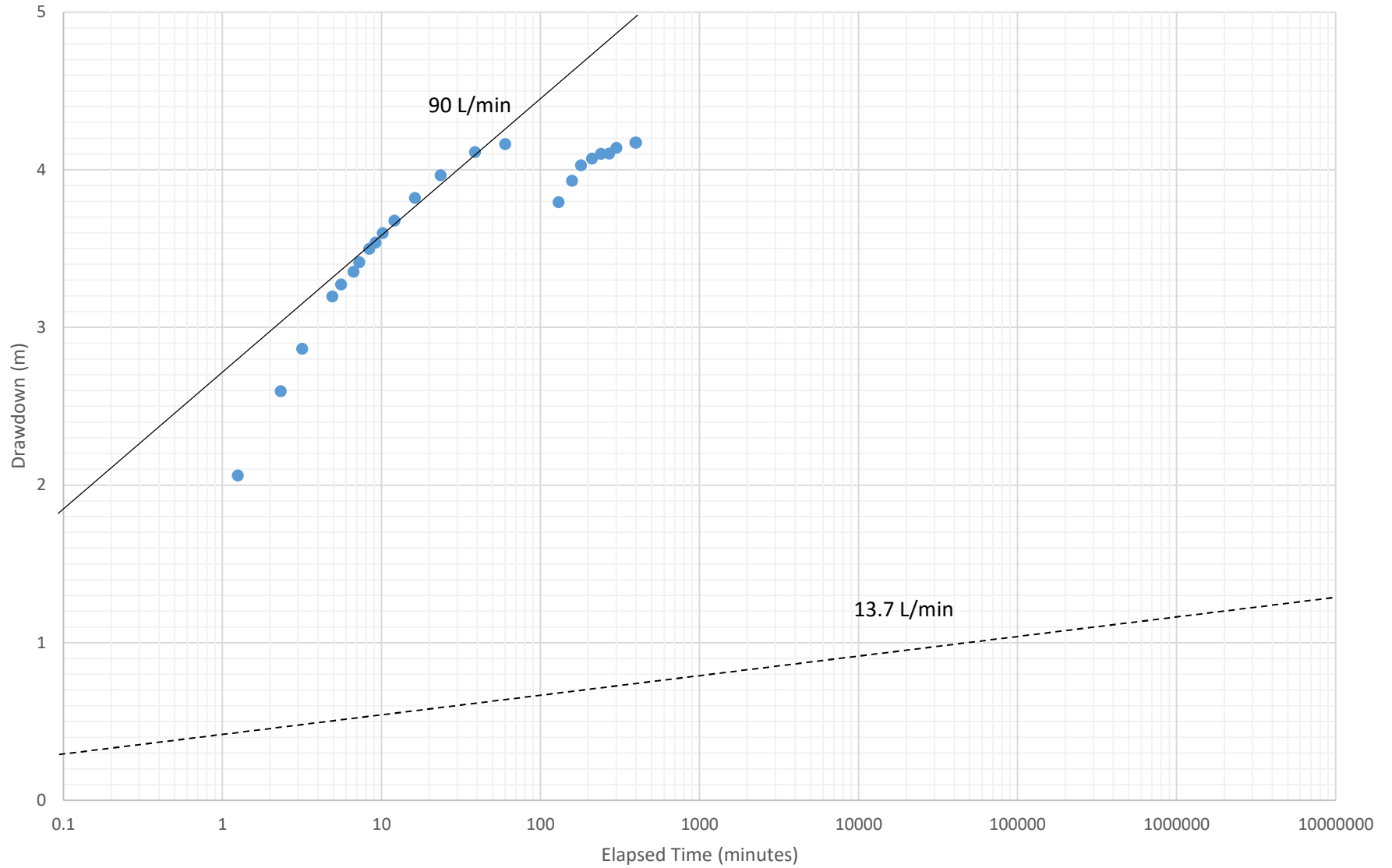
Drawdown vs Time
TW2 Pumping Test (Drawdown), January 13, 2021
Gardiner Shore, Beckwith ON



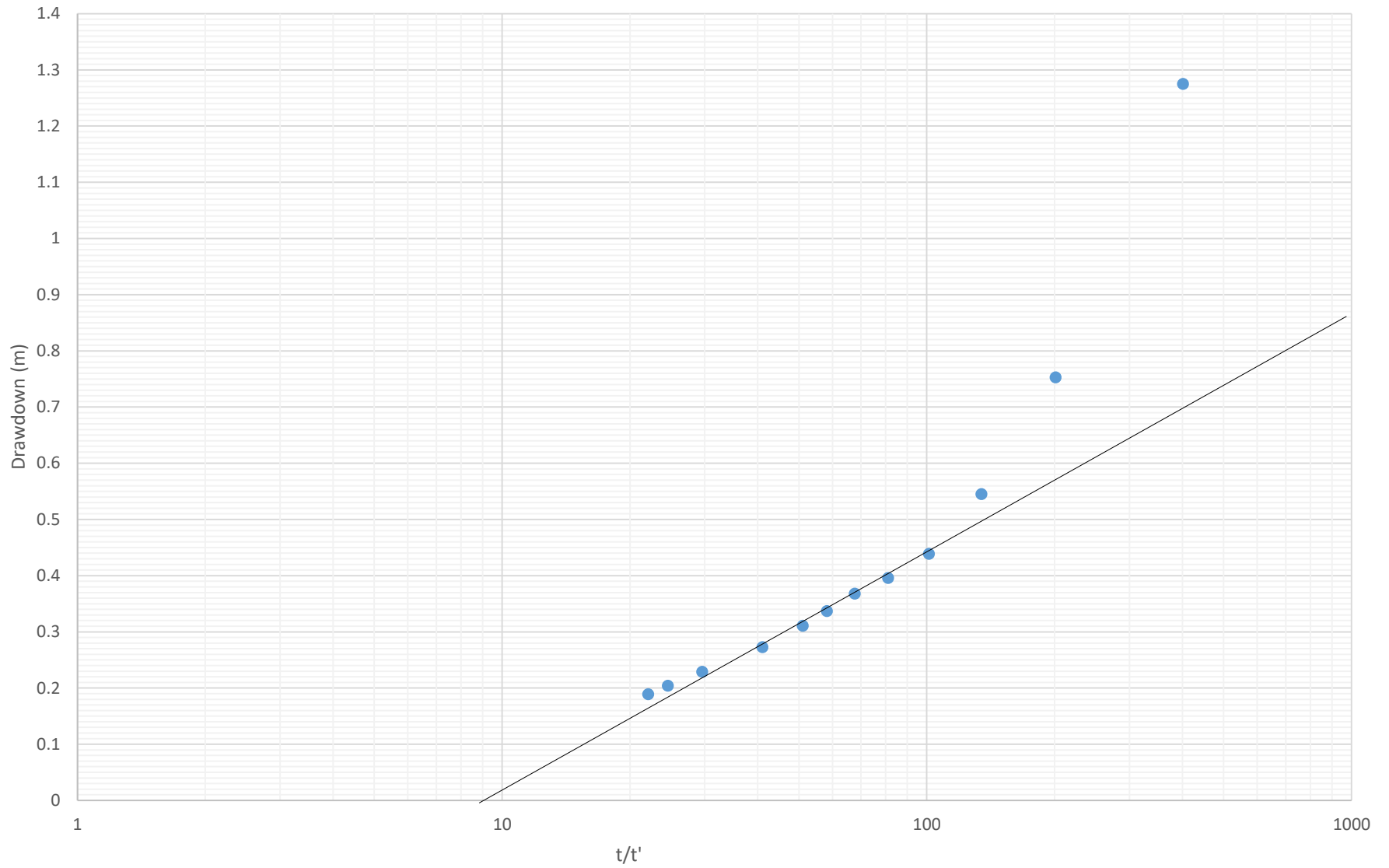
Drawdown vs Log Time
TW2 Pumping Test (Drawdown), January 13, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW2 Pumping Test (Long-Term), January 21, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW2 Pumping Test (Recovery), January 13, 2021
Gardiner Shore, Beckwith ON

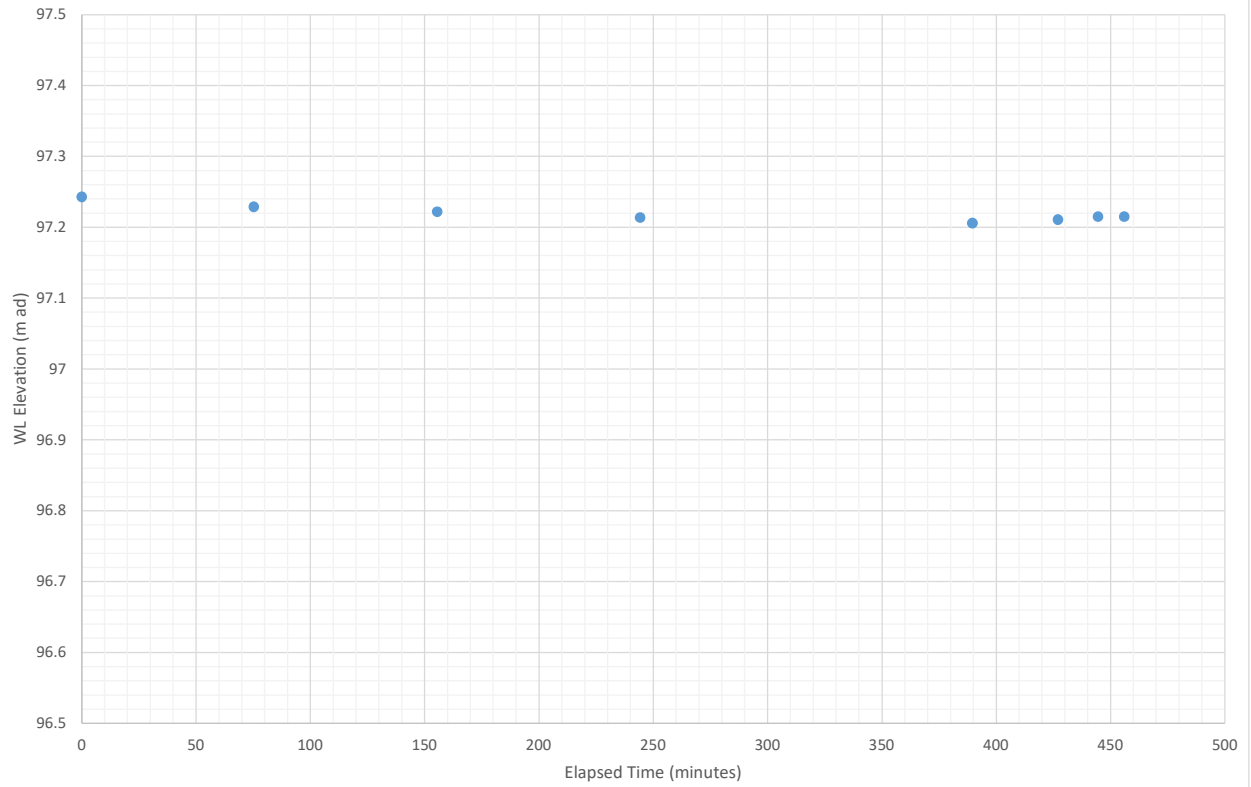


Summary of Water Level Data
Pumping Test - TW2, Observation TW3 - January 11, 2021

| | |
|--------------------------------|----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 4.172 m BTOC |
| Static Water Elevation | 95.828 m AD (Above Datum) |
| 95% Recovery | 4.1031 m BTOC |
| | 95.8969 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|-------|
| 0 | | | 2.757 | 97.243 | -1.415 | |
| 75.25 | | | 2.771 | 97.229 | -1.401 | |
| 155.5 | | | 2.778 | 97.222 | -1.394 | |
| 244.25 | | | 2.786 | 97.214 | -1.386 | |
| 389.5 | | | 2.794 | 97.206 | -1.378 | |
| 427 | | | 2.789 | 97.211 | -1.383 | |
| 444.5 | | | 2.785 | 97.215 | -1.387 | |
| 456 | | | 2.785 | 97.215 | -1.387 | |

Drawdown vs Time
TW2 Pumping Test, Observation TW3 (Drawdown), January 11, 2021
Gardiner Shore, Beckwith ON

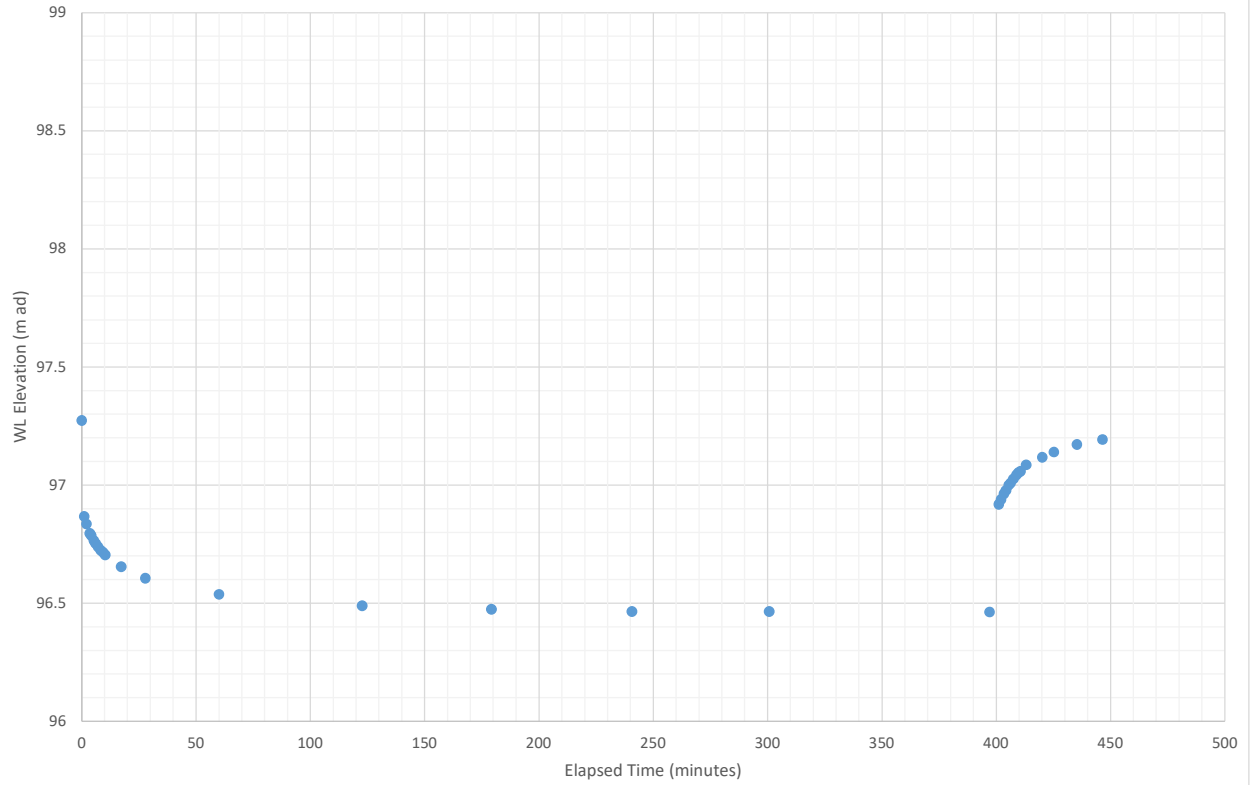


**Summary of Water Level Data
Pumping Test - TW3 - January 12, 2021**

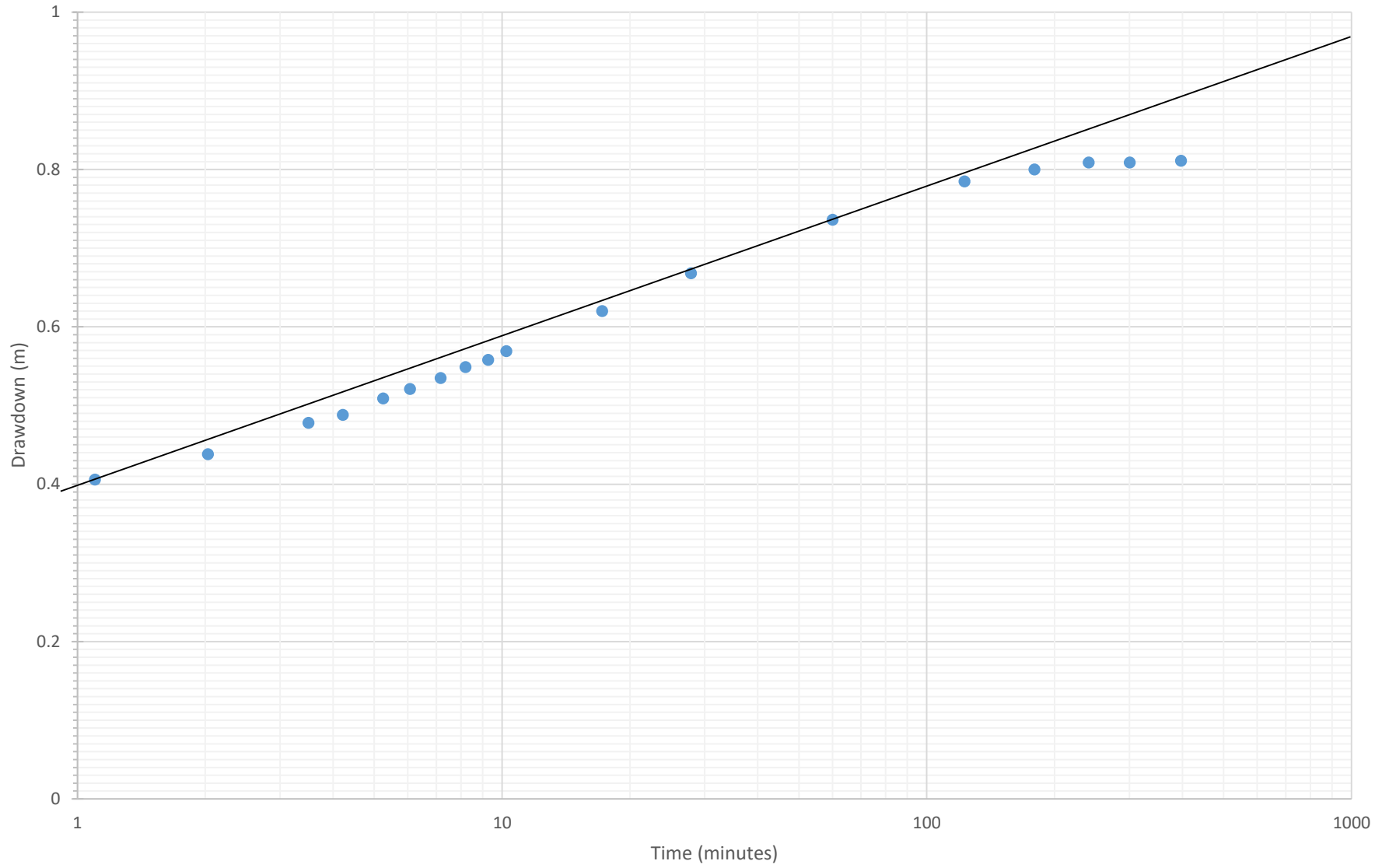
TOC Elevation (assumed) 100 m AD (Above Datum)
Static Water Level 2.726 m BTOC
Static Water Elevation 97.274 m AD (Above Datum)
95% Recovery 2.76655 m BTOC
 97.23345 m AD (Above Datum)

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Turbidity (NTU) | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|----------|-----------------|----------------------|---------------------|--------------|---------------------|
| 0 | | | | 2.726 | 97.274 | 0 | |
| 1.1 | | | | 3.132 | 96.868 | 0.406 | |
| 2.03 | | | | 3.164 | 96.836 | 0.438 | |
| 3.5 | | | | 3.204 | 96.796 | 0.478 | |
| 4.22 | | | | 3.214 | 96.786 | 0.488 | |
| 5.25 | | | | 3.235 | 96.765 | 0.509 | |
| 6.07 | | | | 3.247 | 96.753 | 0.521 | |
| 7.17 | | | | 3.261 | 96.739 | 0.535 | |
| 8.2 | | | | 3.275 | 96.725 | 0.549 | |
| 9.27 | | | | 3.284 | 96.716 | 0.558 | |
| 10.23 | | | | 3.295 | 96.705 | 0.569 | |
| 17.2 | | | | 3.346 | 96.654 | 0.62 | |
| 27.83 | | | | 3.394 | 96.606 | 0.668 | |
| 60.03 | | | | 3.462 | 96.538 | 0.736 | |
| 122.67 | | | | 3.511 | 96.489 | 0.785 | |
| 179.17 | | | | 3.526 | 96.474 | 0.8 | |
| 240.62 | | | | 3.535 | 96.465 | 0.809 | |
| 300.67 | | | | 3.535 | 96.465 | 0.809 | |
| 397.08 | | | | 3.537 | 96.463 | 0.811 | Pump off at 400 min |
| 401.07 | 1 | 401.07 | | 3.081 | 96.919 | 0.355 | |
| 402.08 | 2 | 201.04 | | 3.061 | 96.939 | 0.335 | |
| 403.33 | 3 | 134.4433 | | 3.036 | 96.964 | 0.31 | |
| 404.18 | 4 | 101.045 | | 3.022 | 96.978 | 0.296 | |
| 405.45 | 5 | 81.09 | | 3 | 97 | 0.274 | |
| 406.28 | 6 | 67.71333 | | 2.991 | 97.009 | 0.265 | |
| 407.47 | 7 | 58.21 | | 2.974 | 97.026 | 0.248 | |
| 408.85 | 8 | 51.10625 | | 2.957 | 97.043 | 0.231 | |
| 409.75 | 9 | 45.52778 | | 2.947 | 97.053 | 0.221 | |
| 410.57 | 10 | 41.057 | | 2.942 | 97.058 | 0.216 | |
| 413.08 | 13 | 31.77538 | | 2.914 | 97.086 | 0.188 | |
| 420.1 | 20 | 21.005 | | 2.882 | 97.118 | 0.156 | |
| 425.17 | 25 | 17.0068 | | 2.86 | 97.14 | 0.134 | |
| 435.33 | 35 | 12.438 | | 2.828 | 97.172 | 0.102 | |
| 446.47 | 446 | 1.001054 | | 2.807 | 97.193 | 0.081 | |
| 460.17 | 60 | 7.6695 | | 2.791 | 97.209 | 0.065 | |
| 470.85 | 70 | 6.726429 | | 2.782 | 97.218 | 0.056 | |
| 480.83 | 80 | 6.010375 | | 2.775 | 97.225 | 0.049 | |
| 491.5 | 91 | 5.401099 | | 2.771 | 97.229 | 0.045 | |
| 503.3 | 103 | 4.886408 | | 2.765 | 97.235 | 0.039 | |

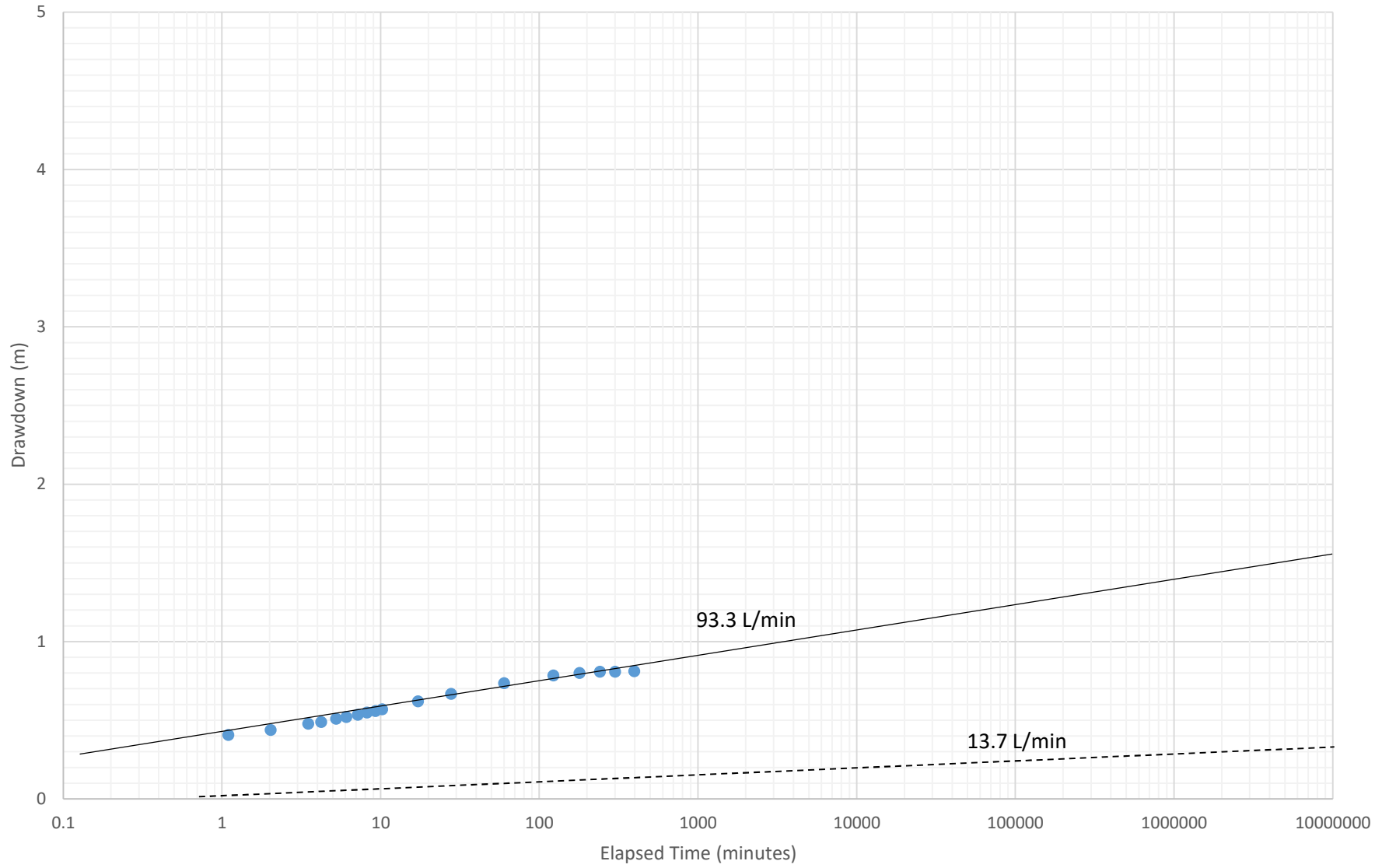
Drawdown vs Time
TW3 Pumping Test (Drawdown), January 12, 2021
Gardiner Shore, Beckwith ON



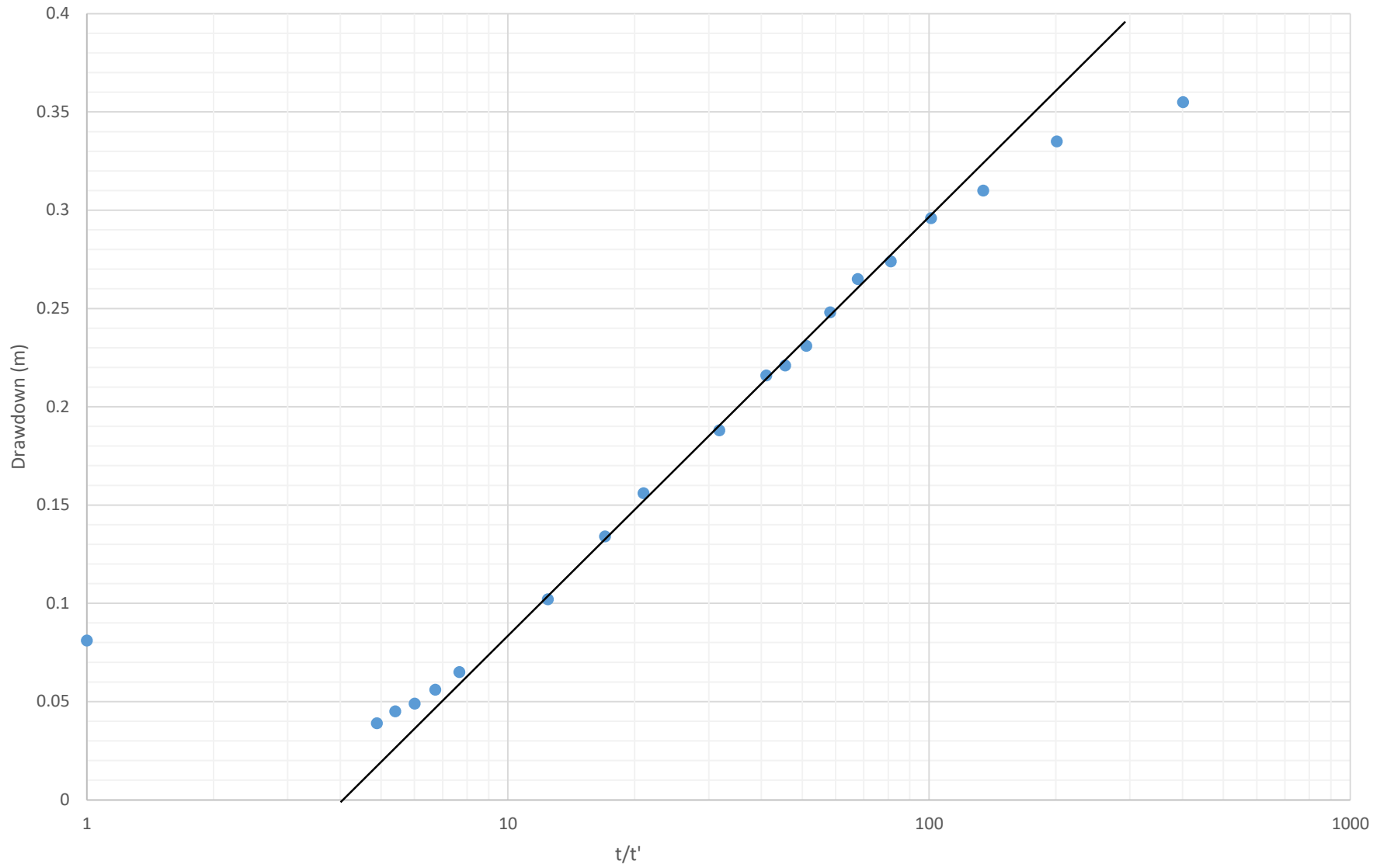
Drawdown vs Log Time
TW3 Pumping Test (Drawdown), January 12, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW3 Pumping Test (Long-Term), January 12, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW3 Pumping Test (Recovery), January 12, 2021
Gardiner Shore, Beckwith ON

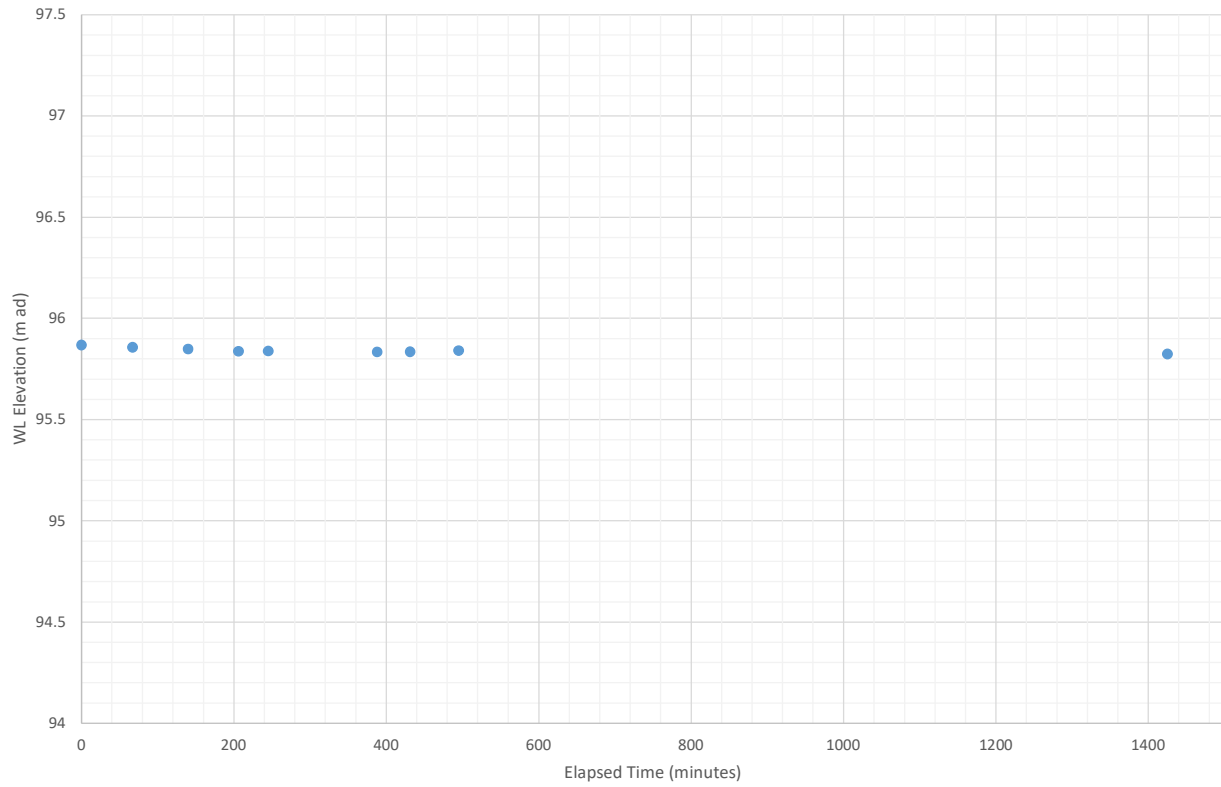


Summary of Water Level Data
Pumping Test - TW3, Observation TW2 - January 12, 2021

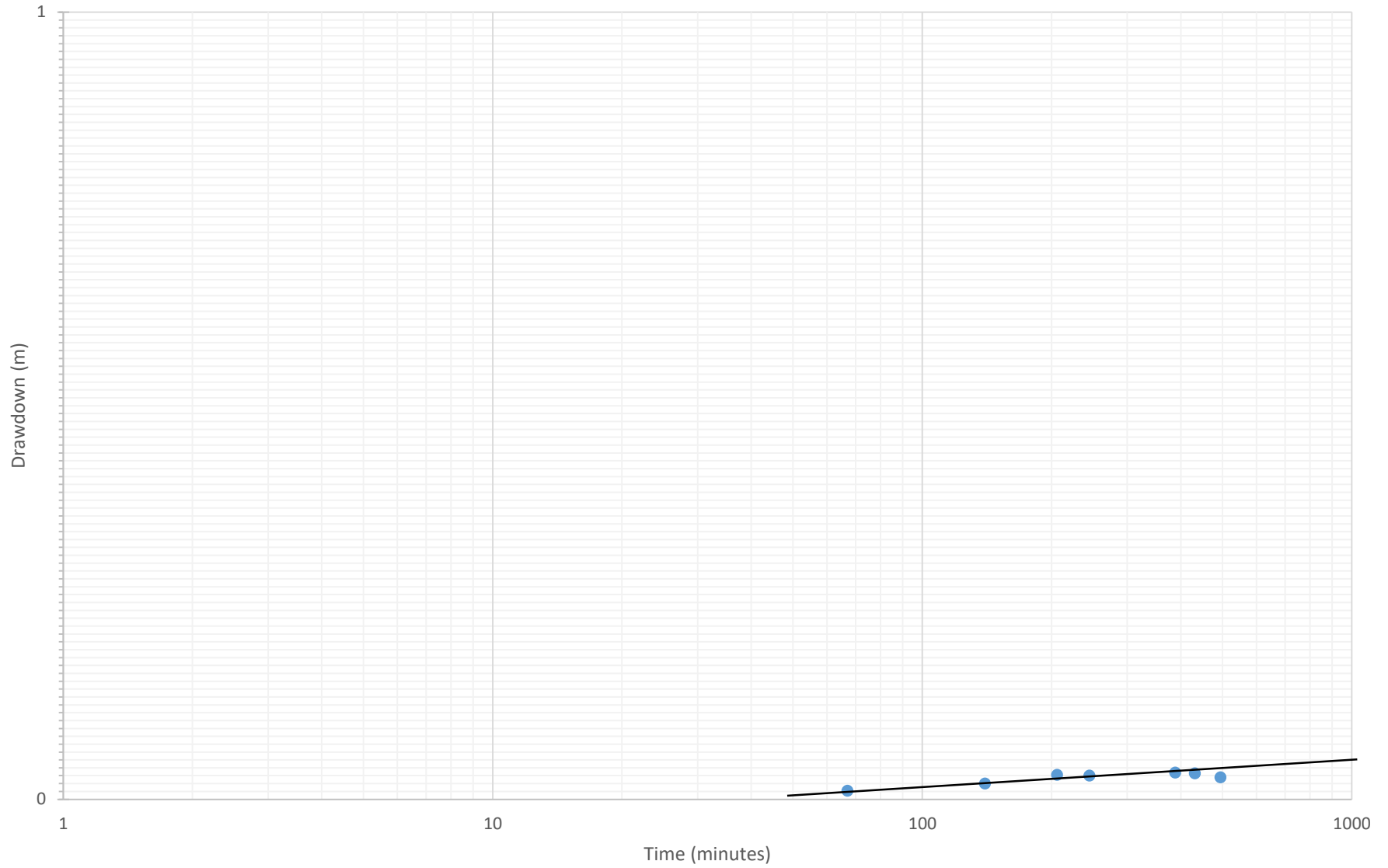
| | |
|--------------------------------|----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 4.131 m BTOC |
| Static Water Elevation | 95.869 m AD (Above Datum) |
| 95% Recovery | 4.1327 m BTOC |
| | 95.8673 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|-------|
| 0 | | | 4.131 | 95.869 | 0 | |
| 67 | | | 4.142 | 95.858 | 0.011 | |
| 140 | | | 4.151 | 95.849 | 0.02 | |
| 206 | | | 4.162 | 95.838 | 0.031 | |
| 245 | | | 4.161 | 95.839 | 0.03 | |
| 388 | | | 4.165 | 95.835 | 0.034 | |
| 431 | | | 4.164 | 95.836 | 0.033 | |
| 495 | | | 4.159 | 95.841 | 0.028 | |
| 1425 | | | 4.175 | 95.825 | 0.044 | |

Drawdown vs Time
TW3 Pumping Test, Observation TW2 (Drawdown), January 12, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW3 Pumping Test, Observation TW2 (Drawdown), January 12, 2021
Gardiner Shore, Beckwith ON

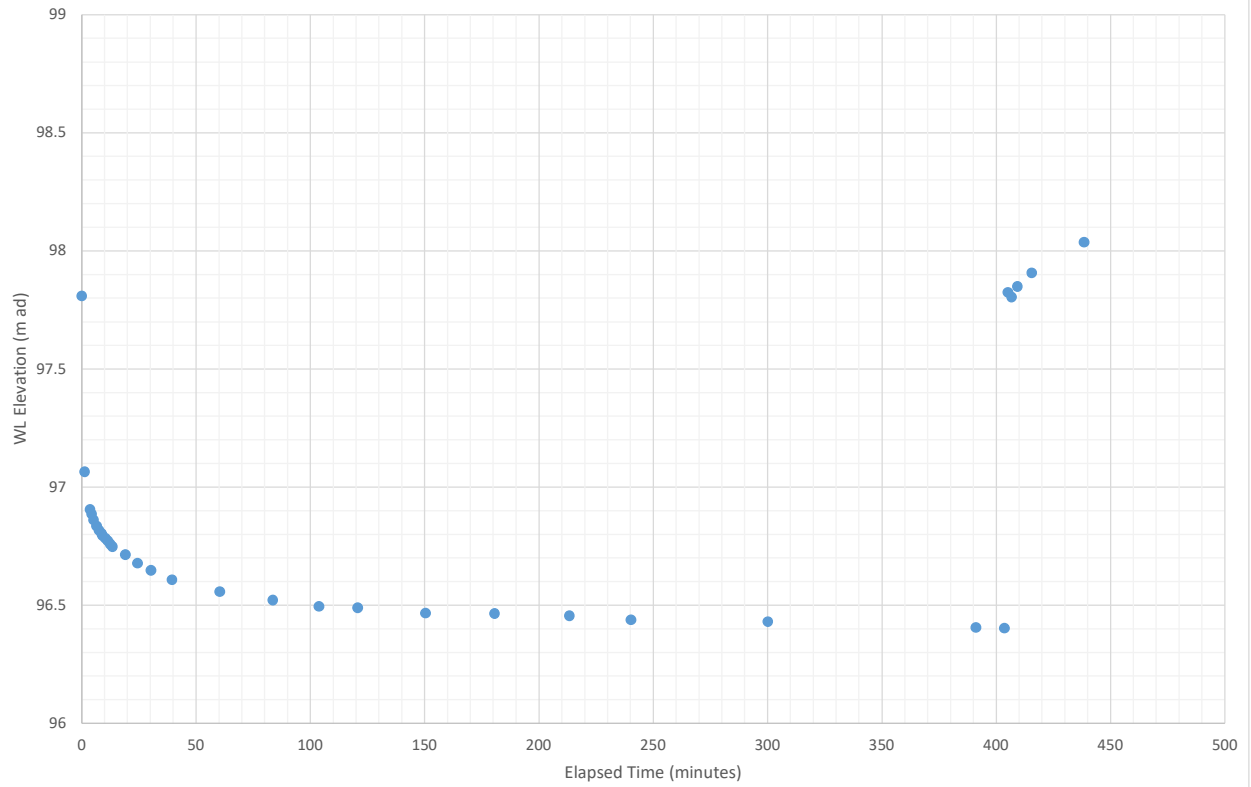


**Summary of Water Level Data
Pumping Test - TW4 - December 21, 2020**

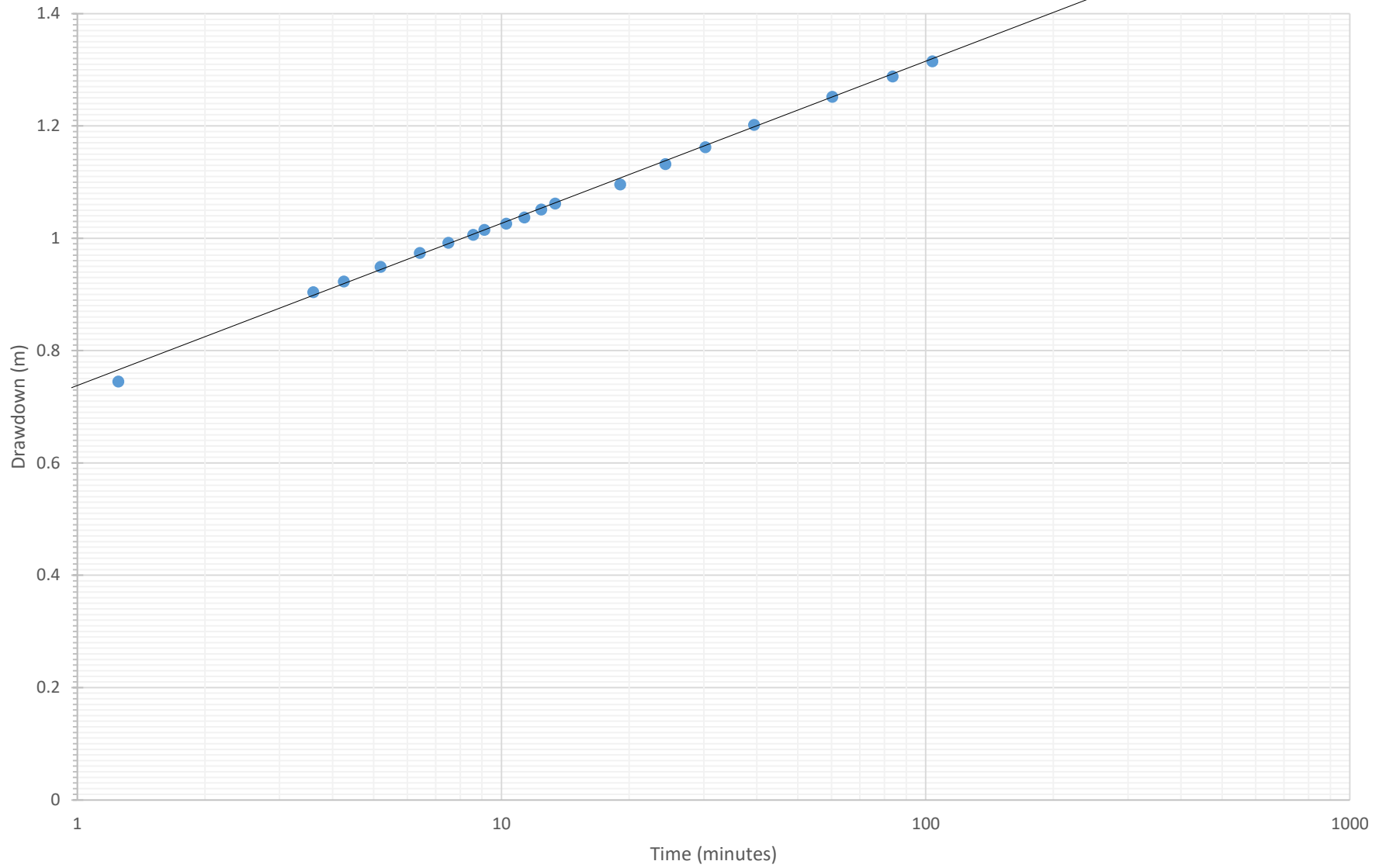
| | |
|--------------------------------|----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 2.19 m BTOC |
| Static Water Elevation | 97.81 m AD (Above Datum) |
| 95% Recovery | 2.2602 m BTOC |
| | 97.7398 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Turbidity (NTU) | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|----------|-----------------|----------------------|---------------------|--------------|---------------------|
| 0 | | | | 2.19 | 97.81 | 0 | |
| 1.25 | | | | 2.935 | 97.065 | 0.745 | |
| 3.6 | | | | 3.094 | 96.906 | 0.904 | |
| 4.25 | | | | 3.113 | 96.887 | 0.923 | |
| 5.19 | | | | 3.139 | 96.861 | 0.949 | |
| 6.42 | | | | 3.164 | 96.836 | 0.974 | |
| 7.5 | | | | 3.182 | 96.818 | 0.992 | |
| 8.58 | | | | 3.196 | 96.804 | 1.006 | |
| 9.12 | | | | 3.205 | 96.795 | 1.015 | |
| 10.27 | | | | 3.216 | 96.784 | 1.026 | |
| 11.33 | | | | 3.227 | 96.773 | 1.037 | |
| 12.42 | | | | 3.241 | 96.759 | 1.051 | |
| 13.38 | | | | 3.252 | 96.748 | 1.062 | |
| 19.05 | | | | 3.286 | 96.714 | 1.096 | |
| 24.35 | | | | 3.322 | 96.678 | 1.132 | |
| 30.27 | | | | 3.352 | 96.648 | 1.162 | |
| 39.42 | | | | 3.392 | 96.608 | 1.202 | |
| 60.3 | | | | 3.442 | 96.558 | 1.252 | |
| 83.6 | | | | 3.478 | 96.522 | 1.288 | |
| 103.75 | | | | 3.505 | 96.495 | 1.315 | |
| 120.67 | | | | 3.511 | 96.489 | 1.321 | |
| 150.35 | | | | 3.533 | 96.467 | 1.343 | |
| 180.5 | | | | 3.535 | 96.465 | 1.345 | |
| 213.28 | | | | 3.545 | 96.455 | 1.355 | |
| 240.17 | | | | 3.562 | 96.438 | 1.372 | |
| 300.12 | | | | 3.569 | 96.431 | 1.379 | |
| 391.12 | | | | 3.594 | 96.406 | 1.404 | |
| 403.5 | | | | 3.597 | 96.403 | 1.407 | pump off at 404 min |
| 405.08 | 1 | 405.08 | | 2.175 | 97.825 | -0.015 | |
| 406.67 | 2 | 203.335 | | 2.195 | 97.805 | 0.005 | |
| 409.25 | 5 | 81.85 | | 2.151 | 97.849 | -0.039 | |
| 415.5 | 11 | 37.77273 | | 2.093 | 97.907 | -0.097 | |
| 438.42 | 34 | 12.89471 | | 1.963 | 98.037 | -0.227 | |

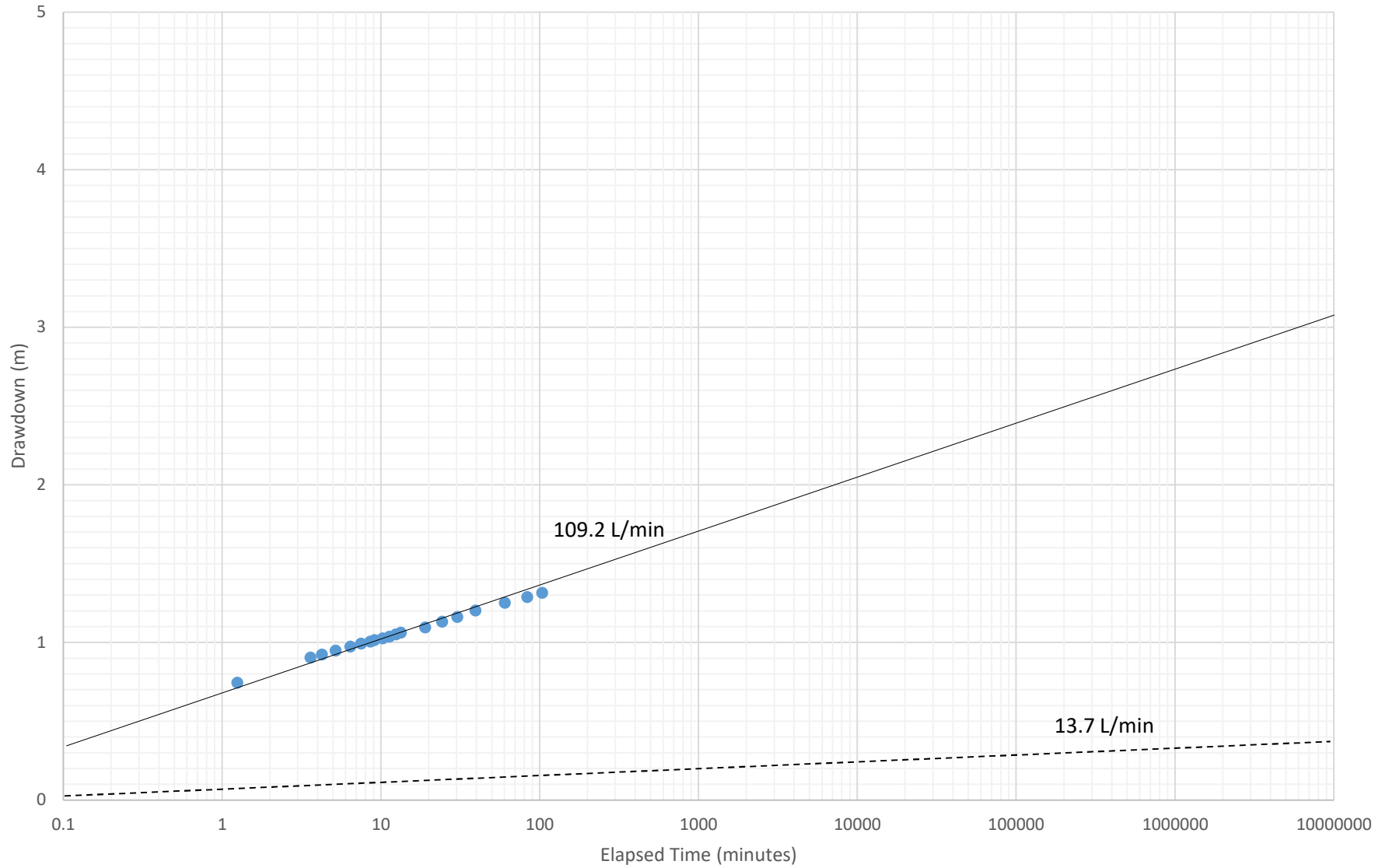
Drawdown vs Time
TW4 Pumping Test (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



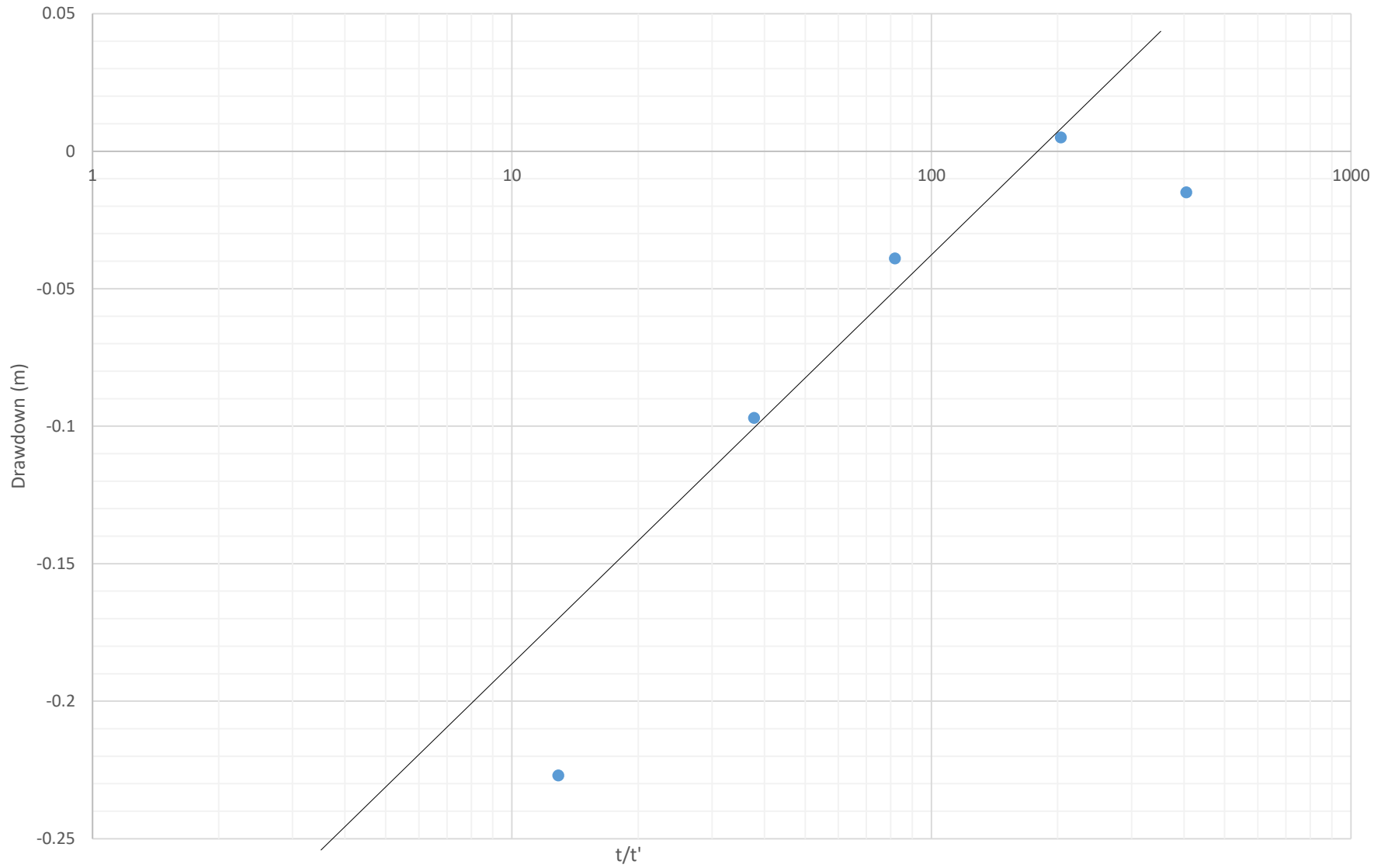
Drawdown vs Log Time
TW4 Pumping Test (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW4 Pumping Test (Long-Term), December 21, 2020
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW4 Pumping Test (Recovery), December 21, 2020
Gardiner Shore, Beckwith ON

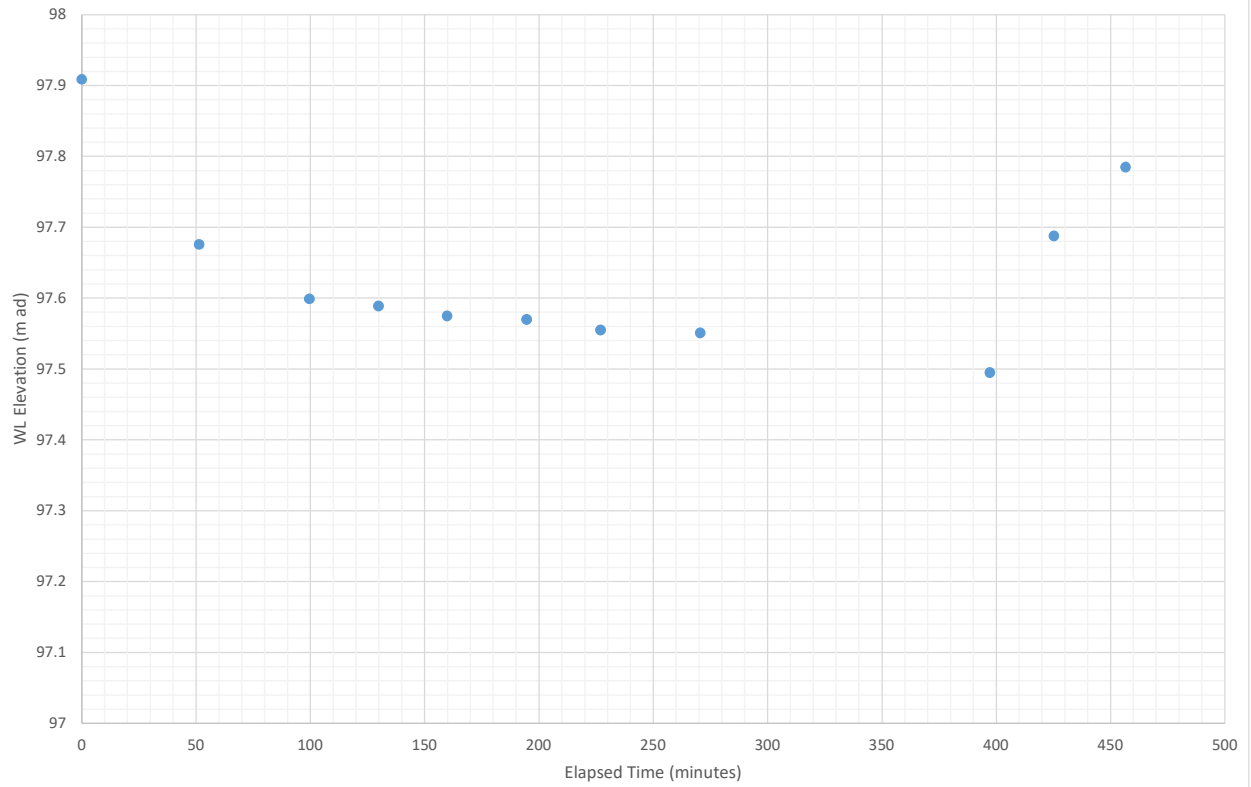


Summary of Water Level Data
Pumping Test - TW4, Observation TW5 - December 21, 2020

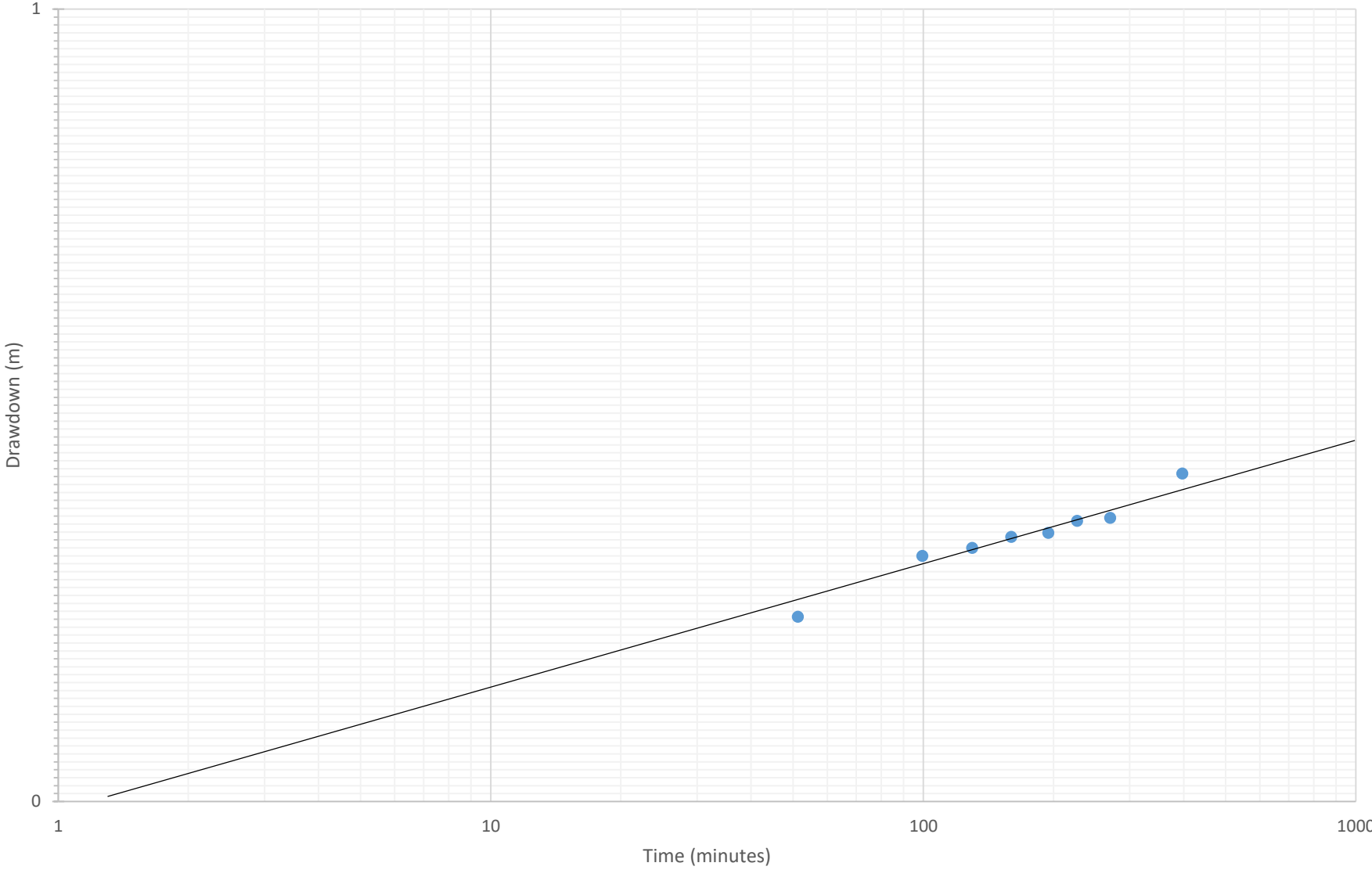
TOC Elevation (assumed) 100 m AD (Above Datum)
Static Water Level 2.091 m BTOC
Static Water Elevation 97.909 m AD (Above Datum)
95% Recovery 2.1117 m BTOC
 97.8883 m AD (Above Datum)

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|---------------------|
| 0 | | | 2.091 | 97.909 | 0 | |
| 51.28 | | | 2.324 | 97.676 | 0.233 | |
| 99.5 | | | 2.401 | 97.599 | 0.31 | |
| 129.75 | | | 2.411 | 97.589 | 0.32 | |
| 159.78 | | | 2.425 | 97.575 | 0.334 | |
| 194.58 | | | 2.43 | 97.57 | 0.339 | |
| 226.93 | | | 2.445 | 97.555 | 0.354 | |
| 270.5 | | | 2.449 | 97.551 | 0.358 | |
| 397.17 | | | 2.505 | 97.495 | 0.414 | Pump off at 404 min |
| 425.17 | | | 2.312 | 97.688 | 0.221 | |
| 456.5 | | | 2.215 | 97.785 | 0.124 | |

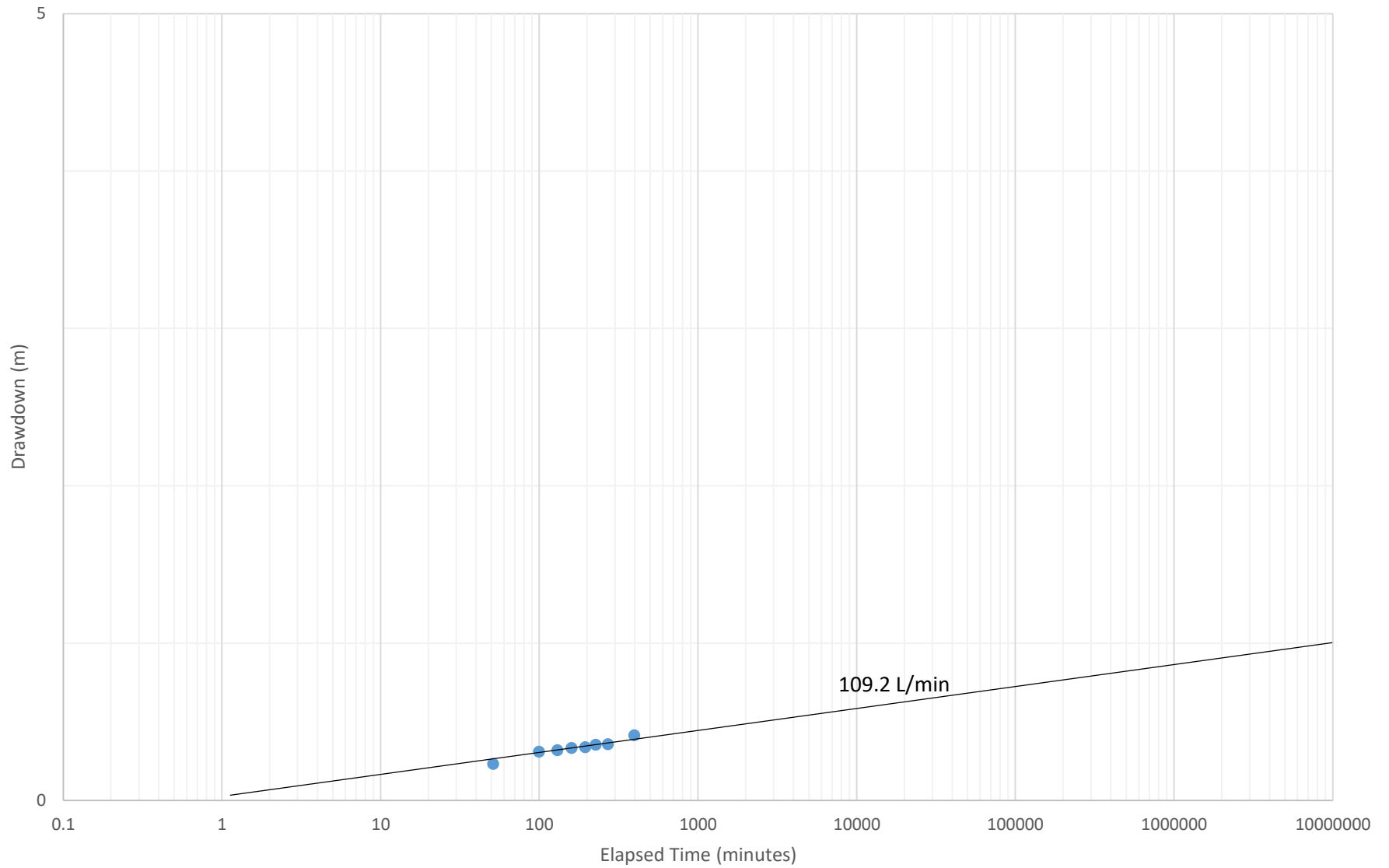
Drawdown vs Time
TW4 Pumping Test, Observation TW5 (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW4 Pumping Test, Observation TW5 (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW4 Pumping Test, Observation TW5 (Long-Term), December 21, 2020
Gardiner Shore, Beckwith ON

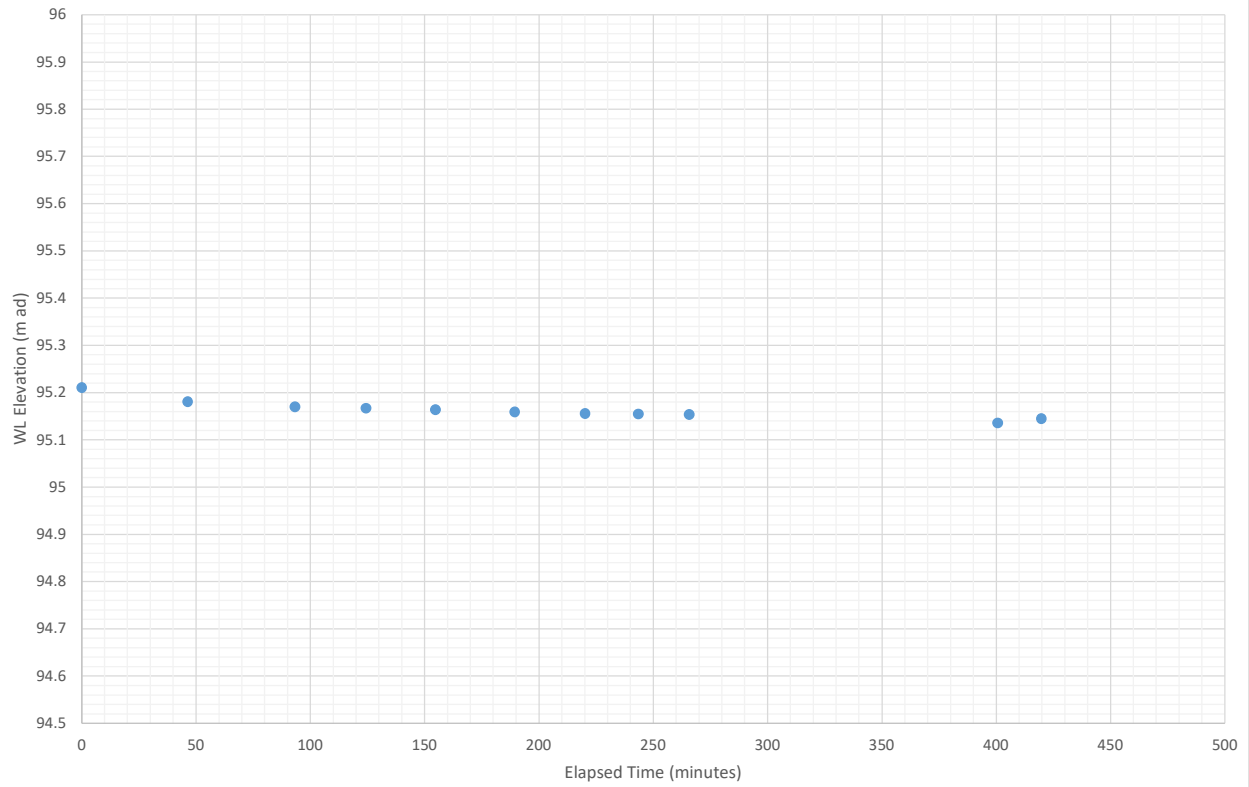


Summary of Water Level Data
Pumping Test - TW4, Observation TW6 - December 21, 2020

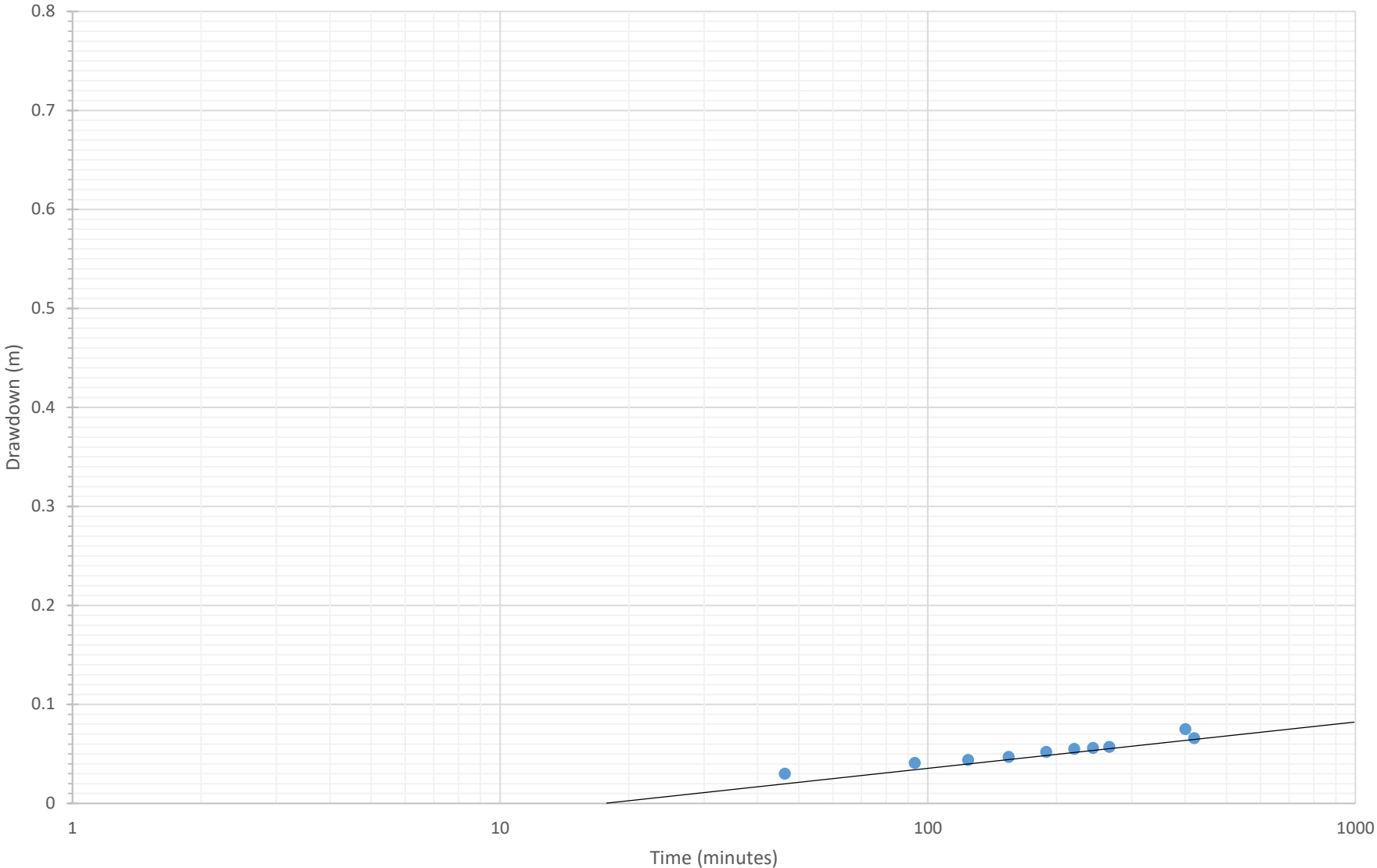
TOC Elevation (assumed) 100 m AD (Above Datum)
Static Water Level 4.789 m BTOC
Static Water Elevation 95.211 m AD (Above Datum)
95% Recovery 4.79275 m BTOC
 95.20725 m AD (Above Datum)

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|----------|----------------------|---------------------|--------------|-------------------------|
| 0 | | | 4.789 | 95.211 | 0 | |
| 46.33 | | | 4.819 | 95.181 | 0.03 | |
| 93.3 | | | 4.83 | 95.17 | 0.041 | |
| 124.27 | | | 4.833 | 95.167 | 0.044 | |
| 154.7 | | | 4.836 | 95.164 | 0.047 | |
| 189.33 | | | 4.841 | 95.159 | 0.052 | |
| 220.17 | | | 4.844 | 95.156 | 0.055 | |
| 243.43 | | | 4.845 | 95.155 | 0.056 | |
| 265.67 | | | 4.846 | 95.154 | 0.057 | |
| 400.58 | | | 4.864 | 95.136 | 0.075 | Pump off at 404 minutes |
| 419.67 | 15 | 27.978 | 4.855 | 95.145 | 0.066 | |
| 459 | 55 | 8.345455 | 4.849 | 95.151 | 0.06 | |
| 580.28 | 176 | 3.297045 | 4.85 | 95.15 | 0.061 | |
| 1390 | 986 | 1.409736 | 4.873 | 95.127 | 0.084 | |

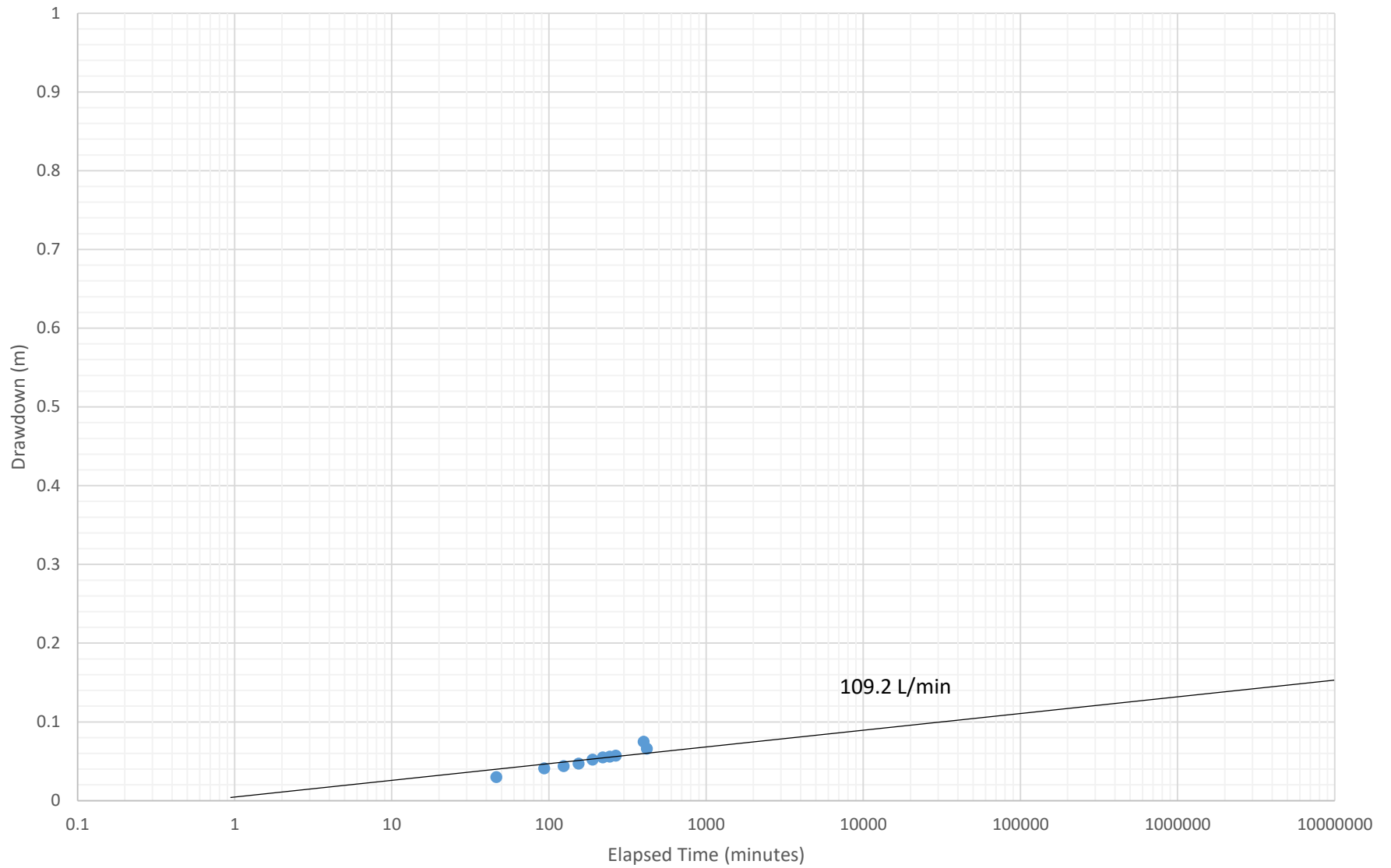
Drawdown vs Time
TW4 Pumping Test, Observation TW6 (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW4 Pumping Test, Observation TW6 (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW4 Pumping Test, Observation TW6 (Long-Term), December 21, 2020
Gardiner Shore, Beckwith ON

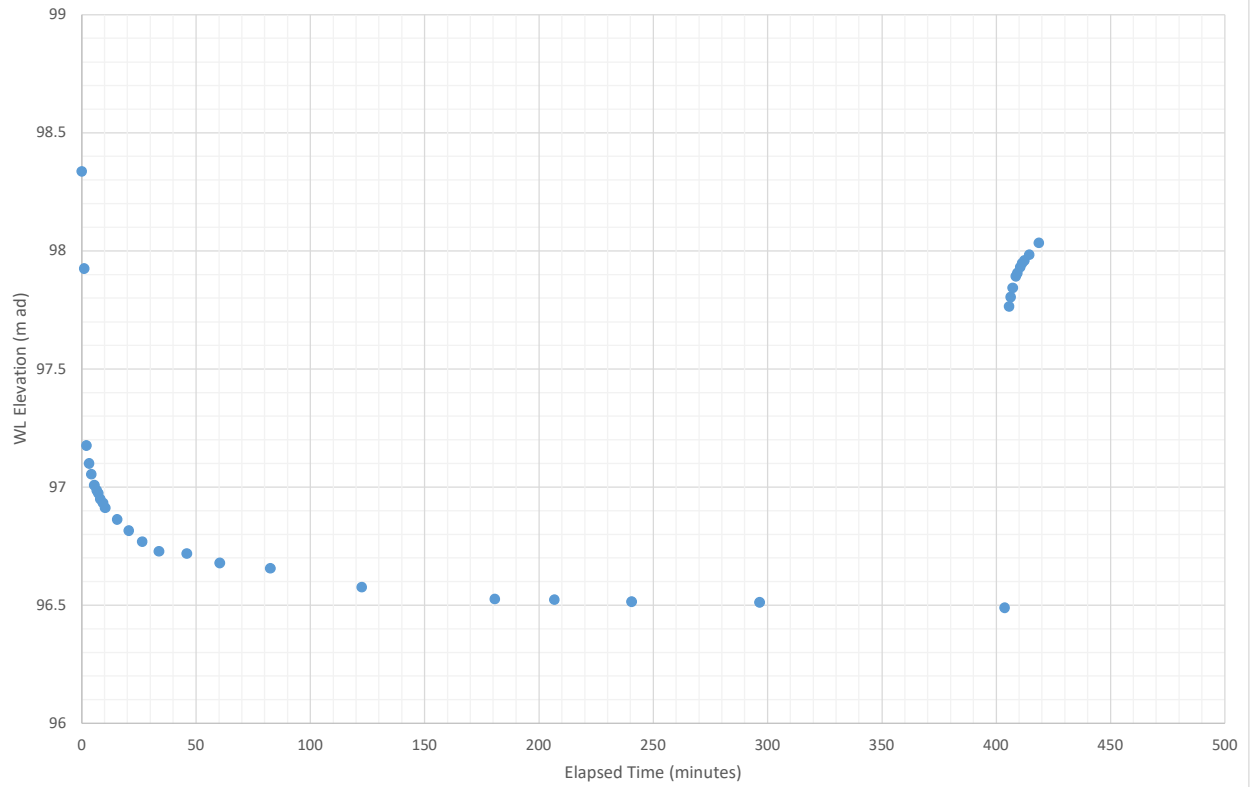


**Summary of Water Level Data
Pumping Test - TW5 - January 6, 2021**

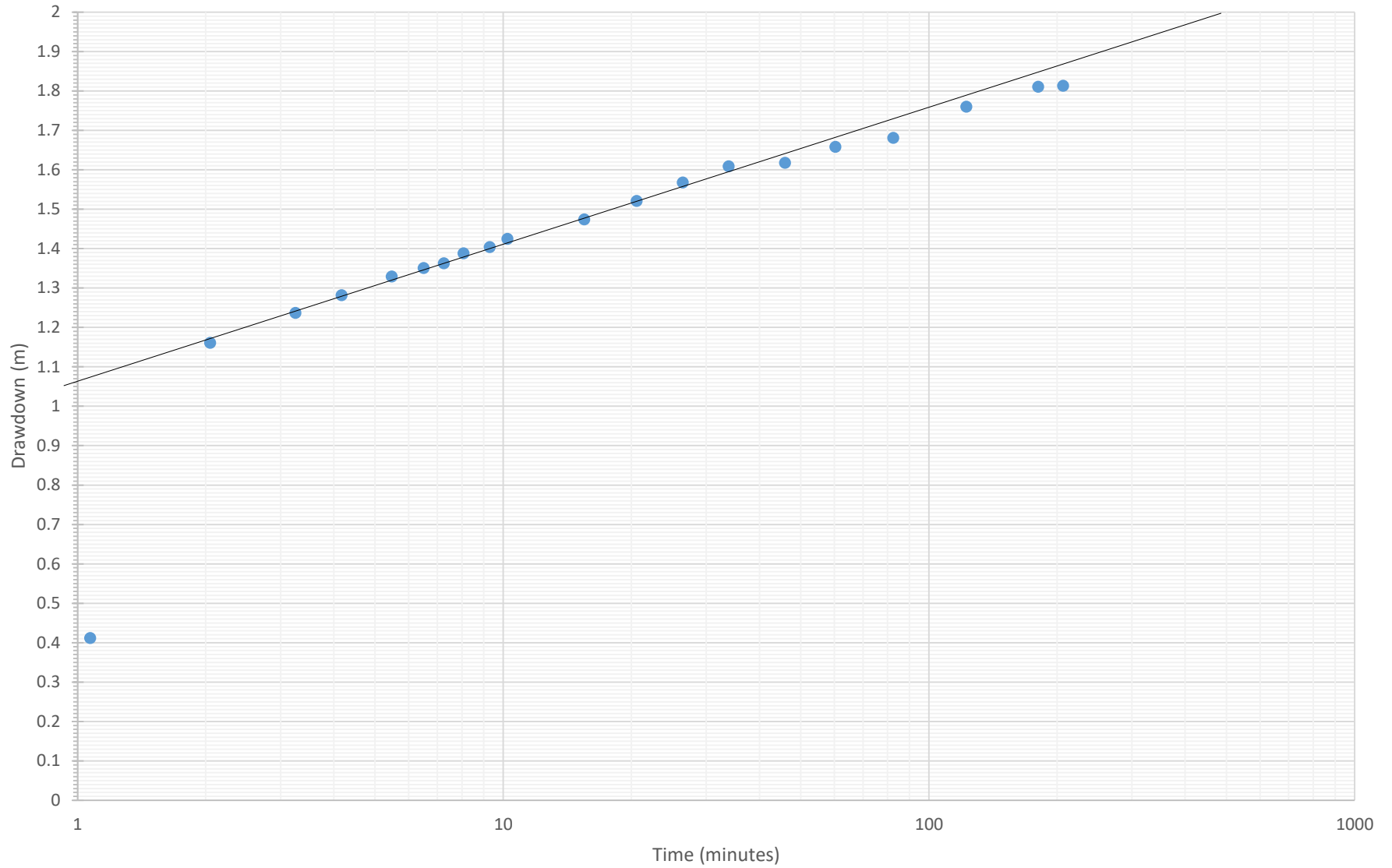
| | |
|--------------------------------|----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 1.663 m BTOC |
| Static Water Elevation | 98.337 m AD (Above Datum) |
| 95% Recovery | 1.7554 m BTOC |
| | 98.2446 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Turbidity (NTU) | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|----------|-----------------|----------------------|---------------------|--------------|-------|
| 0 | | | | 1.663 | 98.337 | 0 | |
| 1.07 | | | | 2.075 | 97.925 | 0.412 | |
| 2.05 | | | | 2.824 | 97.176 | 1.161 | |
| 3.25 | | | | 2.9 | 97.1 | 1.237 | |
| 4.17 | | | | 2.945 | 97.055 | 1.282 | |
| 5.47 | | | | 2.992 | 97.008 | 1.329 | |
| 6.5 | | | | 3.014 | 96.986 | 1.351 | |
| 7.25 | | | | 3.026 | 96.974 | 1.363 | |
| 8.07 | | | | 3.051 | 96.949 | 1.388 | |
| 9.3 | | | | 3.067 | 96.933 | 1.404 | |
| 10.23 | | | | 3.088 | 96.912 | 1.425 | |
| 15.5 | | | | 3.137 | 96.863 | 1.474 | |
| 20.58 | | | | 3.184 | 96.816 | 1.521 | |
| 26.42 | | | | 3.231 | 96.769 | 1.568 | |
| 33.83 | | | | 3.272 | 96.728 | 1.609 | |
| 45.92 | | | | 3.281 | 96.719 | 1.618 | |
| 60.33 | | | | 3.321 | 96.679 | 1.658 | |
| 82.47 | | | | 3.344 | 96.656 | 1.681 | |
| 122.43 | | | | 3.423 | 96.577 | 1.76 | |
| 180.6 | | | | 3.474 | 96.526 | 1.811 | |
| 206.75 | | | | 3.476 | 96.524 | 1.813 | |
| 240.55 | | | | 3.485 | 96.515 | 1.822 | |
| 296.5 | | | | 3.488 | 96.512 | 1.825 | |
| 403.67 | | | | 3.511 | 96.489 | 1.848 | |
| 405.58 | 1 | 405.58 | | 2.235 | 97.765 | 0.572 | |
| 406.33 | 2 | 203.165 | | 2.195 | 97.805 | 0.532 | |
| 407.17 | 3 | 135.7233 | | 2.156 | 97.844 | 0.493 | |
| 408.52 | 4 | 102.13 | | 2.107 | 97.893 | 0.444 | |
| 409.22 | 5 | 81.844 | | 2.094 | 97.906 | 0.431 | |
| 410.5 | 6 | 68.41667 | | 2.068 | 97.932 | 0.405 | |
| 411.33 | 7 | 58.76143 | | 2.052 | 97.948 | 0.389 | |
| 412.27 | 8 | 51.53375 | | 2.041 | 97.959 | 0.378 | |
| 414.4 | 10 | 41.44 | | 2.016 | 97.984 | 0.353 | |
| 418.67 | 14 | 29.905 | | 1.966 | 98.034 | 0.303 | |
| 429.25 | 25 | 17.17 | | 1.895 | 98.105 | 0.232 | |
| 436.33 | 32 | 13.63531 | | 1.855 | 98.145 | 0.192 | |
| 474.5 | 70 | 6.778571 | | 1.771 | 98.229 | 0.108 | |
| 482.17 | 78 | 6.181667 | | 1.764 | 98.236 | 0.101 | |
| 499.83 | 95 | 5.261368 | | 1.743 | 98.257 | 0.08 | |

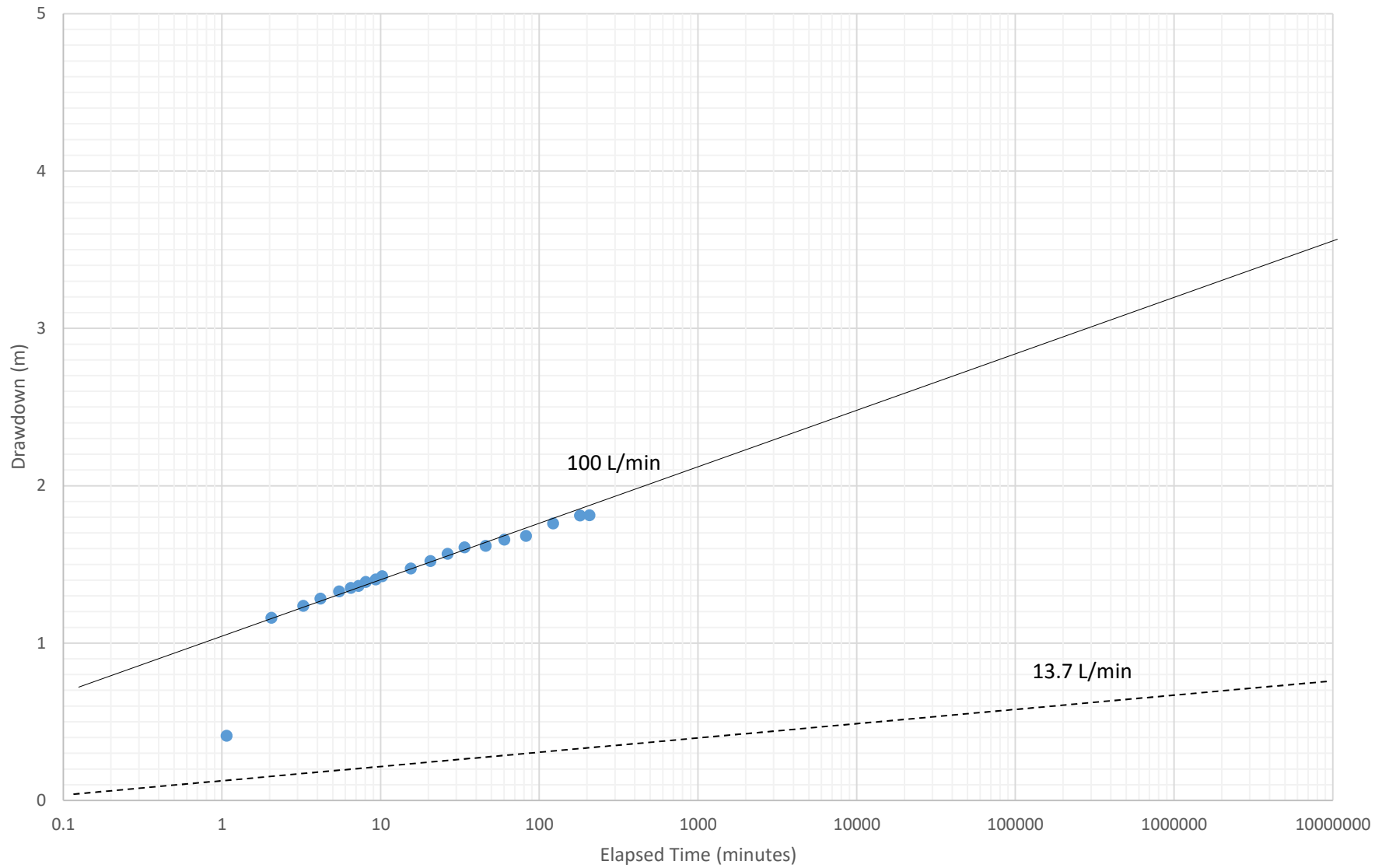
Drawdown vs Time
TW5 Pumping Test (Drawdown), January 6, 2021
Gardiner Shore, Beckwith ON



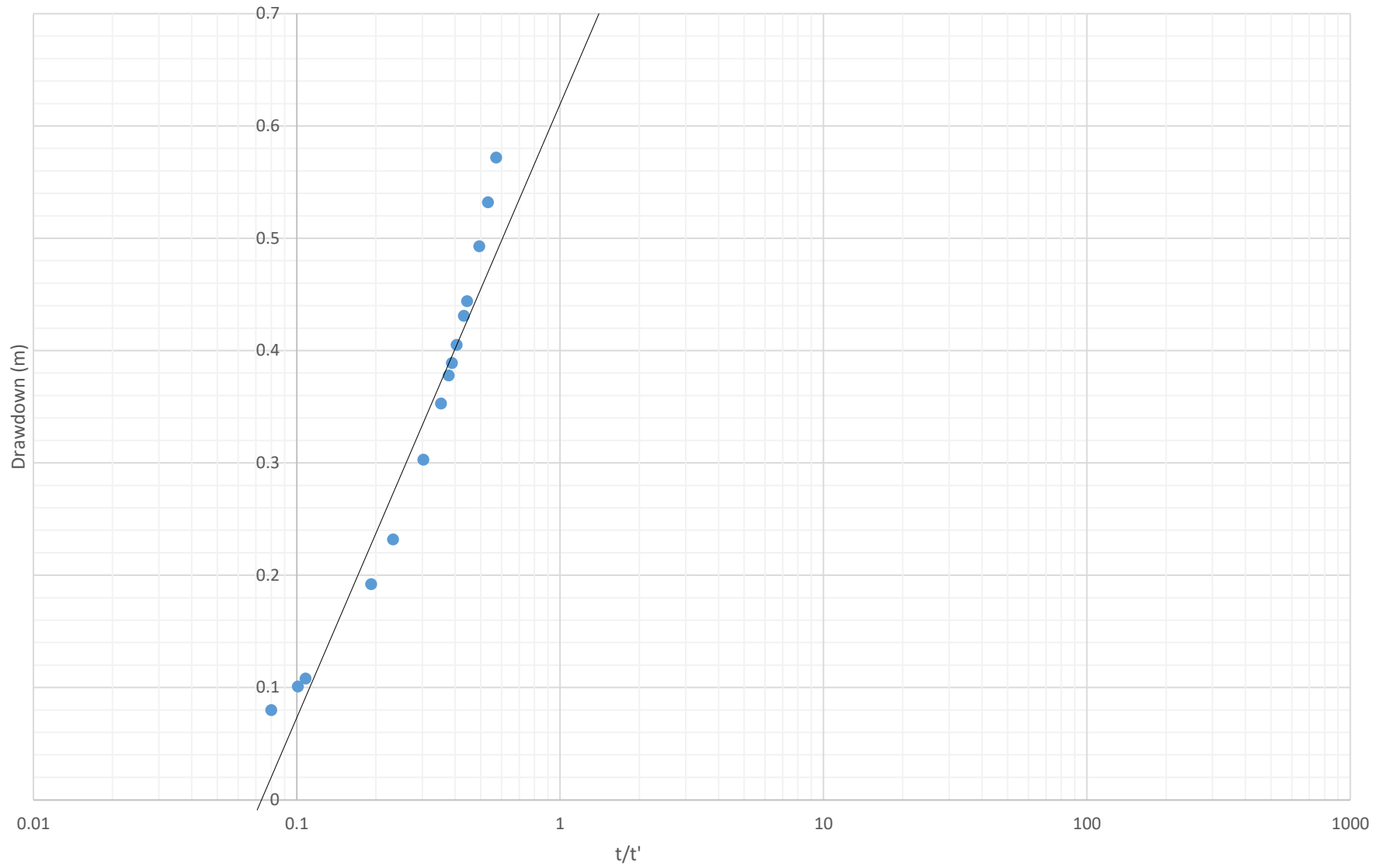
Drawdown vs Log Time
TW5 Pumping Test (Drawdown), January 6, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW5 Pumping Test (Long-Term), January 6, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW5 Pumping Test (Recovery), January 6, 2021
Gardiner Shore, Beckwith ON

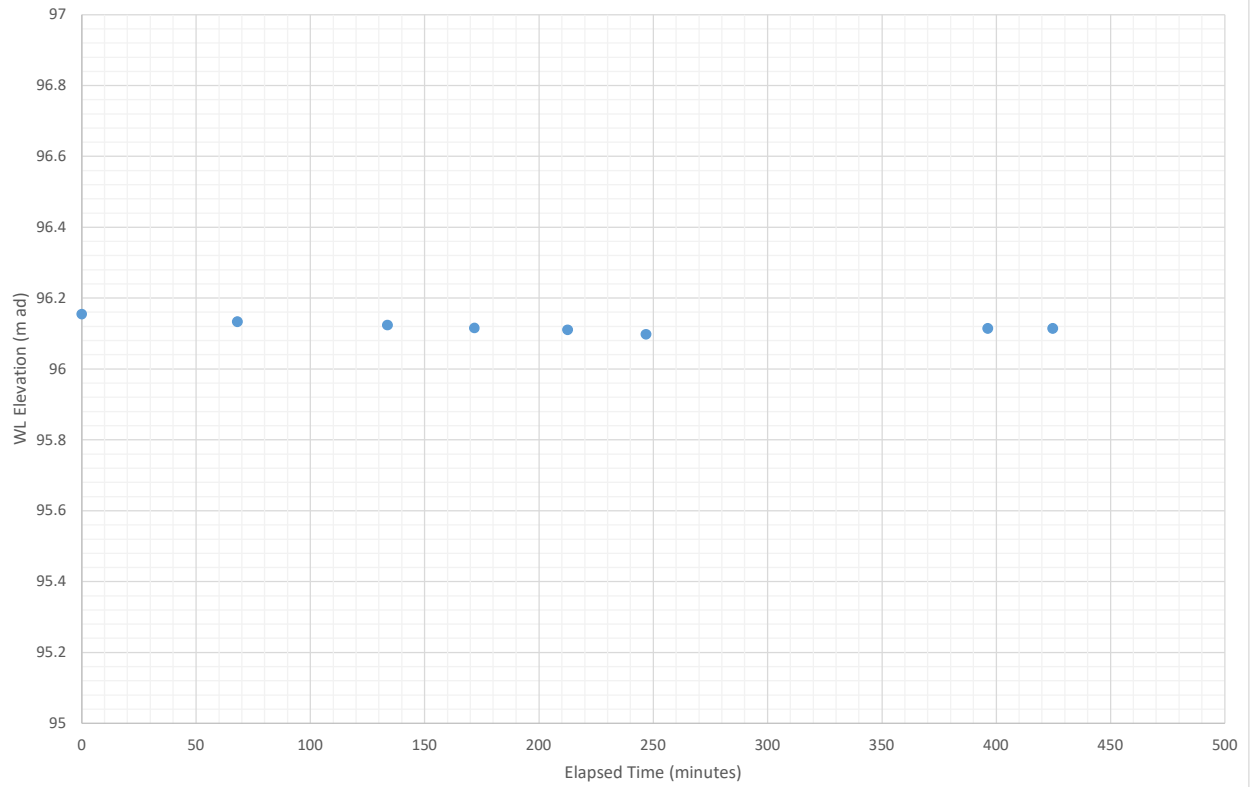


Summary of Water Level Data
Pumping Test - TW5, Observation TW2 - January 6, 2021

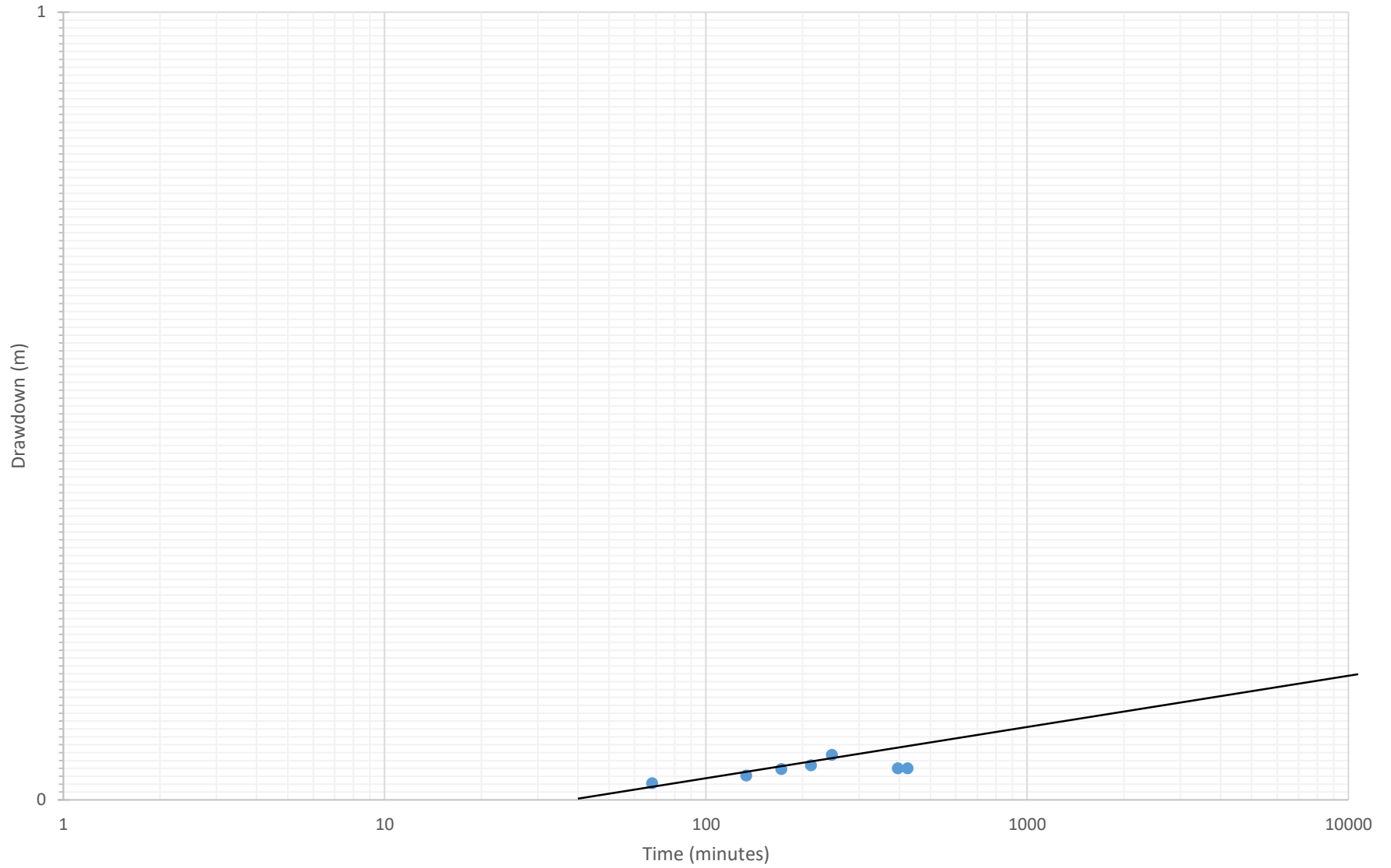
| | |
|--------------------------------|-----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 3.845 m BTOC |
| Static Water Elevation | 96.155 m AD (Above Datum) |
| 95% Recovery | 3.84785 m BTOC |
| | 96.15215 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|-------|
| 0 | | | 3.845 | 96.155 | 0 | |
| 68.08 | | | 3.866 | 96.134 | 0.021 | |
| 133.67 | | | 3.876 | 96.124 | 0.031 | |
| 171.75 | | | 3.884 | 96.116 | 0.039 | |
| 212.5 | | | 3.889 | 96.111 | 0.044 | |
| 246.75 | | | 3.902 | 96.098 | 0.057 | |
| 396.33 | | | 3.885 | 96.115 | 0.04 | |
| 424.75 | | | 3.885 | 96.115 | 0.04 | |
| 442.28 | | | 3.864 | 96.136 | 0.019 | |
| 504.67 | | | 3.835 | 96.165 | -0.01 | |

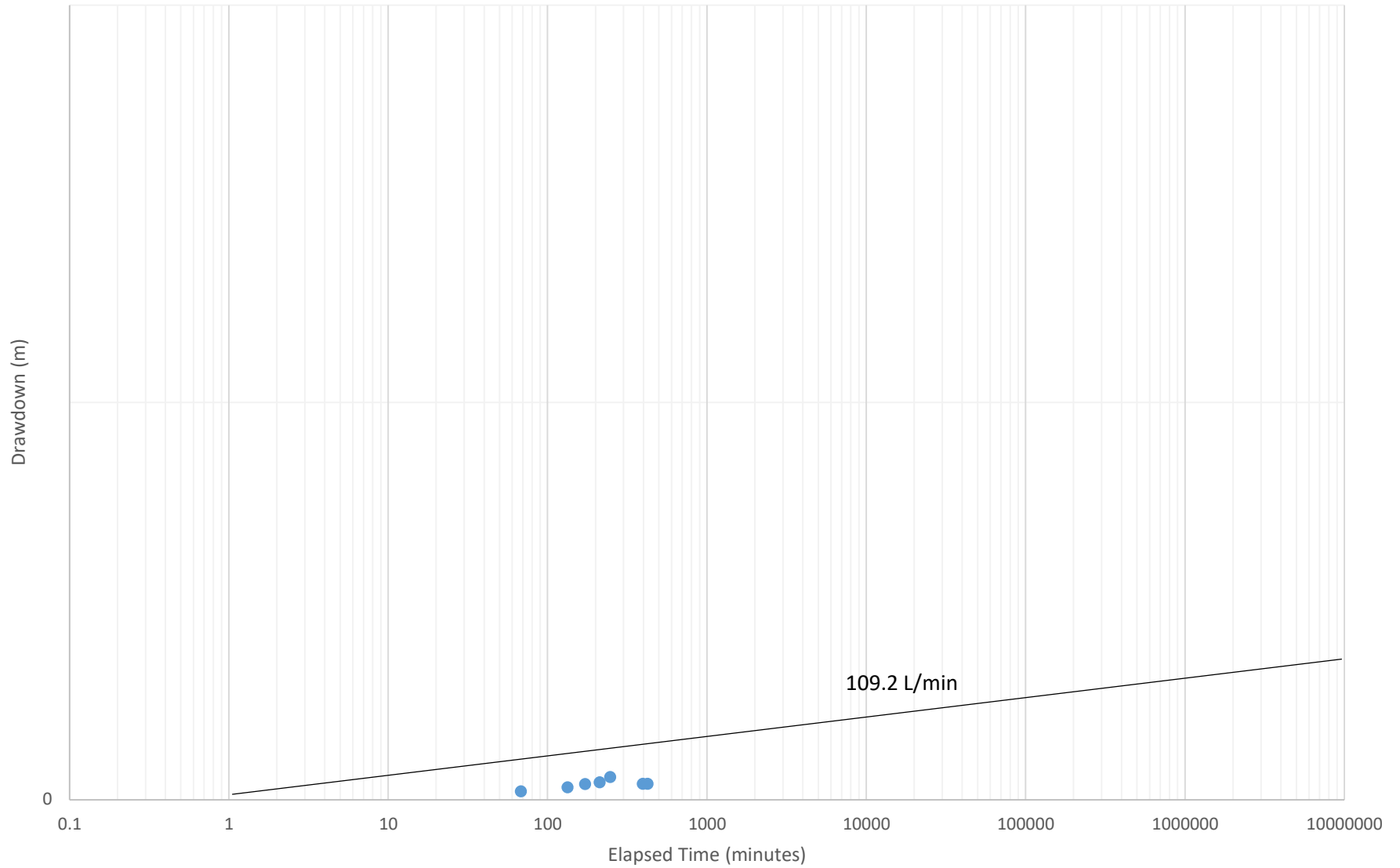
Drawdown vs Time
TW5 Pumping Test, Observation TW2 (Drawdown), January 6, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW5 Pumping Test, Observation TW2 (Drawdown), January 6, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW5 Pumping Test, Observation TW2 (Long-Term), January 6, 2021
Gardiner Shore, Beckwith ON

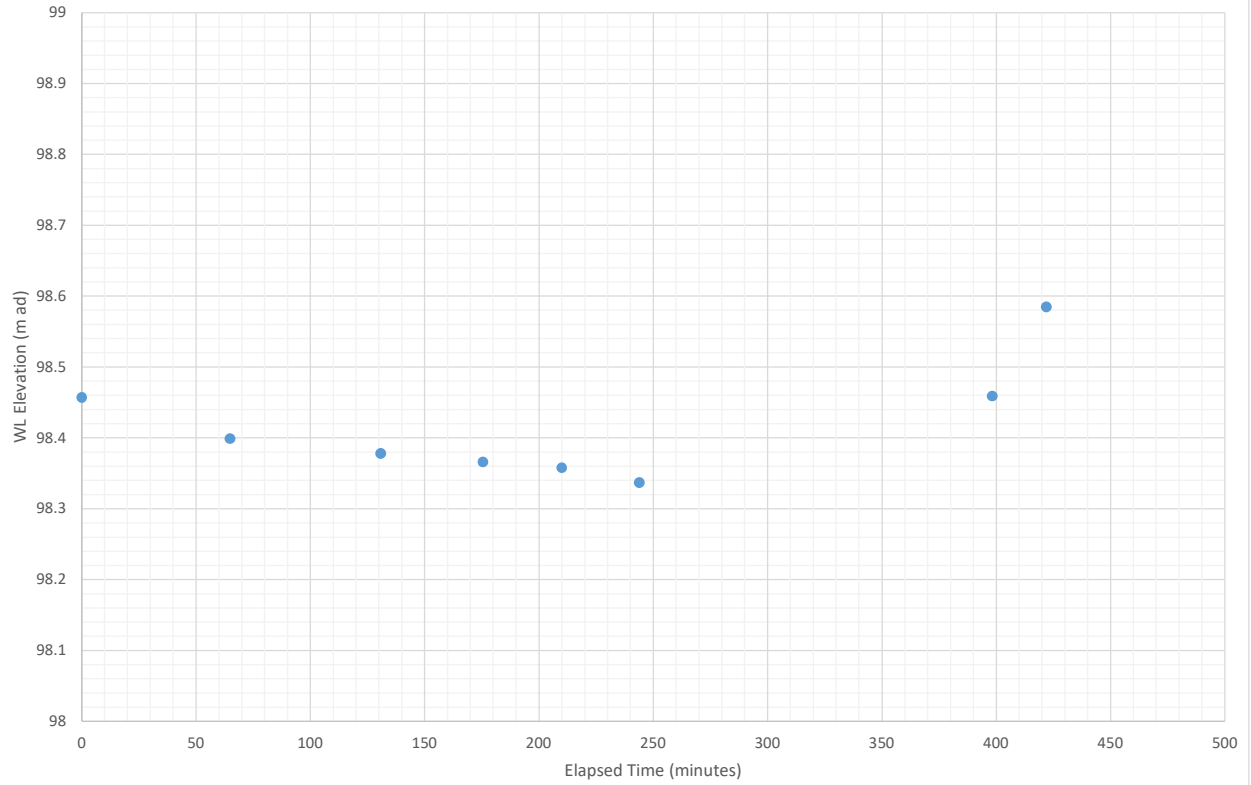


Summary of Water Level Data
Pumping Test - TW5, Observation TW4 - January 6, 2021

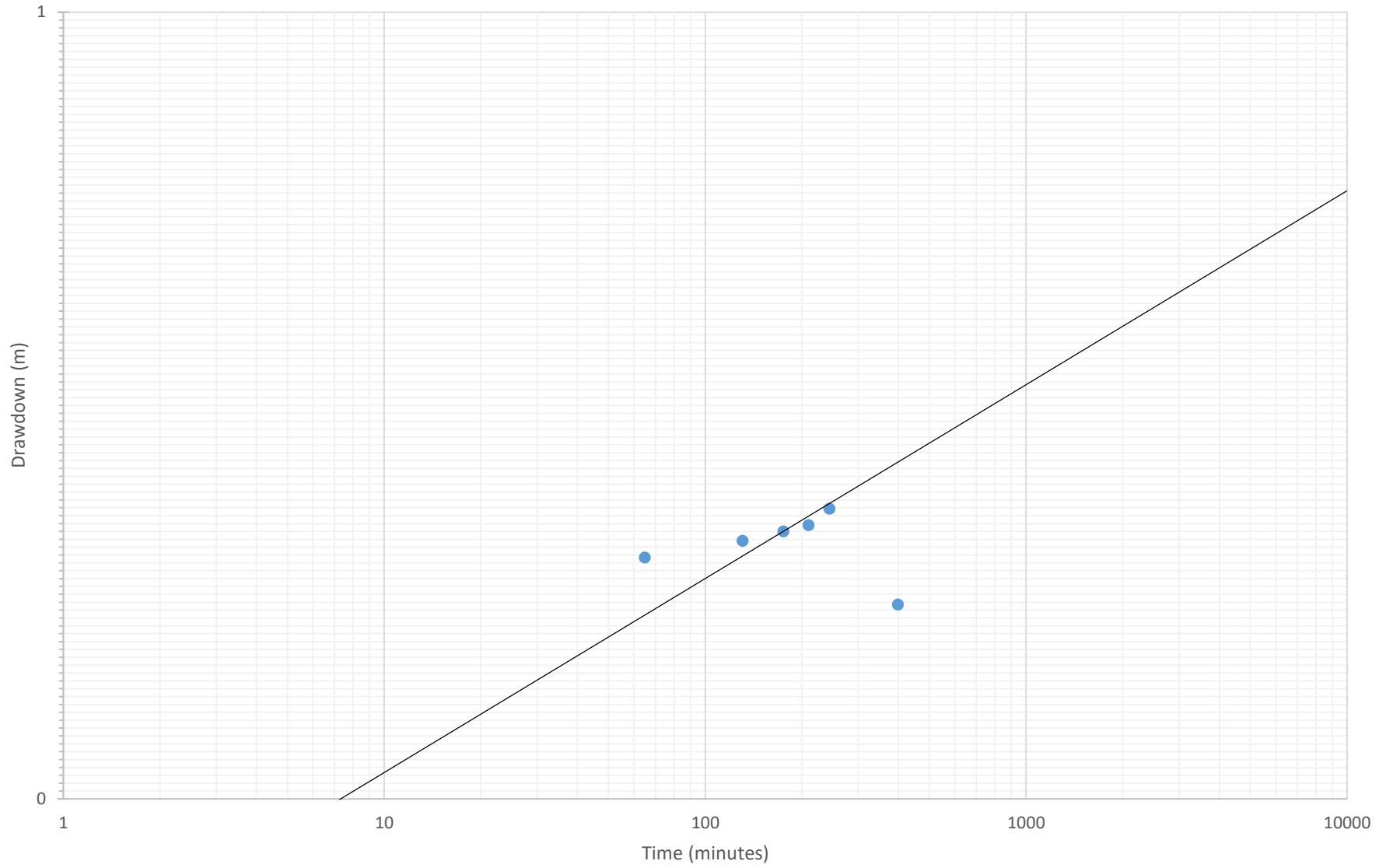
| | |
|--------------------------------|-----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 1.294 m BTOC |
| Static Water Elevation | 98.706 m AD (Above Datum) |
| 95% Recovery | 1.31245 m BTOC |
| | 98.68755 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|-------|
| 0 | | | 1.543 | 98.457 | 0.249 | |
| 64.83 | | | 1.601 | 98.399 | 0.307 | |
| 130.75 | | | 1.622 | 98.378 | 0.328 | |
| 175.42 | | | 1.634 | 98.366 | 0.34 | |
| 209.9 | | | 1.642 | 98.358 | 0.348 | |
| 243.83 | | | 1.663 | 98.337 | 0.369 | |
| 398.28 | | | 1.541 | 98.459 | 0.247 | |
| 421.83 | | | 1.415 | 98.585 | 0.121 | |

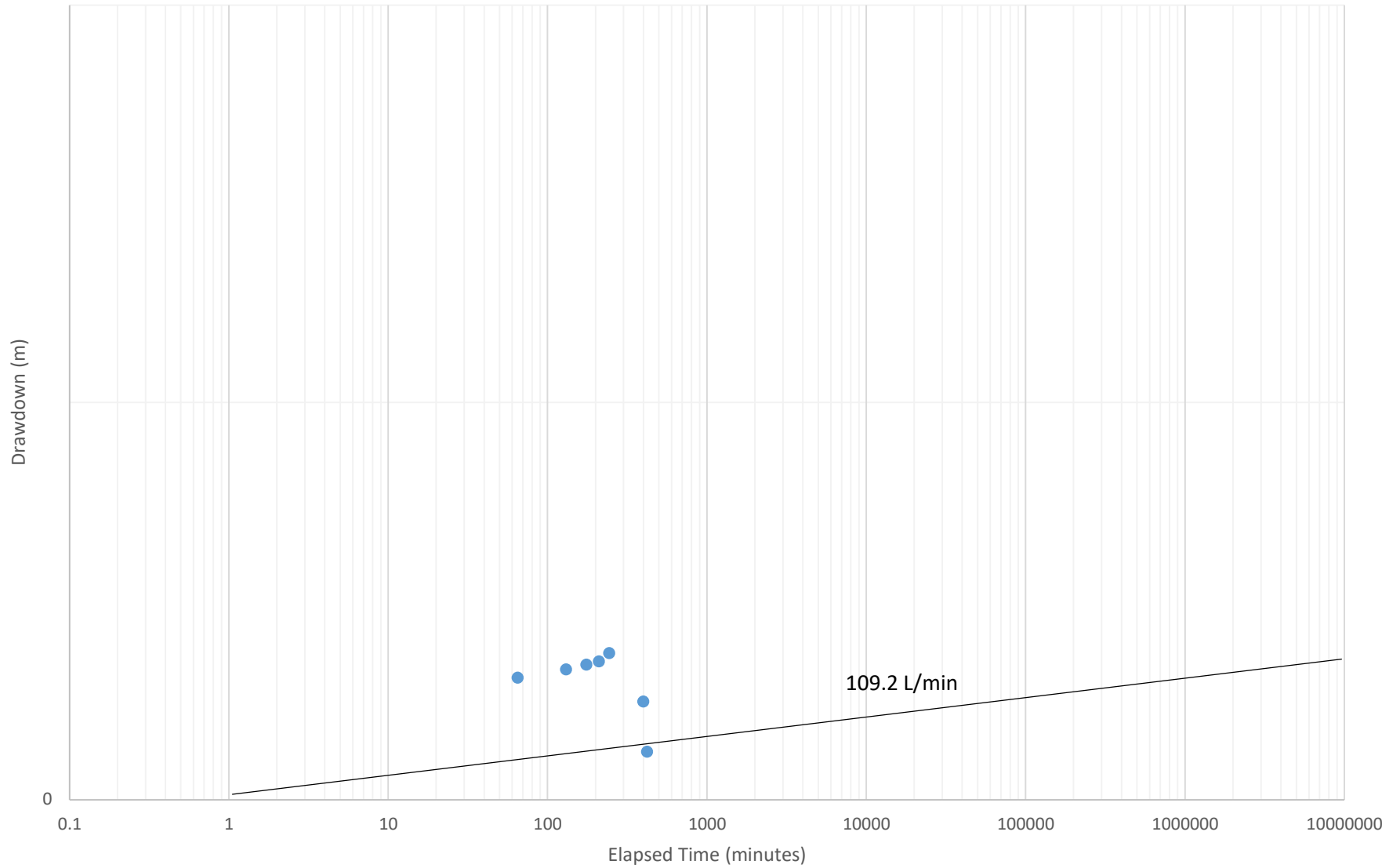
Drawdown vs Time
TW5 Pumping Test, Observation TW4 (Drawdown), January 6, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW5 Pumping Test, Observation TW4 (Drawdown), January 6, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW5 Pumping Test, Observation TW4 (Long-Term), January 6, 2021
Gardiner Shore, Beckwith ON

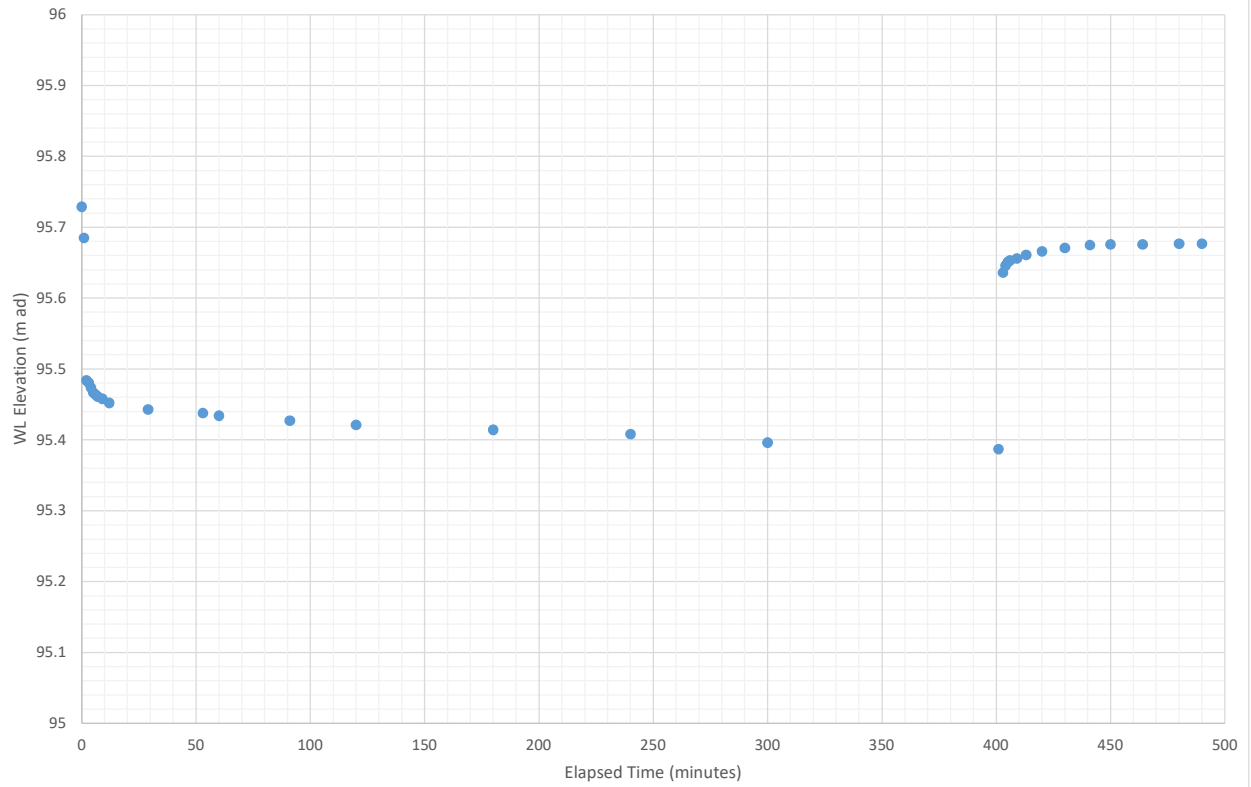


**Summary of Water Level Data
Pumping Test - TW6 - January 7, 2021**

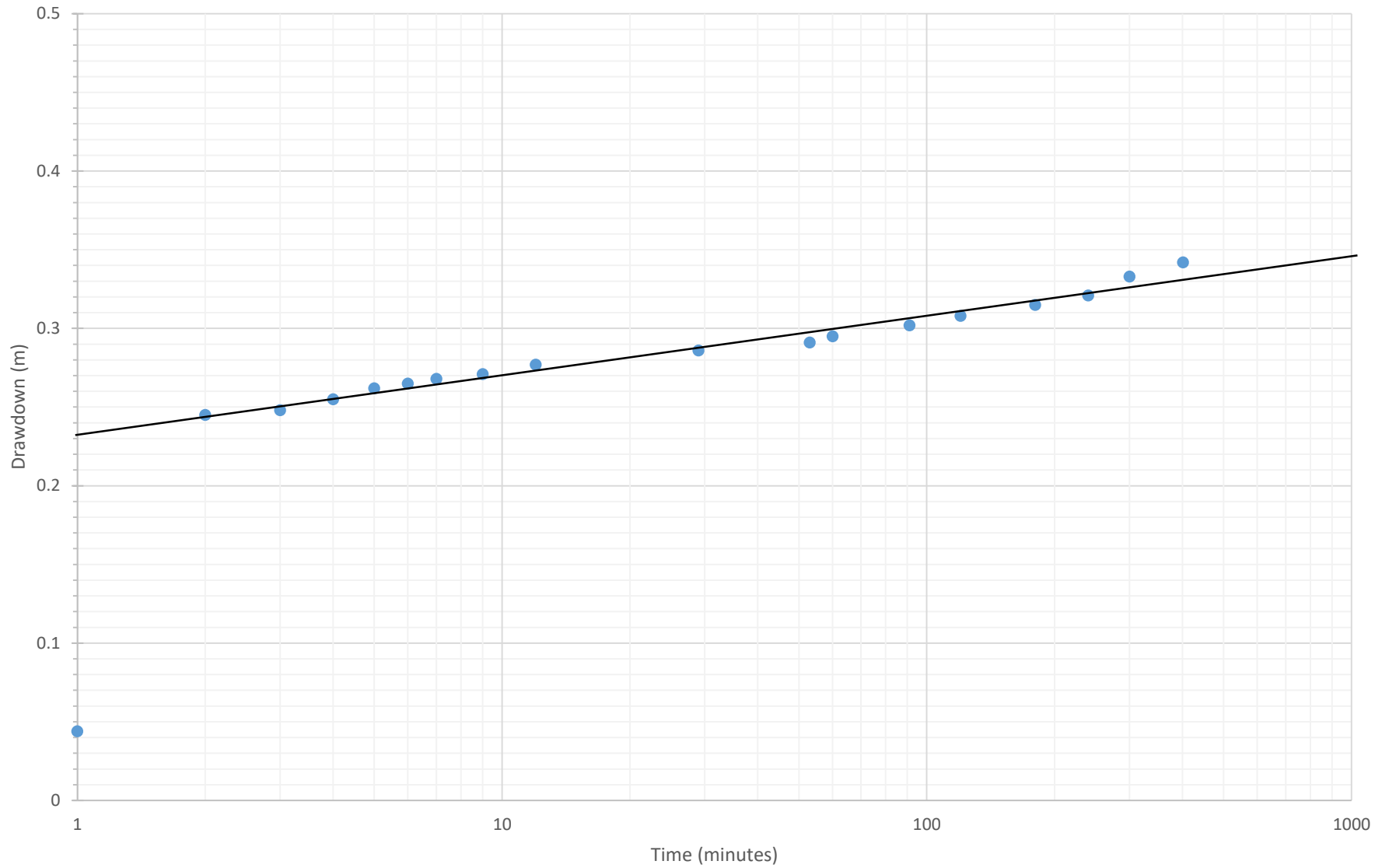
| | |
|--------------------------------|----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 4.271 m BTOC |
| Static Water Elevation | 95.729 m AD (Above Datum) |
| 95% Recovery | 4.2881 m BTOC |
| | 95.7119 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Turbidity (NTU) | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|----------|-----------------|----------------------|---------------------|--------------|--------------------|
| 0 | | | | 4.271 | 95.729 | 0 | |
| 1 | | | | 4.315 | 95.685 | 0.044 | |
| 2 | | | | 4.516 | 95.484 | 0.245 | |
| 3 | | | | 4.519 | 95.481 | 0.248 | |
| 4 | | | | 4.526 | 95.474 | 0.255 | |
| 5 | | | | 4.533 | 95.467 | 0.262 | |
| 6 | | | | 4.536 | 95.464 | 0.265 | |
| 7 | | | | 4.539 | 95.461 | 0.268 | |
| 9 | | | | 4.542 | 95.458 | 0.271 | |
| 12 | | | | 4.548 | 95.452 | 0.277 | |
| 29 | | | | 4.557 | 95.443 | 0.286 | |
| 53 | | | | 4.562 | 95.438 | 0.291 | |
| 60 | | | | 4.566 | 95.434 | 0.295 | |
| 91 | | | | 4.573 | 95.427 | 0.302 | |
| 120 | | | | 4.579 | 95.421 | 0.308 | |
| 180 | | | | 4.586 | 95.414 | 0.315 | |
| 240 | | | | 4.592 | 95.408 | 0.321 | |
| 300 | | | | 4.604 | 95.396 | 0.333 | |
| 401 | | | | 4.613 | 95.387 | 0.342 | |
| 403 | | | | 4.364 | 95.636 | 0.093 | |
| 404 | 1 | 404 | | 4.354 | 95.646 | 0.083 | Pump off @ 403 min |
| 405 | 2 | 202.5 | | 4.349 | 95.651 | 0.078 | |
| 406 | 3 | 135.3333 | | 4.347 | 95.653 | 0.076 | |
| 409 | 6 | 68.16667 | | 4.344 | 95.656 | 0.073 | |
| 413 | 10 | 41.3 | | 4.339 | 95.661 | 0.068 | |
| 420 | 17 | 24.70588 | | 4.334 | 95.666 | 0.063 | |
| 430 | 27 | 15.92593 | | 4.329 | 95.671 | 0.058 | |
| 441 | 38 | 11.60526 | | 4.325 | 95.675 | 0.054 | |
| 450 | 47 | 9.574468 | | 4.324 | 95.676 | 0.053 | |
| 464 | 61 | 7.606557 | | 4.324 | 95.676 | 0.053 | |
| 480 | 77 | 6.233766 | | 4.323 | 95.677 | 0.052 | |
| 490 | 87 | 5.632184 | | 4.323 | 95.677 | 0.052 | |
| 624 | 221 | 2.823529 | | 4.328 | 95.672 | 0.057 | |
| 1591 | 1188 | 1.339226 | | 4.325 | 95.675 | 0.054 | |

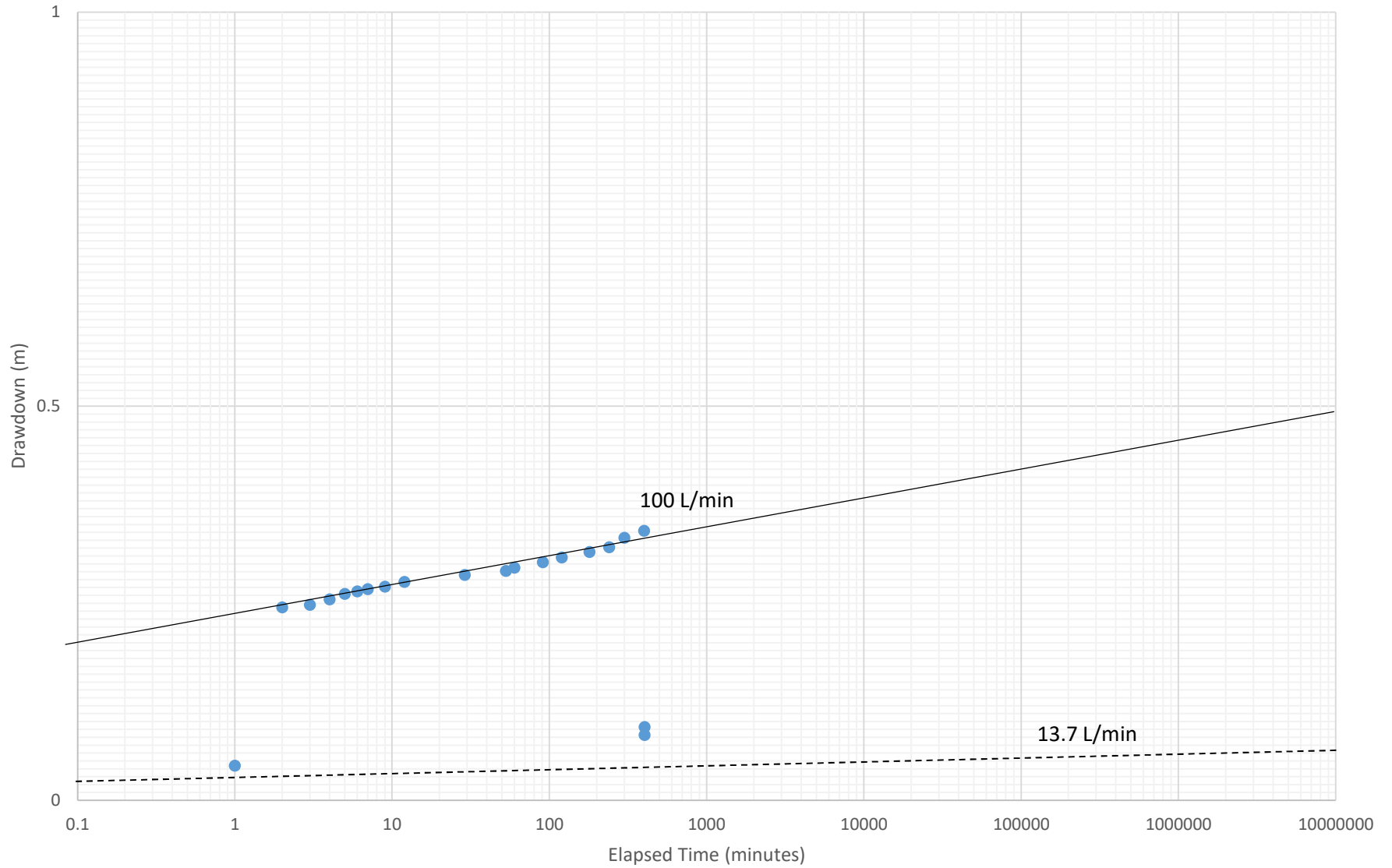
Drawdown vs Time
TW6 Pumping Test (Drawdown), January 7, 2021
Gardiner Shore, Beckwith ON



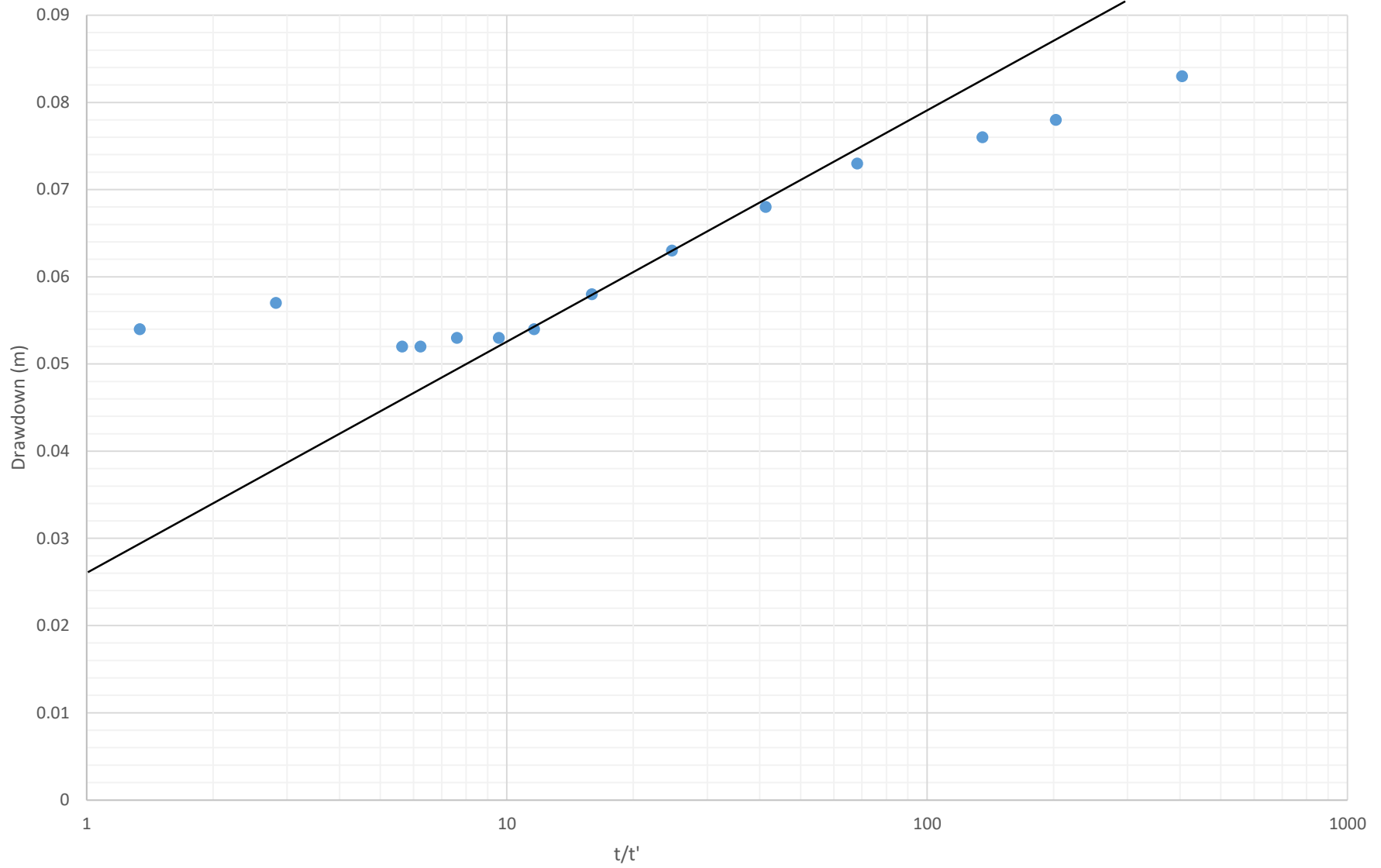
Drawdown vs Log Time
TW6 Pumping Test (Drawdown), January 7, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW6 Pumping Test (Long-Term), January 7, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW6 Pumping Test (Recovery), January 7, 2021
Gardiner Shore, Beckwith ON

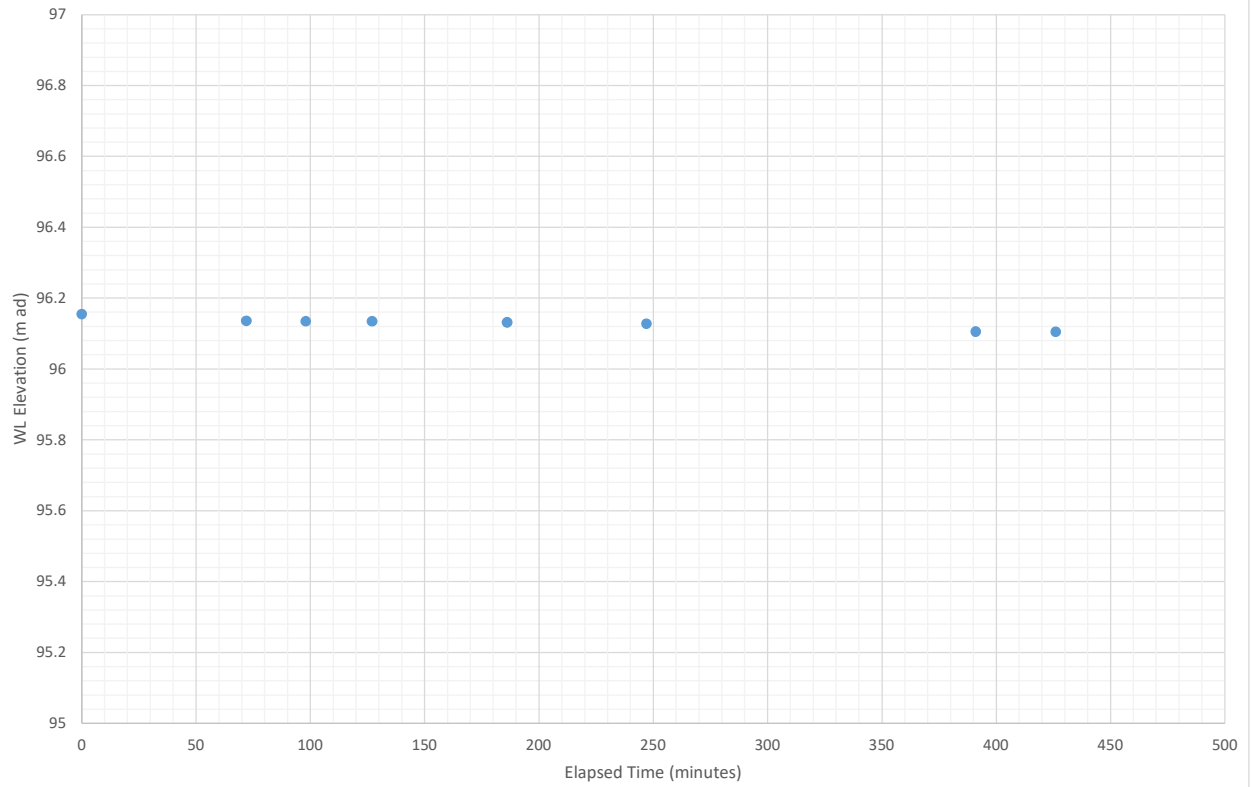


Summary of Water Level Data
Pumping Test - TW2, Observation TW6 - January 7, 2021

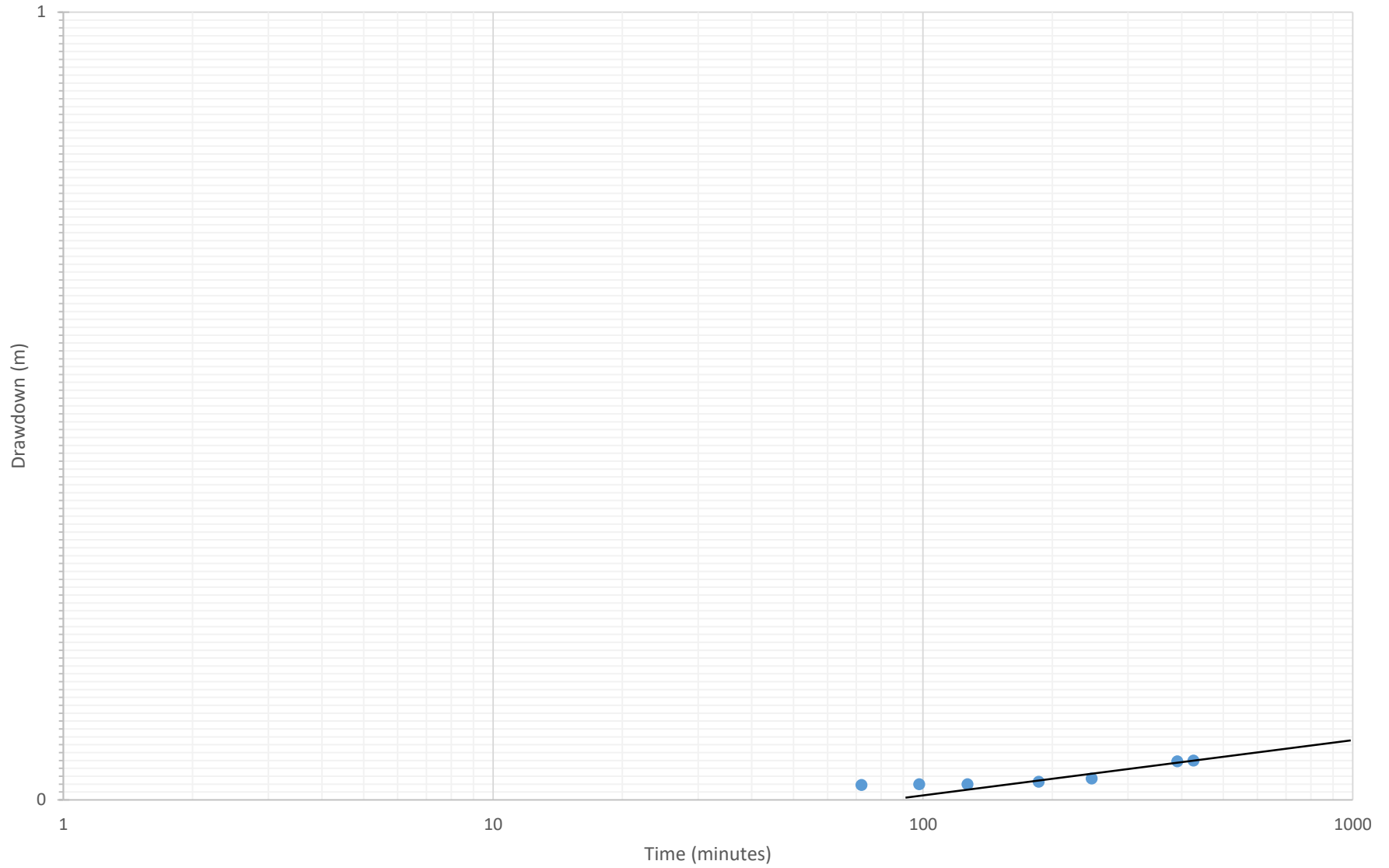
| | |
|--------------------------------|----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 3.845 m BTOC |
| Static Water Elevation | 96.155 m AD (Above Datum) |
| 95% Recovery | 3.8475 m BTOC |
| | 96.1525 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|-------|
| 0 | | | 3.845 | 96.155 | 0 | |
| 72 | | | 3.864 | 96.136 | 0.019 | |
| 98 | | | 3.865 | 96.135 | 0.02 | |
| 127 | | | 3.865 | 96.135 | 0.02 | |
| 186 | | | 3.868 | 96.132 | 0.023 | |
| 247 | | | 3.872 | 96.128 | 0.027 | |
| 391 | | | 3.894 | 96.106 | 0.049 | |
| 426 | | | 3.895 | 96.105 | 0.05 | |
| 460 | | | 3.885 | 96.115 | 0.04 | |
| 1585 | | | 3.901 | 96.099 | 0.056 | |

Drawdown vs Time
TW2 Pumping Test, Observation TW6 (Drawdown), January 7, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW2 Pumping Test, Observation TW6 (Drawdown), January 7, 2021
Gardiner Shore, Beckwith ON

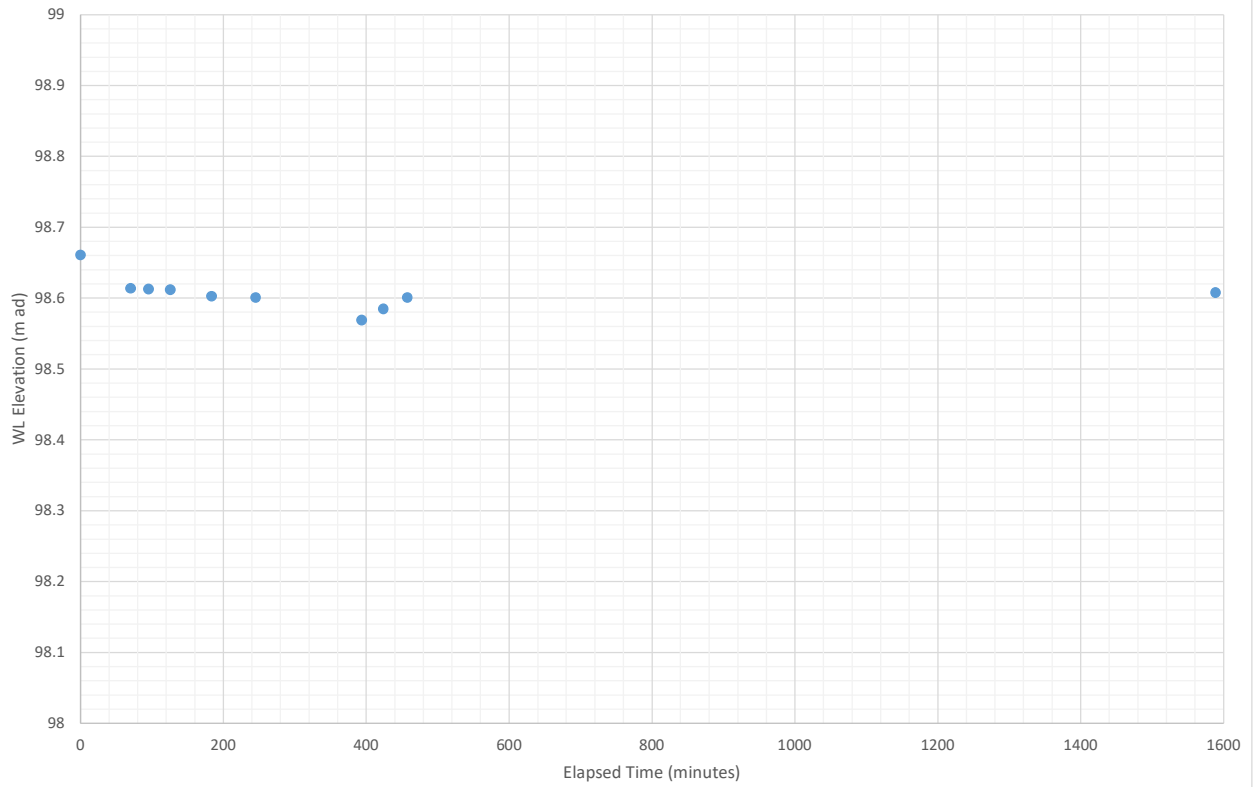


Summary of Water Level Data
Pumping Test - TW6, Observation TW4 - January 7, 2021

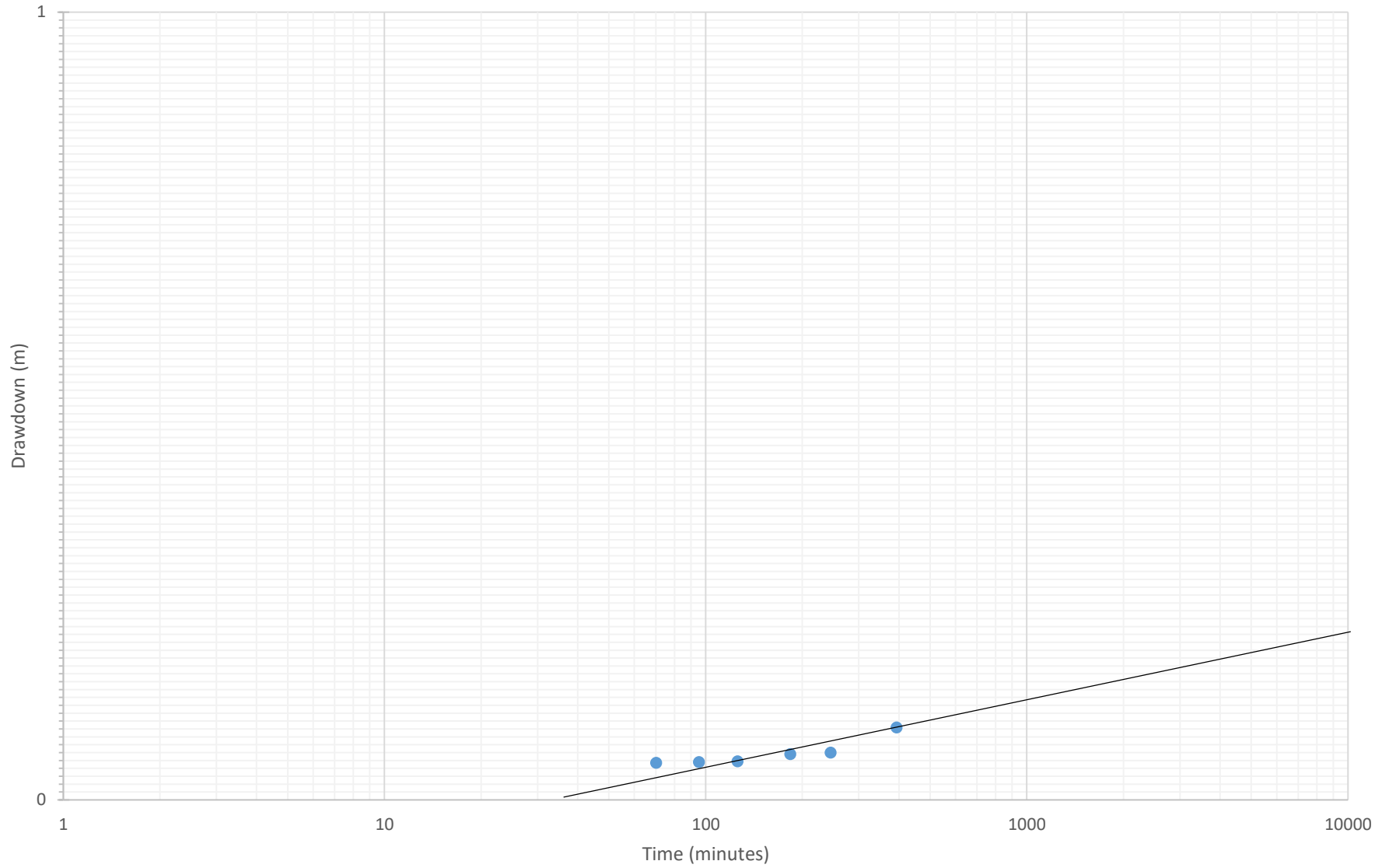
| | |
|--------------------------------|----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 1.339 m BTOC |
| Static Water Elevation | 98.661 m AD (Above Datum) |
| 95% Recovery | 1.3436 m BTOC |
| | 98.6564 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|-------|
| 0 | | | 1.339 | 98.661 | 0 | |
| 70.17 | | | 1.386 | 98.614 | 0.047 | |
| 95.33 | | | 1.387 | 98.613 | 0.048 | |
| 125.67 | | | 1.388 | 98.612 | 0.049 | |
| 183.5 | | | 1.397 | 98.603 | 0.058 | |
| 245.08 | | | 1.399 | 98.601 | 0.06 | |
| 393.42 | | | 1.431 | 98.569 | 0.092 | |
| 423.78 | | | 1.415 | 98.585 | 0.076 | |
| 457.38 | | | 1.399 | 98.601 | 0.06 | |
| 1588.67 | | | 1.392 | 98.608 | 0.053 | |

Drawdown vs Time
TW6 Pumping Test, Observation TW4 (Drawdown), January 7, 2021
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW6 Pumping Test, Observation TW4 (Drawdown), January 7, 2021
Gardiner Shore, Beckwith ON

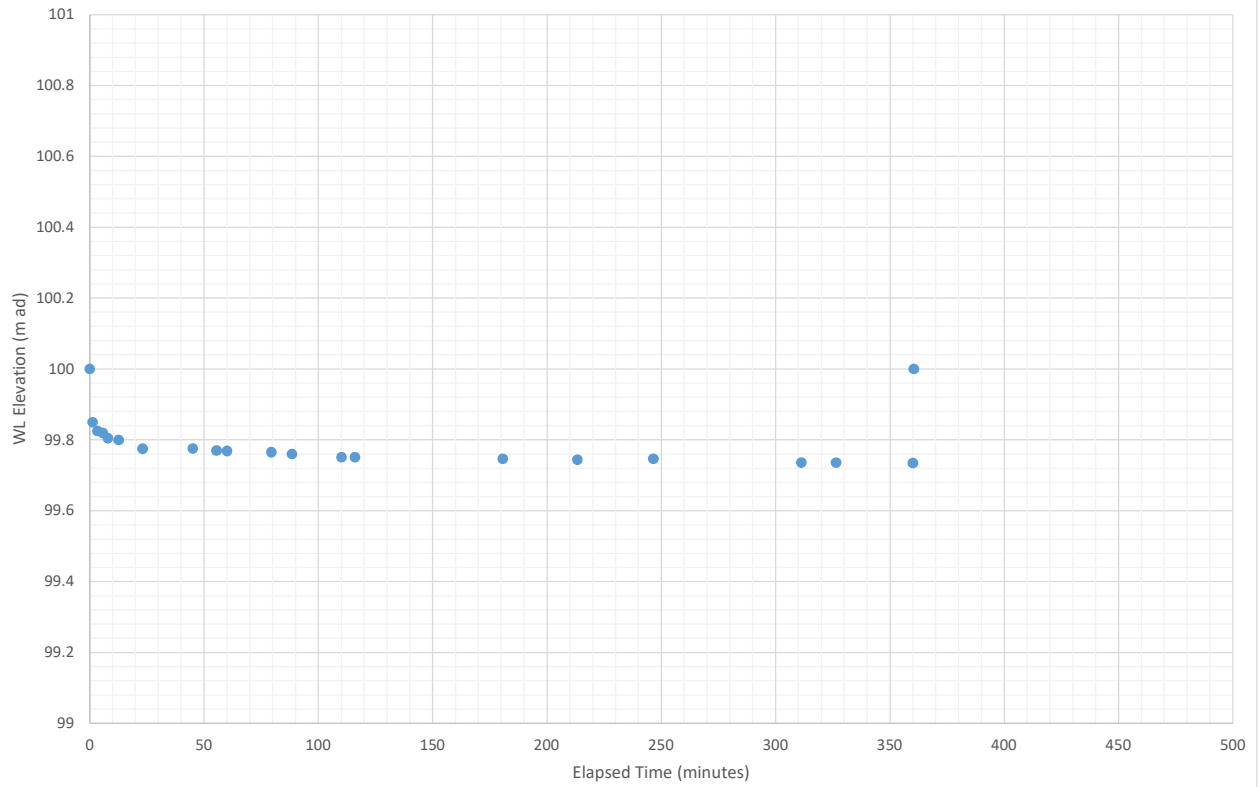


**Summary of Water Level Data
Pumping Test - TW7 - December 21, 2020**

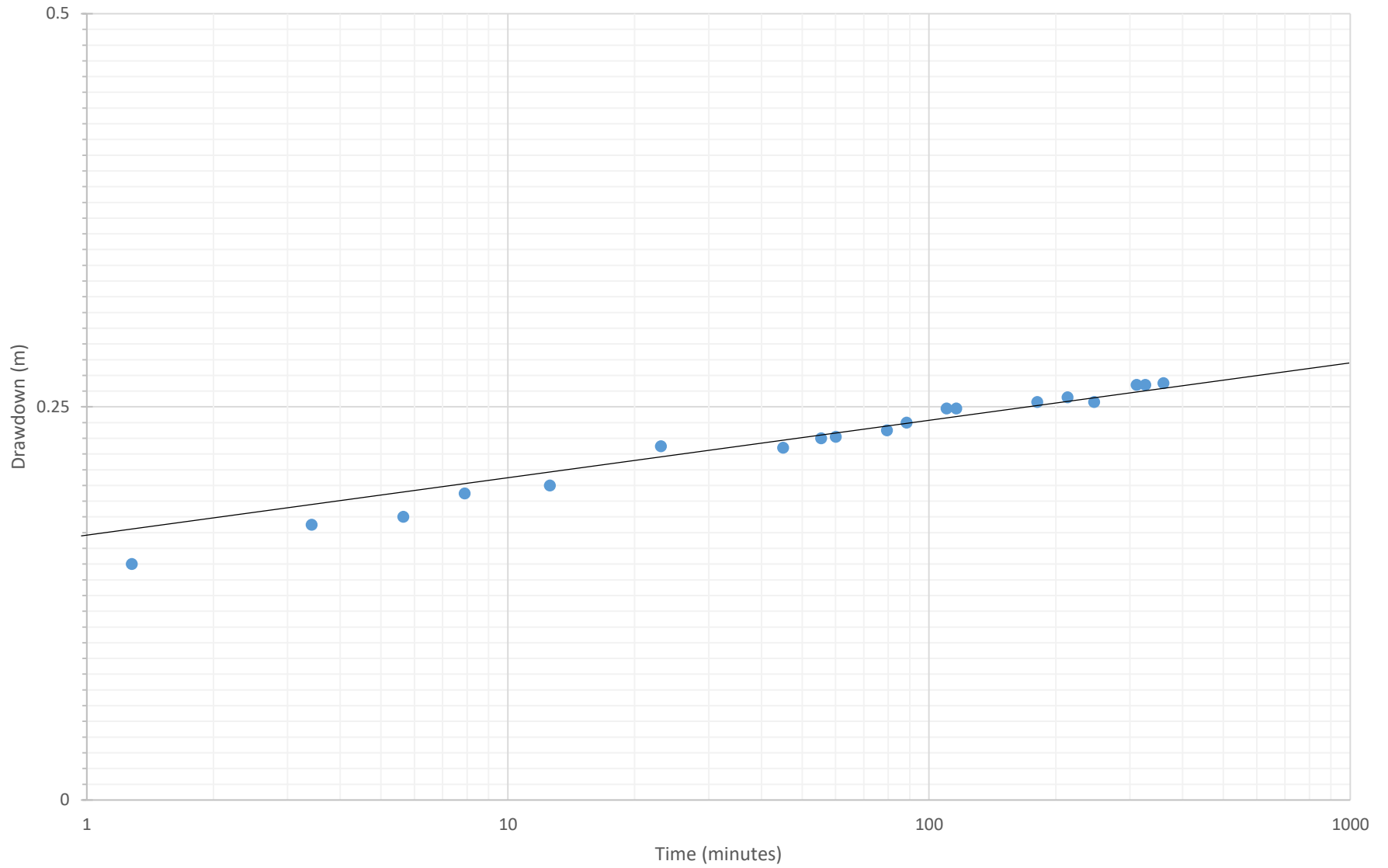
| | |
|--------------------------------|-----------------------------|
| TOC Elevation (assumed) | 100 m AD (Above Datum) |
| Static Water Level | 0 m BTOC |
| Static Water Elevation | 100 m AD (Above Datum) |
| 95% Recovery | 0.01325 m BTOC |
| | 99.98675 m AD (Above Datum) |

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Turbidity (NTU) | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|-----------------|----------------------|---------------------|--------------|----------------|
| 0 | | | | 0 | 100 | 0 | *Artesian well |
| 1.28 | | | | 0.15 | 99.85 | 0.15 | |
| 3.42 | | | | 0.175 | 99.825 | 0.175 | |
| 5.65 | | | | 0.18 | 99.82 | 0.18 | |
| 7.9 | | | | 0.195 | 99.805 | 0.195 | |
| 12.58 | | | | 0.2 | 99.8 | 0.2 | |
| 23.08 | | | | 0.225 | 99.775 | 0.225 | |
| 45.03 | | | | 0.224 | 99.776 | 0.224 | |
| 55.45 | | | | 0.23 | 99.77 | 0.23 | |
| 60.03 | | | | 0.231 | 99.769 | 0.231 | |
| 79.42 | | | | 0.235 | 99.765 | 0.235 | |
| 88.5 | | | | 0.24 | 99.76 | 0.24 | |
| 110.08 | | | | 0.249 | 99.751 | 0.249 | |
| 116 | | | | 0.249 | 99.751 | 0.249 | |
| 180.67 | | | | 0.253 | 99.747 | 0.253 | |
| 213.25 | | | | 0.256 | 99.744 | 0.256 | |
| 246.45 | | | | 0.253 | 99.747 | 0.253 | |
| 311.23 | | | | 0.264 | 99.736 | 0.264 | |
| 326.4 | | | | 0.264 | 99.736 | 0.264 | |
| 360.07 | | | | 0.265 | 99.735 | 0.265 | |
| 360.4 | | | | 0 | 100 | 0 | |

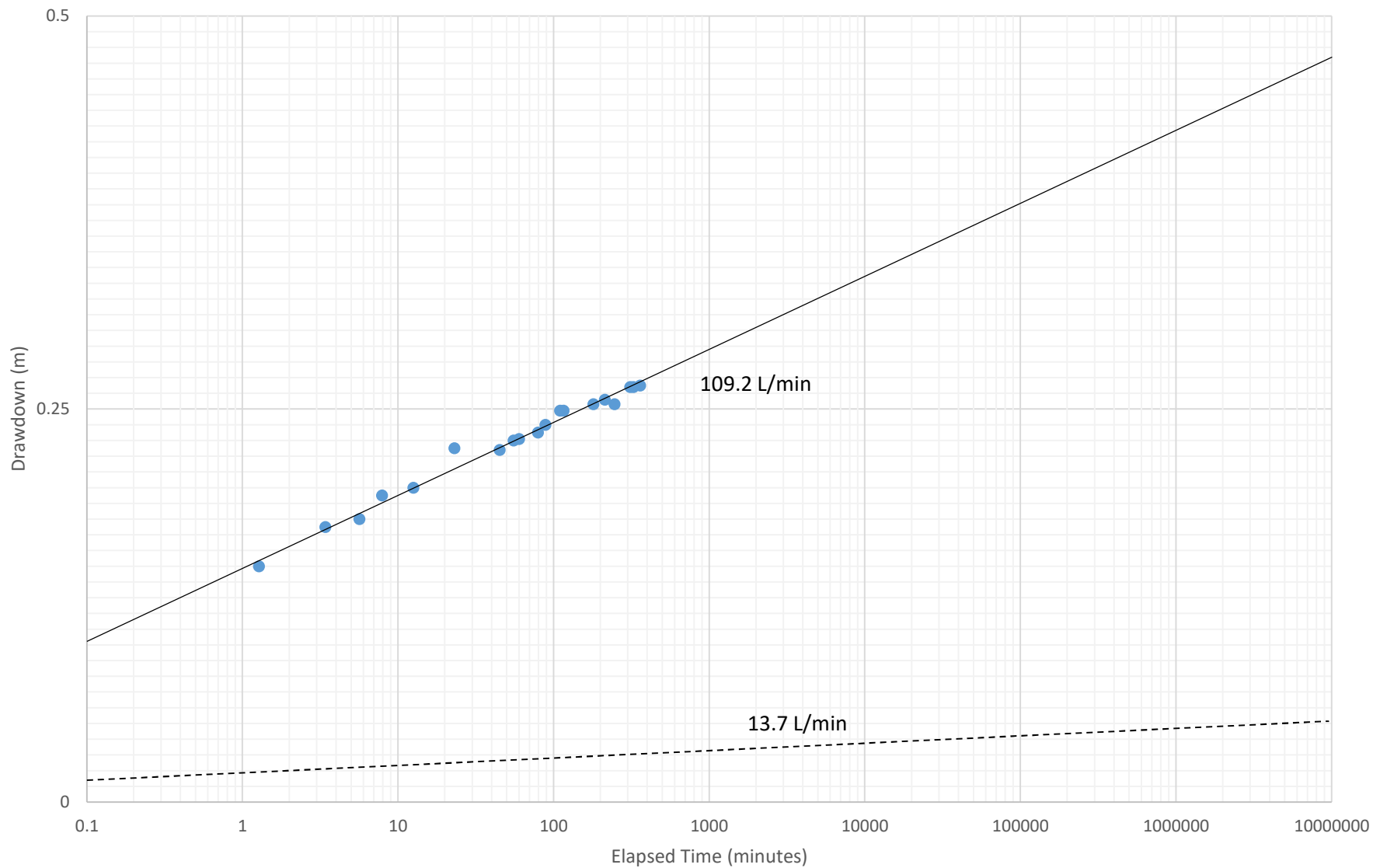
Drawdown vs Time
TW7 Pumping Test (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW7 Pumping Test (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW7 Pumping Test (Long-Term), December 21, 2020
Gardiner Shore, Beckwith ON

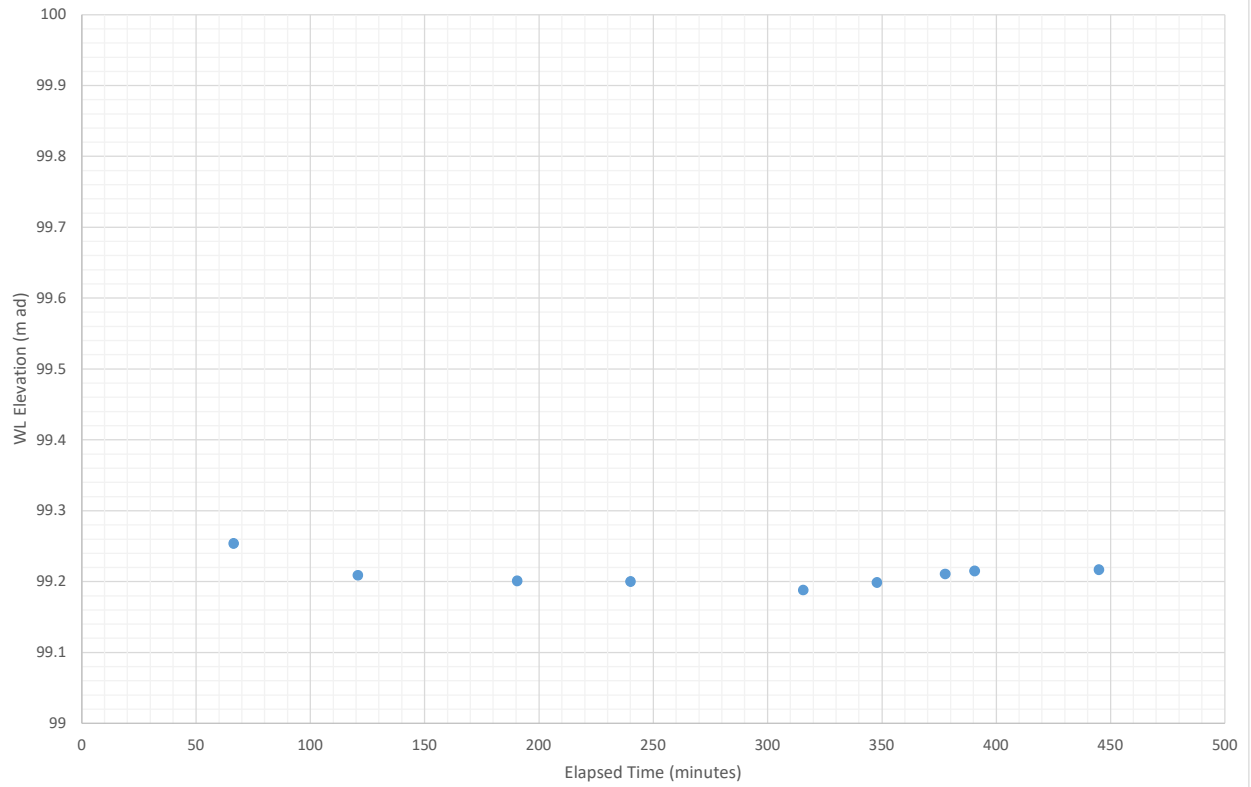


Summary of Water Level Data
Pumping Test - TW7, Observation TW4 - January 13, 2021

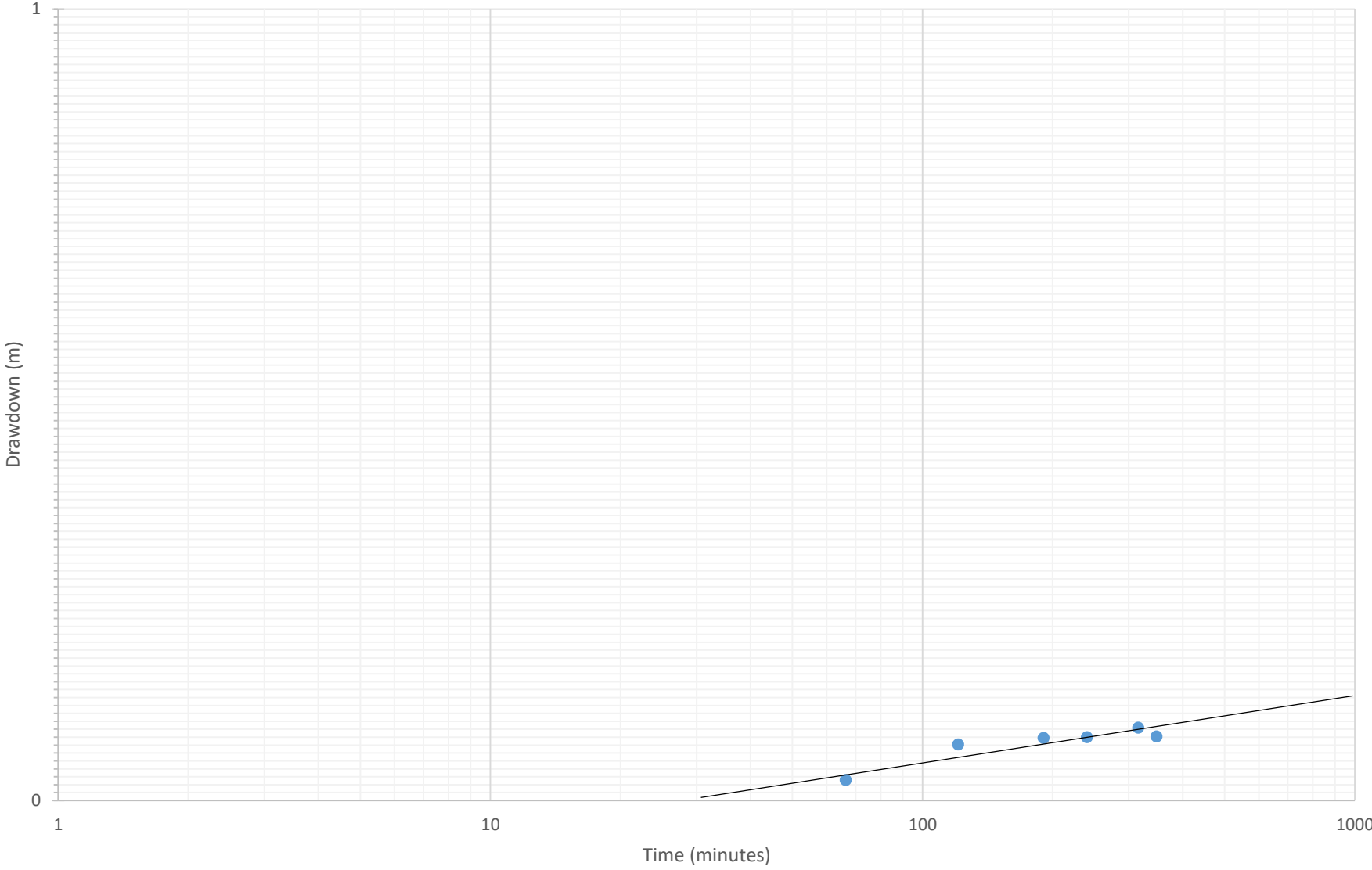
TOC Elevation (assumed) 100 m AD (Above Datum)
Static Water Level 0.72 m BTOC
Static Water Elevation 99.28 m AD (Above Datum)
95% Recovery 0.7246 m BTOC
 99.2754 m AD (Above Datum)

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|---------------------|
| 0 | | | 0.72 | 99.28 | 0 | |
| 66.42 | | | 0.746 | 99.254 | 0.026 | |
| 120.83 | | | 0.791 | 99.209 | 0.071 | |
| 190.45 | | | 0.799 | 99.201 | 0.079 | |
| 240 | | | 0.8 | 99.2 | 0.08 | |
| 315.53 | | | 0.812 | 99.188 | 0.092 | |
| 347.75 | | | 0.801 | 99.199 | 0.081 | |
| 377.67 | | | 0.789 | 99.211 | 0.069 | Pump off at 360 min |
| 390.5 | | | 0.785 | 99.215 | 0.065 | |
| 444.93 | | | 0.783 | 99.217 | 0.063 | |
| 572.67 | | | 0.769 | 99.231 | 0.049 | |
| 1391 | | | 0.781 | 99.219 | 0.061 | |

Drawdown vs Time
TW7 Pumping Test, Observation TW4 (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



Drawdown vs Log Time
TW7 Pumping Test, Observation TW4 (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON

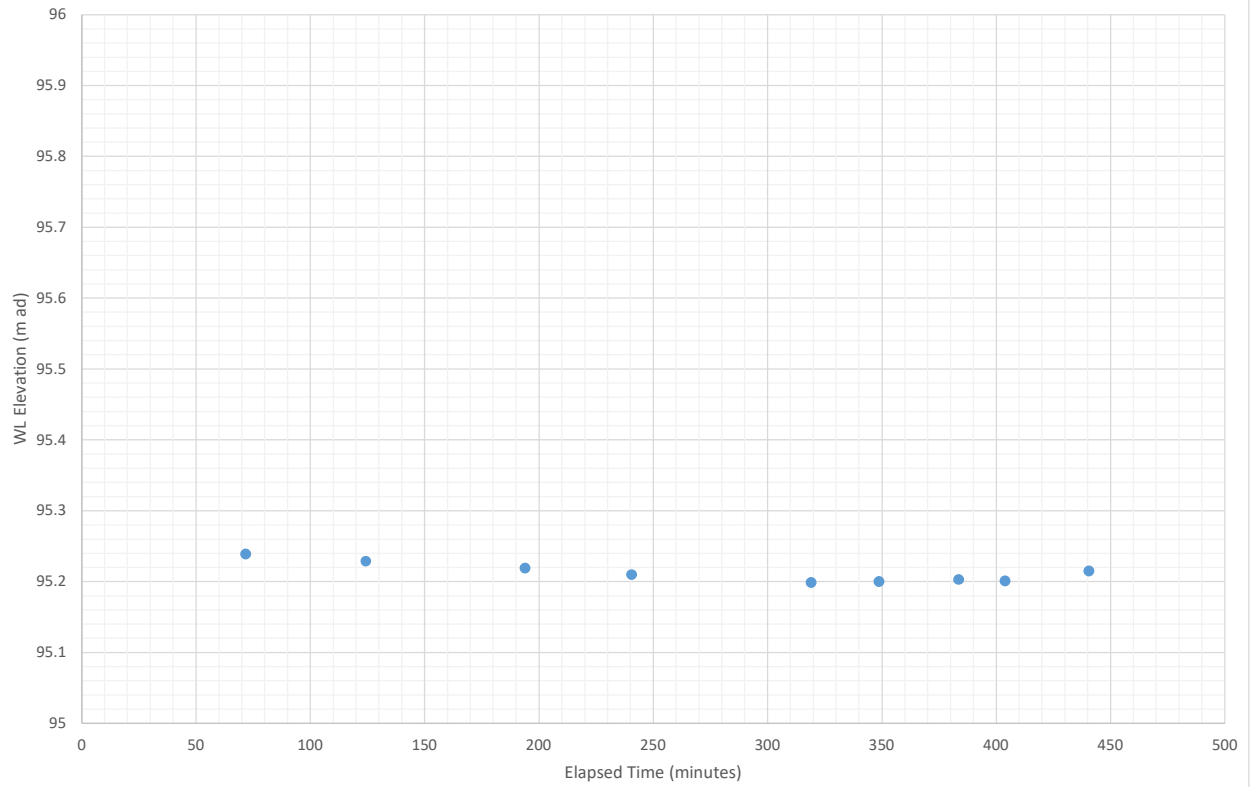


Summary of Water Level Data
Pumping Test - TW7, Observation TW6 - December 21, 2020

TOC Elevation (assumed) 100 m AD (Above Datum)
Static Water Level 4.721 m BTOC
Static Water Elevation 95.279 m AD (Above Datum)
95% Recovery 4.725 m BTOC
 95.275 m AD (Above Datum)

| Elapsed Time (minutes) | Elapsed Time (Recovery) | T/T' | Water Level (m BTOC) | Water Level (m ASL) | Drawdown (m) | Notes |
|------------------------|-------------------------|------|----------------------|---------------------|--------------|-------|
| 71.7 | | | 4.761 | 95.239 | 0.04 | |
| 124.25 | | | 4.771 | 95.229 | 0.05 | |
| 193.87 | | | 4.781 | 95.219 | 0.06 | |
| 240.5 | | | 4.79 | 95.21 | 0.069 | |
| 318.97 | | | 4.801 | 95.199 | 0.08 | |
| 348.67 | | | 4.8 | 95.2 | 0.079 | |
| 383.53 | | | 4.797 | 95.203 | 0.076 | |
| 403.83 | | | 4.799 | 95.201 | 0.078 | |
| 440.5 | | | 4.785 | 95.215 | 0.064 | |
| 576.67 | | | 4.781 | 95.219 | 0.06 | |
| 1386 | | | 4.789 | 95.211 | 0.068 | |

Drawdown vs Time
TW7 Pumping Test, Observation TW6 (Drawdown), December 21, 2020
Gardiner Shore, Beckwith ON



HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



APPENDIX E – CALCULATIONS

Transmissivity Calculations

Test Well 1
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (144 m³/day)/4 π (0.16 m)
T= 164.8 m²/day
Q = 100 L/min
Q=(100 L/min)/(1000L))*(60 min)(24 hour)
Q= 144 m³/day
 $\Delta s = 0.16m$

Test Well 2
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (129.6 m³/day)/4 π (0.75 m)
T= 31.6 m²/day
Q = 90 L/min
Q=(90 L/min)/(1000L))*(60 min)(24 hour)
Q= 129.6 m³/day
 $\Delta s = 0.75$

Test Well 3
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (134.35 m³/day)/4 π (0.19 m)
T= 129.5 m²/day
Q = 93.3 L/min
Q=(93.3 L/min)/(1000L))*(60 min)(24 hour)
Q= 134.35 m³/day
 $\Delta s = 0.19$

Test Well 4
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (157.17 m³/day)/4 π (0.285 m)
T= 101.0 m²/day
Q = 109.15 L/min
Q=(109.15 L/min)/(1000L))*(60 min)(24 hour)
Q= 157.17 m³/day
 $\Delta s = 0.285$

Test Well 5
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (144 m³/day)/4 π (0.355 m)
T= 74.3 m²/day
Q = 100 L/min
Q=(100 L/min)/(1000L))*(60 min)(24 hour)
Q= 144 m³/day
 $\Delta s = 0.355$

Test Well 6
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (144 m³/day)/4 π (0.04 m)
T= 659.2 m²/day
Q = 100 L/min
Q=(100 L/min)/(1000L))*(60 min)(24 hour)
Q= 144 m³/day
 $\Delta s = 0.04$

Test Well 7
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (157.25 m³/day)/4 π (0.039 m)
T= 738.4 m²/day
Q = 109.2 L/min
Q=(109.2 L/min)/(1000L))*(60 min)(24 hour)
Q= 157.25 m³/day
 $\Delta s = 0.039$

Test Well 1 Recovery
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (144 m³/day)/4 π (0.13 m)
T= 202.8 m²/day
Q = 100 L/min
Q=((100 L/min)/(1000L))*(60 min)(24 hour)
Q= 144 m³/day
 $\Delta s = 0.13m$

Test Well 2 Recovery
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (129.6 m³/day)/4 π (0.42)
T= 56.5 m²/day
Q = 90 L/min
Q=(90 L/min)/(1000L))*(60 min)(24 hour)
Q= 129.6 m³/day
 $\Delta s = 0.42$

Test Well 3 Recovery
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (134.35 m³/day)/4 π (0.22)
T= 111.8 m²/day
Q = 93.3 L/min
Q=((93.3 L/min)/(1000L))*(60 min)(24 hour)
Q= 134.35 m³/day
 $\Delta s = 0.22$

Test Well 5 Recovery
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (144 m³/day)/4 π (0.54 m)
T= 48.8 m²/day
Q = 100 L/min
Q=((100 L/min)/(1000L))*(60 min)(24 hour)
Q= 144 m³/day
 $\Delta s = 0.54$

Test Well 6 Recovery
T= $2.3 Q / 4\pi \Delta S$
T= 2.3 (144 m³/day)/4 π (0.027 m)
T= 976.6 m²/day
Q = 100 L/min
Q=((100 L/min)/(1000L))*(60 min)(24 hour)
Q= 144 m³/day
 $\Delta s = 0.027$

Storativity Calculations

$$S = 2.25 T t_0 / r^2$$

T is the transmissivity (m²/day)

t₀ is the x-intercept of the observation well drawdown vs. log time line of best fit

r is the distance between the pumped well and the observation well

Test Well 1 - Observation Test Well 6

$$S = 2.25 (376.7 \text{ m}^2/\text{day})(3.47\text{e-}3)/(705^2)$$

$$S = 6.13917\text{E-}06$$

$$t_0 = 3.60\text{E-}03 \text{ days}$$

$$T = 376.7 \text{ m}^2/\text{day}$$

$$r = 705 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (144 \text{ m}^3/\text{day})/4\pi (0.07 \text{ m})$$

$$T = 376.7 \text{ m}^2/\text{day}$$

$$Q = 100 \text{ L/min}$$

$$Q = ((100 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 144 \text{ m}^3/\text{day}$$

$$\Delta s = 0.07\text{m}$$

Test Well 3 - Observation Test Well 2

$$S = 2.25 (1640.2 \text{ m}^2/\text{day})(0.035\text{m})/(375^2)$$

$$S = 3.37\text{E-}04$$

$$t_0 = 0.03 \text{ days}$$

$$T = 702.9 \text{ m}^2/\text{day}$$

$$r = 375 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (157.17 \text{ m}^3/\text{day})/4\pi (0.035 \text{ m})$$

$$T = 702.9 \text{ m}^2/\text{day}$$

$$Q = 93.3 \text{ L/min}$$

$$Q = ((93.3 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 134.35 \text{ m}^3/\text{day}$$

$$\Delta s = 0.035\text{m}$$

Test Well 4 - Observation Test Well 5

$$S = 2.25 (179.9 \text{ m}^2/\text{day})(9 \times 10^{-4} \text{ days})/(380^2)$$

$$S = 2.52\text{E-}06$$

$$t_0 = 9.00\text{E-}04 \text{ days}$$

$$T = 179.9 \text{ m}^2/\text{day}$$

$$r = 380 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (157.17 \text{ m}^3/\text{day})/4\pi (0.16 \text{ m})$$

$$T = 179.9 \text{ m}^2/\text{day}$$

$$Q = 109.15 \text{ L/min}$$

$$Q = ((109.15 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 157.17 \text{ m}^3/\text{day}$$

$$\Delta s = 0.16\text{m}$$

Test Well 4 - Observation Test Well 6

$$S = 2.25 (442.8 \text{ m}^2/\text{day})(0.0125)/(225^2)$$

$$S = 2.46\text{E-}04$$

$$t_0 = 0.0125 \text{ days}$$

$$T = 442.8 \text{ m}^2/\text{day}$$

$$r = 225 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (157.17 \text{ m}^3/\text{day})/4\pi (0.065 \text{ m})$$

$$T = 442.8 \text{ m}^2/\text{day}$$

$$Q = 109.15 \text{ L/min}$$

$$Q = ((109.15 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 157.17 \text{ m}^3/\text{day}$$

$$\Delta s = 0.065\text{m}$$

Test Well 5 - Observation Test Well 2

$$S = 2.25 (376.7 \text{ m}^2/\text{day})(0.028\text{day})/(618^2)$$

$$S = 6.21383\text{E-}05$$

$$t_0 = 0.028 \text{ days}$$

$$T = 442.8 \text{ m}^2/\text{day}$$

$$r = 618 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (144\text{m}^3/\text{day})/4\pi (0.07 \text{ m})$$

$$T = 376.7 \text{ m}^2/\text{day}$$

$$Q = 100 \text{ L/min}$$

$$Q = ((100 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 144 \text{ m}^3/\text{day}$$

$$\Delta s = 0.07\text{m}$$

Test Well 5 - Observation Test Well 4

$$S = 2.25 (109.9 \text{ m}^2/\text{day})(5.2 \times 10^{-3} \text{ d})/(375^2)$$

$$S = 9.14\text{E-}06$$

$$t_0 = 5.20\text{E-}03 \text{ days}$$

$$T = 109.9 \text{ m}^2/\text{day}$$

$$r = 375 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (144\text{m}^3/\text{day})/4\pi (0.24 \text{ m})$$

$$T = 109.9 \text{ m}^2/\text{day}$$

$$Q = 100 \text{ L/min}$$

$$Q = ((100 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 144 \text{ m}^3/\text{day}$$

$$\Delta s = 0.24\text{m}$$

Test Well 6 - Observation Test Well 2

$$S = 2.25 (144 \text{ m}^2/\text{day})(0.0625\text{d})/(375^2)$$

$$S = 2.74\text{E-}04$$

$$t_0 = 0.0625 \text{ day}$$

$$T = 376.7 \text{ m}^2/\text{day}$$

$$r = 440 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (144\text{m}^3/\text{day})/4\pi (0.07 \text{ m})$$

$$T = 376.7 \text{ m}^2/\text{day}$$

$$Q = 100 \text{ L/min}$$

$$Q = ((100 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 144 \text{ m}^3/\text{day}$$

$$\Delta s = 0.07\text{m}$$

Test Well 6 - Observation Test Well 4

$$S = 2.25 (296.3 \text{ m}^2/\text{day})(0.025\text{d})/(440^2)$$

$$S = 8.60851\text{E-}05$$

$$t_0 = 0.025 \text{ days}$$

$$T = 296.3 \text{ m}^2/\text{day}$$

$$r = 440 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (144\text{m}^3/\text{day})/4\pi (0.089 \text{ m})$$

$$T = 296.3 \text{ m}^2/\text{day}$$

$$Q = 100 \text{ L/min}$$

$$Q = ((100 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 144 \text{ m}^3/\text{day}$$

$$\Delta s = 0.089\text{m}$$

Test Well 7 - Observation Test Well 4

$$S = 2.25 (296.3 \text{ m}^2/\text{day})(0.02\text{d})/(440^2)$$

$$S = 5.75732\text{E-}05$$

$$t_0 = 0.02 \text{ days}$$

$$T = 319.9 \text{ m}^2/\text{day}$$

$$r = 500 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (157.2\text{m}^3/\text{day})/4\pi (0.089 \text{ m})$$

$$T = 319.9 \text{ m}^2/\text{day}$$

$$Q = 109.15 \text{ L/min}$$

$$Q = ((109.15 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 157.17 \text{ m}^3/\text{day}$$

$$\Delta s = 0.09\text{m}$$

Test Well 7 - Observation Test Well 6

$$S = 2.25 (319.9 \text{ m}^2/\text{day})(0.029\text{d})/(530^2)$$

$$S = 7.4298\text{E-}05$$

$$t_0 = 0.029 \text{ days}$$

$$T = 319.9 \text{ m}^2/\text{day}$$

$$r = 530 \text{ m}$$

$$T = 2.3 Q / 4\pi \Delta s$$

$$T = 2.3 (157.2\text{m}^3/\text{day})/4\pi (0.089 \text{ m})$$

$$T = 319.9 \text{ m}^2/\text{day}$$

$$Q = 109.15 \text{ L/min}$$

$$Q = ((109.15 \text{ L/min})/(1000\text{L})) * (60 \text{ min})(24 \text{ hour})$$

$$Q = 157.17 \text{ m}^3/\text{day}$$

$$\Delta s = 0.089\text{m}$$

Farvolden Method - Long Term Yeild Calculations

$Q_{20} = 0.68 T H_a S_f$

Ha= the available water column height (m)
Sf= safety factor
T= Transmissivity (m²/day)

Test Well 1

$Q_{20} = 0.68 (164.8 \text{ m}^2/\text{day})(16.459 \text{ m})(0.7)$
T= 164.8 m²/day
Sf= 0.7
pump at 73 ft = 22.25 m
static WL: 5.791 m
Q20= 1291.123 m³/day
Q20= 1291123 L/day
Q20= 896.6132 L/min
Ha = 22.25 m - 5.791 m
Ha= 16.459

Test Well 2

$Q_{20} = 0.68 (31.6 \text{ m}^2/\text{day})(24.27 \text{ m})(0.7)$
T= 31.6 m²/day
Sf = 0.7
pump at 93 ft = 28.34 m
static WL: 4.070 m
Q20= 365.0596 m³/day
Q20= 365059.6 L/day
Q20= 253.5136 L/min
Ha = 28.34 m - 4.070 m
Ha= 24.27 m

Test Well 3

$Q_{20} = 0.68 (129.5 \text{ m}^2/\text{day})(25.614 \text{ m})(0.7)$
T= 129.5 m²/day
Sf = 0.7
pump at 93 ft = 28.34 m
static WL: 2.726 m
Q20= 1578.898 m³/day
Q20= 1578898 L/day
Q20= 1096.457 L/min
Ha = 28.34 m - 2.726 m
Ha= 25.614 m

Test Well 4

$Q_{20} = 0.68 (101 \text{ m}^2/\text{day})(28.59 \text{ m})(0.7)$
T= 101.0 m²/day
Sf = 0.7
pump at 101 ft = 30.78 m
static WL: 2.19 m
Q20= 1374.493 m³/day
Q20= 1374493 L/day
Q20= 954.5089 L/min
Ha = 30.78 m - 2.19 m
Ha= 28.59 m

Test Well 5

$Q_{20} = 0.68 (74.3 \text{ m}^2/\text{day})(20.277 \text{ m})(0.7)$
T= 74.3 m²/day
Sf = 0.7
pump at 72 ft = 21.94 m
static WL: 1.663 m
Q20= 717.1326 m³/day
Q20= 717132.6 L/day
Q20= 498.0088 L/min
Ha = 21.94 m - 1.663 m
Ha= 20.277 m

Test Well 6

$Q_{20} = 0.68 (659.2 \text{ m}^2/\text{day})(36.259 \text{ m})(0.7)$
T= 659.2 m²/day
Sf = 0.7
pump at 133 ft = 40.53 m
static WL: 4.271 m
Q20= 11377.32 m³/day
Q20= 11377320 L/day
Q20= 7900.917 L/min
Ha = 40.53 m - 4.271 m
Ha= 36.259 m

Test Well 7

$Q_{20} = 0.68 (738.4 \text{ m}^2/\text{day})(34.44 \text{ m})(0.7)$
T= 738.4 m²/day
Sf = 0.7
pump at 113 ft = 34.44 m
static WL: 0 m
Q20= 12104.92 m³/day
Q20= 12104916 L/day
Q20= 8406.192 L/min
Ha = 34.44 m

Moell Method - Long Term Yeild Calculations

$$Q_{20} = (Q \text{ Ha Sf}) / (s_{100} + 5 \Delta s)$$

Q= the pumping rate (m3/day)
 Ha= the available water column height (m)
 Sf= safety factor
 s₁₀₀= the drawdown at 100 minutes (semi-log long-term graph)
 Δs= the change in hydraulic head over one log cycle (drawdown vs. long time)

Test Well 1

Q = 144 m³/day
 Ha= 16.459
 Sf = 0.7
 s₁₀₀ = 0.52 m
 ΔS = 0.16m

Q₂₀= ((144 m³/day)(16.459 m)(0.7))/[(0.52 m + 5(0.16 m))]
 Q₂₀= 1256.869 m³/day
 Q₂₀= 1256869 L/day
 Q₂₀= 872.8258 L/min

Test Well 2

Q = 129.6 m³/day
 Ha= 24.27 m
 Sf = 0.7
 s₁₀₀ = 4.35
 ΔS = 0.75 m

Q₂₀= ((129.6 m³/day)(24.27 m)(0.7))/[(0.485 m + 5(0.10 m))]
 Q₂₀= 271.824 m³/day
 Q₂₀= 271824 L/day
 Q₂₀= 188.7667 L/min

Test Well 3

Q= 134.35 m³/day
 Ha= 25.614 m
 Sf = 0.7
 s₁₀₀ = 0.90 m
 ΔS = 0.19 m

Q₂₀= ((134.35 m³/day)(25.614 m)(0.7))/[(0.70 m + 5(0.19 m))]
 Q₂₀= 1302.091 m³/day
 Q₂₀= 1302091 L/day
 Q₂₀= 904.23 L/min

Test Well 4

Q= 157.17 m³/day
 Ha= 28.59 m
 Sf = 0.7
 s₁₀₀ = 1.38 m
 ΔS = 0.285

Q₂₀= ((157.17 m³/day)(28.59 m)(0.7))/(1.38 m + 5(0.285 m))
 Q₂₀= 1121.37 m³/day
 Q₂₀= 1121370 L/day
 Q₂₀= 778.7293 L/min

Test Well 5

Q= 144 m³/day
 Ha= 20.277 m
 Sf = 0.7
 s₁₀₀ = 1.75 m
 ΔS = 0.355

Q₂₀= ((144 m³/day)(20.277 m)(0.7))/(1.75 m + 5(0.355 m))
 Q₂₀= 593.9336 m³/day
 Q₂₀= 593933.6 L/day
 Q₂₀= 412.4539 L/min

Test Well 6

Q= 144 m³/day
 Ha= 36.259 m
 Sf = 0.7
 s₁₀₀ = 0.31 m
 ΔS = 0.04

Q₂₀= ((144 m³/day)(36.259 m)(0.7))/(0.31 m + 5(0.04 m))
 Q₂₀= 7166.485 m³/day
 Q₂₀= 7166485 L/day
 Q₂₀= 4976.725 L/min

Test Well 7

Q= 157.25 m³/day
 Ha= 34.44 m
 Sf = 0.7
 s₁₀₀ = 0.24 m
 ΔS = 0.039

Q₂₀= ((157.25 m³/day)(34.44 m)(0.7))/(0.24 m + 5(0.039 m))
 Q₂₀= 8714.903 m³/day
 Q₂₀= 8714903 L/day
 Q₂₀= 6052.016 L/min

HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



APPENDIX F – MECP WELL RECORDS SUMMARY

| WELL_ID | COMPLETED | WELL DEPTH (m) | STATIC WATER LEVEL (m) | DEPTH TO BEDROCK (m) | GEOLOGY |
|---------|-----------|----------------|------------------------|----------------------|---------------------------|
| 3505867 | 21-Apr-80 | 21.3 | 4.6 | | TOPSOIL,, |
| 3505867 | 21-Apr-80 | 21.3 | 4.6 | 0.6 | SANDSTONE,, |
| 7318042 | 13-Aug-18 | 41.5 | 3.8 | | SAND,GRAVEL,BOULDERS |
| 7318042 | 13-Aug-18 | 41.5 | 3.8 | | LIMESTONE,, |
| 7318042 | 13-Aug-18 | 41.5 | 3.8 | 0 | SANDSTONE,, |
| 3512961 | 18-May-00 | 20.1 | 9.1 | | CLAY,BOULDERS, |
| 3512961 | 18-May-00 | 20.1 | 9.1 | | SANDSTONE,, |
| 3512961 | 18-May-00 | 20.1 | 9.1 | | SANDSTONE,, |
| 3512961 | 18-May-00 | 20.1 | 9.1 | | SANDSTONE,, |
| 3512961 | 18-May-00 | 20.1 | 9.1 | | SANDSTONE,, |
| 3512961 | 18-May-00 | 20.1 | 9.1 | 0.9 | SANDSTONE,, |
| 3514631 | 30-Aug-04 | 16.4 | 0.6 | | CLAY,SANDY, |
| 3514631 | 30-Aug-04 | 16.4 | 0.6 | 4 | SANDSTONE,, |
| 3515314 | 18-Apr-06 | 24.4 | 3.1 | | SAND,GRAVEL, |
| 3515314 | 18-Apr-06 | 24.4 | 3.1 | 0.9 | SAND,LIMESTONE, |
| 7287927 | 08-May-17 | 31.1 | 5 | | STONES,CLAY, |
| 7287927 | 08-May-17 | 31.1 | 5 | | SANDSTONE,LIMESTONE, |
| 7287927 | 08-May-17 | 31.1 | 5 | | SANDSTONE,LIMESTONE, |
| 7287927 | 08-May-17 | 31.1 | 5 | 0 | SANDSTONE,LIMESTONE, |
| 7209640 | 27-Sep-13 | 25.9 | 0 | | CLAY,, |
| 7209640 | 27-Sep-13 | 25.9 | 0 | | SANDSTONE,, |
| 7209640 | 27-Sep-13 | 25.9 | 0 | | SANDSTONE,, |
| 7209640 | 27-Sep-13 | 25.9 | 0 | 0 | SANDSTONE,, |
| 3508974 | 16-Aug-89 | 18.3 | 2.4 | | SAND,PACKED, |
| 3508974 | 16-Aug-89 | 18.3 | 2.4 | | SANDSTONE,SOFT, |
| 3508974 | 16-Aug-89 | 18.3 | 2.4 | 0.6 | SANDSTONE,LAYERED, |
| 3514471 | 03-Mar-04 | 19.2 | 1.2 | | TOPSOIL,STONES, |
| 3514471 | 03-Mar-04 | 19.2 | 1.2 | 1.2 | SANDSTONE,, |
| 7301339 | 03-Nov-17 | 42.7 | 1.9 | | CLAY,SANDY,BOULDERS |
| 7301339 | 03-Nov-17 | 42.7 | 1.9 | | LIMESTONE,, |
| 7301339 | 03-Nov-17 | 42.7 | 1.9 | 0 | SANDSTONE,, |
| 7210743 | 22-Aug-13 | 30.5 | 7.6 | | CLAY,SANDY, |
| 7210743 | 22-Aug-13 | 30.5 | 7.6 | | SANDSTONE,, |
| 7210743 | 22-Aug-13 | 30.5 | 7.6 | 0 | SANDSTONE,, |
| 7296387 | 08-Sep-17 | 25 | 0.7 | | SAND,CLAY, |
| 7296387 | 08-Sep-17 | 25 | 0.7 | | SANDSTONE,, |
| 7296387 | 08-Sep-17 | 25 | 0.7 | | SANDSTONE,, |
| 7296387 | 08-Sep-17 | 25 | 0.7 | 0 | SANDSTONE,, |
| 3505948 | 24-Jul-80 | 15.2 | 3 | | TOPSOIL,, |
| 3505948 | 24-Jul-80 | 15.2 | 3 | | SANDSTONE,GRAVEL,LAYERED |
| 3505948 | 24-Jul-80 | 15.2 | 3 | 0.3 | SANDSTONE,MEDIUM-GRAINED, |
| 3510361 | 08-Jun-92 | 13.7 | 0.6 | | TOPSOIL,WATER-BEARING, |
| 3510361 | 08-Jun-92 | 13.7 | 0.6 | | SAND,WATER-BEARING, |
| 3510361 | 08-Jun-92 | 13.7 | 0.6 | 4.3 | SANDSTONE,HARD, |
| 3502882 | 30-Jul-71 | 17.7 | 2.4 | | MEDIUM SAND,STONES, |
| 3502882 | 30-Jul-71 | 17.7 | 2.4 | | SANDSTONE,, |
| 3502882 | 30-Jul-71 | 17.7 | 2.4 | 1.5 | SANDSTONE,MEDIUM SAND, |
| 7226480 | 04-Jun-14 | 31.1 | 0 | | SANDSTONE,TOPSOIL, |
| 7226480 | 04-Jun-14 | 31.1 | 0 | | SANDSTONE,LIMESTONE, |
| 7226480 | 04-Jun-14 | 31.1 | 0 | | SANDSTONE,LIMESTONE, |
| 7226480 | 04-Jun-14 | 31.1 | 0 | | SANDSTONE,LIMESTONE, |
| 7226480 | 04-Jun-14 | 31.1 | 0 | 0 | SANDSTONE,LIMESTONE, |
| 7167524 | 07-Jun-11 | 18.9 | 2.2 | | CLAY,, |
| 7167524 | 07-Jun-11 | 18.9 | 2.2 | | SANDSTONE,, |
| 7167524 | 07-Jun-11 | 18.9 | 2.2 | | SANDSTONE,, |
| 7167524 | 07-Jun-11 | 18.9 | 2.2 | | SANDSTONE,, |
| 7340324 | 25-Jun-19 | 37.5 | 7.4 | | CLAY,BOULDERS,SANDY |
| 7340324 | 25-Jun-19 | 37.5 | 7.4 | | SANDSTONE,, |
| 7340324 | 25-Jun-19 | 37.5 | 7.4 | | SANDSTONE,, |
| 7340324 | 25-Jun-19 | 37.5 | 7.4 | | SANDSTONE,, |
| 7340324 | 25-Jun-19 | 37.5 | 7.4 | 0 | SANDSTONE,, |
| 3502894 | 29-Sep-71 | 18.3 | 2.7 | | MEDIUM SAND,, |
| 3502894 | 29-Sep-71 | 18.3 | 2.7 | | GRANITE,, |
| 3502894 | 29-Sep-71 | 18.3 | 2.7 | | GRANITE,, |
| 3502894 | 29-Sep-71 | 18.3 | 2.7 | 1.2 | GRANITE,, |
| 3505705 | 23-Oct-79 | 15.2 | 2.1 | | SAND,GRAVEL, |
| 3505705 | 23-Oct-79 | 15.2 | 2.1 | | SANDSTONE,FRACTURED, |

| | | | | | |
|---------|-----------|------|------|-----|---------------------------|
| 3505705 | 23-Oct-79 | 15.2 | 2.1 | 0.9 | SANDSTONE,MEDIUM-GRAINED, |
| 7310015 | 26-Feb-18 | 42.7 | 1.2 | | SAND,CLAY, |
| 7310015 | 26-Feb-18 | 42.7 | 1.2 | 0 | SANDSTONE,, |
| 3514236 | 28-Jun-03 | 0 | 0 | 0 | ,, |
| 3511246 | 26-Aug-94 | 15.2 | 0 | | SAND,BOULDERS,PACKED |
| 3511246 | 26-Aug-94 | 15.2 | 0 | 1.8 | SANDSTONE,HARD, |
| 7210746 | 23-Aug-13 | 36.6 | 1.2 | | CLAY,BOULDERS, |
| 7210746 | 23-Aug-13 | 36.6 | 1.2 | | SANDSTONE,, |
| 7210746 | 23-Aug-13 | 36.6 | 1.2 | | SANDSTONE,, |
| 7210746 | 23-Aug-13 | 36.6 | 1.2 | 0 | SANDSTONE,, |
| 7287173 | 25-Oct-16 | 30.2 | 10.7 | | TOPSOIL,STONES, |
| 7287173 | 25-Oct-16 | 30.2 | 10.7 | | LIMESTONE,,HARD |
| 7287173 | 25-Oct-16 | 30.2 | 10.7 | 0 | SANDSTONE,,HARD |
| 7296316 | 15-Aug-17 | 36.6 | 6.5 | | SAND,CLAY, |
| 7296316 | 15-Aug-17 | 36.6 | 6.5 | | SANDSTONE,, |
| 7296316 | 15-Aug-17 | 36.6 | 6.5 | | SANDSTONE,, |
| 7296316 | 15-Aug-17 | 36.6 | 6.5 | 0 | SANDSTONE,, |
| 7252387 | 06-Oct-15 | 30.5 | 1.1 | | CLAY,GRAVEL,BOULDERS |
| 7252387 | 06-Oct-15 | 30.5 | 1.1 | | SANDSTONE,, |
| 7252387 | 06-Oct-15 | 30.5 | 1.1 | | GRANITE,QUARTZITE, |
| 7252387 | 06-Oct-15 | 30.5 | 1.1 | | GRANITE,QUARTZITE, |
| 7252387 | 06-Oct-15 | 30.5 | 1.1 | 0 | GRANITE,QUARTZITE, |
| 7287860 | 15-May-17 | 27.7 | 3.8 | | CLAY,STONES, |
| 7287860 | 15-May-17 | 27.7 | 3.8 | | LIMESTONE,, |
| 7287860 | 15-May-17 | 27.7 | 3.8 | | SANDSTONE,, |
| 7287860 | 15-May-17 | 27.7 | 3.8 | | SANDSTONE,, |
| 7287860 | 15-May-17 | 27.7 | 3.8 | 0 | SANDSTONE,, |
| 7210745 | 22-Aug-13 | 24.4 | 2.8 | | CLAY,GRAVEL, |
| 7210745 | 22-Aug-13 | 24.4 | 2.8 | | SANDSTONE,, |
| 7210745 | 22-Aug-13 | 24.4 | 2.8 | | SANDSTONE,, |
| 7210745 | 22-Aug-13 | 24.4 | 2.8 | | SANDSTONE,, |
| 7210745 | 22-Aug-13 | 24.4 | 2.8 | 0 | SANDSTONE,, |
| 3508910 | 15-Jul-89 | 18.6 | 0 | | SAND,BOULDERS,SILT |
| 3508910 | 15-Jul-89 | 18.6 | 0 | | CLAY,BOULDERS,PACKED |
| 3508910 | 15-Jul-89 | 18.6 | 0 | 4 | SANDSTONE,HARD, |
| 3514347 | 10-Oct-03 | 24.4 | 3.7 | | TOPSOIL,ROCK, |
| 3514347 | 10-Oct-03 | 24.4 | 3.7 | 0 | SANDSTONE,, |
| 3506093 | 27-May-81 | 19.5 | 5.5 | 0 | SANDSTONE,, |
| 7210744 | 21-Aug-13 | 24.4 | 5.9 | | GRAVEL,, |
| 7210744 | 21-Aug-13 | 24.4 | 5.9 | | SANDSTONE,, |
| 7210744 | 21-Aug-13 | 24.4 | 5.9 | | SANDSTONE,, |
| 7210744 | 21-Aug-13 | 24.4 | 5.9 | 0 | SANDSTONE,, |
| 7318034 | 10-Aug-18 | 30.5 | 6.7 | | SAND,STONES, |
| 7318034 | 10-Aug-18 | 30.5 | 6.7 | | LIMESTONE,, |
| 7318034 | 10-Aug-18 | 30.5 | 6.7 | 0 | SANDSTONE,, |
| 7235561 | 05-Dec-14 | 32 | 0.6 | | HARDPAN,, |
| 7235561 | 05-Dec-14 | 32 | 0.6 | | LIMESTONE,, |
| 7235561 | 05-Dec-14 | 32 | 0.6 | 0 | LIMESTONE,, |
| 3510085 | 14-May-91 | 30.5 | 1.5 | | FILL,, |
| 3510085 | 14-May-91 | 30.5 | 1.5 | | CLAY,, |
| 3510085 | 14-May-91 | 30.5 | 1.5 | 7.3 | LIMESTONE,, |
| 7301340 | 06-Nov-17 | 30.5 | 6.4 | | SANDSTONE,LIMESTONE, |
| 7301340 | 06-Nov-17 | 30.5 | 6.4 | 0 | CLAY,SANDY,BOULDERS |
| 7111672 | 19-Aug-08 | 24.4 | 0 | | CLAY,STONES, |
| 7111672 | 19-Aug-08 | 24.4 | 0 | 0 | SANDSTONE,, |
| 3515320 | 29-Apr-06 | 18.3 | 4.9 | | TOPSOIL,STONES, |
| 3515320 | 29-Apr-06 | 18.3 | 4.9 | 0.3 | SANDSTONE,, |
| 3505865 | 19-Jun-80 | 25 | 6.1 | | FILL,, |
| 3505865 | 19-Jun-80 | 25 | 6.1 | 0.9 | SANDSTONE,, |
| 3513688 | 28-Feb-02 | 24.4 | 5.5 | | TOPSOIL,, |
| 3513688 | 28-Feb-02 | 24.4 | 5.5 | 1.2 | SANDSTONE,, |
| 3506573 | 15-Jul-83 | 22.9 | 0.6 | | SAND,FILL, |
| 3506573 | 15-Jul-83 | 22.9 | 0.6 | | CLAY,, |
| 3506573 | 15-Jul-83 | 22.9 | 0.6 | 6.4 | SANDSTONE,HARD, |
| 3506348 | 25-Sep-82 | 21.3 | 3.7 | | UNKNOWN TYPE,, |
| 3506348 | 25-Sep-82 | 21.3 | 3.7 | | UNKNOWN TYPE,, |
| 3506348 | 25-Sep-82 | 21.3 | 3.7 | 0 | UNKNOWN TYPE,, |

| | | | | | |
|---------|-----------|------|------|-----|---------------------------|
| 3515475 | 16-Aug-06 | 0 | 0 | 0 | „ |
| 3507175 | 16-Aug-85 | 27.4 | 9.1 | | SAND,STONES,PACKED |
| 3507175 | 16-Aug-85 | 27.4 | 9.1 | | SANDSTONE,, |
| 3507175 | 16-Aug-85 | 27.4 | 9.1 | 2.7 | SANDSTONE,, |
| 3503310 | 28-Feb-73 | 23.5 | 3 | | SAND,, |
| 3503310 | 28-Feb-73 | 23.5 | 3 | 1.8 | SANDSTONE,, |
| 7279801 | 10-Nov-16 | 18.6 | 3 | | SANDSTONE,SANDY,CLAY |
| 7279801 | 10-Nov-16 | 18.6 | 3 | | SANDSTONE,, |
| 7279801 | 10-Nov-16 | 18.6 | 3 | | SANDSTONE,, |
| 7279801 | 10-Nov-16 | 18.6 | 3 | | SANDSTONE,, |
| 7279801 | 10-Nov-16 | 18.6 | 3 | 0 | SANDSTONE,, |
| 7206700 | 30-Jul-13 | 25 | 3.7 | | GRAVEL,, |
| 7206700 | 30-Jul-13 | 25 | 3.7 | | SANDSTONE,, |
| 7206700 | 30-Jul-13 | 25 | 3.7 | | SANDSTONE,, |
| 7206700 | 30-Jul-13 | 25 | 3.7 | 0 | SANDSTONE,, |
| 7287926 | 05-May-17 | 31.7 | 5.7 | | CLAY,STONES, |
| 7287926 | 05-May-17 | 31.7 | 5.7 | | SANDSTONE,LIMESTONE, |
| 7287926 | 05-May-17 | 31.7 | 5.7 | | SANDSTONE,LIMESTONE, |
| 7287926 | 05-May-17 | 31.7 | 5.7 | 0 | SANDSTONE,LIMESTONE, |
| 3513520 | 05-Sep-01 | 0 | 0 | 0 | „ |
| 7318044 | 15-Aug-18 | 40.8 | 4.2 | | SAND,GRAVEL,BOULDERS |
| 7318044 | 15-Aug-18 | 40.8 | 4.2 | | LIMESTONE,, |
| 7318044 | 15-Aug-18 | 40.8 | 4.2 | 0 | SANDSTONE,, |
| 3500437 | 10-Aug-55 | 9.8 | 2.7 | | CLAY,, |
| 3500437 | 10-Aug-55 | 9.8 | 2.7 | 7.3 | SANDSTONE,, |
| 3502838 | 31-Jul-71 | 11 | 2.1 | | MEDIUM SAND,, |
| 3502838 | 31-Jul-71 | 11 | 2.1 | 0.9 | SANDSTONE,, |
| 3513522 | 05-Sep-01 | 0 | 0 | 0 | „ |
| 3503337 | 11-May-73 | 14.6 | 3 | | SAND,, |
| 3503337 | 11-May-73 | 14.6 | 3 | 0.9 | LIMESTONE,, |
| 7292141 | 21-Jun-17 | 42.7 | 3.7 | | SAND,STONES, |
| 7292141 | 21-Jun-17 | 42.7 | 3.7 | | LIMESTONE,, |
| 7292141 | 21-Jun-17 | 42.7 | 3.7 | | SANDSTONE,, |
| 7292141 | 21-Jun-17 | 42.7 | 3.7 | | SANDSTONE,, |
| 7292141 | 21-Jun-17 | 42.7 | 3.7 | 0 | SANDSTONE,, |
| 3513232 | 19-Jan-01 | 19.8 | 11.6 | | CLAY,STONES, |
| 3513232 | 19-Jan-01 | 19.8 | 11.6 | | SANDSTONE,, |
| 3513232 | 19-Jan-01 | 19.8 | 11.6 | | SANDSTONE,, |
| 3513232 | 19-Jan-01 | 19.8 | 11.6 | | SANDSTONE,, |
| 3513232 | 19-Jan-01 | 19.8 | 11.6 | 1.2 | SANDSTONE,, |
| 7187428 | 06-Jun-12 | 25.9 | 1.9 | | TOPSOIL,STONES, |
| 7187428 | 06-Jun-12 | 25.9 | 1.9 | 0 | SANDSTONE,, |
| 3505949 | 07-Jul-80 | 14.6 | 0.9 | | SAND,STONES, |
| 3505949 | 07-Jul-80 | 14.6 | 0.9 | 4.3 | SANDSTONE,, |
| 3514233 | 28-Jun-03 | 11.6 | 0 | 0 | UNKNOWN TYPE,, |
| 3512364 | 13-May-98 | 30.5 | 0.9 | | CLAY,SANDY, |
| 3512364 | 13-May-98 | 30.5 | 0.9 | | SAND,STONES,WATER-BEARING |
| 3512364 | 13-May-98 | 30.5 | 0.9 | | SANDSTONE,HARD, |
| 3512364 | 13-May-98 | 30.5 | 0.9 | 3.7 | GRANITE,HARD,VERY |
| 3515167 | 19-Oct-05 | 18.3 | 1.5 | | CLAY,SAND, |
| 3515167 | 19-Oct-05 | 18.3 | 1.5 | 2.4 | SANDSTONE,, |
| 7187580 | 20-Jul-12 | 26.8 | 6.1 | | TOPSOIL,, |
| 7187580 | 20-Jul-12 | 26.8 | 6.1 | | LIMESTONE,, |
| 7187580 | 20-Jul-12 | 26.8 | 6.1 | 0 | SANDSTONE,, |
| 7210747 | 10-Sep-13 | 30.5 | 0 | | LIMESTONE,, |
| 7210747 | 10-Sep-13 | 30.5 | 0 | | SANDSTONE,, |
| 7210747 | 10-Sep-13 | 30.5 | 0 | | SANDSTONE,LIMESTONE, |
| 7210747 | 10-Sep-13 | 30.5 | 0 | 0 | SANDSTONE,LIMESTONE, |
| 7336868 | 31-May-19 | 44.8 | 4.2 | | SAND,CLAY, |
| 7336868 | 31-May-19 | 44.8 | 4.2 | | SANDSTONE,LIMESTONE, |
| 7336868 | 31-May-19 | 44.8 | 4.2 | | SANDSTONE,LIMESTONE, |
| 7336868 | 31-May-19 | 44.8 | 4.2 | 0 | SANDSTONE,LIMESTONE, |
| 7296315 | 14-Aug-17 | 36.6 | 5.5 | | SAND,ROCK,FRACTURED |
| 7296315 | 14-Aug-17 | 36.6 | 5.5 | | LIMESTONE,, |
| 7296315 | 14-Aug-17 | 36.6 | 5.5 | | SANDSTONE,, |
| 7296315 | 14-Aug-17 | 36.6 | 5.5 | | SANDSTONE,, |
| 7296315 | 14-Aug-17 | 36.6 | 5.5 | 0 | SANDSTONE,, |
| 3502509 | 20-Nov-69 | 24.7 | 3.7 | | CLAY,MEDIUM SAND,BOULDERS |

| | | | | | |
|---------|-----------|------|-----|-----|-------------------------|
| 3502509 | 20-Nov-69 | 24.7 | 3.7 | 1.2 | SANDSTONE,, |
| 3507240 | 06-Nov-85 | 22.6 | 9.1 | | SAND,GRAVEL, |
| 3507240 | 06-Nov-85 | 22.6 | 9.1 | | SAND,GRAVEL,HARDPAN |
| 3507240 | 06-Nov-85 | 22.6 | 9.1 | | SANDSTONE,, |
| 3507240 | 06-Nov-85 | 22.6 | 9.1 | 6.7 | SANDSTONE,, |
| 3503828 | 09-Sep-74 | 18.3 | 2.4 | | TOPSOIL,, |
| 3503828 | 09-Sep-74 | 18.3 | 2.4 | 0.6 | SANDSTONE,, |
| 3500407 | 09-Jun-61 | 13.4 | 2.7 | | SANDSTONE,, |
| 3500407 | 09-Jun-61 | 13.4 | 2.7 | 0 | SANDSTONE,, |
| 3502909 | 06-Nov-71 | 15.2 | 3 | | MEDIUM SAND,SILT, |
| 3502909 | 06-Nov-71 | 15.2 | 3 | 3 | SANDSTONE,, |
| 3506858 | 15-Jun-84 | 24.4 | 4.6 | | TOPSOIL,PACKED, |
| 3506858 | 15-Jun-84 | 24.4 | 4.6 | | SANDSTONE,POROUS, |
| 3506858 | 15-Jun-84 | 24.4 | 4.6 | | SANDSTONE,HARD, |
| 3506858 | 15-Jun-84 | 24.4 | 4.6 | 0.6 | SANDSTONE,POROUS, |
| 3513523 | 05-Sep-01 | 7.9 | 0 | | QUICKSAND,, |
| 3513523 | 05-Sep-01 | 7.9 | 0 | 0 | STONES,, |
| 7307175 | 29-Sep-17 | 41.1 | 3.6 | 0 | ,,HARD |
| 3506953 | 17-Jul-84 | 18.3 | 5.5 | | TOPSOIL,, |
| 3506953 | 17-Jul-84 | 18.3 | 5.5 | 1.2 | SANDSTONE,, |
| 3514624 | 18-Aug-04 | 24.4 | 3.4 | | TOPSOIL,SAND, |
| 3514624 | 18-Aug-04 | 24.4 | 3.4 | 1.2 | SANDSTONE,, |
| 3502870 | 14-Aug-71 | 11.9 | 1.5 | | MEDIUM SAND,, |
| 3502870 | 14-Aug-71 | 11.9 | 1.5 | 4.6 | SANDSTONE,, |
| 7313720 | 23-May-18 | 28 | 8.1 | | SAND,STONES, |
| 7313720 | 23-May-18 | 28 | 8.1 | | LIMESTONE,, |
| 7313720 | 23-May-18 | 28 | 8.1 | 0 | SANDSTONE,, |
| 7187435 | 07-Jun-12 | 0 | 0 | 0 | ,, |
| 7287859 | 15-May-17 | 32.6 | 6.7 | | SAND,CLAY,BOULDERS |
| 7287859 | 15-May-17 | 32.6 | 6.7 | | LIMESTONE,, |
| 7287859 | 15-May-17 | 32.6 | 6.7 | | SANDSTONE,, |
| 7287859 | 15-May-17 | 32.6 | 6.7 | | SANDSTONE,, |
| 7287859 | 15-May-17 | 32.6 | 6.7 | 0 | SANDSTONE,, |
| 7040887 | 20-Nov-06 | 30.5 | 0 | 0 | SANDSTONE,, |
| 7222478 | 04-Jun-14 | 36 | 0 | | TOPSOIL,SANDY,LOOSE |
| 7222478 | 04-Jun-14 | 36 | 0 | | SANDSTONE,,HARD |
| 7222478 | 04-Jun-14 | 36 | 0 | 0 | GRANITE,,HARD |
| 7298664 | 20-Oct-17 | 39.6 | 0 | | TOPSOIL,SAND, |
| 7298664 | 20-Oct-17 | 39.6 | 0 | | SANDSTONE,, |
| 7298664 | 20-Oct-17 | 39.6 | 0 | | SANDSTONE,, |
| 7298664 | 20-Oct-17 | 39.6 | 0 | 0 | SANDSTONE,, |
| 3508657 | 12-May-88 | 18.6 | 4.9 | 0 | SANDSTONE,, |
| 3505026 | 17-Mar-78 | 14.9 | 1.2 | | SAND,PACKED, |
| 3505026 | 17-Mar-78 | 14.9 | 1.2 | 5.2 | SANDSTONE,HARD, |
| 7285379 | 17-Jan-17 | 25 | 3.7 | | SAND,STONES, |
| 7285379 | 17-Jan-17 | 25 | 3.7 | | LIMESTONE,,FRACTURED |
| 7285379 | 17-Jan-17 | 25 | 3.7 | | LIMESTONE,, |
| 7285379 | 17-Jan-17 | 25 | 3.7 | | SANDSTONE,LIMESTONE, |
| 7285379 | 17-Jan-17 | 25 | 3.7 | | SANDSTONE,LIMESTONE, |
| 7285379 | 17-Jan-17 | 25 | 3.7 | 0 | SANDSTONE,LIMESTONE, |
| 3513844 | 26-Aug-02 | 13.1 | 0.6 | | SAND,, |
| 3513844 | 26-Aug-02 | 13.1 | 0.6 | 4.6 | SANDSTONE,, |
| 3506294 | 30-Apr-82 | 17.7 | 1.5 | | FINE SAND,, |
| 3506294 | 30-Apr-82 | 17.7 | 1.5 | 0.9 | SANDSTONE,LAYERED, |
| 3515528 | 27-Oct-06 | 0 | 0 | 0 | ,, |
| 3502842 | 08-Jul-71 | 18.9 | 7 | | MEDIUM SAND,CLAY,GRAVEL |
| 3502842 | 08-Jul-71 | 18.9 | 7 | | LIMESTONE,, |
| 3502842 | 08-Jul-71 | 18.9 | 7 | 5.8 | SANDSTONE,, |
| 3505086 | 16-May-78 | 19.5 | 0 | | CLAY,, |
| 3505086 | 16-May-78 | 19.5 | 0 | 8.2 | SANDSTONE,, |
| 3514751 | 04-Nov-04 | 30.5 | 3.5 | | TOPSOIL,ROCK, |
| 3514751 | 04-Nov-04 | 30.5 | 3.5 | 0 | SANDSTONE,, |
| 7299160 | 18-Sep-17 | 42.7 | 3.8 | | SAND,STONES, |
| 7299160 | 18-Sep-17 | 42.7 | 3.8 | | SANDSTONE,LIMESTONE, |
| 7299160 | 18-Sep-17 | 42.7 | 3.8 | | SANDSTONE,, |
| 7299160 | 18-Sep-17 | 42.7 | 3.8 | | SANDSTONE,, |
| 7299160 | 18-Sep-17 | 42.7 | 3.8 | 0 | SANDSTONE,, |
| 3511193 | 16-Aug-94 | 26.2 | 4.6 | | GRAVEL,, |
| 3511193 | 16-Aug-94 | 26.2 | 4.6 | 1.8 | SANDSTONE,LIMESTONE, |

| | | | | |
|---------|-----------|------|------|------------------------------|
| 3500406 | 07-Jun-61 | 13.7 | 3 | TOPSOIL,MEDIUM SAND,BOULDERS |
| 3500406 | 07-Jun-61 | 13.7 | 3 | 0.9 SANDSTONE,, |
| 3515312 | 18-Apr-06 | 32 | 5 | SAND,CLAY, |
| 3515312 | 18-Apr-06 | 32 | 5 | 1.2 SANDSTONE,, |
| 3513720 | 23-May-02 | 25 | 7.3 | CLAY,STONES, |
| 3513720 | 23-May-02 | 25 | 7.3 | SANDSTONE,, |
| 3513720 | 23-May-02 | 25 | 7.3 | SANDSTONE,, |
| 3513720 | 23-May-02 | 25 | 7.3 | 0.9 SANDSTONE,, |
| 3514472 | 27-Feb-04 | 18.9 | 4.3 | TOPSOIL,STONES, |
| 3514472 | 27-Feb-04 | 18.9 | 4.3 | 3.4 SANDSTONE,, |
| 7114730 | 21-Oct-08 | 0 | 0 | 0,, |
| 3513797 | 30-Mar-02 | 22.3 | 0 | SAND,BOULDERS,LOOSE |
| 3513797 | 30-Mar-02 | 22.3 | 0 | 5.2 SANDSTONE,HARD, |
| 7313717 | 22-May-18 | 27.4 | 5.9 | SAND,STONES, |
| 7313717 | 22-May-18 | 27.4 | 5.9 | LIMESTONE,, |
| 7313717 | 22-May-18 | 27.4 | 5.9 | 0 SANDSTONE,LIMESTONE, |
| 3510814 | 23-Aug-93 | 21.6 | 6.7 | GRAVEL,, |
| 3510814 | 23-Aug-93 | 21.6 | 6.7 | 0.6 SANDSTONE,, |
| 7118461 | 26-Sep-08 | 42.7 | 3.2 | SAND,GRAVEL, |
| 7118461 | 26-Sep-08 | 42.7 | 3.2 | 0 SANDSTONE,, |
| 3515249 | 19-Dec-05 | 24.4 | 2.4 | TOPSOIL,, |
| 3515249 | 19-Dec-05 | 24.4 | 2.4 | 1.2 SANDSTONE,, |
| 3510004 | 13-Sep-91 | 0 | 6.1 | 0,, |
| 3504101 | 10-Aug-75 | 13.7 | 1.2 | SAND,LOOSE, |
| 3504101 | 10-Aug-75 | 13.7 | 1.2 | SAND,GRAVEL,PACKED |
| 3504101 | 10-Aug-75 | 13.7 | 1.2 | 3.4 SANDSTONE,HARD, |
| 7050455 | 13-Aug-07 | 30.5 | 0 | CLAY,GRAVEL,STONES |
| 7050455 | 13-Aug-07 | 30.5 | 0 | SANDSTONE,, |
| 7050455 | 13-Aug-07 | 30.5 | 0 | SANDSTONE,, |
| 7050455 | 13-Aug-07 | 30.5 | 0 | 0 SANDSTONE,, |
| 3514232 | 28-Jun-03 | 0 | 0 | 0,, |
| 3508658 | 12-May-88 | 18.9 | 3.4 | TOPSOIL,, |
| 3508658 | 12-May-88 | 18.9 | 3.4 | 1.2 SANDSTONE,, |
| 3508256 | 31-Mar-88 | 25.9 | 3 | SAND,, |
| 3508256 | 31-Mar-88 | 25.9 | 3 | 1.8 SANDSTONE,, |
| 7336869 | 29-May-19 | 36.9 | 2 | SAND,GRAVEL,BOULDERS |
| 7336869 | 29-May-19 | 36.9 | 2 | SANDSTONE,LIMESTONE, |
| 7336869 | 29-May-19 | 36.9 | 2 | 0 SANDSTONE,LIMESTONE, |
| 3515479 | 15-Sep-06 | 15.2 | 3.7 | TOPSOIL,STONES, |
| 3515479 | 15-Sep-06 | 15.2 | 3.7 | 0.6 SANDSTONE,, |
| 7270162 | 18-May-16 | 30.5 | 10.3 | TOPSOIL,ROCK,FILL |
| 7270162 | 18-May-16 | 30.5 | 10.3 | LIMESTONE,,HARD |
| 7270162 | 18-May-16 | 30.5 | 10.3 | 0 SANDSTONE,,HARD |
| 3500438 | 26-Aug-58 | 14.6 | 3.7 | MEDIUM SAND,CLAY, |
| 3500438 | 26-Aug-58 | 14.6 | 3.7 | 1.5 SANDSTONE,, |
| 7270189 | 16-Nov-15 | 37.2 | 8.1 | TOPSOIL,ROCK,FRACTURED |
| 7270189 | 16-Nov-15 | 37.2 | 8.1 | LIMESTONE,,HARD |
| 7270189 | 16-Nov-15 | 37.2 | 8.1 | 0 SAND,,HARD |
| 3500409 | 18-Jan-65 | 17.1 | 8.8 | LIMESTONE,, |
| 3500409 | 18-Jan-65 | 17.1 | 8.8 | LIMESTONE,, |
| 3500409 | 18-Jan-65 | 17.1 | 8.8 | SANDSTONE,, |
| 3500409 | 18-Jan-65 | 17.1 | 8.8 | LIMESTONE,, |
| 3500409 | 18-Jan-65 | 17.1 | 8.8 | 0 ROCK,, |
| 7324309 | 06-Nov-18 | 29.9 | 5.4 | SAND,STONES, |
| 7324309 | 06-Nov-18 | 29.9 | 5.4 | LIMESTONE,, |
| 7324309 | 06-Nov-18 | 29.9 | 5.4 | SANDSTONE,, |
| 7324309 | 06-Nov-18 | 29.9 | 5.4 | 0 SANDSTONE,, |
| 3500408 | 02-Feb-62 | 11.3 | 7.6 | TOPSOIL,, |
| 3500408 | 02-Feb-62 | 11.3 | 7.6 | SANDSTONE,, |
| 3500408 | 02-Feb-62 | 11.3 | 7.6 | 0.3 SANDSTONE,, |
| 7109803 | 05-Jun-08 | 30.5 | 9.1 | SAND,GRAVEL, |
| 7109803 | 05-Jun-08 | 30.5 | 9.1 | 0 LIMESTONE,SANDSTONE, |
| 3504651 | 24-May-77 | 22.3 | 4.6 | SANDSTONE,FRACTURED, |
| 3504651 | 24-May-77 | 22.3 | 4.6 | SANDSTONE,HARD, |
| 3504651 | 24-May-77 | 22.3 | 4.6 | 0 SANDSTONE,HARD, |
| 7187581 | 20-Jul-12 | 26.8 | 6.1 | HARDPAN,TILL, |
| 7187581 | 20-Jul-12 | 26.8 | 6.1 | LIMESTONE,, |
| 7187581 | 20-Jul-12 | 26.8 | 6.1 | 0 SANDSTONE,, |
| 3505126 | 14-Jul-78 | 22.9 | 8.2 | SAND,STONES,FRACTURED |

| | | | | | |
|---------|-----------|------|-----|-----|--------------------------|
| 3505126 | 14-Jul-78 | 22.9 | 8.2 | 1.2 | SANDSTONE,, |
| 3504007 | 21-Apr-75 | 14.6 | 1.5 | | CLAY,, |
| 3504007 | 21-Apr-75 | 14.6 | 1.5 | 0.3 | GRANITE,, |
| 7340325 | 21-Jun-19 | 37.5 | 3.2 | | CLAY,BOULDERS,SANDY |
| 7340325 | 21-Jun-19 | 37.5 | 3.2 | | SANDSTONE,, |
| 7340325 | 21-Jun-19 | 37.5 | 3.2 | | SANDSTONE,, |
| 7340325 | 21-Jun-19 | 37.5 | 3.2 | 0 | SANDSTONE,, |
| 3504630 | 26-Apr-77 | 21.9 | 0.9 | | SAND,GRAVEL,LOOSE |
| 3504630 | 26-Apr-77 | 21.9 | 0.9 | | SANDSTONE,FRACTURED,SOFT |
| 3504630 | 26-Apr-77 | 21.9 | 0.9 | 0.6 | SANDSTONE,HARD, |
| 3515030 | 13-Jul-05 | 30.5 | 0 | | COARSE GRAVEL,STONES, |
| 3515030 | 13-Jul-05 | 30.5 | 0 | | FINE GRAVEL,, |
| 3515030 | 13-Jul-05 | 30.5 | 0 | | SANDSTONE,, |
| 3515030 | 13-Jul-05 | 30.5 | 0 | | SANDSTONE,, |
| 3515030 | 13-Jul-05 | 30.5 | 0 | | SANDSTONE,, |
| 3515030 | 13-Jul-05 | 30.5 | 0 | | SANDSTONE,, |
| 3515030 | 13-Jul-05 | 30.5 | 0 | 7.9 | GRANITE,, |
| 7315310 | 12-Jun-18 | 41.8 | 3.2 | | SAND,CLAY, |
| 7315310 | 12-Jun-18 | 41.8 | 3.2 | 0 | SANDSTONE,, |
| 7296375 | 08-Sep-17 | 0 | 0 | 0 | ,, |

HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



APPENDIX G – NITRATE DILUTION CALCULATIONS

Nitrate Dilution Calculation
Scenario (40 mg/L)

CCO-20-0203

Proposed Subdivision - Tweedsmuir Gardiner Property
Nitrate Loading Calculations (Apr.9.2021)

Land Area 84.004556 ha
840045.56 m²

Water Surplus (Ws)

Ws = Precipitation - Evapotranspiration

Precipitation 943.4 mm/yr
Evapotranspiration 609.52387 mm/yr

Ws 333.87613 mm/yr
0.3338761 m/yr

Infiltration Factor (I_f) per MOEE 1995

Topo Rolling Land/Hilly Land (1.6% slope) 0.14
Soil 30:70 ratio of bedrock/sand 0.31
Cover Cultivated Land 0.1

I_f = 0.545006

Infiltration (I)

I = Ws * I_f 181.9645 mm/yr
I = 0.1819645 m/yr

Dilution Water Available (D_w)

D_w = A * I

D_w = 152858.47 m³/yr
418790.33 L/day

Background Nitrate Concentration (C_b) C_b = 1.526 mg/L

Max Boundary Nitrate Concentration (C_{boun}) C_{boun} = 10 mg/L

Effluent Loading (Q_e) Q_e = 1000 L/day/Residential Lot

Effluent Nitrate Concentration (C_e) C_e = 40 mg/L

Maximum Allowable Number of Lots (N) or

$N = [(C_{boun} * D_w) - (C_b * D_w)] / [(C_e * Q_e) - (C_b * Q_e)]$
N = 118.298

Calculated Nitrate Concentration (C_w)

N = 118
 $C_w = [(C_b * D_w) + (C_e * Q_e * N)] / [D_w + (Q_e * N)]$
C_w = 9.983

C_w <= C_{boun}, therefore proposed development will not exceed ODWO at property limit

Potential Evapotranspiration

Thornthwaite Method, "Hydrology & Hydraulic Systems", Gupta

Etmonth = 1.62 (10*Tm)/I^a

where:

a = 675*10⁻⁹*I³ - 771 *10⁻⁷*I² +179*10⁻⁴ * I + 492*10⁻³

I = sum (Tm/5)^{1.514}

Stn: Ottawa MacDonald -Cartier Int'l
Site Climate ID: 6106000

| Month | Temp C | I | ET (cm) unadjusted | Daylight Factor | ET (cm) adjusted |
|----------|--------|----------|-----------------------|--------------------|---------------------|
| January | -10.3 | | | | |
| Feb | -8.1 | | | | |
| March | -2.3 | | | | |
| April | 6.3 | 1.4189 | 2.8610 | 1.13 | 3.2330 |
| May | 13.3 | 4.3982 | 6.4518 | 1.28 | 8.2583 |
| June | 18.5 | 7.2487 | 9.2396 | 1.29 | 11.9191 |
| July | 21 | 8.7821 | 10.6062 | 1.31 | 13.8942 |
| Aug | 19.8 | 8.0336 | 9.9484 | 1.21 | 12.0375 |
| Sept | 15 | 5.2767 | 7.3542 | 1.04 | 7.6483 |
| Oct | 8 | 2.0372 | 3.7105 | 0.94 | 3.4879 |
| Nov | 1.5 | 0.1616 | 0.6001 | 0.79 | 0.4741 |
| Dec | -6.2 | | | | |
| I | | 37.35695 | 50.7719 | | 60.9524 |
| thus a = | | 1.0883 | | | |

Notes:

-Daylight Factor is an adjustment Factor for possible hours of sunshine based on latitude for Ottawa.

-Monthly temperatures from Environment Canada Climate Normals (1981-2010)

| |
|---|
| Input data from user |
| Set value |
| Site Constant (adjustment for latitude) |
| Calculated by worksheet |

HYDROGEOLOGICAL ASSESSMENT GARDINERS SHORE SUBDIVISION, BECKWITH ON



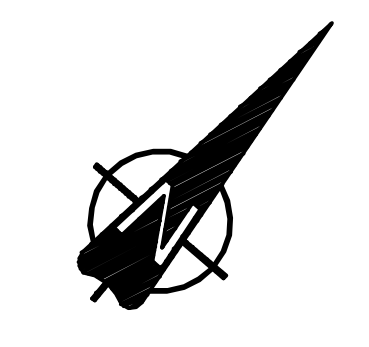
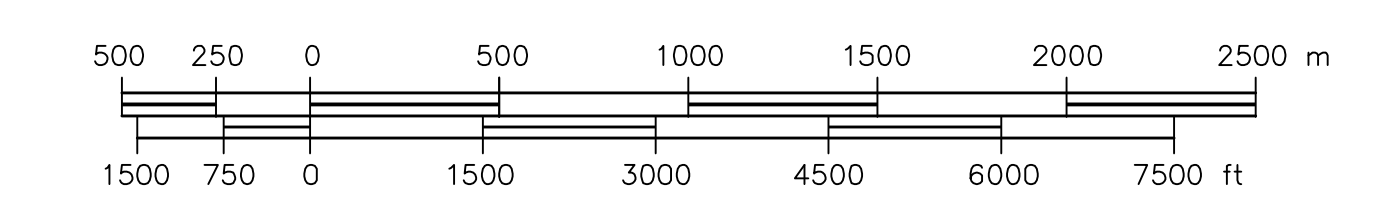
APPENDIX H – BECKWITH TOWNSHIP OFFICIAL PLAN



2010 Official Plan of the Township of Beckwith

Schedule A Land Use

Scale 1:20000

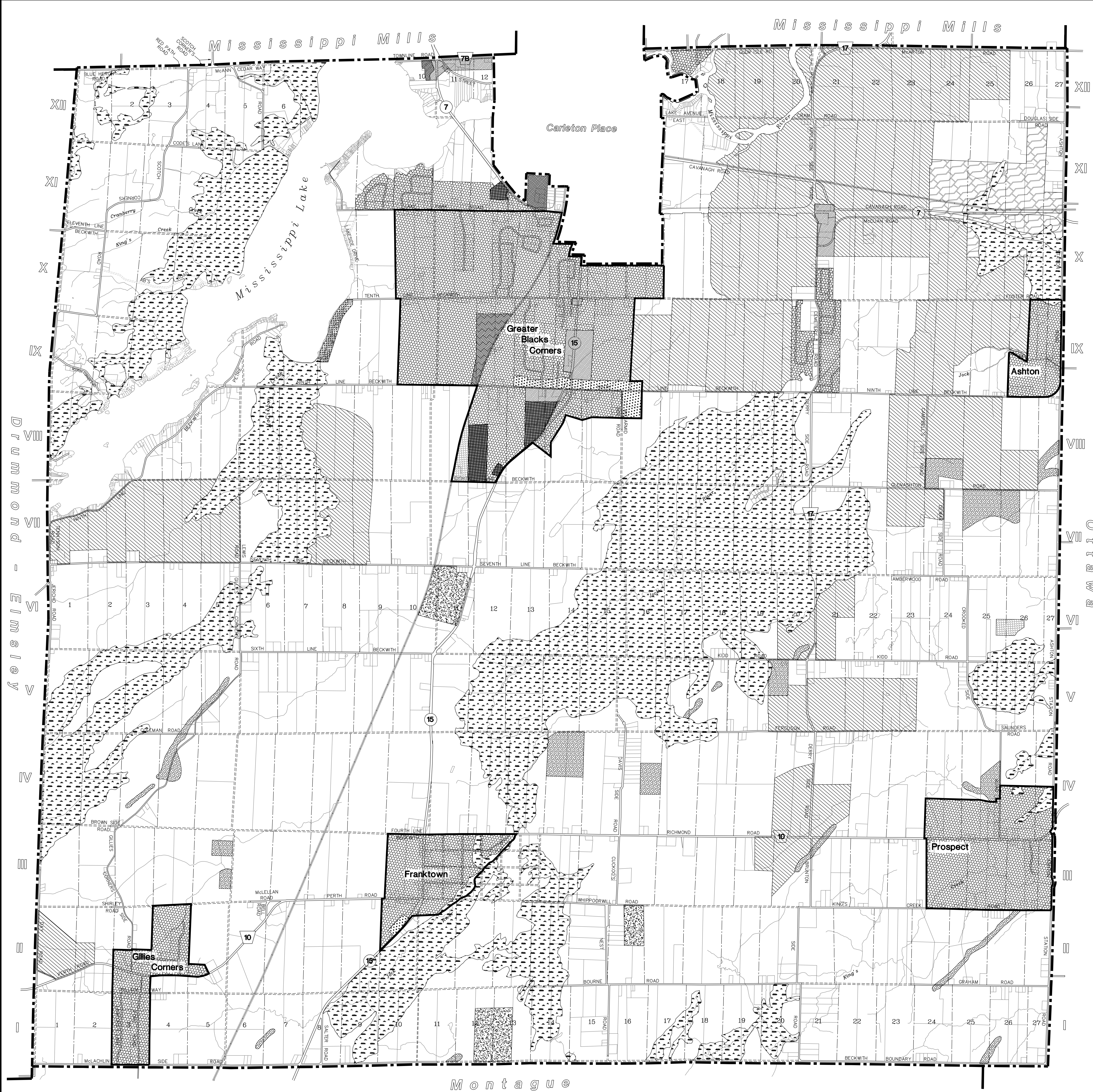


| | | | |
|--------------------|--|----------------------|--|
| township boundary | | county road | |
| provincial highway | | secondary local road | |
| primary local road | | private road | |
| unopened row | | | |

Legend:

Community Development Areas

| | |
|---|--|
| Residential | |
| Commercial | |
| Industrial | |
| Institutional | |
| Rural Areas | |
| Agriculture | |
| Mineral Aggregate Pit | |
| Mineral Aggregate Quarry | |
| Wetlands | |
| Rural Lands | |
| Mobile Home Park | |
| Wrecking Yard | |
| Airport | |
| Waste Disposal Site | |
| Hauled Septage Disposal Site | |
| Rural Residential - Special policy Area | |
| Highway 7 Corridor Area | |



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Printed: 20-Nov-12

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