HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ON

Project No.: CCO-22-0256

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McINTOSH PERRY

EXECUTIVE SUMMARY

McIntosh Perry (MP) was retained by Grizzly Homes ('the Client') to conduct a Hydrogeological Assessment and Terrain Analysis at the Grizzly Homes Subdivision in the Township of Beckwith, Franktown, Ontario (the Site) (Figure 1). The site is bounded by Fourth Line Road to the north, Perth Road to the south, and is located approximately 275m west of Highway 15, near the hamlet of Franktown within the Township of Beckwith. An outline of the Site, showing the neighbouring properties is presented on Figure 2. At the present time, the Site consists primarily of undeveloped shrub/forested land, with the exception of the presence of a single residential dwelling in the northern portion of the site.

The Site is relatively flat. 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 148 metres above sea level (m asl).

McIntosh Perry supervised the installation of four on-site water wells, as well as the excavation of fifteen on-site test pits. Wells were used for groundwater quality and quantity testing, and all test well locations were selected 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 shallow bedrock, sand, gravelly sand or clay overlain by topsoil. Bedrock was found at a maximum depth of approximately 1.7 metres below ground surface (m bgs) and generally consists of dolostone and sandstone of the Beekmantown Group 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 Grizzly Homes ('the Client') to conduct a Hydrogeological Assessment and Terrain Analysis at a property located west of Highway 15, between Fourth Line Road and Perth Road in the Township of Beckwith, Franktown, Ontario (the Site) (Figure 1). The approximate civic address of the property is 2084 Fourth Line Road, Smiths Falls. This hydrogeological assessment and terrain analysis has been prepared in support of an application for the approval of a proposed 30-lot subdivision at the Site, which currently consists primarily of undeveloped forested land with the exception of a single residential dwelling located on the northern portion of the Site.

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 2021 with a Site reconnaissance to observe surface conditions and select drilling locations. The work presented herein involved the following:

- Topographic survey of on-site drilled wells (completed by McIntosh Perry Surveying Inc.);
- Hydrogeological assessment (for evaluating water supply); and
- Terrain Analysis (for evaluating existing conditions for private sewage treatment).

The property is owned by Grizzly Homes Inc. and is legally described as follows:

PT SW1/2 LT 10 CON 3 BECKWITH AS IN RS45238, EXCEPT 27R2160, 27R5512, 27R6268, 27R4263, 27R4808, 27R3949; S/T RS34528; BECKWITH

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 30 lots over a total area of approximately 27 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 in the western portion of the hamlet of Franktown within the Township of Beckwith in central Eastern Ontario, south of the Town of Carleton Place (Figure 1).

The Site currently exists predominantly as undeveloped forested/shrub land with the exception of a single residential dwelling located on the northern portion of the Site. There are residentially developed lands immediately north and south of the Site along Fourth Line Road and Perth Road, as well as to the east along Highway 15; otherwise, the surrounding land use is predominately forested land.

This region is characterized by thin overburden overlying Paleozoic bedrock (OGS, 2022; MECP, 2020).

The Site currently consists of forested land and several wetlands and has likely never been contemporarily developed with the exception of the existing residential present on the northern portion of the Site. On-site elevation ranges between 141 and 149 metres above sea level (m asl). The topography of the Site is generally flat.

2.2 Neighbouring Properties and Land Uses

For purposes of this report, Highway 15 is assumed to be oriented in a North-South direction. The property is bounded to the north by Fourth Line Road, Highway 15 and rural residential properties to the east, Perth Road and rural residential properties to the south, and undeveloped forested land 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 subject site and the surrounding properties to the east and south are located within a community development area designated as residential, while the properties to the north and west are designated as rural lands within rural areas in the Township of Beckwith's Official Plan. The Township's Official Plan – Schedule A is included as Appendix B.

2.3 Hydrology

The Site is relatively flat. Wetland areas appear to be present around the center of the Site. A small local waterbody is also present on Site, as seen in Figure 2. The Franktown Swamp, which forms part of the Upper Jock River (part of the Mississippi River system), is the closest permanent waterbody to the Site and is located approximately 550 m east of the Site at its closest point. On a local scale, shallow groundwater flow cannot be determined fully due to limited data, however there is likely a northwestern flow component and potentially more localized flow patterns toward on-site water features (pond, wetland). On a regional scale, groundwater in the deeper bedrock formation has a southern/southwestern component.

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, 2022). This classification is consistent with on-site observations made by McIntosh Perry. Based on OGS 2022 data, the underlying bedrock is classified as dolostone and sandstone of the Beekmantown Group, which is consistent with MECP WWIS Records (MECP 2020).

Well records for on-site drilled test wells indicate an average overburden thickness of approximately 1.0 m, with only one record indicating an overburden depth greater than 1.8 m. It should be noted that overburden thickness was recorded at less than 0.5 m in some areas of the Site. 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 – 4.3 m bgs, with an average depth of approximately 0.83 m bgs. Where noted in the well records, bedrock is typically referred to as either “sandstone” or “limestone” by the driller (Appendix C).

An offsite well used strictly for testing purposes located at 2030 Fourth Line Road indicates that overburden thickness is approximately 1.2 m.

2.4.2 *Recharge and Discharge Areas*

A review of topographic data, geological maps, and field notes show that the property is generally flat with some local sloping down towards the northwest. Shallow groundwater and surface water likely drain in this direction. Shallow groundwater in the northern portion of the site may move toward what appears to be a large on-site wetland complex and waterbody, located in the middle of the Site. In most areas of the Site, the terrain appears to be well-drained.

2.4.3 *Hydrogeologically Sensitive Areas*

The underlying bedrock appears to be relatively shallow across the property, ranging from 0.3 – 1.8 m bgs based on test well records. Areas exhibiting exposed bedrock were observed during fieldwork, closest to the south property boundary along Perth Road. Based on the thin overburden, the Site is considered to be hydrogeologically sensitive.

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 area, with forested/undeveloped and/or residential-rural properties in the immediate vicinity. None of these uses are expected to pose a significant source of potential contamination to the proposed development.

As there is no wastewater service available in the area surrounding the Site, there are likely individual on-site sewage systems at all nearby residences. There are currently no known services located on the Site, aside from private services assumed to be connected to the single detached dwelling present at the northern end of the site accessed from Fourth Line Road.

A review of the MECP WWIS database indicated Sixty-two (62) water wells located within 500 m of the Site. Sixty (60) of these wells are listed for domestic purposes, while the remaining two (2) wells are listed as either observation well or abandoned. The MECP WWIS records are shown on Figure 3, and data are summarized in Appendix D.

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 Grizzly Homes to drill four 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 the pumping test activities at the drilled test wells (TW2, TW3, TW4, TW5). 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.

It is important to note that TW1 is an existing offsite well, located at 2030 Fourth Line Road, Beckwith, ON.

Table 1: On-Site Test Well Details

Well ID	Depth (m bgs)	Completion Material[1]	Driller's Estimated Yield[2] (L/min)
TW 1 (offsite)	24.7	Sandstone	90
TW 2	30.5	Sandstone	90

TW 3	36.6	Sandstone	90
TW4	37.2	Sandstone	90
TW 5	42.7	Sandstone	90

[1] Bedrock formations as noted on Well Record
[2] Recommended pumping rates as noted on Well Record

The initial estimation of the yield and quality of water from each test well was made by the drillers during development, which occurred approximately one day 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 D.

A minimum six-hour pumping test was conducted at each of the four on-site test wells (TW2, TW3, TW4, and TW5) and the offsite private well (TW1), by McIntosh Perry staff (July 2021 – January 2022). During each test, the test wells were pumped at a rate not less than the driller-recommended pumping rate, with the exception of TW1, offsite which utilized existing plumbing fixtures. 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 five 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.

All samples were collected unfiltered and unchlorinated directly into clean bottles supplied by the analytical laboratory (Paracel Laboratories of Ottawa, ON). Prior to each sample collection in 2021, a field test for chlorine (disposable testing strips) was completed to ensure no residual chlorine persisted from the initial well shocking. Samples collected in April and May, 2023 utilized a zero-standardized Hach DR900 colorimeter for confirmation of zero chlorine residual.

Visual and olfactory observations of the pumped water were made during each pumping test to monitor for effervescence, odours, or other physical indicators of water quality. Samples were kept on ice and shipped directly to Paracel under strict chain of custody procedures. All samples were received by the laboratory within 24 hours of collection. Paracel 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 five pumping tests, water level monitoring consisted of manual readings with a water level tape. Drawdown was measured in the pumped wells and recovery 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 Additional Groundwater Sampling

Additional groundwater samples were collected in April and May of 2023, following the Spring freshet. This additional sampling is outlined in Sections 3.3.1 and 3.3.2 below.

3.3.1 *April 2023*

On April 17-19, 2023, additional groundwater samples were collected based on the occurrence of nitrate (non exceedance) concentrations observed at TW3 and TW4 from the 2021 sampling. In order to make additional observations, McIntosh Perry collected follow up samples from TW1, TW2, TW3, TW4, and TW5 to confirm current Site conditions. Four (4) surrounding properties located at 9477 Hwy 15, 9493 Hwy 15, 9578 Hwy 15, and 220 Perth Road were also sampled to characterize the groundwater surrounding the Site. Sampling locations are outlined on Figure 2.

A total of nine (9) locations (listed above) were sampled for the following parameters that may be related to surficial impacts based on shallow groundwater at the Site:

- Microbial parameters (E.Coli, Total Coliforms, and Fecal Coliforms);
- Nitrate;
- Nitrite;
- TKN;
- Ammonia; and
- Phosphorus.

Additionally, as requested by the Beckwith Township Peer Reviewer, two (2) Volatile Organic Compound (VOC) samples were collected from two non-adjacent on-Site test wells (TW2 and TW5).

Prior to sample collection, the on-Site test wells were purged a minimum of three (3) well volumes to allow for the influx of fresh formation water.

Between the 2021 and the April 2023 sample collections the following observations were made: at TW4, the concentration of nitrate decreased from 1.6 mg/L to 0.1 mg/L; at TW3 the concentration of nitrate remained constant between 2.4 mg/L and 2.8 mg/L; at TW5 the concentration of nitrate remained constant between 0.8 mg/L and 1.0 mg/L; and at TW2 the concentration of nitrate remained constant between 0.5 mg/L and 0.6 mg/L. A Total Coliform exceedance was observed at TW5 in the April 2023 sample that did not occur in the 2021 sample.

Nitrate was present in all the off-site wells, with the exception of TW1, at concentrations between 0.4 mg/L and 1.2 mg/L. The higher being from the wells located near Highway 15. Two of the off-site wells (220 Perth Rd and 9477 Hwy 15) exceeded for Total Coliform.

3.3.2 *May 2023*

Based on the higher nitrate concentrations and variations at TW3 and TW4, and the health-related parameter exceedance at TW5, McIntosh Perry completed another round of follow up samples at these wells.

On May 29, 2023, the three (3) locations (listed above) were sampled for the same parameters listed in Section 3.3.1 (microbial parameters, nitrate, nitrite, TKN, ammonia and phosphorus).

Prior to sample collection, the on-Site test wells were purged a minimum of three (3) well volumes to allow for the influx of fresh formation water.

Between the April 2023 and May 2023 sample collections the following observations were made: at TW4 the concentration of nitrate decreased from 0.1 mg/L to non-detected; at TW3 the concentration of nitrate remained constant between 2.8 mg/L and 2.7 mg/L; at TW5 the concentration of nitrate decreased from 1.0 mg/L to 0.4 mg/L. There was no Total Coliform exceedance observed at TW5.

3.4 Results

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

3.4.1 *Static Conditions provided by drillers*

Prior to the initiation of pumping, water levels were measured in the five test wells (Table 2, below). The static groundwater elevation ranged between 142.904 – 148.916 m asl at the time of the pumping tests (Figure 4). Static groundwater elevations suggest that on-site bedrock groundwater flow has a a southwestern flow component. 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]	Stick Up (m)	Static Groundwater Level (m btoc)	Static Water Elevation (m asl)
TW1	24.7	N/A	N/A	3.78	N/A
TW 2	30.5	142.904	0.626	4.762	138.142
TW 3	36.6	147.776	0.637	9.481	138.295
TW 4	37.2	148.299	0.648	11.51	136.789
TW 5	42.7	148.916	0.548	11.446	137.47

[1] As measured by McIntosh Perry Surveyors Inc. (May 2022)

3.4.2 *Test Well Installations*

Pumping tests were conducted at each of the five wells by McIntosh Perry. The pump, hose, and power supply were provided by Air Rock, who installed and removed the pump from each well, with the exception of TW1. TW1 was completed at an off-Site private residence where the plumbing was already installed. The discharged water was directed away from each pumping well and allowed to flow overland away and downgradient from the test well. At the time of the on-site pumping tests, the weather was approximately between 22-25 °C, with sun and clouds. The weather was approximately -15°C with sun and clouds at the time of the pumping test at TW1.

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

TW1

TW1 (an existing private well) was drilled to a depth of 24.7 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 cement. The hole was grouted from ground surface to approximately 12.2 m bgs. The remainder of the well is an open hole in the rock. The rock was described as “limestone” with “sandstone with limestone” from 1.22 m – 24.7 m by the driller. Water was encountered at 21.64 m and 22.9 m.

The driller initially estimated a yield of 90 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 18, 2022. The well was pumped at a rate of 21.1 L/min for over six hours, and monitored throughout the duration of the test. The pumping rate was manually measured throughout the pumping test using a volumetric bucket and stopwatch. The water levels stabilized at approximately 4.15 m btoc. Over 95% recovery in water level was achieved within 51 minutes of terminating the test.

TW 2

TW 2 was drilled to a depth of 30.48 m. The overburden was approximately 0.30 m thick at this location. A 13.4 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 ground surface to approximately 12.8 m bgs. The remainder of the well is an open hole in the rock. The rock was described as “limestone” from 0.30 m – 9.14 m and “sandstone” from 9.14 – 30.48 m by the driller. Water was encountered at 28.65 m.

The driller initially estimated a yield of 90 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 July 13, 2021. The well was pumped at a rate of 87.3 L/min for over six hours, and monitored throughout the duration of the test. The pumping rate was manually measured throughout the pumping test using a volumetric bucket and stopwatch. The water levels stabilized at approximately 9.5 m btoc (~133.404 m asl). Over 95% recovery in water level was achieved within 35 minutes of terminating the test.

TW 3

TW 3 was drilled to a depth of 36.6 m. The overburden was approximately 0.46 m thick at this location. A 13.4 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 12.8 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 0.46 – 9.14 m, and “sandstone” from 9.14 – 36.6 m. Water was encountered at 27.4 and 34.7 m.

The driller initially estimated a yield of 90 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 90 L/min for over six hours, and monitored throughout the duration of the test. The pumping rate was manually measured throughout the pumping test using a volumetric bucket and stopwatch. The water levels stabilized at approximately 9.9 m btoc (~137.876 m asl). Approximately 69% recovery in water level was achieved within 24 hours of terminating the test; it is assumed that atmospheric pressure changes and further

well development over the pumping and recovery period may have contributed to the failure to fully recover past 95%.

TW 4

TW 4 was drilled to a depth of 37.2 m. The overburden was approximately 1.83 m thick at this location. A 13.4 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 12.8 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 1.83 – 7.62 m, and “sandstone” from 7.62 – 37.2 m. Water was encountered at 29.9 and 35.4 m bgs.

The driller initially estimated a yield of 90 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 September 9, 2021. The well was pumped at a rate of 90 L/min for over six hours, and monitored throughout the duration of the test. The pumping rate was manually measured throughout the pumping test using a volumetric bucket and stopwatch. The water levels stabilized at approximately 11.85 m btoc (~136.449 m asl). Over 95% recovery in water level was achieved within 161 minutes of terminating the test.

TW 5

TW 5 was drilled to a depth of 42.7 m. The overburden was approximately 1.52 m thick at this location. A 13.4 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 12.8 m to the ground surface. The remainder of the well is an open hole in the rock. The rock was described as “limestone” from 1.52 – 8.23 m bgs, and “sandstone” from 8.23 – 42.7 m bgs by the driller. Water was encountered at 26.5 m bgs and again at 34.7 m bgs.

The driller initially estimated a yield of 90 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 90 L/min for over six hours, and monitored throughout the duration of the test. The pumping rate was manually measured throughout the pumping test using a volumetric bucket and stopwatch. The drawdown stabilized at approximately 11.64 m btoc (~137.276 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	21	0.431	Observation well not available at the time of the test	N/A	N/A
TW 2	87.27	4.791	Observation well not available at the time of the test	N/A	N/A
TW 3	90	0.632	Observation well not used due to proximity and accessibility	N/A	N/A
TW 4	90	0.377	TW2	Minimal drawdown observed	527
			TW3	Minimal drawdown observed	300
			TW5	Minimal drawdown observed	225
TW 5	90	0.236	Observation well not used due to proximity and accessibility	N/A	N/A

3.4.3 *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 five well locations, at least 7,560 L of water was pumped from each well. This volume exceeds the daily demand for water for a typical 4-bedroom home (2,000 L) and the minimum volume for a 6-hour pumping test (6,750 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, with the exception of TW3.

The five well locations were spaced 250 m apart at minimum. Due to the distance between wells and accessibility throughout the property, observation well measurements were not recorded, with the exception of TW4. Two observation wells (TW2 and TW3) were monitored during the 6-hour pumping test at TW4. Minimal drawdown (0.028 – 0.15 m btoc) was observed in the observation wells.

3.4.4 *Transmissivity and Storativity*

A summary of the transmissivity values calculated using the Cooper-Jacob method are presented in Table 4.

Table 4: Transmissivity Values

Well ID	Transmissivity (m^2/day) (Pumping Test Calculation) (Recovery Calculation)
TW 1	43.3 55.4
TW 2	13.9 16.7
TW 3	175.8 192.9
TW 4	26.7 26.4
TW 5	474.6 365.1

The calculations for transmissivity and storativity are presented in Appendix G.

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

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

Where possible, 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 (m^2/day)
- Q is the pumping rate (m^3/day)
- Δs is the change in hydraulic head over one log cycle (drawdown vs. log time)
- S is the storativity
- t_0 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

Transmissivity values ranged from 13.9 – 474.6 m^2/day, as calculated based on water level drawdown and recovery data from pumped test wells.

Storativity cannot be assessed properly without the use of observation wells, which were not available for a majority of the pumping tests. Observations wells were used during the pumping test at TW4, but minimal drawdown was observed.

3.4.5 *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 (m^2/day, the more conservative value is used)
- b is the thickness of X m, which corresponds to the interval between the bottom of the casing and the bottom of the well, used as aquifer thickness (m)

Table 5: Summary of Hydraulic Conductivity Calculations

Well ID	TW1	TW2	TW3	TW4	TW5
Hydraulic Conductivity (m/s)	4.01×10^{-5}	9.1×10^{-6}	8.56×10^{-5}	1.25×10^{-5}	1.41×10^{-4}

The hydraulic conductivity values summarized in Table 5 are generally consistent with higher values for limestone published by Freeze and Cherry, 1979 (10^{-9} to 10^{-5}).

The calculations for hydraulic conductivity are presented in Appendix G.

3.4.6 *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.

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}).

$$Q_{20}=0.68\ T\ Ha\ S_f$$

Where:

- Q_{20} is the twenty-year safe yield (m^3/day)
- T, is the transmissivity (m^2/day)
- Ha 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:

$$(Q_{20}) = (Q\ Ha\ Sf) / (s100 + 5\ \Delta s)$$

Where:

- Q_{20} is the twenty-year safe yield (m^3/day)
- Ha is the available water column height (m)
- S_f is a safety factor
- s100 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 E)

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 G.

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 18.75 L/min (considered the base rate for a house in this proposed development) if pumped constantly for 20 years (see Appendix E). The calculated maximum drawdown for all wells when theoretically pumped at a rate of 18.75 L/min was below 0.95 m, with the exception of TW2 which would be expected to have a drawdown of approximately 2.2m.

Table 6: Summary of Long-Term Yield Calculations

Well ID	TW1	TW2	TW3	TW4	TW5
Farvolden Method **Long Term Yield (Q_{20}) (L/min)**	207.7	90.2	1,220.3	165.5	3,032.4
Moell Method **Long Term Yield (Q_{20}) (L/min)**	206.1	84.7	1,155.5	249.0	3,518.2
Tested Pumping Rate (L/min)	21.0	81.8	90	90	90
Driller-Recommended Pumping Rate (L/min)	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 Q_{20} values. Data collected from the Site indicate a highly productive aquifer.

Additionally, the lowest and most conservative transmissivity value from each test well was used to calculate long-term yields using both the Farvolden and Moell method.

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, as well as the base rate of 18.75 L/min, which is considered a more reasonable peak flow rate for a house in this proposed development.

3.4.7 *Well Interference*

Using the Theis equation theory, the estimated cumulative drawdown across the Site generated by all proposed wells (30) was determined. Using the data collected during McIntosh Perry's field program, an average transmissivity and storativity were used (average T = 139.08 m2/day; assumed S = 1.0 x 10^{-4}). The theoretical drawdown across the Site, assuming all wells were pumping for 365 days, was calculated to be 0.369 m which is well within the available head for all test well locations. (see Appendix E).

3.4.7.1 Spring Water Level Measurements

Water levels at each test well were collected in the Spring (April and May, 2023) to assess the potential effects of seasonal fluctuations due to the Spring freshet. Water levels collected in 2021 are compared to the water levels collected in 2023, in Table 6 below:

Table 6: Spring Water Level Measurements

Test Well Location	Water Level	Collected in July of 2021	April 2023	May 2023	Maximum Fluctuation (m)
TW2	m bgs	4.762	1.985	N/A	2.777
	m asl	138.142	140.919	N/A	
TW3	m bgs	9.481	6.651	8.12	2.830
	m asl	138.295	141.125	139.656	
TW4	m bgs	11.51	6.954	8.632	4.556
	m asl	136.789	141.345	139.667	
TW5	m bgs	11.446	8.66	9.96	2.786
	m asl	137.47	140.256	138.956	

**The data collected from TW1 was from a neighboring residential property.

The fluctuation between July 2021 and Spring 2023, at each test well, ranges from 2.777 – 4.556 m, with an average fluctuation of 3.23 m.

Additionally, a Solonist level logger®3001 and a Solonist baro logger®3001 were installed at TW5 from April 18, 2023, to May 29, 2023, at 60-minute intervals. A fluctuation of 1.95 m was observed across the 42-day period. The level logger and baro logger data is included in Appendix H of this report.

3.4.8 *Water Quality*

Laboratory Certificates of Analysis for all groundwater testing are presented in Appendix F. A summary of all analytical results and field parameters collected from on-Site (TW2, TW3, TW4 and TW5) and off-Site wells (TW1, 9477 Hwy 15, 9493 Hwy 15, 9578 Hwy 15, and 220 Perth Road) are included in Table 7 and 8, respectively, and appended to this report. Samples that were taken twice during the six-hour test at all test well locations are denoted by a '-1' (e.g. TW1-1) for the initial sample, denoted by a '-2' (e.g. TW1-2) for the second sample.

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

- Maximum Allowable Concentration (MAC) for **Total Coliforms** were exceeded in samples TW5 (April 2023), 220 Perth Road, and 9477 Highway 15.
- Aesthetic Objectives (AO) for **colour** were exceeded in samples TW1-1 and TW1-2.

- Operational Guidelines (OG) for **hardness** were exceeded in samples TW1-1, TW1-2, TW2-1, TW2-2, TW3-1, TW3-2, TW4-1, and TW4-2;
- **Organic nitrogen** was calculated (total Kjeldahl nitrogen – ammonia as nitrogen) and found to be above the OG at TW3 in samples collected in April and May of 2023.
- Aesthetic Objects (AO) for laboratory-reported **turbidity** were exceeded in TW1-1, TW1-2, TW2-1, TW3-1, TW3-2, and TW4-1. 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. It is important to note that all field turbidity measurements were recorded below 1.0 NTU prior to the cessation of pumping (TW1: 0.87 NTU, TW2: 0.73 NTU, TW3: 0.89 NTU and TW4: 0.9 NTU);
- Aesthetic Objects (AO) for **iron** were exceeded in samples TW1-1, TW1-2, and TW3-1; these exceedances appear to be loosely associated with elevated turbidity and/or colour in TW1, TW2, and TW3.
- Aesthetic Objects (AO) for **manganese** were exceeded in samples TW1-1, TW1-2, TW2-1, TW2-2, and TW3-1.
- The health-related warning limit for **sodium** (20 mg/L) was exceeded in samples TW5-1 and TW5-2.
- The occurrence of **nitrate** concentrations in excess of 1 mg/L (1.3 – 2.8 mg/L) were observed in samples TW3-1, TW3-2, TW3 (sampled on April and May of 2023), TW4-1, and TW4-2.

3.5 Water Well Record Review

The MECP's WWIS database indicated sixty-two (62) water wells that are located within 500 m of the Site boundary. All wells are listed for domestic purposes, with the exception of one observation well, and one abandoned. The MECP WWIS records are shown on Figure 2, and data are summarized in Appendix D.

Most wells were completed in either limestone or sandstone, with isolated records listing driller-reported "shale" or "dolomite". After removing obviously erroneous records, the total depths of the wells ranged from 14.9 – 39.6 m, with an average depth of 25.6 m. Static water levels ranged from 0.3 – 13.7 m bgs and averaged at approximately 7.16 m bgs (MECP 2020).

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 – 4.3 m bgs, with an average depth of approximately 0.83 m bgs.

4.0 TERRAIN ANALYSIS

4.1 Preamble

A series of 15 test pits were advanced under supervision of McIntosh Perry staff on December 14th, 2021, at various locations throughout the Site (see Figure 7 for test pit locations). The test pit locations were advanced by use of a mini-excavator (operated by an Owner's representative) to determine the exact depth of overburden, depth to shallow groundwater and to permit the collection of overburden soil samples for characterization. Various soil samples were taken throughout the test pits by use of hand shovel and by use of mini-excavator, where required.

4.2 General Soils Evaluations

Overburden across the Site was found to be relatively shallow (< 1.7 m below ground surface (bgs)), having an average thickness of 0.95 m bgs. It should be noted that shallow overburden (<= 0.17 m bgs) was encountered in TP10.

Soil types, total depth, and depth to shallow groundwater for each of the 15 test pits are summarized in Table 7, below.

Table 9: Summary of Test Pits

Test Pit ID	Total Depth (m)	Depth to Water (m)	Main Soil Characterization	Notes
TP-1	0.40	0.30	Shallow bedrock	-Wet
TP-2	1.70	1.10	Sandy gravel/ gravelly sand, some silt/clay	-Wet -Cobbles up to 15 cm diameter
TP-3	1.45	0.80	Sandy gravel/ gravelly sand, some silt/clay	-Wet -Cobbles up to 25 cm diameter
TP-4	0.70	-	Sandy gravel/ gravelly sand, some silt/clay	-
TP-5	0.38	-	Gravelly sand, trace silt/clay	-Red/brown
TP-6	0.45	-	Gravelly sand, trace silt/clay	-Brown
TP-7	0.70	0.60	Gravelly sand, trace silt/clay	-Wet -Red
TP-8	0.25	-	Shallow bedrock	-

Test Pit ID	Total Depth (m)	Depth to Water (m)	Main Soil Characterization	Notes
TP-9	0.30	-	Shallow bedrock	-
TP-10	0.17	-	Shallow bedrock	-
TP-11	0.30	-	Shallow bedrock	-
TP-12	0.60	-	Silty gravelly sand, trace clay	-
TP-13	0.85	0.75	Gravelly sand, trace silt/clay	-Brown
TP-14	1.20	-	Silty gravelly sand, trace clay	-Very dry
TP-15	0.65	0.5	Sandy gravel/ gravelly sand, some silt/clay	-Wet -Cobbles

4.2.1 *Overburden Characterization*

Soil and shallow groundwater conditions for each of the 15 test pits are summarized in Appendix I. Test pit locations are outlined in Figure 7. Soil characterization is summarized in Figure 8.

Boundaries between zones on the logs are often not discrete but transitional and have been interpreted. Subsurface conditions described have various degrees of precision based on the frequency of test pits, uniformity of subsurface conditions and number of samples collected. Where conditions at locations other than the test pit locations are reported, these are inferred and may vary from the conditions at the test pits.

The soil descriptions in this report are based on commonly accepted classification and identification employed in engineering practice. McIntosh Perry employed judgement in the classification and description of soil and may not be exact but are accurate to what is common in current engineering practice.

Grain size distribution testing by an accredited geotechnical laboratory was undertaken on representative samples of the soils encountered. Refer to Appendix H for particle size distribution reports.

4.2.1.1 Topsoil

A layer of topsoil was encountered within all 15 test pits. The topsoil generally consists of dark brown sand and silt mix with organic material and had a varying thickness between 0.05m and 0.60m.

In test pit TP10, a thin layer of topsoil (0.17 m) was located directly on top of bedrock. In all other test pits, soil was encountered at varying thicknesses were located under the topsoil layer.

4.2.1.2 Shallow Bedrock

Soil was characterized as 'shallow bedrock' where less than 25 cm of native soil material was present under the topsoil. This occurred within test pits TP1, TP8, TP9, TP10 and TP11.

Test pits TP1, TP8, TP9, TP10 and TP11 are located within the East and North-East portions of the site (Figure 8).

4.2.1.3 Sandy Gravel/Gravelly Sand, Some Silt/Clay

Native deposits of sandy gravel/gravelly sand, some silt/clay were encountered within test pits TP2, TP3, TP4, and TP15, under the topsoil layer.

Test pits TP2, TP3, and TP4 are located within the East portion of the Site. Test pit TP15 is located within the South-West portion of the Site (Figure 8).

Sandy gravel/gravelly sand was also encountered within test pit TP1 from 0.20 m bgs to 0.40 m bgs.

4.2.1.4 Gravelly Sand, Trace Silt/Clay

Native deposits of gravelly sand, trace silt/clay were encountered within test pits TP5, TP6, TP7, and TP13.

The gravelly sand layer in both TP5 and TP7 was described as red/ brown. In TP6, a shelf of weathered bedrock was breaking off in larger chucks (up to 0.6 m) directly under the topsoil layer. Beside the bedrock shelf was a layer of brown sand of from 0.15 m to 0.45 m bgs. The sand layer in TP13 is described as brown gravelly sand.

Test pits TP5, TP6, TP7, and TP13 are located within the West and South-West portions of the site (Figure 8).

4.2.1.5 Silty Gravelly Sand, Trace Clay

Native deposits of silty gravelly sand, trace clay were encountered within test pits TP12 and TP14.

Both test pits TP12 and TP14 are located within the North, North-West portion of the Site.

The silty gravelly sand layer located within TP12 is described as grey. The silty gravelly sand layer within TP14 is located under a relatively thick layer of topsoil (0.6 m). The silty gravelly sand layer is described as having a dry and crumbly texture.

4.2.2 *Soil Classification for Private Sanitary Servicing*

Comparison of the soil classification for the Unified Soil Classification as provided in the Ministry of Municipal Affairs and Housing (MMAH) Supplementary Standard SB-6: Time and Soil Descriptions, reveals that the main native soils assessed on-site for **Test Pits TP2 through TP7, and Test Pits TP12 through TP15** fall within either of the following:

- GW-SW: Well graded gravel and sands mixtures, some fines

- According to Table 2 of SB-6, the SW group of soils has a coefficient of permeability (K) of 10^{-1} to 10^{-4} cm/sec with a percolation time (T) of 1 to 12 min/cm.
  - Due to the permeable to medium permeability of this soil type, it is deemed acceptable as the native receiving soil for a proposed Class 4 sewage systems.

- SP: Poorly graded sand, gravelly sand, little or no fines
  - According to Table 2 of SB-6, the SP group of soils has a coefficient of permeability (K) of 10^{-1} to 10^{-3} cm/sec with a percolation time (T) of 2 to 8 min/cm.
    - Due to the medium permeability of this soil type, it is deemed acceptable as the native receiving soil for a proposed Class 4 sewage systems.
- SM: Silty sand, sand-silt mixtures
  - According to Table 2 of SB-6, the SM group of soils has a coefficient of permeability (K) of 10^{-3} to 10^{-5} cm/sec with a percolation time (T) of 8 to 20 min/cm.
    - Due to the medium to low permeability of this soil type, it is deemed acceptable as the native receiving soil for a proposed Class 4 sewage systems.

Please note that for the purposes of this report, a minimum thickness of 0.25 m of soil located under the topsoil and above the bedrock was used when establishing the main soil type for each test pit. Areas with less than 0.25m of soil under the topsoil have been identified as bedrock; in these areas, it is recommended that an imported clay layer (minimum 0.1m in depth) be installed on the bedrock surface before placing leaching bed fill for sewage systems to prevent the possibility of short-circuiting of sewage effluent to the underlying bedrock aquifer. Refer to Figure 8 for a distribution of soil types throughout the Site.

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 0.66 hectares each in size. 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 are on average 0.66 hectares in size, 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, 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 nor 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 Thorthwaite 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 J for more information):

- A water surplus (Ws) 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). This station represents the nearest station to the site with data quality that meets the "3 and 5 rule" per the United Nation's World Meterological Organization (WMO) 30 Year Standard Normals;
- An infiltration factor (I_f) of **0.649** 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 (If) and the associated rational for selection are presented below:

- A topographic factor of 0.1875 was used for rolling land (0.7% slope).
- A soil factor of 0.3113 was used. This factor represents a weighted average of the soil conditions on-site, with approximately 26% of the site consisting of topsoil over shallow bedrock (infiltration factor of 0.10), 11% of the site consisting of silty gravelly sand (infiltration factor of 0.3), with the remaining 63% of the site consisting of gravelly sand or sand-gravel mixtures (infiltration factor 0.40) having a minimum depth of 0.25 m.
- A cover factor of 0.15 was used as the site is expected to consist of a mix of woodland and cultivated land after development.

- Available infiltration (I) was calculated by multiplying the water surplus (Ws) by the infiltration factor (If). This yielded an infiltration value of **0.216619 m/yr**.
- The infiltration area (A) was determined to be 24.14 ha (241,443 m^2). This consists of the total site area (26.85 ha) minus the proposed road right-of-way (2.119 ha) and 200 m^2 for each of the proposed houses.
- The dilution water (D_w) available was calculated as 52,301 m^3/yr (143,291 L/day) by multiplying the infiltration area (A) with the available infiltration (I).
- Background nitrate concentration (C_b) of 2.8 mg/L was used, which represents the maximum concentration found within all test well samples collected (refer to Appendix F).

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 = **31.454 severed lots**.

As can be seen above, the property can accommodate a subdivision of up to 30 lots to proceed while ensuring the Ontario Drinking Water Objective (ODWO) of 10 mg/L for nitrate-nitrogen is not exceeded. The proposed 30 lot residential subdivision yields a calculated nitrate-nitrogen concentration of **9.725 mg/L** at the property boundary.

It should be noted that the above-noted analysis does not account for the possible use of Low Impact Development (LID) into the developed Site's stormwater management strategy. The use of LID, such as infiltration trenches, are typically used to reduce stormwater runoff by increasing groundwater recharge, which in turn would be expected to be associated with a reduction of the predicted nitrate-nitrogen concentration compared to results presented from the calculations above.

5.0 SUMMARY OF CONDITIONS

5.1 Preamble

The Site is located in the western portion of the hamlet of Franktown within the Township of Beckwith in central Eastern Ontario, south of the Town of Carleton Place (Figure 1). The site is bounded by Fourth Line Road to the north, Perth Road to the south, and is located approximately 275 m west of Highway 15.

The Site currently exists predominantly as undeveloped forested/shrub land with the exception of a single residential dwelling located on the northern portion of the Site. There are residentially developed lands immediately north and south of the Site along Fourth Line Road and Perth Road, as well as to the east along Highway 15; otherwise, the surrounding land use is predominately forested land.

According to Ontario Geological Survey (OGS) regional mapping, surficial overburden at the Site is thin, and is characterized by Paleozoic bedrock (OGS, 2022). This classification is consistent with on-site observations made by McIntosh Perry. Based on OGS 2022 data, the underlying bedrock is classified as dolostone and sandstone of the Beekmantown Group, which is consistent with MECP WWIS Records (MECP 2020).

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 International Airport).

The Site currently consists of forested land and several wetlands and has likely never been contemporarily developed. On-site elevation ranges between 141 and 149 metres above sea level (m asl). The topography of the Site is generally flat.

5.2 Regional Hydrogeology

The Site is relatively flat. Wetland areas appear to be present around the center of the Site. A small local waterbody is also present on Site, as seen in Figure 2. The Franktown Swamp, which forms part of the Upper Jock River (part of the Mississippi River system), is the closest permanent waterbody to the Site and is located approximately 550 m east of the Site at its closest point. On a local scale, shallow groundwater flow cannot be determined fully due to limited data, however there is likely a northwestern flow component and potentially more localized flow patterns toward on-site water features (pond, wetland).

5.3 Site Hydrogeology

A review of topographic data, geological maps, and field notes show that the property is generally flat with some local sloping down towards the northwest. Shallow groundwater and surface water likely drain in this direction. On a local scale, shallow groundwater flow cannot be determined fully due to limited data, however there is likely a northwestern flow component and potentially more localized flow patterns toward on-site water features (pond, wetland). In most areas of the Site, the terrain appears to be well-drained.

Based on OGS 2020 data, the underlying bedrock is classified as dolostone and sandstone of the Beekmantown Group, which is consistent with MECP WWIS Records (MECP 2020).

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 – 4.3 m bgs, with an average depth of approximately 0.83 m bgs. Where noted in the well records, bedrock is typically referred to as either “sandstone” or “limestone” by the driller (Appendix C).

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.

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 84.7 – 3,518.2 L/min, as shown in Table 6.

Total Coliforms (TC) exceeded the MAC of 0 CFU/100 ml in TW5 (April 19, 2023). A follow up sample was collected on May 29, 2023, and TC were non-detect. Additionally, TC exceedances were observed at 220 Perth Road and 9477 Highway 15. As these locations exist as off-site neighbouring locations, follow up bacteria sampling was not completed.

Several additional ODWS Aesthetic Objectives (AO) were exceeded. These exceedances were noted for colour, lab-reported turbidity, iron, manganese, and the health-warning limit for sodium. It is important to note that 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 the laboratory-reported data. Field-measured turbidity is generally considered to be more reliable than laboratory-reported data due to changes in temperature and pH that can occur during sample transport.

Additionally, two Operational Guideline (OG) exceedances were noted for hardness and organic nitrogen. Exceedances of these Operational Guideline are considered normal for the region and are considered treatable.

It is important to note that water with a hardness above 300 mg/L is considered very hard. If water softening is desired, the use of potassium salts (i.e. KCl) is recommended. With the use of conventional water softeners, it is important to note that sodium concentrations will be elevated, which may affect persons on a sodium reduced diet.

Noted concentrations of nitrate (> 1 mg/L) were observed at TW3 and TW4 in 2021. As a result of these concentrations, McIntosh Perry completed follow up sampling in April 2023, indicating similar results from 2021 at TW1, TW2, TW3, and TW5, and decreased concentrations at TW4. Due to the decreased concentrations at TW4, another round of follow up sampling was completed in May 2023 at TW3, TW4, and TW5 to confirm

on-Site conditions. Based on the results from May 2023, nitrate concentrations at TW3 and TW4 appear to be stable, and TW5 showed a slight decrease.

It has been shown that the bedrock aquifer is suitable for supplying the needs of 30 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 four newly installed test wells (TW2, TW3, TW4, and TW5) 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.
- Any newly installed wells at the Grizzly Homes Subdivision will require a minimum of 12 m of casing to protect against surface water and/or shallow groundwater intrusion. Wells must adhere to all other requirements of O.Reg. 903, as outlined above.
- 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 color, iron, and manganese can be readily treated.
  - Colour can be treated using an activated carbon filter.
  - Iron can be treated through water softeners or manganese greensand filters, oxidation with filtration through proprietary filter media, or chlorination followed by sand or multimedia filtration, depending on the iron concentrations.
- If water softening is desired, the use of potassium salts (i.e. KCl) is recommended. With the use of conventional water softeners, it is important to note that sodium concentrations will be elevated.
  - It is important to note that water with a hardness above 300 mg/L is considered very hard. The ODWS states that groundwater with hardness that exceeds 500 mg/L is unacceptable for domestic purposes.
- Due to the low field turbidity observed in the fully developed test wells, a UV system may be used as a precaution against bacteriological impacts.
- Prior to occupation, it is recommended that the Client notify the local Medical Officer of Health of the sodium exceeding the health-related warning limit at TW5.

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, it is expected that imported leaching bed fill will be necessary on a large portion of the lots to provide the required vertical separation from shallow groundwater and/or bedrock layer.
    - Areas with less than 0.25m of soil under the topsoil have been identified as bedrock; in these areas, it is recommended that an imported clay layer (minimum 0.1m in depth) be installed on the bedrock surface before placing leaching bed fill for sewage systems to prevent the possibility of short-circuiting of sewage effluent to the underlying bedrock aquifer.
- The proposed lot sizes are sufficient to meet the requirements of Procedure D-5-4, assuming that each lot is serviced by an 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 for the Client. It is intended for the sole, and exclusive use of the Client with respect to the stated purpose of the work carried out by McIntosh Perry.

The report may not be relied upon by any other person or entity without the express written consent of McIntosh Perry. 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 accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report or the information contained within it.

The investigation undertaken by McIntosh Perry with respect to this report and any conclusions or recommendations made in this report reflect McIntosh Perry's judgment based on the Site conditions observed at the time of the Site investigations, inspections, and/or sampling on the date(s) set out in this report, and on information available at the time of the preparation of this report. Conditions such as ground cover, weather, physical obstructions, etc. may influence conclusions or recommendations made in this report. McIntosh Perry does not certify or warrant the environmental status of the property.

This report has been prepared for specific application to this Site and it may be based, in part, upon visual observation of the Site, subsurface investigation at discrete locations and depths, and/or 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, Site locations, subsurface or otherwise, which were not investigated directly, or chemical parameters, materials, or analysis which were not addressed or performed. Substances other than those addressed by the investigation described in this report may exist at 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,

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HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

TABLES

McINTOSH PERRY

Table 8
Summary of Field Parameters
Grizzly Homes, Beckwith, Ontario

Sample ID	Units	MDL	ODWSOG	Limit Type	TW1-1	TW1-2	TW1	TW2-1	TW2-2	TW2	TW3-1	TW3-2	TW3		TW4-1	TW4-2	TW4		TW5-1	TW5-2	TW5		220 Perth Road	9477 Hwy 15	9493 Hwy 15	9578 Hwy 15
Sample Date					18-Jan-22		18-Apr-23	13-Jul-21		18-Apr-23	14-Jul-21		18-Apr-23	2023-05-29	09-Sep-21		19-Apr-23	2023-05-29	15-Jul-21		19-Apr-23	2023-05-29	19-Apr-23				
Microbiological Parameters																										
E. Coli	MPN/100 mL	1	0	MAC	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Fecal Coliforms	CFU/100 mL	1	0	-	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Total Coliforms	MPN/100 mL	1	0	MAC	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	1	ND (1)	9	1	ND (1)	ND (1)
Heterotrophic Plate Count	CFU/mL	10	-	-	170	70	-	ND (10)	ND (10)	-	ND (10)	ND (10)	-		-	-	-		-	-	-		-	-	-	-
General Inorganics																										
Alkalinity, total	mg/L	5	500	OG	254	252	-	272	269	-	279	280	-	-	269	272	-	-	264	264	-	-	-	-	-	-
Ammonia as N	mg/L	0.01	-	-	0.04	0.05	0.02	0.05	0.06	ND (0.01)	0.05	0.05	ND (0.01)	ND (0.01)	0.01	0.01	0.01	0.01	0.04	0.04	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Dissolved Organic Carbon	mg/L	0.5	5	AO	2.3	2.3	-	2	1.8	-	0.9	1	-	-	1.3	0.9	-	-	2.5	1.7	-	-	-	-	-	-
Colour	TCU	2	5	AO	17	16	-	2	3	-	ND (2)	ND (2)	-	-	ND (2)	ND (2)	-	-	3	3	-	-	-	-	-	-
Conductivity	uS/cm	5	-	-	546	528	-	620	614	-	668	678	-	-	621	643	-	-	662	667	-	-	-	-	-	-
Hardness	mg/L		80-100	OG	255	256	-	293	293	-	282	283	-	-	286	292	-	-	-	-	-	-	-	-	-	-
pH	pH Units	0.1	6.5-8.5	-	7.5	7.5	-	7.7	7.7	-	7.7	7.7	-	-	7.7	7.7	-	-	7.6	7.7	-	-	-	-	-	-
Phenolics	mg/L	0.001	-	-	ND (0.001)	ND (0.001)	-	ND (0.001)	ND (0.001)	-	ND (0.001)	ND (0.001)	-	-	ND (0.001)	ND (0.001)	-	-	ND (0.001)	ND (0.001)	-	-	-	-	-	-
Total Dissolved Solids	mg/L	10	500	AO	288	300	-	332	314	-	334	356	-	-	298	340	-	-	346	338	-	-	-	-	-	-
Sulphide	mg/L	0.02	0.05	AO	ND (0.02)	ND (0.02)	-	ND (0.02)	ND (0.02)	-	ND (0.02)	ND (0.02)	-	-	ND (0.02)	ND (0.02)	-	-	ND (0.02)	ND (0.02)	-	-	-	-	-	-
Tannin & Lignin	mg/L	0.1	-	-	ND (0.1)	ND (0.1)	-	ND (0.1)	ND (0.1)	-	ND (0.1)	ND (0.1)	-	-	ND (0.1)	ND (0.1)	-	-	ND (0.1)	ND (0.1)	-	-	-	-	-	-
Total Kjeldahl Nitrogen	mg/L	0.1	-	-	0.1	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.1	ND (0.1)	0.2	0.2	ND (0.1)	ND (0.1)	ND (0.1)	0.1	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	0.1
Organic Nitrogen (calculated)	mg/L		0.15	OG	0.06	0.05	0.08	0.05	0.04	0.09	0.05	0.05	0.19	0.225	0.09	0.09	0.09	0.136	0.06	0.06	0.09	ND (0.100)	0.09	0.09	0.09	0.09
Turbidity	NTU	0.1	5	AO	7.4	5.7	-	12.5	1.2	-	30.2	6.3	-	-	17	0.8	-	-	1.6	0.3	-	-	-	-	-	-
Anions																										
Chloride	mg/L	1	250	-	13	12	-	21	20	-	27	28	-	-	30	26	-	-	39	39	-	-	-	-	-	-
Fluoride	mg/L	0.1	1.5	MAC	0.3	0.3	-	0.2	0.2	-	ND (0.1)	ND (0.1)	-	-	ND (0.1)	ND (0.1)	-	-	ND (0.1)	ND (0.1)	-	-	-	-	-	-
Nitrate as N	mg/L	0.1	10	MAC	ND (0.1)	ND (0.1)	ND (0.1)	0.6	0.5	0.5	2.5	2.4	2.8	2.7	1.3	1.6	0.1	ND (0.1)	0.9	0.8	1	0.4	0.4	1.1	1.1	1.2
Nitrite as N	mg/L	0.05	1	MAC	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Sulphate	mg/L	1	500	-	15	14	-	16	17	-	15	15	-	-	16	15	-	-	16	16	-	-	-	-	-	-
Phosphorus, total	mg/L	0.01					ND (0.01)			ND (0.01)			0.02	ND (0.01)			ND (0.01)	ND (0.01)			ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Metals																										
Calcium	mg/L	0.1	-	-	71	70.8	-	80	80.3	-	75.7	75.5	-		79.5	81.3	-		64.5	63.9	-		-	-	-	
Iron	mg/L	0.1	0.3	AO	0.9	0.9	-	0.3	ND (0.1)	-	0.4	0.1	-		ND (0.1)	ND (0.1)	-		ND (0.1)	ND (0.1)	-		-	-	-	
Magnesium	mg/L	0.2	-	-	18.9	19.3	-	22.6	22.4	-	22.7	22.9	-		21.2	21.7	-		19.7	19.9	-		-	-	-	
Manganese	mg/L	0.005	0.02	AO	0.078	0.078	-	0.053	0.059	-	0.026	0.01	-		0.008	ND (0.005)	-		ND (0.005)	ND (0.005)	-		-	-	-	
Potassium	mg/L	0.1	-	-	2.5	2.5	-	3	2.7	-	4.2	3.6	-		3.5	3.4	-		1.37	1.4	-		-	-	-	
Sodium	mg/L	0.2	20	MAC	5.6	5.5	-	9.3	8.5	-	13.4	13.3	-		22.2	19.4	-		23.6	24	-		-	-	-	
Volatile Organic Compounds (VOCs)																										
Acetone	ug/L	5			-	-	-	-	-	ND (5.0)	-	-	-		-	-	-		-	-	ND (5.0)		-	-	-	-
Benzene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Bromodichloromethane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Bromoform	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Bromomethane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Carbon Tetrachloride	ug/L	0.2			-	-	-	-	-	ND (0.2)	-	-	-		-	-	-		-	-	ND (0.2)		-	-	-	-
Chlorobenzene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Chloroethane	ug/L	1			-	-	-	-	-	ND (1.0)	-	-	-		-	-	-		-	-	ND (1.0)		-	-	-	-
Chloroform	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Chloromethane	ug/L	3			-	-	-	-	-	ND (3.0)	-	-	-		-	-	-		-	-	ND (3.0)		-	-	-	-
Dibromochloromethane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Dichlorodifluoromethane	ug/L	1			-	-	-	-	-	ND (1.0)	-	-	-		-	-	-		-	-	ND (1.0)		-	-	-	-
Ethylene dibromide (dibromoethane, 1,2-)	ug/L	0.2			-	-	-	-	-	ND (0.2)	-	-	-		-	-	-		-	-	ND (0.2)		-	-	-	-
1,2-Dichlorobenzene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,3-Dichlorobenzene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,4-Dichlorobenzene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,1-Dichloroethane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,2-Dichloroethane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,1-Dichloroethylene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
cis-1,2-Dichloroethylene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
trans-1,2-Dichloroethylene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,2-Dichloroethylene, total	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,2-Dichloropropane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
cis-1,3-Dichloropropylene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
trans-1,3-Dichloropropylene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,3-Dichloropropene, total	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Ethylbenzene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Hexane	ug/L	1			-	-	-	-	-	ND (1.0)	-	-	-		-	-	-		-	-	ND (1.0)		-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	ug/L	5			-	-	-	-	-	ND (5.0)	-	-	-		-	-	-		-	-	ND (5.0)		-	-	-	-
Methyl Butyl Ketone (2-Hexanone)	ug/L	10			-	-	-	-	-	ND (10.0)	-	-	-		-	-	-		-	-	ND (10.0)		-	-	-	-
Methyl Isobutyl Ketone	ug/L	5			-	-	-	-	-	ND (5.0)	-	-	-		-	-	-		-	-	ND (5.0)		-	-	-	-
Methyl tert-butyl ether	ug/L	2			-	-	-	-	-	ND (2.0)	-	-	-		-	-	-		-	-	ND (2.0)		-	-	-	-
Methylene Chloride	ug/L	5			-	-	-	-	-	ND (5.0)	-	-	-		-	-	-		-	-	ND (5.0)		-	-	-	-
Styrene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,1,1,2-Tetrachloroethane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,1,2,2-Tetrachloroethane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Tetrachloroethylene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Toluene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,1,1-Trichloroethane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
1,1,2-Trichloroethane	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Trichloroethylene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Trichlorofluoromethane	ug/L	1			-	-	-	-	-	ND (1.0)	-	-	-		-	-	-		-	-	ND (1.0)		-	-	-	-
1,3,5-Trimethylbenzene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Vinyl Chloride	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
m/p-Xylene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
o-Xylene	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-
Xylenes, total	ug/L	0.5			-	-	-	-	-	ND (0.5)	-	-	-		-	-	-		-	-	ND (0.5)		-	-	-	-

Notes:

MDL	Method Detection Limit
ODWSOG	Ontario Drinking Water Standards, Objectives, and Guidelines (MECP, 2003 rev. 2006;
AO	Aesthetic Objective
MAC	Maximum Allowable Concentration (Health-Related Parameter)
OG	Operational Guideline
ND	Non detectable (below MDL)
mg/L	Milligrams per litre
TCU	True Colour Units
uS/cm	Microsemens per centimeter
NTU	Nephelometric Turbidity Units
CFU/100 mL	Number of bacteria-forming colonies per 100 mL
	Exceedance of ODWS Parameters
	Exceedance of MAC (health-related parameter)

Table 8
Summary of Field Parameters
Grizzly Homes, Beckwith, Ontario

Test Well 1

Pumping Test:	TW1					
Date:	January 18, 2022					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (ms/cm)	Temperature (^{o}C)	TDS (ppm)	Free Chlorine (mg/L)
15	9.6	6.51	N/A	9.97	0.345	
26	2.4	6.67	0.543	8.17	0.347	
36	2.2	6.65	0.545	7.9	0.348	
50	1.7	6.68	0.548	7.14	0.352	
60	1.8	7.14	0.549	7.08	0.351	
120	1.7	7.35	0.546	8.03	0.351	
180	1.1	7.45	0.535	8.78	0.342	
240	1.2	7.26	0.535	8.78	0.343	
300	1.4	7.18	0.538	8.6	0.344	
360	0.82	7.27	0.54	8.37	0.346	
Notes:	*Flow rate measured with bucket and stopwatch (21 l/min)*					

Follow up Sample	TW1					
Date:	April 18, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (ms/cm)	Temperature (^{o}C)	TDS (ppm)	Free Chlorine (mg/L)
4	1.5	7.77	0.585	8.94	0.374	
10	0	7.66	0.588	8.19	0.376	
15	0	7.42	0.585	8.31	0.374	
22	0	7.51	0.585	8.38	0.375	0
Notes:	*Flow rate measured with bucket and stopwatch (25.5 L/min)*					

Table 8
Summary of Field Parameters
Grizzly Homes, Beckwith, Ontario

Test Well 2

Pumping Test	TW2					
Date:	January 13, 2021					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (^{o}C)	TDS (ppm)	Free Chlorine (mg/L)
23	12.3	6.14	487	10.1	245	
60	11.6	6.53	493	9.8	247	
120	4.48	6.14	503	10	252	
180	2.87	6.13	503	10.2	250	
240	2.21	6.52	497	10.3	249	
300	1.5	6.42	494	10.3	248	
360	0.73	6.71	502	9.9	251	
Notes:	*Flow rate measured with bucket and stopwatch (87.3 l/min)*					

Follow Up Sample	TW2					
Date:	April 18, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (ms/cm)	Temperature (^{o}C)	TDS (g/L)	Free Chlorine (mg/L)
7	220	8.36	0.572	7.19	0.336	
98	31.6	7.77	0.607	7.38	0.388	
108	7.9	7.34	0.59	7.39	0.377	
170	1.5	7.4	0.594	7.22	0.380	
173	0.9	7.39	0.593	7.23	0.380	0.02
Notes:	*Flow rate measured with bucket and stopwatch (14 l/min)*					

Table 8
Summary of Field Parameters
Grizzly Homes, Beckwith, Ontario

Test Well 3

Pumping Test:	TW3					
Date:	July 14, 2021					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (^{o}C)	TDS (ppm)	Free Chlorine (mg/L)
20	28.7	6.26	552	9.4	274	
60	21	6.58	553	9.2	276	
120	11.4	6.35	547	9.7	275	
180	11.8	6.81	547	10.0	274	
240	9.66	6.28	546	10.2	272	
300	8.22	6.67	549	9.6	275	
360	0.89	6.68	546	9.8	270	
Notes:	*Flow rate measured with bucket and stopwatch (90 l/min)*					

Follow Up Sample	TW3					
Date:	April 18, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (ms/cm)	Temperature (^{o}C)	TDS (g/L)	Free Chlorine (mg/L)
8	1.2	7.38	0.551	7.55	0.354	
15	290	7.22	0.629	7.49	0.404	
22	18.8	7.23	0.638	7.47	0.408	
31	3.9	7.25	0.639	7.5	0.409	
41	2.5	7.27	0.64	7.45	0.41	
52	1.7	7.20	0.659	7.4	0.409	
63	10.1	7.30	0.641	7.45	0.410	
73	14	7.29	0.644	7.4	0.412	
82	3.5	7.28	0.645	7.41	0.413	
92	2.7	7.27	0.645	7.4	0.412	
104	2.2	7.27	0.645	7.42	0.413	
123	0.5	7.28	0.648	7.4	0.415	0.02
Notes:	*Flow rate measured with bucket and stopwatch (16.5 l/min)*					

Follow up Sample	TW3					
Date:	May 29, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (^{o}C)	TDS (ppm)	Free Chlorine (mg/L)
19	2.87	7.31	624	9.7	293	
33	0.48	7.19	596	10	288	
48	N/A	7.22	581	9.3	288	
66	0.86	7.06	580	9.4	283	
72	0.23	7.07	569	9.4	284	
99	0.26	7.1	570	9.2	286	0
Notes:	*Flow rate measured with bucket and stopwatch (15 L/min)*					

Table 8
Summary of Field Parameters
Grizzly Homes, Beckwith, Ontario

Test Well 4

Pumping Test at:	TW4					
Date:	September 9, 2021					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (^{o}C)	TDS (ppm)	Free Chlorine (mg/L)
5	73.5	6.72	552	8.9	276	
34	35	6.7	549	8.7	276	
60	22.1	6.74	558	8.9	278	
120	5.86	6.63	547	9	273	
180	2.62	N/A	548	9	274	
240	1.38	6.43	545	9.1	273	
300	1.5	6.6	539	9.2	270	
360	0.9	6.6	543	9	272	
Notes:	*Flow rate measured with bucket and stopwatch (90 l/min)*					

Follow Up Sample	TW4					
Date:	April 19, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (ms/cm)	Temperature (^{o}C)	TDS (g/L)	Free Chlorine (mg/L)
3	33.8	6.27	0.255	11.31	0.166	
11	49.5	7.59	0.7	8.7	0.498	
21	46.2	7.34	0.501	8.03	0.32	
29	9.3	7.41	0.697	7.82	0.446	
44	2.9	7.4	0.707	7.64	0.452	
58	3.4	7.46	0.706	7.49	0.459	
73	3.2	7.4	0.703	7.45	0.45	
91	1	7.35	0.703	7.42	0.45	
96	0.9	7.35	0.701	7.36	0.449	0
Notes:	*Flow rate measured with bucket and stopwatch (18 l/min)*					

Follow Up Sample	TW4					
Date:	May 29, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (^{o}C)	TDS (ppm)	Free Chlorine (mg/L)
5	0.78	7.54	458	9.6	230	
90	0.71	7.11	621	9.3	311	
105	0.58	7.11	623	9.0	311	0
Notes:	*Flow rate measured with bucket and stopwatch (14 l/min)*					

Table 8
Summary of Field Parameters
Grizzly Homes, Beckwith, Ontario

Test Well 5

Pumping Test:	TW5					
Date:	July 15, 2021					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (^{o}C)	TDS (ppm)	Free Chlorine (mg/L)
15	1.74	6.65	544	9.7	273	
106	1.02	6.77	545	9.9	273	
120	0.3	6.84	556	9.1	278	
180	0.28	6.86	548	9.6	271	
240	0.2	6.8	550	9.6	275	
300	0.08	6.31	533	10	267	
360	0.09	6.31	533	9.8	267	
Notes:	*Flow rate measured with bucket and stopwatch (90 l/min)*					

Follow up Sample	TW5					
Date:	April 18, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (ms/cm)	Temperature (^{o}C)	TDS (g/L)	Free Chlorine (mg/L)
4	86.9	7.74	0.403	7.05	0.262	
13	40.5	7.52	0.429	7.8	0.251	
26	19.2	7.39	0.523	7.82	0.335	
38	15.5	7.39	0.524	7.79	0.336	
49	13.5	7.4	0.524	7.79	0.335	
57	12.3	7.41	0.524	7.8	0.335	
67	36.6	7.32	0.589	7.36	0.337	
77	6.9	7.35	0.59	7.38	0.378	
90	2.3	7.34	0.591	7.36	0.378	
103	0.9	7.35	0.581	7.38	0.373	0.02
Notes:	*Flow rate measured with bucket and stopwatch (20 l/min)*					

Follow Up Sample	TW5					
Date:	May 29, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (^{o}C)	TDS (ppm)	Free Chlorine (mg/L)
29	1.31	7.19	452	9.7	223	
58	0.81	7.12	472	9.6	236	
87	0.75	7.23	404	9.3	203	0
Notes:	*Flow rate measured with bucket and stopwatch (16 l/min)*					

Table 8
Summary of Field Parameters
Grizzly Homes, Beckwith, Ontario

Private Well	9578 Highway 15					
Date:	April 18, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (^{o}C)	TDS (g/L)	Free Chlorine (mg/L)
5	0	7.13	127	9.21	0.813	
7	0	7.19	127	9.14	0.814	
15	0	7.16	128	9.1	0.817	0.01
Notes:	*Sampled from untreated kitchen tap.*					

Private Well	220 Perth Road					
Date:	April 18, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (us/cm)	Temperature (^{o}C)	TDS (g/L)	Free Chlorine (mg/L)
0.5	0	7.9	0.352	8.3	0.229	
5	0	7.83	0.345	8.03	0.224	
11	0	7.7	0.219	8.45	0.194	0
Notes:						

Private Well	9477 Highway 15					
Date:	April 18, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (ms/cm)	Temperature (^{o}C)	TDS (g/L)	Free Chlorine (mg/L)
2	0.2	7.24	1.45	8.89	0.926	
10	0	7.52	1.42	8.69	0.908	0.01
Notes:	*Sampled from untreated kitchen tap.*					

Private Well	9493 Highway 15					
Date:	April 18, 2023					
Time Elapsed (min)	Turbidity (NTU)	pH	Conductivity (ms/cm)	Temperature (^{o}C)	TDS (g/L)	Free Chlorine (mg/L)
2	0.2	7.77	1.22	7.85	0.751	
10	0	7.79	1.24	7.77	0.796	0
Notes:						

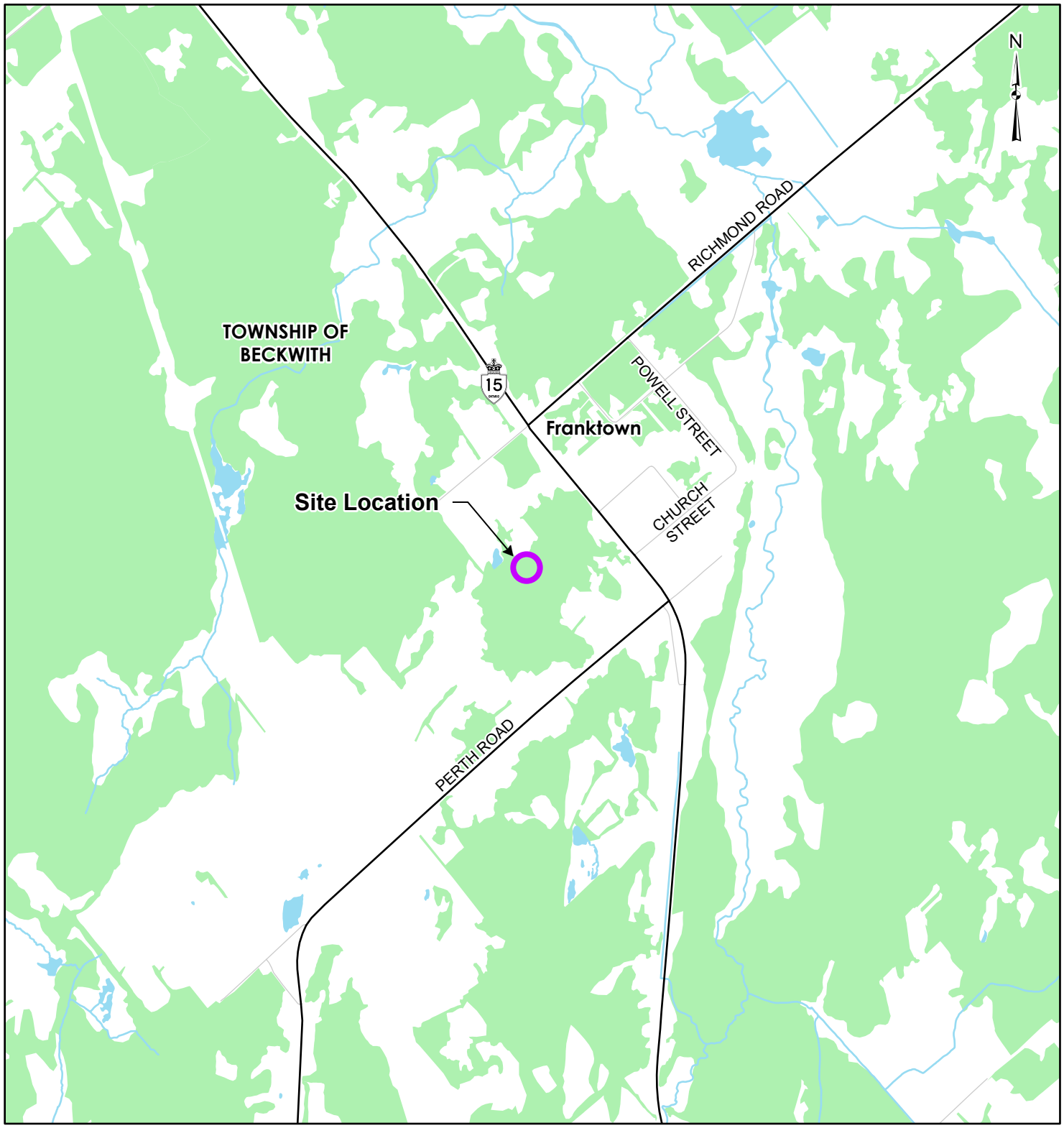
NOTES:

min	Minutes
NTU	Nephelometric Turbidity Units
(ms/cm)	Millisiemens per centimeter
(us/cm)	Microsiemens per centimeter
(^{o}C)	Degrees celsius
g/L	Grams per litre
ppm	Parts per million
N/A	Not Analyzed

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

FIGURES

McINTOSH PERRY



LEGEND

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

600 300 0 600

Scale 1:25,000 Metres

REFERENCE

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

CLIENT: GRIZZLY HOLDINGS INC.

PROJECT: HYDROGEOLOGICAL ASSESSMENT
GRIZZLY HOMES SUBDIVISION

TITLE: SITE LOCATION

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:	CCO-22-0256
Date	Aug., 03, 2021
GIS	EU
Checked By	MB

FIGURE: 1

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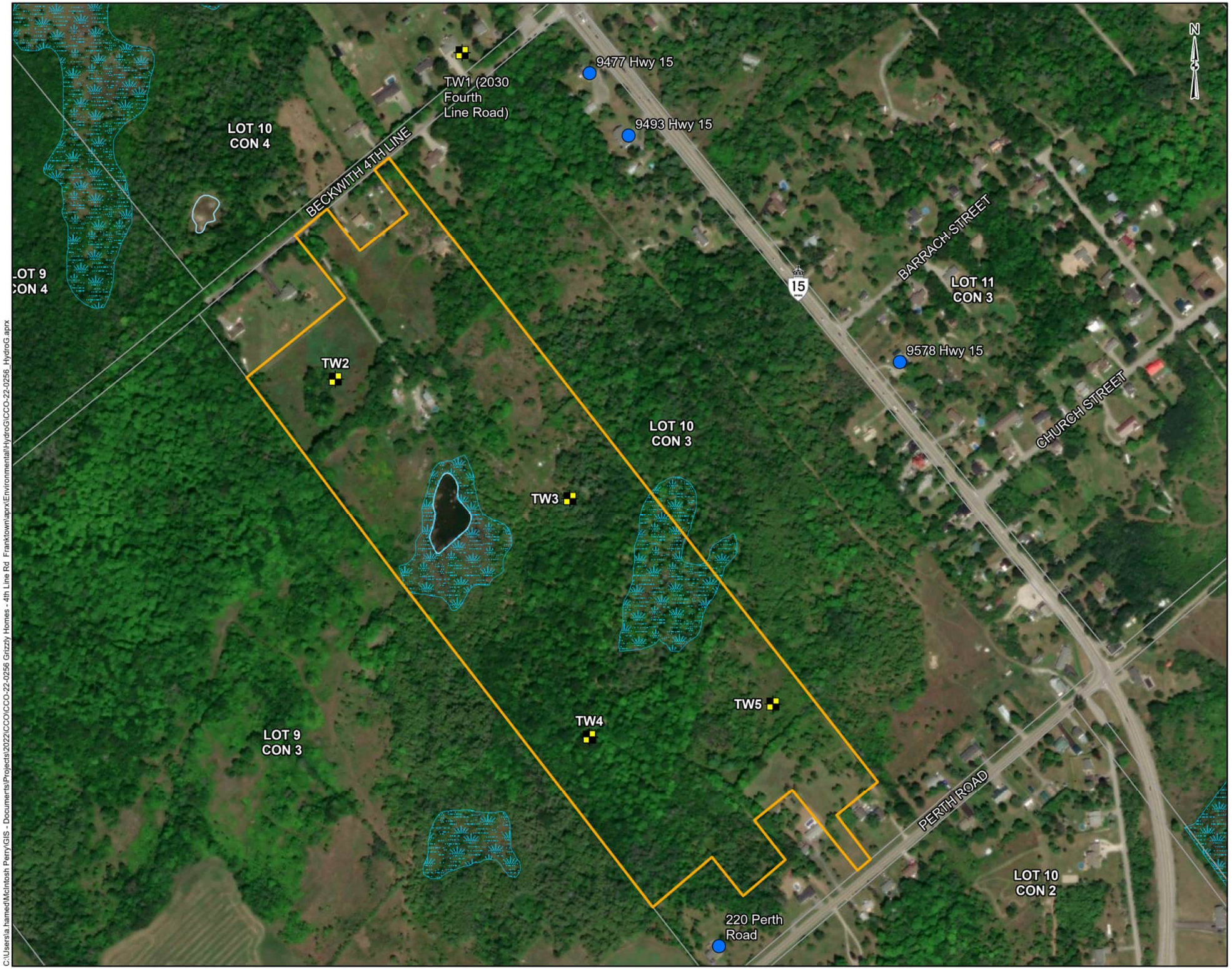

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LEGEND

- Private well location
- Test Well Location
- Approximate Site Boundary
- Lot & Concession
- Watercourse
- Unevaluated Wetland
- Waterbody

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources, 2023.

100 50 0 100
Scale 1:4,500 Metres

CLIENT: GRIZZLY HOLDINGS INC.

PROJECT: HYDROGEOLOGICAL ASSESSMENT
GRIZZLY HOMES SUBDIVISION

TITLE: SITE LAYOUT

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO: CCO-22-0256		FIGURE:
Date	Jul., 18, 2023	2
GIS	MG	
Checked By	MB	

LEGEND

- Approximate Site Boundary
- MECP Well Location
- 500m Buffer
- Local Road
- Major Road
- Watercourse
- Waterbody
- Unevaluated Wetland
- Provincially Significant Wetland

REFERENCE

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

200 100 0 200

Scale 1:8,500 Metres

CLIENT: GRIZZLY HOLDINGS INC.

PROJECT: HYDROGEOLOGICAL ASSESSMENT
GRIZZLY HOMES SUBDIVISION

TITLE: MECP WWIS SUMMARY

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO: CCO-22-0256	FIGURE: 3
Date	Aug., 03, 2021
GIS	EU
Checked By	MB

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LEGEND

- Approximate Site Boundary
- Waterbody
- Unevaluated Wetland
- Test Well Location
- Groundwater direction
- *136.1* Static water elevation

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources, 2023.

100 50 0 100
Scale 1:4,500 Metres

CLIENT: GRIZZLY HOLDINGS INC.

PROJECT: HYDROGEOLOGICAL ASSESSMENT
GRIZZLY HOMES SUBDIVISION

TITLE: GROUNDWATER CONTOUR
AND FLOW DIRECTION

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO: CCO-22-0256		FIGURE:
Date	Jul., 18, 2023	4
GIS	MG	
Checked By	MB	

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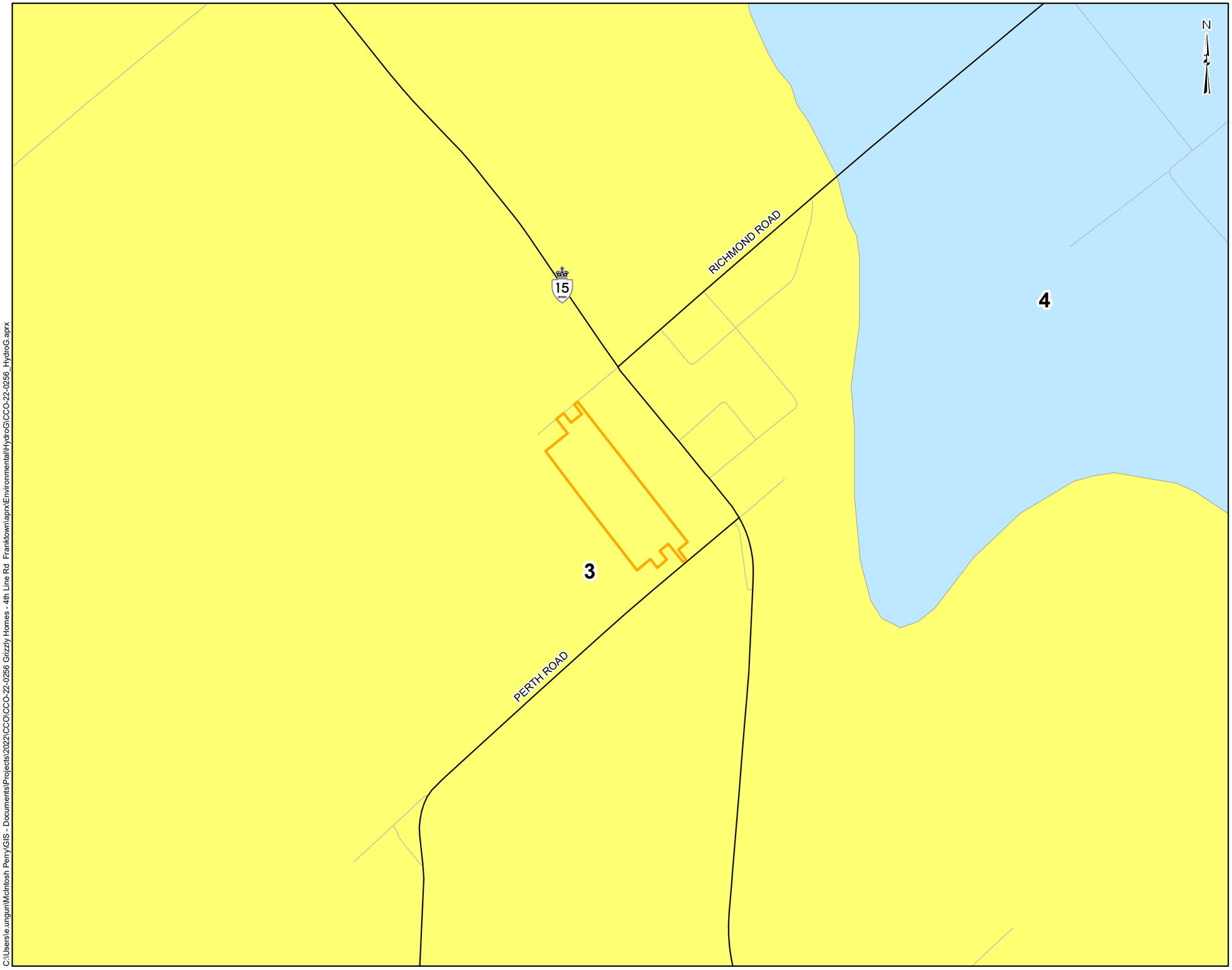

LEGEND

- Approximate Site Boundary
- Local Road
- Major Road

Bedrock Geology

Lower Ordovician

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

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2021.
Urban Geology of the National Captial Area, Bélanger, R; Geological Survey of Canada, Open File 5311, 2008

500 250 0 500
Scale 1:20,000 Metres

CLIENT: GRIZZLY HOLDINGS INC.

PROJECT: HYDROGEOLOGICAL ASSESSMENT
GRIZZLY HOMES SUBDIVISION

TITLE: BEDROCK FORMATION

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:	CCO-22-0256
Date	Aug., 03, 2021
GIS	EU
Checked By	MB

FIGURE: 5

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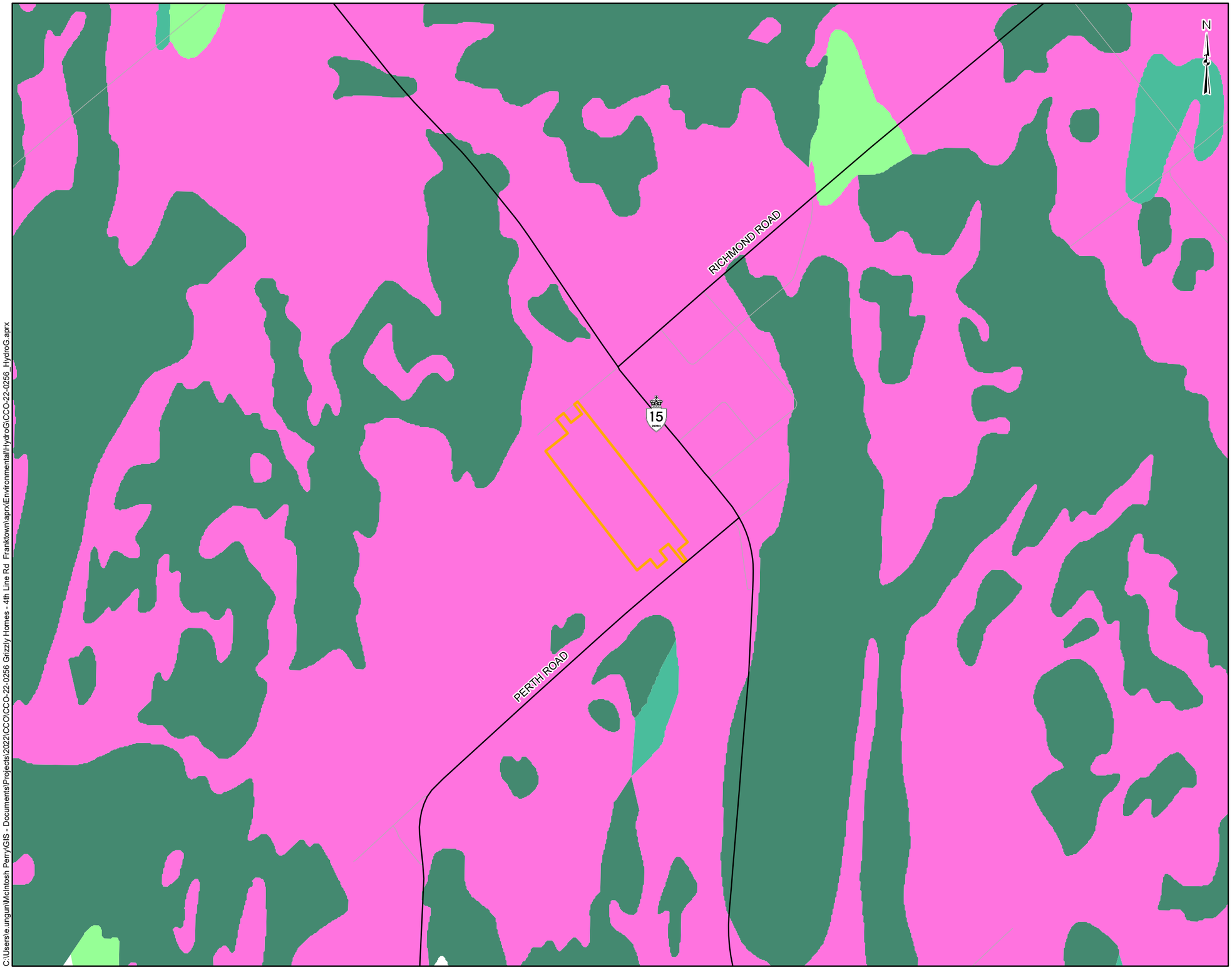

LEGEND

- Approximate Site Boundary
- Local Road
- Major Road

Surficial geology

Description

- Organic Deposits
- Beach Formations
- Till, plain
- Paleozoic Bedrock

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

500 250 0 500

Scale 1:20,000 Metres

CLIENT: GRIZZLY HOLDINGS INC.

PROJECT: HYDROGEOLOGICAL ASSESSMENT
GRIZZLY HOMES SUBDIVISION

TITLE: SURFICIAL GEOLOGY

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Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:CCO-22-0256		FIGURE:
Date	Aug., 03, 2021	6
GIS	EU	
Checked By	MB	

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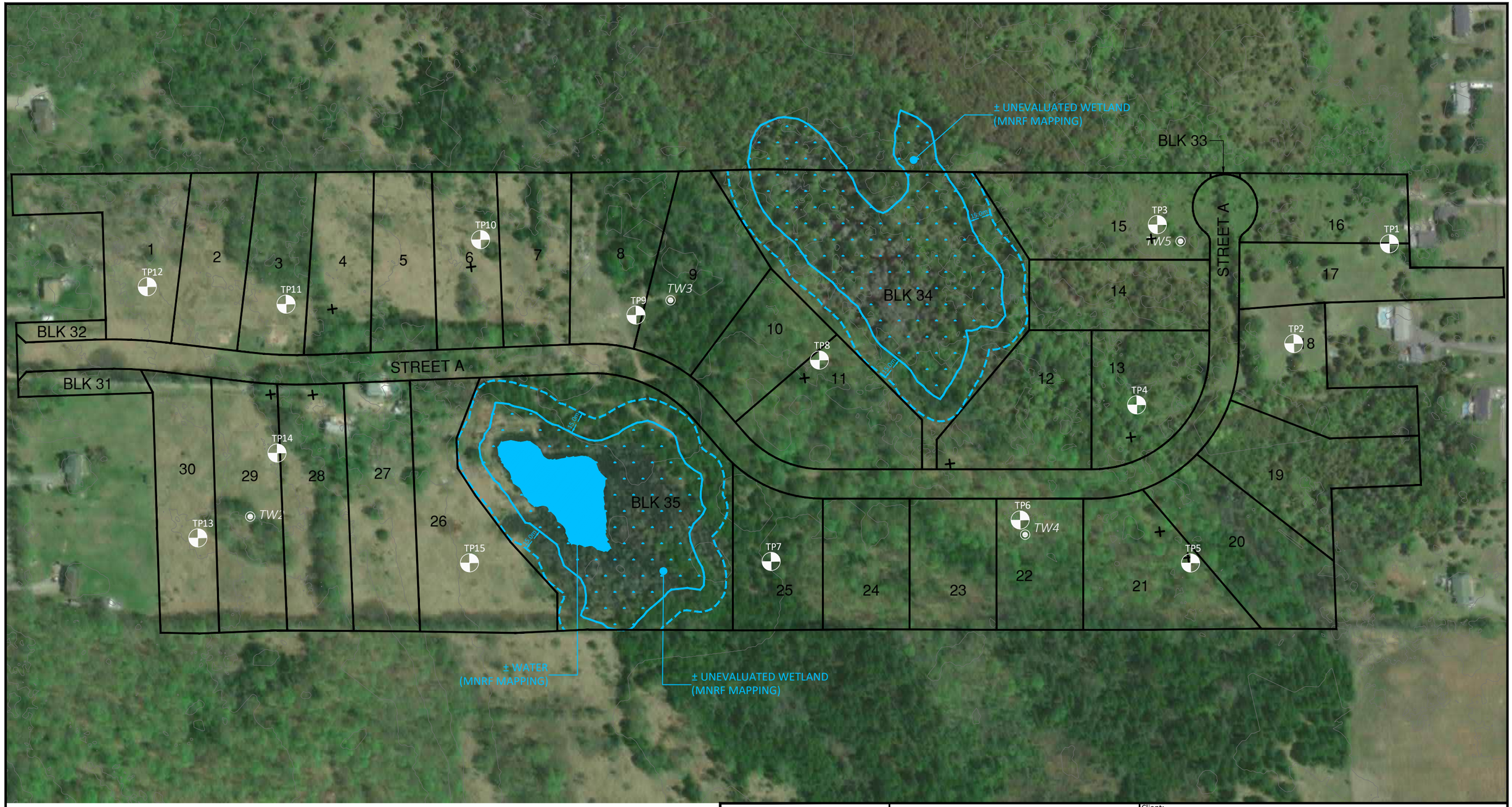


SCALE 1 : 2500

0 50 100 150 200 250 Metres

N

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

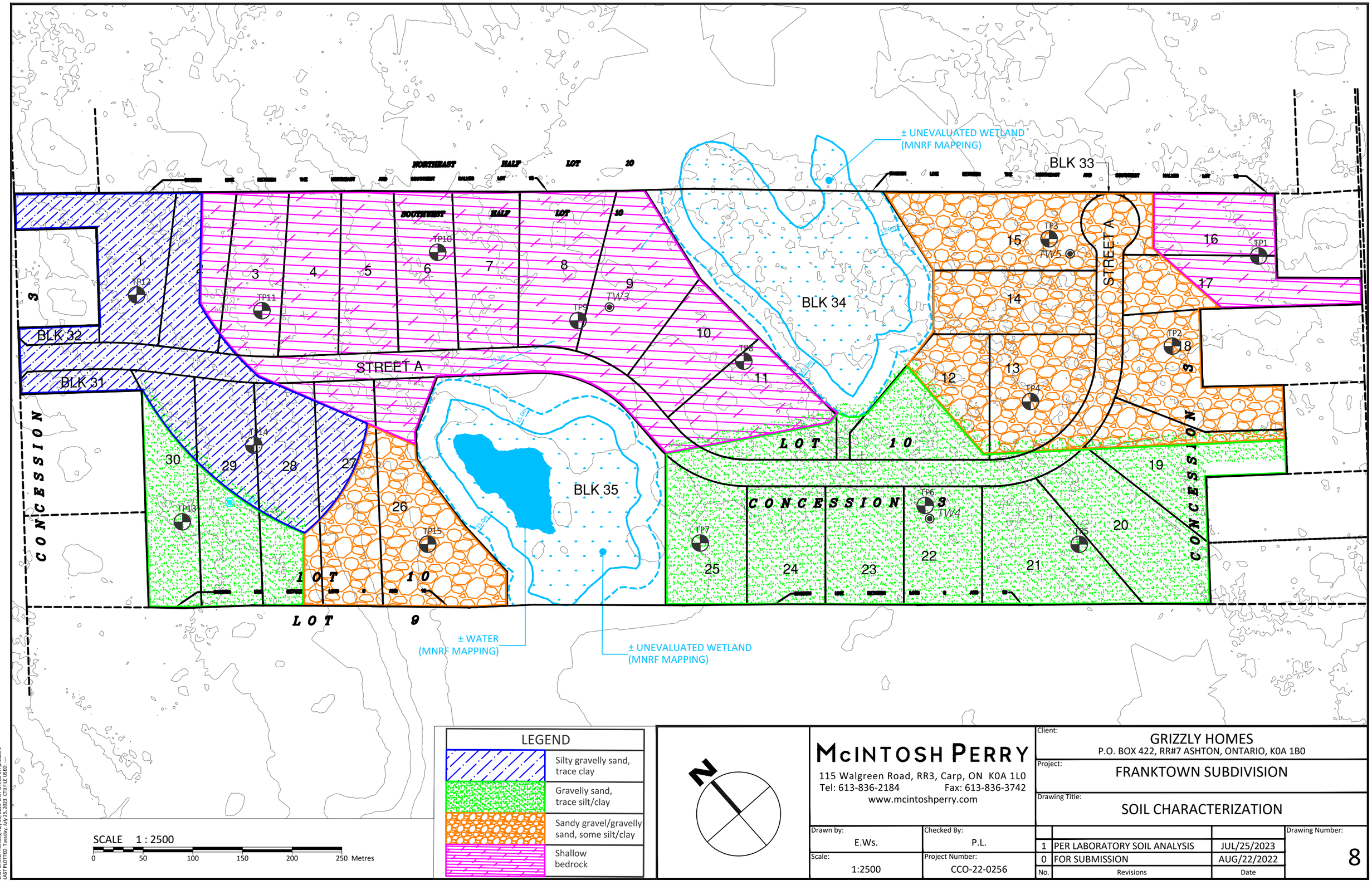
Client: GRIZZLY HOMES
P.O. BOX 422, RR#7 ASHTON, ONTARIO, K0A 1B0

Project: FRANKTOWN SUBDIVISION

Drawing Title: TEST PIT LAYOUT

Drawn by:	Checked By:				Drawing Number:
E.Ws.	P.L.				7
Scale: 1:2500	Project Number: CCO-22-0256	0	FOR SUBMISSION	AUG/22/2022	
		No.	Revisions	Date	

FILENAME: U:\Perth\MPCE JOBS\MPCE Projects\2022\CCO\CCO-22-0256 - Grizzly Homes - Franktown Subdivision Review\Hydro G\Terrain Analysis\CCO-22-0256 Grizzly-Franktown- Test Pit Layout.dwg
LAST SAVED: Friday, August 05, 2022 LAST SAVED BY: e.williams
LAST PLOTTED: Tuesday, August 23, 2022 CTB FILE USED: ----



LEGEND

	Silty gravelly sand, trace clay
	Gravelly sand, trace silt/clay
	Sandy gravel/gravelly sand, some silt/clay
	Shallow bedrock

SCALE 1 : 2500

0 50 100 150 200 250 Metres

N

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: GRIZZLY HOMES
P.O. BOX 422, RR#7 ASHTON, ONTARIO, K0A 1B0

Project: FRANKTOWN SUBDIVISION

Drawing Title: SOIL CHARACTERIZATION

Drawn by:	Checked By:
E.Ws.	P.L.
Scale: 1:2500	Project Number: CCO-22-0256

No.	Revisions	Date
1	PER LABORATORY SOIL ANALYSIS	JUL/25/2023
0	FOR SUBMISSION	AUG/22/2022

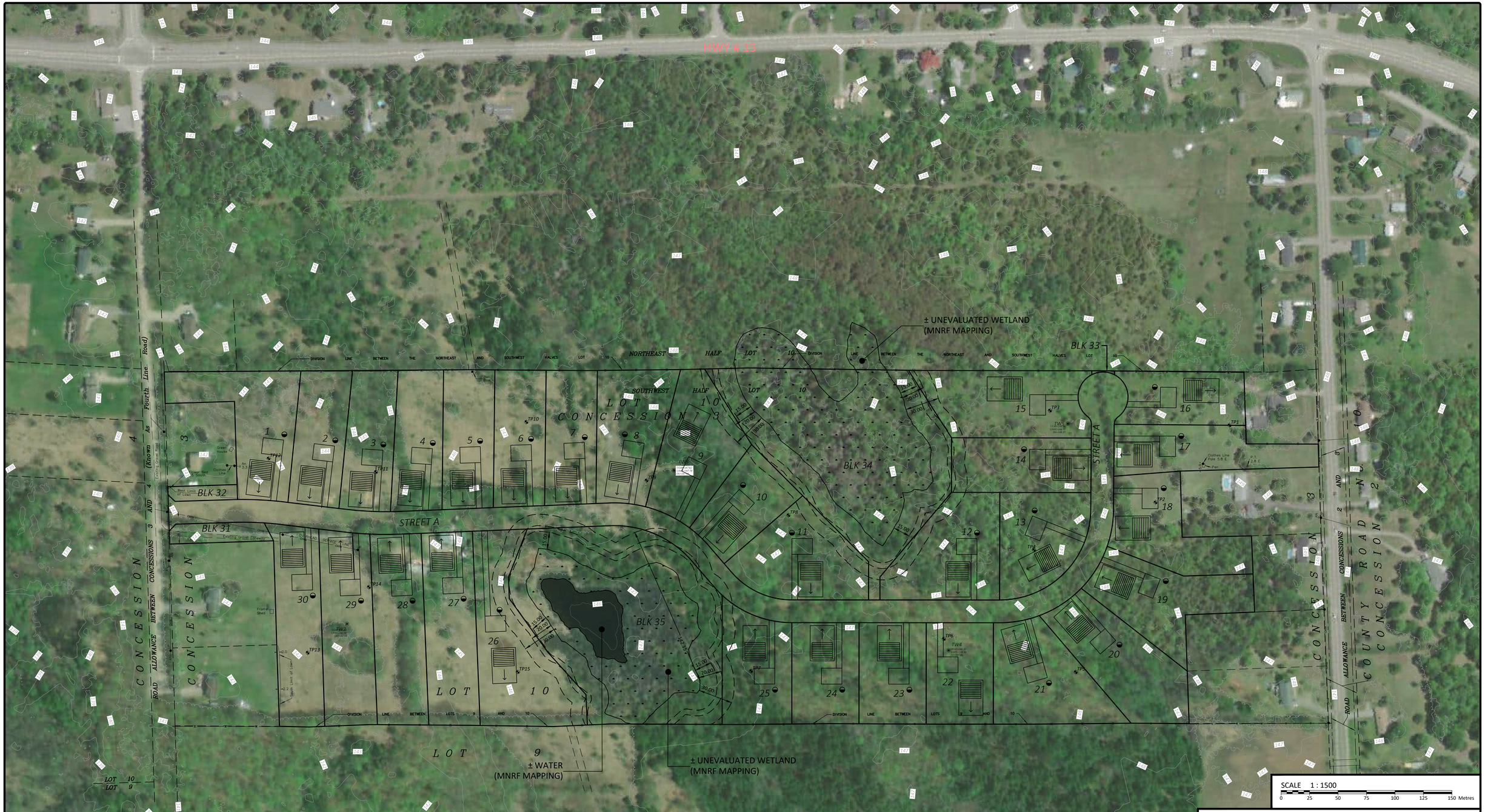
Drawing Number: 8

FILENAME: U:\Perth\MRCE (OBS\MPCE Projects\2022\CCO\CCO-22-0256 - Grizzly Homes - Franktown Subdivision Review\Hydro G\Terrain Analysis\CCO-22-0256 Grizzly-Franktown- Soil Characterization July 25, 2023.dwg
LAST SAVED: Tuesday, July 25, 2023 LAST SAVED BY: pjeldanc
LAST PLOTTED: Tuesday, July 25, 2023 CTB FILE USED: ----

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

APPENDIX A: PRELIMINARY CONCEPT PLAN

McINTOSH PERRY



TEST WELLS :

TEST WELL LOCATIONS SHOWN ARE APPROXIMATE ONLY AND SHALL BE VERIFIED PRIOR TO DETAILED DESIGN.

ANY TEST WELLS THAT DO NOT MEET OBC REQUIREMENTS SHALL BE ABANDONED IN ACCORDANCE WITH O.REG 903

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

LEGEND
(IF APPLICABLE)

- CONCEPTUAL WELL LOCATION
- CONCEPTUAL DWELLING & DRIVEWAY LOCATION
- CONCEPTUAL SEPTIC LOCATION
- TW — APPROXIMATE TEST WELL LOCATION
- 147 — EXISTING GROUND CONTOUR (DRAPE 2014)
- EXISTING LEGAL FABRIC
- CONCEPTUAL PROPERTY LINE

STAMP:

No.	Revision/Issue	Date

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

Designed by:	SH
Drawn by:	SH
Checked By:	AO
Scale:	1:1500

Client:
GRIZZLY HOMES
P.O. BOX 422, RR#7
ASHTON, ONTARIO, K0A 1B0

Project:
FRANKTOWN SUBDIVISION
BECKWITH TOWNSHIP

Drawing Title:
CONCEPTUAL LOT DEVELOPMENT PLAN

Date: MAY.19.2023
Project Number: CCO-22-0256
Drawing Number: DEV

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

FILENAME: U:\Prom\MPC_DES\MPC Projects\2022\CCO\CCO-22-0256 - Grizzly Homes - Franktown Subdivision Review\12 - Dwgs\CCO-22-0256 Grizzly-Franktown Con, Dev - Prel&Post.dwg
LAST SAVED: Thursday, August 25, 2022 LAST SAVED BY: i.hall
LAST PLOTTED: Friday, May 19, 2023 CTB FILE USED: ---

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

APPENDIX B: BECKWITH TOWNSHIP OFFICIAL PLAN

McINTOSH PERRY

2010 Official Plan of the Township of Beckwith

Schedule A
Land Use

Scale 1:20000

500 250 0 500 1000 1500 2000 2500 m
1500 750 0 1500 3000 4500 6000 7500 ft

township boundary
provincial highway (7)
county road (17)
primary local road
secondary local local road
unopened row
private road

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

Prepared: June 2011
Revised: November 16, 2012
Printed: 20-Nov-12

NOTE: Approved with modifications by the Minister of Municipal Affairs and Housing on September 17, 2012. Adopted by Council September 7, 2010.

J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

File Location: J:\11\09_01 Official Plan Review\ALR DWG\Backup\OPAtlas_OP_Sched_Landuse_MxdMAH.dwg

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

APPENDIX C: ON-SITE WATER WELL RECORDS (AIR ROCK DRILLING)

McINTOSH PERRY

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 GRIZZLY HOMES
(Name of Landowner)

LOCATED AT #2085 4TH Line Beckwith, Franktown
(Civic Address)

LOT # 10 **CON #** 3 ~~PLAN #~~ Test Well # 2 **S/L #** 29

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 9TH day of JULY 2021

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

Witness **Debbie Davis**

HYDROLOGIST (Signature / Stamp)

2021
A320952

Ontario — Ministry of the Environment, Conservation and Parks

Well Tag#: A320952 (Below) — A320952

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	GRIZZLY HOMES		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
Box 422. RR4	Ashton	Ont	K0A 1B0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
#2085 4TH Line Beckwith	Beckwith	10	3

County/District/Municipality	City/Town/Village	Province	Postal Code
LANARK	Franktown	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	18	415703	4908086	TW# 2	S/L 29

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	Depth (m/ft) To
	Sand			0'	1'
	Grey limestone			1'	30'
	Grey Sandstone			30'	100'
	*TW# 2	S/L 29 *			

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/Imp gal)
42'	32'	Neat Cement Slurry	10.92
32'	0'	Bentonite Slurry	4.20

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☒ 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

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	Steel	.188"	+2'	42'
6"	Open Hole		42'	100'

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Construction Record - Screen

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

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
94 (m/ft) ☐ Gas	☐ Fresh ☒ Untested ☐ Other, specify	0'	42'	9 3/4"
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	42'	100'	6"
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify			

Results of Well Yield Testing

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

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 80

Pumping rate (l/min / GPM): 20

Duration of pumping: (hrs + 0 min

Final water level end of pumping (m/ft): 33' 8"

If flowing give rate (l/min/GPM): X

Recommended pump depth (m/ft): 80'

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

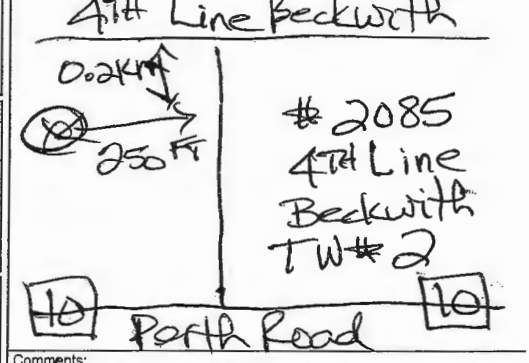
Well production (l/min/GPM): 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	15'6"		33'8"
1	22.5	1	27.6
2	25.3	2	23.2
3	27.	3	20.5
4	28.3	4	17.9
5	29.2	5	15.6
10	31.5	10	15'6"
15	32.5	15	
20	33.1	20	
25	33.2	25	
30	33.4	30	
40	33.6	40	
50	33.7	50	
60	33'8"	60	

Map of Well Location

Please provide a map below following instructions on the back.



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

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
AIRRock Drilling Co LTD	C7681

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
6659 Franktown Road	Richmond	Ont	K0A 2Z0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138382170	HANNA, Jeremy	13632		2024/07/31

Well owner's information package delivered: ☒ Yes ☐ No

Date Package Delivered: 2024/07/31

Date Work Completed: 2024/07/09

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Audit No: Z355100

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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 GRIZZLY HOMES
(Name of Landowner)

LOCATED AT #2085 4TH Line Beckwith, Franktown
(Civic Address)

LOT # 10 **CON #** 3 ~~PLAN #~~ Test Well # 3 **S/L #** 9

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 13TH day of JULY 2021

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

Witness **Debbie Davis**

HYDROLOGIST (Signature / Stamp)

2021
A320954

Ontario Ministry of the Environment, Conservation and Parks

Well Tag Tag#: A320954 (low)

A320954

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	ORIZZLY HOMES		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
Box 422 RR4	Ashton	Ont	K0A 1B0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
#2085 4TH line Beckwith	Beckwith	10	3

County/District/Municipality	City/Town/Village	Province	Postal Code
LANARK	Franktown	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	18	415984	4907947	TW# 3	S/L 9

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	Depth (m/ft) To
	Sand			0'	1.5'
Grey	limestone			1.5'	30'
Grey	Sandstone			30'	120'

*TW# 3 - S/L 9 *

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
42'	32'	Neat Cement Slurry	10.92
32'	0'	Bentonite Slurry	4.20.

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☒ 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

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	Steel	.188"	+2'	42'
5 15/16"	Open Hole		42'	120'

Construction Record - Screen

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

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water	Hole Diameter Depth From	Depth To	Diameter (cm/in)
90	☐	☐ Fresh ☐ Untested ☐ Other, specify ____	0'	42'	9 3/4"
114	☐	☐ Fresh ☐ Untested ☐ Other, specify ____	42'	120'	5 15/16"
	☐	☐ Fresh ☐ Untested ☐ Other, specify ____			

Results of Well Yield Testing

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

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 100'

Pumping rate (l/min/GPM): 20

Duration of pumping: ___ hrs + 0 min

Final water level end of pumping (m/ft): 33'4"

If flowing give rate (l/min/GPM): X

Recommended pump depth (m/ft): 100'

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

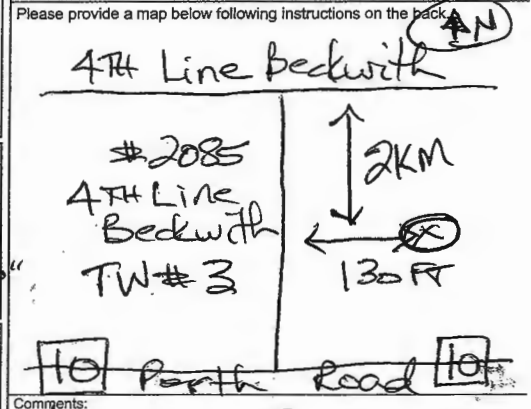
Well production (l/min/GPM): 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	31'5"		33'4"
1	32.3	1	31'5"
2	32.5	2	31'5"
3	32.6	3	
4	32.7	4	
5	32.8	5	
10	32.9	10	
15	33.	15	
20	33.1	20	
25	33.2	25	
30	33.2	30	
40	33.3	40	
50	33.3	50	
60	33.4"	60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: 1/2HP-10GPM Set @ 100 FT

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
AIR ROCK DRILLING CO LTD	7681

Business Address (Street Number/Name)	Municipality
6659 Franktown Road	Richmond

Province	Postal Code	Business E-mail Address
Ont	K0A 2Z0	

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

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T3632		2021/07/31

Well owner's information package delivered: ☒ Yes ☐ No

Date Package Delivered: 2021/07/14

Date Work Completed: 2021/07/13

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Audit No. Z364644

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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 GRIZZLY HOMES
(Name of Landowner)

LOCATED AT # 2085 4TH LINE BECKWITH, Franktown
(Civic Address)

LOT # 10 **CON #** 3 **~~PLAN~~ #** TW # 4 **S/L #** 22

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 31ST day of AUGUST 2021

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

Witness **Debbie Davis**

HYDROLOGIST (Signature / Stamp)

2021700
TAG A318561
TW# 4 / S/L# 22

Ontario — Ministry of the Environment, Conservation and Parks

Tag#: A318561 (Print Below)

A318561

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	Grizzly Homes		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
PO Box 422.RR#4	Ashton	On	K0A 1B0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
2085 4th Line [redacted] Beckwith	~~Franktown~~ Beckwith	10	3

County/District/Municipality	City/Town/Village	Province	Postal Code
Lanark	~~Beckwith~~ Franktown	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	18	416009	4987655	TW #4	S/L 22

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	Depth (m/ft) To
	[redacted]	Sand & Stones		0	6
Grey	Limestone			6	25
White W/Yellow layer	Sandstone	Mix		25	98
White W/Yellow layer	Sandstone	Mix		98	116
White W/Yellow layer	Sandstone	Mix		116	122

* TW#4 - S/L 22 *

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
42	32	Neat cement	10.92
32	0	Bentonite slurry	8.4

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ 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

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	Steel	.188"	+2	42
5 15/16"	Open Hole		42	122

Construction Record - Screen

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

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Water Details

Water found at Depth (m/ft)	Gas	Kind of Water: Fresh	Untested	Other, specify
98	☐	☐	☒	
116	☐	☐	☒	
	☐	☐	☐	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	42	9 3/4"
42	122	5 15/16"

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: X

Pump intake set at (m/ft): 100

Pumping rate (l/min / GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 39.6

If flowing give rate (l/min/GPM): X

Recommended pump depth (m/ft): 100

Recommended pump rate (l/min/GPM): 10

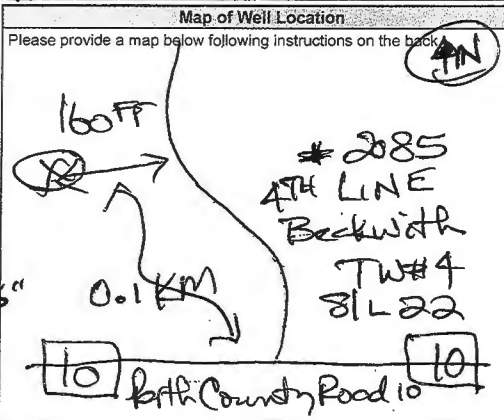
Well production (l/min/GPM): 30

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	38		39.6
1	38.7	1	38.4
2	38.8	2	38
3	38.9	3	38
4	39	4	38
5	39.1	5	38
10	39.2	10	38
15	39.3	15	38
20	39.3	20	38
25	39.4	25	38
30	39.4	30	38
40	39.5	40	38
50	39.6	50	38
60	39.6	60	38

Map of Well Location

Please provide a map below following instructions on the back.



Comments: 1/2HP 10 GPM - Set @ 100 FT

Well Contractor and Well Technician Information

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

Business Address (Street Number/Name)	Municipality
6650 Prankton Road	Richmond

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

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

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted (Y Y Y Y M M D D)
13632		2021 09 30

Well owner's information package delivered	Date Package Delivered (Y Y Y Y M M D D)	Date Work Completed (Y Y Y Y M M D D)
☒ Yes ☐ No	2021 09 01	2021 08 31

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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 GRIZZLY HOMES
(Name of Landowner)

LOCATED AT #2085 4TH Line Beckwith, Franktown
(Civic Address)

LOT # 10 **CON #** 3 ~~PLAN #~~ Test Well #5 **S/L #** 15

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 14TH day of JULY 2021

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

Witness **Debbie Davis**

HYDROLOGIST (Signature / Stamp)

2021
A320985

Ontario — Ministry of the Environment, Conservation and Parks

Well Tag#: A320985 (Write in Below) — A320985

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	GRIZZLY HOMES		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
Box 422, RR4	Ashton	Ont	K0A 1B0	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
# 2085 4th Line Beckwith	Beckwith	10	3

County/District/Municipality	City/Town/Village	Province	Postal Code
LANARK	Franktown	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	416228	4987683	TW# 5	S/L 15

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	Depth (m/ft) To
	Sand			0'	5'
	Grey Limestone			5'	27'
	Grey Sandstone			27'	120'
	Grey & Yellow Sandstone			120'	140'
	* TW# 5 S/L 15 *				

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³)
42'	32'	Neat Cement Slurry	10.9
32'	0'	Bentonite Slurry	4.2

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☒ Air percussion ☐ Other, specify ____

Well Use

☐ Public ☒ Domestic ☐ Livestock ☐ Irrigation ☐ Industrial ☐ Other, specify ____ ☐ Commercial ☐ Municipal ☐ Test Hole ☐ Cooling & Air Conditioning ☐ Not used ☐ Dewatering ☐ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	Steel	.188"	+2'	42'
6"	Open Hole		42'	140'

Status of Well

☒ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ____ ☐ Other, specify ____

Construction Record - Screen

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

Water Details

Water found at Depth (m/ft)	Kind of Water	Water found at Depth (m/ft)	Kind of Water
87	☐ Fresh ☒ Untested ☐ Gas ☐ Other, specify ____	114	☐ Fresh ☒ Untested ☐ Gas ☐ Other, specify ____
Water found at Depth (m/ft)	Kind of Water		
	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify ____		

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0'	42'	9 3/4"
42'	140'	6"

Results of Well Yield Testing

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

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 120'

Pumping rate (l/min/GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 38'8"

If flowing give rate (l/min/GPM): X

Recommended pump depth (m/ft): 100'

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

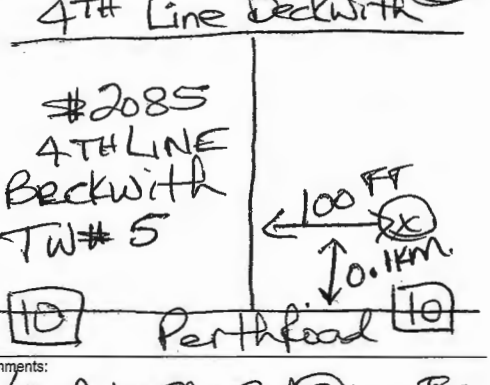
Well production (l/min/GPM): 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	37'8"		38'8"
1	38.2	1	37'8"
2	38.2	2	37'8"
3	38.2	3	
4	38.3	4	
5	38.3	5	
10	38.4	10	
15	38.4	15	
20	38.5	20	
25	38.5	25	
30	38.6	30	
40	38.7	40	
50	38.8	50	
60	38'8"	60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments: 1/2HP 10GPM Set @ 100 FT

Well Contractor and Well Technician Information

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

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
6659 Franktown Road	Richmond	Ont	K0A 2Z0	

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

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
13632		2021/07/31

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2021/07/14	2021/07/14

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Ontario — Ministry of the Environment

Well A105321 (Tag No. Below) A105321

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Joseph & Lauren Dowdall		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
2030 Fourth Line Beckwith	Franktown	ON	K7A 4S7	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
2030 Fourth Line Beckwith	Beckwith	10	4

County/District/Municipality	City/Town/Village	Province	Postal Code
Lanark	Franktown	Ontario	

UTM Coordinates NAD 8 3	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
	18	415856	4988482		

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	Depth (m/ft) To
			Sand/Gravel	0'	4'
Grey & White	Sandstone	w/grey	Limestone	4'	71'
Grey & White	Sandstone	w/grey	Limestone	71'	75'
Grey & White	Sandstone	w/grey	Limestone	75'	81'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
40'	0'	Neat cement slurry	17.2

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☒ 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

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6"	Steel	.188"	+2'	40'
5⅞"	Open Hole		40'	81'

Construction Record - Screen

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

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
71'		
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
75'		
Water found at Depth (m/ft)	☐ Gas	Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0'	40'	6"
40'	81'	5⅞"

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): 60

Pumping rate (l/min / GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 28.6

If flowing give rate (l/min / GPM): X

Recommended pump depth (m/ft): 60'

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

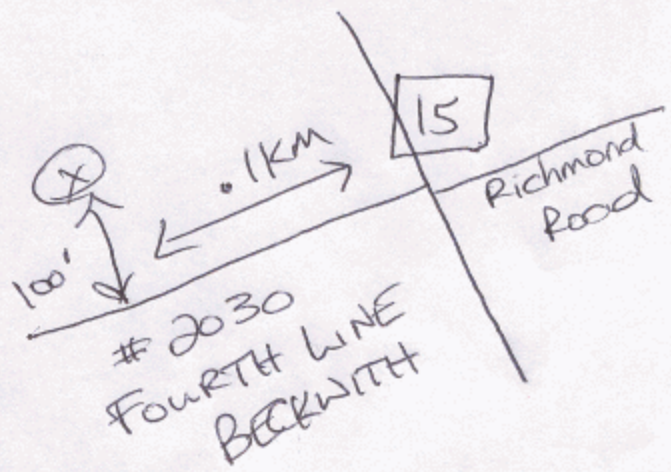
Well production (l/min / GPM): 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	18.3		28.6
1	23.5	1	18.3
2	24.3	2	18.3
3	25.4	3	18.3
4	26.1	4	18.3
5	26.7	5	18.3
10	27.5	10	18.3
15	27.9	15	18.3
20	28	20	18.3
25	28.1	25	18.3
30	28.2	30	18.3
40	28.4	40	18.3
50	28.5	50	18.3
60	28.6	60	18.3'

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Air Rock Drilling Co. Ltd.	1119

Business Address (Street Number/Name)	Municipality
6659 Franktown Road, RR#1	Richmond

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

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138382170	Hogan, Dan

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted (Y Y Y Y M M D D)
T3058		2011 08 31

Well owner's information package delivered	Date Package Delivered (Y Y Y Y M M D D)	Date Work Completed (Y Y Y Y M M D D)
☒ Yes ☐ No	2011 08 18	2011 08 16

Ministry Use Only

Audit No. Z119702

Received OCT 11 2011

0506E (2007/12)

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HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

APPENDIX D: MECP WELL RECORDS SUMMARY

McINTOSH PERRY

WELL_ID	COMPLETED	WELL DEPTH (m)	STATIC WATER LEVEL (m)	DEPTH TO BEDROCK (m)	FINAL STATUS	USE1	GEOLOGY	FORMATION_TOP_DEPTH	FORMATION_END_DEPTH	UNITS OF MEASUREMENT
2410073	07-Aug-04	34.7	2	4.3	Water Supply	Domestic	CLAY,,	0	4.2	m
2410073	07-Aug-04	34.7	2	4.3	Water Supply	Domestic	,DOLOMITE,	4.2	6	m
2410073	07-Aug-04	34.7	2	4.3	Water Supply	Domestic	,DOLOMITE,	6	34.7	m
3500134	01-Apr-63	22.9		0.9	Water Supply	Domestic	MEDIUM SAND,TOPSOIL,	0	3	ft
3500134	01-Apr-63	22.9		0.9	Water Supply	Domestic	SANDSTONE,,	3	75	ft
3500298	25-May-61	14.9	5.5	0	Water Supply	Domestic	SHALE,,	0	10	ft
3500298	25-May-61	14.9	5.5	0	Water Supply	Domestic	SANDSTONE,,	10	49	ft
3500299	08-Mar-62	30.5	10.7	0.6	Water Supply	Domestic	TOPSOIL,,	0	2	ft
3500299	08-Mar-62	30.5	10.7	0.6	Water Supply	Domestic	LIMESTONE,MEDIUM SAND,	2	100	ft
3500300	23-Jul-65	26.2	11.3	0.6	Water Supply	Domestic	MEDIUM SAND,TOPSOIL,	0	2	ft
3500300	23-Jul-65	26.2	11.3	0.6	Water Supply	Domestic	SANDSTONE,,	2	6	ft
3500300	23-Jul-65	26.2	11.3	0.6	Water Supply	Domestic	SANDSTONE,,	6	86	ft
3500301	24-Apr-62	16.8	3.4	0.3	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,	0	1	ft
3500301	24-Apr-62	16.8	3.4	0.3	Water Supply	Domestic	SANDSTONE,MEDIUM SAND,	1	13	ft
3500301	24-Apr-62	16.8	3.4	0.3	Water Supply	Domestic	SANDSTONE,,	13	55	ft
3500307	26-Nov-59	15.2	7.9	1.2	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,	0	4	ft
3500307	26-Nov-59	15.2	7.9	1.2	Water Supply	Domestic	SHALE,,	4	11	ft
3500307	26-Nov-59	15.2	7.9	1.2	Water Supply	Domestic	SANDSTONE,,	11	50	ft
3500308	29-Oct-55	25.6	7.6	0.3	Water Supply	Domestic	TOPSOIL,,	0	1	ft
3500308	29-Oct-55	25.6	7.6	0.3	Water Supply	Domestic	SANDSTONE,,	1	84	ft
3500309	24-Sep-56	21	4.6	0	Water Supply	Domestic	LIMESTONE,MEDIUM SAND,	0	69	ft
3500310	19-Mar-59	22.9	5.5	0.3	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,	0	1	ft
3500310	19-Mar-59	22.9	5.5	0.3	Water Supply	Domestic	SANDSTONE,,	1	75	ft
3500311	08-May-59	21	6.1	0.3	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,	0	1	ft
3500311	08-May-59	21	6.1	0.3	Water Supply	Domestic	SANDSTONE,,	1	69	ft
3500312	25-Jul-61	22.3	6.7	1.2	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,	0	4	ft
3500312	25-Jul-61	22.3	6.7	1.2	Water Supply	Domestic	SANDSTONE,,	4	73	ft
3500313	02-Sep-64	22.6	7.6	1.8	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,	0	6	ft
3500313	02-Sep-64	22.6	7.6	1.8	Water Supply	Domestic	SANDSTONE,,	6	74	ft
3500314	12-Aug-66	28	10.7	0	Water Supply	Livestock	SANDSTONE,,	0	92	ft
3500315	26-Mar-59	18.3	5.2	0.9	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,	0	3	ft
3500315	26-Mar-59	18.3	5.2	0.9	Water Supply	Domestic	SHALE,,	3	7	ft
3500315	26-Mar-59	18.3	5.2	0.9	Water Supply	Domestic	SANDSTONE,,	7	60	ft
3500318	28-Oct-59	23.5	3.7	1.5	Water Supply	Domestic	TOPSOIL,STONES,	0	5	ft
3500318	28-Oct-59	23.5	3.7	1.5	Water Supply	Domestic	LIMESTONE,,	5	77	ft
3500319	14-May-60	21.6	3.7	1.2	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,	0	4	ft
3500319	14-May-60	21.6	3.7	1.2	Water Supply	Domestic	MEDIUM SAND,SHALE,	4	12	ft
3500319	14-May-60	21.6	3.7	1.2	Water Supply	Domestic	SANDSTONE,,	12	71	ft
3500320	25-Jul-63	22.9	5.5	3.7	Water Supply	Domestic	CLAY,TOPSOIL,	0	12	ft
3500320	25-Jul-63	22.9	5.5	3.7	Water Supply	Domestic	SANDSTONE,,	12	75	ft
3502343	26-Apr-68	20.1	2.4	0.6	Water Supply	Domestic	CLAY,TOPSOIL,	0	2	ft
3502343	26-Apr-68	20.1	2.4	0.6	Water Supply	Domestic	SANDSTONE,,	2	66	ft
3502416	04-Mar-69	18.9	5.5	0.6	Water Supply	Commerical	GRAVEL,TOPSOIL,	0	2	ft
3502416	04-Mar-69	18.9	5.5	0.6	Water Supply	Commerical	LIMESTONE,,	2	57	ft
3502416	04-Mar-69	18.9	5.5	0.6	Water Supply	Commerical	SANDSTONE,,	57	62	ft
3502816	13-Jul-71	23.2	10.4	1.2	Water Supply	Domestic	MEDIUM SAND,,	0	4	ft
3502816	13-Jul-71	23.2	10.4	1.2	Water Supply	Domestic	SANDSTONE,,	4	76	ft
3502881	18-Aug-71	24.4	12.2	0.9	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,STONES	0	3	ft
3502881	18-Aug-71	24.4	12.2	0.9	Water Supply	Domestic	SANDSTONE,,	3	20	ft
3502881	18-Aug-71	24.4	12.2	0.9	Water Supply	Domestic	SANDSTONE,LIMESTONE,	20	70	ft
3502881	18-Aug-71	24.4	12.2	0.9	Water Supply	Domestic	SANDSTONE,MEDIUM SAND,	70	80	ft
3502883	17-Jul-71	25.9	8.2	1.5	Water Supply	Domestic	TOPSOIL,MEDIUM SAND,STONES	0	5	ft
3502883	17-Jul-71	25.9	8.2	1.5	Water Supply	Domestic	SANDSTONE,,	5	21	ft
3502883	17-Jul-71	25.9	8.2	1.5	Water Supply	Domestic	LIMESTONE,SANDSTONE,	21	68	ft
3502883	17-Jul-71	25.9	8.2	1.5	Water Supply	Domestic	SANDSTONE,LIMESTONE,	68	85	ft
3503274	29-Sep-72	30.5	9.1	0.3	Water Supply	Domestic	FILL,,	0	1	ft
3503274	29-Sep-72	30.5	9.1	0.3	Water Supply	Domestic	LIMESTONE,,	1	40	ft
3503274	29-Sep-72	30.5	9.1	0.3	Water Supply	Domestic	SANDSTONE,,	40	58	ft
3503274	29-Sep-72	30.5	9.1	0.3	Water Supply	Domestic	SANDSTONE,,	58	65	ft
3503274	29-Sep-72	30.5	9.1	0.3	Water Supply	Domestic	SANDSTONE,,	65	72	ft
3503274	29-Sep-72	30.5	9.1	0.3	Water Supply	Domestic	SANDSTONE,,	72	100	ft
3503383	27-Jun-73	27.4	10.7	0.3	Water Supply	Domestic	TOPSOIL,,	0	1	ft
3503383	27-Jun-73	27.4	10.7	0.3	Water Supply	Domestic	LIMESTONE,,	1	60	ft
3503383	27-Jun-73	27.4	10.7	0.3	Water Supply	Domestic	SANDSTONE,,	60	90	ft
3503454	06-Jul-73	22.9	6.1	1.8	Water Supply	Domestic	TOPSOIL,,	0	6	ft
3503454	06-Jul-73	22.9	6.1	1.8	Water Supply	Domestic	LIMESTONE,SANDY,	6	75	ft
3503664	15-Oct-73	25.9	5.5	0.3	Water Supply	Domestic	CLAY,TOPSOIL,	0	1	ft
3503664	15-Oct-73	25.9	5.5	0.3	Water Supply	Domestic	SANDSTONE,,	1	85	ft
3503718	10-May-74	27.4	0.3	0.3	Water Supply	Domestic	CLAY,,	0	1	ft
3503718	10-May-74	27.4	0.3	0.3	Water Supply	Domestic	SANDSTONE,,	1	90	ft
3503763	15-Jul-74	21.9	9.4	1.2	Water Supply	Domestic	TOPSOIL,,	0	4	ft
3503763	15-Jul-74	21.9	9.4	1.2	Water Supply	Domestic	LIMESTONE,SAND,	4	72	ft
3504268	14-Aug-75	25.9	10.1	0.6	Water Supply	Domestic	SAND,STONES,LOOSE	0	2	ft
3504268	14-Aug-75	25.9	10.1	0.6	Water Supply	Domestic	SANDSTONE,SAND,LAYERED	2	16	ft
3504268	14-Aug-75	25.9	10.1	0.6	Water Supply	Domestic	LIMESTONE,HARD,	16	73	ft
3504268	14-Aug-75	25.9	10.1	0.6	Water Supply	Domestic	LIMESTONE,SAND,LAYERED	73	85	ft
3504368	21-May-76	33.5	6.1	0	Water Supply	Domestic	LIMESTONE,,	0	40	ft
3504368	21-May-76	33.5	6.1	0	Water Supply	Domestic	SANDSTONE,,	40	110	ft
3504536	26-Oct-76	23.2	5.5	0.6	Water Supply	Domestic	TOPSOIL,,	0	2	ft
3504536	26-Oct-76	23.2	5.5	0.6	Water Supply	Domestic	SANDSTONE,,	2	76	ft

3504537	27-Oct-76	29	5.5	0.3	Water Supply	Domestic	TOPSOIL,STONES,	0	1 ft
3504537	27-Oct-76	29	5.5	0.3	Water Supply	Domestic	SANDSTONE,,	1	30 ft
3504537	27-Oct-76	29	5.5	0.3	Water Supply	Domestic	LIMESTONE,,	30	95 ft
3504815	23-Nov-77	27.7	1.2	0.6	Water Supply	Domestic	TOPSOIL,,	0	2 ft
3504815	23-Nov-77	27.7	1.2	0.6	Water Supply	Domestic	LIMESTONE,,	2	20 ft
3504815	23-Nov-77	27.7	1.2	0.6	Water Supply	Domestic	SANDSTONE,,	20	91 ft
3505131	04-Jul-78	27.4	10.7	0.3	Water Supply	Domestic	TOPSOIL,,	0	1 ft
3505131	04-Jul-78	27.4	10.7	0.3	Water Supply	Domestic	LIMESTONE,,	1	45 ft
3505131	04-Jul-78	27.4	10.7	0.3	Water Supply	Domestic	SANDSTONE,,	45	90 ft
3505618	01-Nov-79	27.4	5.5	0	Water Supply	Domestic	SANDSTONE,,	0	90 ft
3505792	15-Apr-80	22.9	6.1	0	Water Supply	Domestic	SANDSTONE,,	0	15 ft
3505792	15-Apr-80	22.9	6.1	0	Water Supply	Domestic	SANDSTONE,,	15	75 ft
3506595	04-Oct-83	24.4	12.2	1.5	Water Supply	Livestock	FILL,,	0	5 ft
3506595	04-Oct-83	24.4	12.2	1.5	Water Supply	Livestock	LIMESTONE,SANDY,	5	25 ft
3506595	04-Oct-83	24.4	12.2	1.5	Water Supply	Livestock	SANDSTONE,,	25	80 ft
3506603	10-Jan-83	25.6	10.7	0	Water Supply	Domestic	SANDSTONE,,	0	84 ft
3508675	07-Sep-88	23.2	7.6	0.6	Water Supply	Domestic	FILL,,	0	2 ft
3508675	07-Sep-88	23.2	7.6	0.6	Water Supply	Domestic	LIMESTONE,,	2	56 ft
3508675	07-Sep-88	23.2	7.6	0.6	Water Supply	Domestic	SANDSTONE,,	56	76 ft
3509074	26-Oct-89	24.4	13.7	0.6	Water Supply	Domestic	GRAVEL,TOPSOIL,LOOSE	0	2 ft
3509074	26-Oct-89	24.4	13.7	0.6	Water Supply	Domestic	SANDSTONE,HARD,	2	80 ft
3510822	03-Sep-93	27.4	12.5	1.8	Water Supply	Domestic	TOPSOIL,SANDY,DRY	0	6 ft
3510822	03-Sep-93	27.4	12.5	1.8	Water Supply	Domestic	SANDSTONE,VERY,HARD	6	90 ft
3511553	06-Jul-95	29	7.6	0.9144	Water Supply	Domestic	ROCK,FILL,	0	3 ft
3511553	06-Jul-95	29	7.6	0.9144	Water Supply	Domestic	SANDSTONE,,	3	95 ft
3512519	22-Oct-98	30.5	9.4	3.4	Water Supply	Domestic	CLAY,,	0	11 ft
3512519	22-Oct-98	30.5	9.4	3.4	Water Supply	Domestic	LIMESTONE,,	11	30 ft
3512519	22-Oct-98	30.5	9.4	3.4	Water Supply	Domestic	SANDSTONE,,	30	100 ft
3512844	29-Oct-99	29.3	4.3	1.2336	Water Supply	Domestic	ROCK,FILL,	0	4 ft
3512844	29-Oct-99	29.3	4.3	1.2336	Water Supply	Domestic	LIMESTONE,,	4	63 ft
3512844	29-Oct-99	29.3	4.3	1.2336	Water Supply	Domestic	SANDSTONE,,	63	96 ft
3514514	12-Apr-04	21.3	6.2	0.9	Water Supply	Domestic	FILL,,	0	0.91 m
3514514	12-Apr-04	21.3	6.2	0.9	Water Supply	Domestic	SANDSTONE,,	0.91	21.3 m
3514558	19-May-04	30.5	8.8	0.9	Water Supply	Domestic	FILL,,	0	0.91 m
3514558	19-May-04	30.5	8.8	0.9	Water Supply	Domestic	LIMESTONE,SANDSTONE,	0.91	30.5 m
3515533	20-Oct-06	39.6	0.5	0.6	Water Supply	Domestic	TOPSOIL,,	0	0.6 m
3515533	20-Oct-06	39.6	0.5	0.6	Water Supply	Domestic	LIMESTONE,,	0.6	39.6 m
7126066	11-Jun-06	24.4	3.2	0.3084	Water Supply		TOPSOIL,,	0	1 m
7126066	11-Jun-06	24.4	3.2	0.3084	Water Supply		SANDSTONE,,	1	24.4 m
7131322	17-Sep-09	24.4	4.9	0.3048	Water Supply	Domestic	SAND,,	0	1 ft
7131322	17-Sep-09	24.4	4.9	0.3048	Water Supply	Domestic	LIMESTONE,,	1	80 ft
7148253	24-Jun-10	24.4		0.9144	Water Supply	Domestic	CLAY,STONES,	0	3 ft
7148253	24-Jun-10	24.4		0.9144	Water Supply	Domestic	SANDSTONE,,	3	76 ft
7148253	24-Jun-10	24.4		0.9144	Water Supply	Domestic	SANDSTONE,,	76	80 ft
3508666	29-Feb-88	29	4.6	0.6	Water Supply	Domestic	TOPSOIL,,	0	2 ft
3508666	29-Feb-88	29	4.6	0.6	Water Supply	Domestic	LIMESTONE,,	2	35 ft
3508666	29-Feb-88	29	4.6	0.6	Water Supply	Domestic	SANDSTONE,,	35	95 ft
3508672	21-Sep-88	23.8	12.2	0.6	Water Supply	Domestic	TOPSOIL,STONES,	0	2 ft
3508672	21-Sep-88	23.8	12.2	0.6	Water Supply	Domestic	SHALE,,	2	8 ft
3508672	21-Sep-88	23.8	12.2	0.6	Water Supply	Domestic	LIMESTONE,,	8	36 ft
3508672	21-Sep-88	23.8	12.2	0.6	Water Supply	Domestic	SANDSTONE,,	36	78 ft
3508676	13-Sep-88	25	12.2	0	Water Supply	Domestic	LIMESTONE,,	0	30 ft
3508676	13-Sep-88	25	12.2	0	Water Supply	Domestic	SANDSTONE,,	30	82 ft
3509139	22-Nov-89	33.5	5.5	0	Water Supply	Domestic	LIMESTONE,,	0	20 ft
3509139	22-Nov-89	33.5	5.5	0	Water Supply	Domestic	SANDSTONE,,	20	110 ft
3510402	29-Jul-92	21.3	4.6	0	Water Supply	Domestic	SHALE,,	0	7 ft
3510402	29-Jul-92	21.3	4.6	0	Water Supply	Domestic	SANDSTONE,,	7	70 ft
3512946	03-Apr-00	36.6	4.3	0.3	Water Supply	Domestic	CLAY,,	0	1 ft
3512946	03-Apr-00	36.6	4.3	0.3	Water Supply	Domestic	LIMESTONE,,	1	120 ft
3513366	22-May-01	31.4	4.6	0.9	Water Supply	Domestic	SAND,,	0	3 ft
3513366	22-May-01	31.4	4.6	0.9	Water Supply	Domestic	SANDSTONE,,	3	103 ft
7169696	16-Aug-11	24.7	5.6	1.2192	Water Supply	Domestic	SAND,GRAVEL,	0	4 ft
7169696	16-Aug-11	24.7	5.6	1.2192	Water Supply	Domestic	SANDSTONE,LIMESTONE,	4	71 ft
7169696	16-Aug-11	24.7	5.6	1.2192	Water Supply	Domestic	SANDSTONE,LIMESTONE,	71	75 ft
7169696	16-Aug-11	24.7	5.6	1.2192	Water Supply	Domestic	SANDSTONE,LIMESTONE,	75	81 ft
7186914	03-Aug-12	15.2		0.9144	Observation Wells	Monitoring and Test Hole	SAND,TOPSOIL,DRY	0	3 ft
7186914	03-Aug-12	15.2		0.9144	Observation Wells	Monitoring and Test Hole	LIMESTONE,SAND,LAYERED	3	50 ft
7228030	26-Aug-14	30.8	8.9	0.6144	Water Supply	Domestic	SAND,FILL,	0	3 ft
7228030	26-Aug-14	30.8	8.9	0.6144	Water Supply	Domestic	SANDSTONE,,	3	73 ft
7228030	26-Aug-14	30.8	8.9	0.6144	Water Supply	Domestic	SANDSTONE,,	73	78 ft
7228030	26-Aug-14	30.8	8.9	0.6144	Water Supply	Domestic	SANDSTONE,,	78	91 ft
7228030	26-Aug-14	30.8	8.9	0.6144	Water Supply	Domestic	SANDSTONE,,	91	101 ft
7235413	03-Dec-14	24.4		0	Water Supply	Domestic	SANDSTONE,,	0	54 ft
7235413	03-Dec-14	24.4		0	Water Supply	Domestic	SANDSTONE,,	54	56 ft
7235413	03-Dec-14	24.4		0	Water Supply	Domestic	SANDSTONE,,	56	74 ft
7235413	03-Dec-14	24.4		0	Water Supply	Domestic	SANDSTONE,,	74	80 ft
7292087	19-Jul-17	36.6		0.6096	Water Supply	Domestic	CLAY,GRAVEL,	0	2 ft
7292087	19-Jul-17	36.6		0.6096	Water Supply	Domestic	SANDSTONE,,	2	120 ft

WELL_ID	COMPLETED	WELL DEPTH (m)	STATIC WATER LEVEL (m)	DEPTH TO BEDROCK (m)	FINAL STATUS	USE1	PUMPING RATE	RECOM RATE
2410073	07-Aug-04	34.7	2	4.3	Water Supply	Domestic	44 LPM	30LPM
3500134	01-Apr-63	22.9	0	0.9	Water Supply	Domestic	10 GPM	5GPM
3500298	25-May-61	14.9	5.5	0	Water Supply	Domestic	7 GPM	7GPM
3500299	08-Mar-62	30.5	10.7	0.6	Water Supply	Domestic	5 GPM	5GPM
3500300	23-Jul-65	26.2	11.3	0.6	Water Supply	Domestic	15 GPM	5GPM
3500301	24-Apr-62	16.8	3.4	0.3	Water Supply	Domestic	10 GPM	10GPM
3500307	26-Nov-59	15.2	7.9	1.2	Water Supply	Domestic	5 GPM	5GPM
3500308	29-Oct-55	25.6	7.6	0.3	Water Supply	Domestic	13 GPM	GPM
3500309	24-Sep-56	21	4.6	0	Water Supply	Domestic	8 GPM	GPM
3500310	19-Mar-59	22.9	5.5	0.3	Water Supply	Domestic	30 GPM	5GPM
3500311	08-May-59	21	6.1	0.3	Water Supply	Domestic	8 GPM	8GPM
3500312	25-Jul-61	22.3	6.7	1.2	Water Supply	Domestic	10 GPM	10GPM
3500313	02-Sep-64	22.6	7.6	1.8	Water Supply	Domestic	8 GPM	8GPM
3500314	12-Aug-66	28	10.7	0	Water Supply	Livestock	10 GPM	5GPM
3500315	26-Mar-59	18.3	5.2	0.9	Water Supply	Domestic	30 GPM	10GPM
3500318	28-Oct-59	23.5	3.7	1.5	Water Supply	Domestic	7 GPM	5GPM
3500319	14-May-60	21.6	3.7	1.2	Water Supply	Domestic	25 GPM	5GPM
3500320	25-Jul-63	22.9	5.5	3.7	Water Supply	Domestic	10 GPM	10GPM
3502343	26-Apr-68	20.1	2.4	0.6	Water Supply	Domestic	8 GPM	5GPM
3502416	04-Mar-69	18.9	5.5	0.6	Water Supply	Commerical	3 GPM	3GPM
3502816	13-Jul-71	23.2	10.4	1.2	Water Supply	Domestic	4 GPM	4GPM
3502881	18-Aug-71	24.4	12.2	0.9	Water Supply	Domestic	15 GPM	5GPM
3502883	17-Jul-71	25.9	8.2	1.5	Water Supply	Domestic	15 GPM	5GPM
3503274	29-Sep-72	30.5	9.1	0.3	Water Supply	Domestic	15 GPM	15GPM
3503383	27-Jun-73	27.4	10.7	0.3	Water Supply	Domestic	15 GPM	15GPM
3503454	06-Jul-73	22.9	6.1	1.8	Water Supply	Domestic	10 GPM	5GPM
3503664	15-Oct-73	25.9	5.5	0.3	Water Supply	Domestic	6 GPM	5GPM
3503718	10-May-74	27.4	0.3	0.3	Water Supply	Domestic	7 GPM	7GPM
3503763	15-Jul-74	21.9	9.4	1.2	Water Supply	Domestic	5 GPM	5GPM
3504268	14-Aug-75	25.9	10.1	0.6	Water Supply	Domestic	15 GPM	5GPM
3504368	21-May-76	33.5	6.1	0	Water Supply	Domestic	8 GPM	8GPM
3504536	26-Oct-76	23.2	5.5	0.6	Water Supply	Domestic	12 GPM	12GPM
3504537	27-Oct-76	29	5.5	0.3	Water Supply	Domestic	12 GPM	12GPM
3504815	23-Nov-77	27.7	1.2	0.6	Water Supply	Domestic	8 GPM	8GPM
3505131	04-Jul-78	27.4	10.7	0.3	Water Supply	Domestic	10 GPM	10GPM
3505618	01-Nov-79	27.4	5.5	0	Water Supply	Domestic	12 GPM	12GPM
3505792	15-Apr-80	22.9	6.1	0	Water Supply	Domestic	8 GPM	5GPM
3506595	04-Oct-83	24.4	12.2	1.5	Water Supply	Livestock	20 GPM	20GPM
3506603	10-Jan-83	25.6	10.7	0	Water Supply	Domestic	10 GPM	10GPM
3508675	07-Sep-88	23.2	7.6	0.6	Water Supply	Domestic	7 GPM	7GPM
3509074	26-Oct-89	24.4	13.7	0.6	Water Supply	Domestic	12 GPM	15GPM
3510822	03-Sep-93	27.4	12.5	1.8	Water Supply	Domestic	15 GPM	5GPM
3511553	06-Jul-95	29	7.6	0	Water Supply	Domestic	10 GPM	10GPM
3512519	22-Oct-98	30.5	9.4	3.4	Water Supply	Domestic	15 GPM	15GPM
3512844	29-Oct-99	29.3	4.3	0	Water Supply	Domestic	14 GPM	14GPM
3514514	12-Apr-04	21.3	6.2	0.9	Water Supply	Domestic	91 LPM	91LPM
3514558	19-May-04	30.5	8.8	0.9	Water Supply	Domestic	91 LPM	91LPM
3515533	20-Oct-06	39.6	0.5	0.6	Water Supply	Domestic	23 LPM	23LPM
7126066	11-Jun-06	24.4	3.2	0	Water Supply		67 LPM	50LPM
7131322	17-Sep-09	24.4	4.9	0	Water Supply	Domestic	20 GPM	20GPM
7148253	24-Jun-10	24.4	0	0	Water Supply	Domestic	14 GPM	15GPM
3508666	29-Feb-88	29	4.6	0.6	Water Supply	Domestic	14 GPM	14GPM
3508672	21-Sep-88	23.8	12.2	0.6	Water Supply	Domestic	12 GPM	12GPM
3508676	13-Sep-88	25	12.2	0	Water Supply	Domestic	20 GPM	20GPM
3509139	22-Nov-89	33.5	5.5	0	Water Supply	Domestic	12 GPM	12GPM
3510402	29-Jul-92	21.3	4.6	0	Water Supply	Domestic	18 GPM	18GPM
3512946	03-Apr-00	36.6	4.3	0.3	Water Supply	Domestic	30 GPM	30GPM
3513366	22-May-01	31.4	4.6	0.9	Water Supply	Domestic	7 GPM	7GPM
7169696	16-Aug-11	24.7	5.6	0	Water Supply	Domestic	20 GPM	20GPM
7186914	03-Aug-12	15.2	0	0	Observation Wells	Monitoring and Test Hole		
7228030	26-Aug-14	30.8	8.9	0	Water Supply	Domestic	20 GPM	20GPM
7228037	04-Sep-14	0	0	0	Abandoned-Other			
7235413	03-Dec-14	24.4	0	0	Water Supply	Domestic	20 GPM	20GPM
7292087	19-Jul-17	36.6	0	0	Water Supply	Domestic	20 GPM	20GPM

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

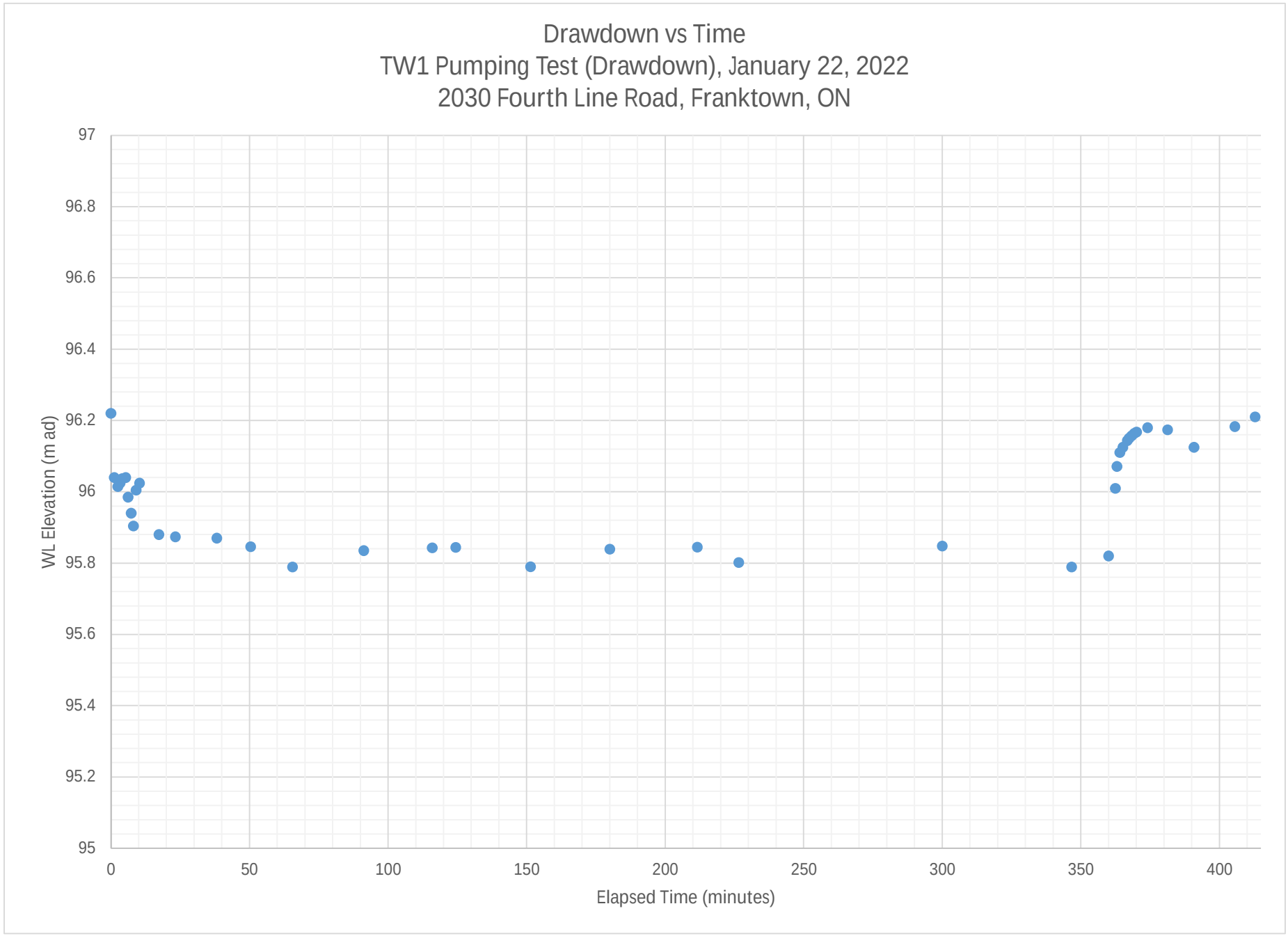
APPENDIX E: PUMPING TEST DATA

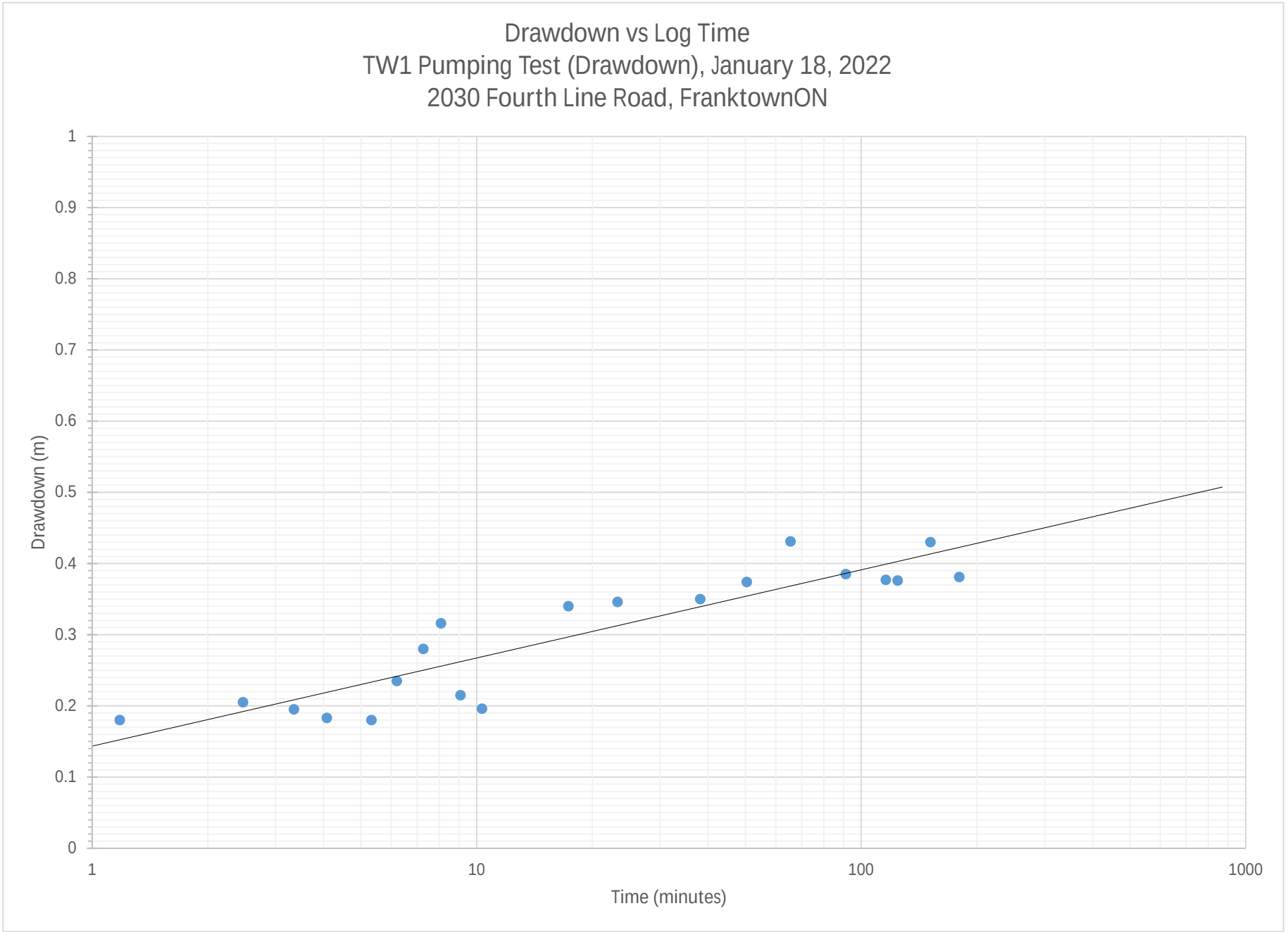
McINTOSH PERRY

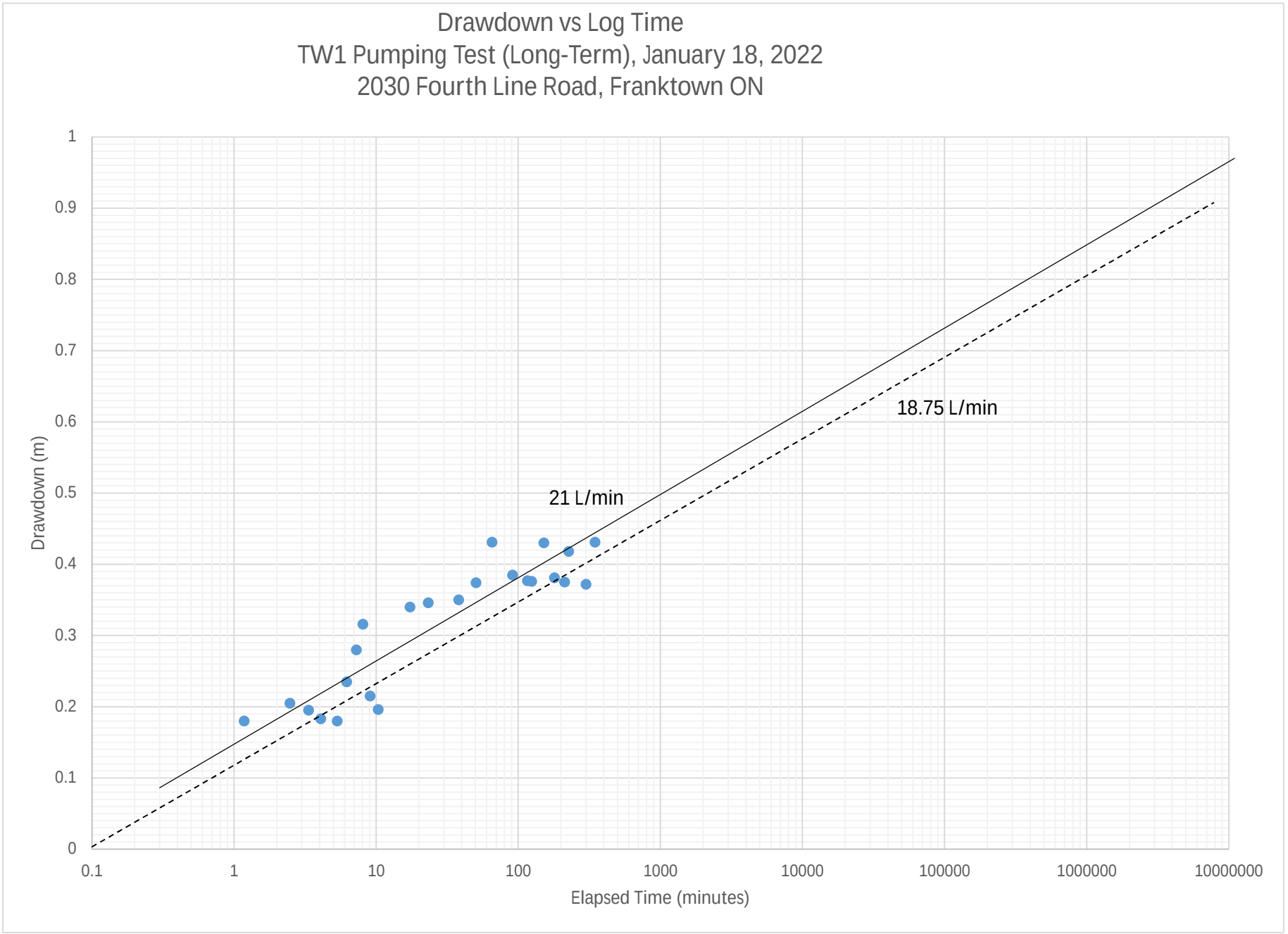
Summary of Water Level Data
Pumping Test - TW1 - January 18, 2022

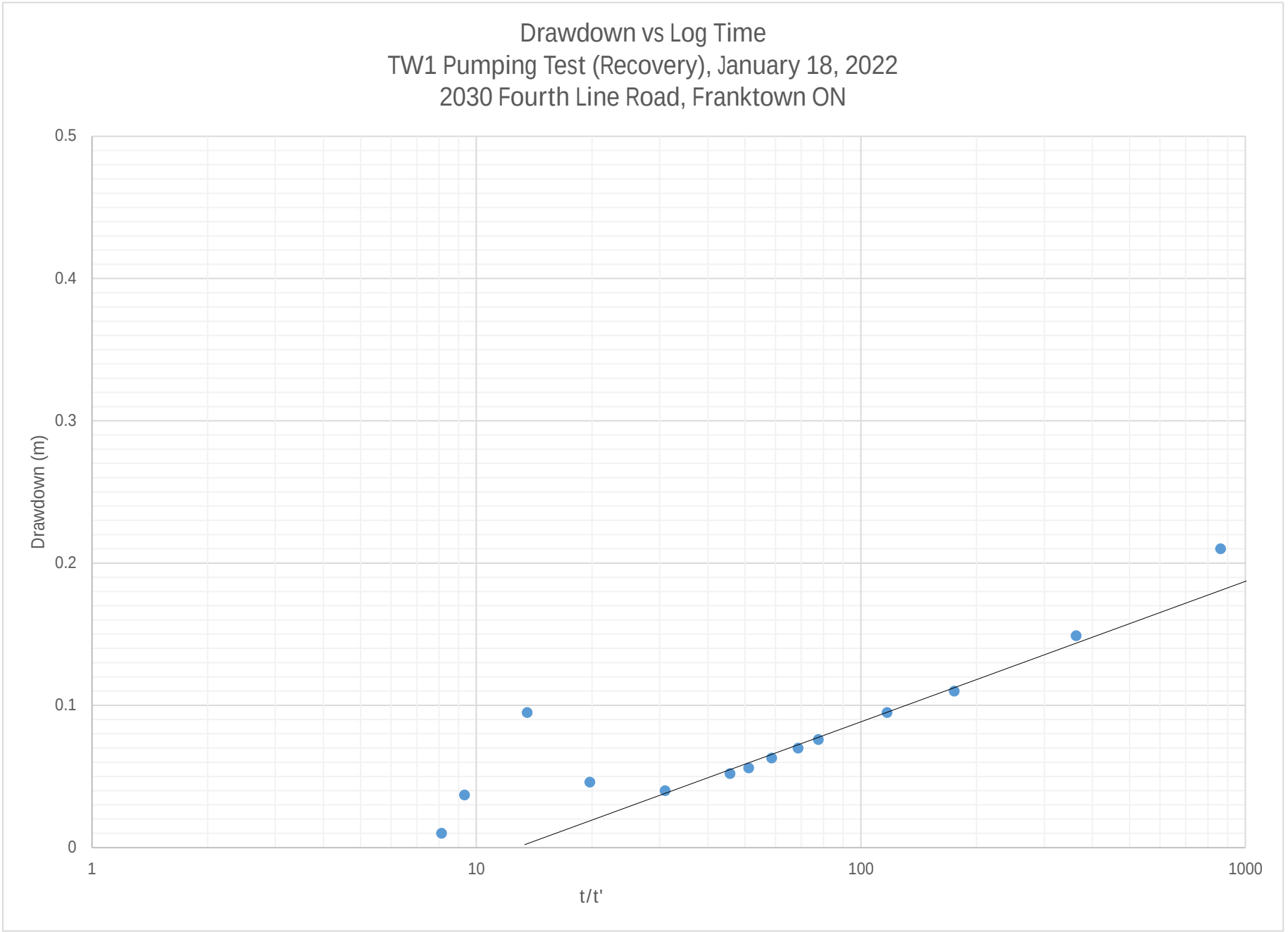
TOC Elevation (assumed)	100	m AD (Above Datum)
Static Water Level	3.78	m BTOC
Static Water Elevation	96.22	m AD (Above Datum)
95% Recovery	3.80155	m BTOC
	96.19845	m AD (Above Datum)

Elapsed Time (minutes)	Elapsed Time (Recovery)	T/T'	Water Level (m BTOC)	Water Level (m ASL)	Drawdown (m)	Notes
0			3.78	96.22	0	Pumping rate = 21 l/min
1.18			3.96	96.04	0.18	
2.47			3.985	96.015	0.205	
3.35			3.975	96.025	0.195	
4.08			3.963	96.037	0.183	
5.33			3.96	96.04	0.18	
6.2			4.015	95.985	0.235	
7.27			4.06	95.94	0.28	
8.08			4.096	95.904	0.316	
9.08			3.995	96.005	0.215	
10.33			3.976	96.024	0.196	
17.33			4.12	95.88	0.34	
23.25			4.126	95.874	0.346	
38.17			4.13	95.87	0.35	
50.42			4.154	95.846	0.374	
65.5			4.211	95.789	0.431	
91.25			4.165	95.835	0.385	
115.92			4.16	95.843	0.377	
124.42			4.156	95.844	0.376	
151.4			4.21	95.79	0.43	
180			4.161	95.839	0.381	
211.6			4.155	95.845	0.375	
226.5			4.198	95.802	0.418	
300			4.152	95.848	0.372	
346.67			4.211	95.789	0.431	
360			4.18	95.82	0.4	
362.42	0.42	862.9048	3.99	96.01	0.21	Pump off at 362 min
363	1	363	3.929	96.071	0.149	
364.08	2.08	175.0385	3.89	96.11	0.11	
365.12	3.12	117.0256	3.875	96.125	0.095	
366.73	4.73	77.53277	3.856	96.144	0.076	
367.35	5.35	68.66355	3.85	96.15	0.07	
368.28	6.28	58.64331	3.843	96.157	0.063	
369.23	7.23	51.06916	3.836	96.164	0.056	
370.1	8.1	45.69136	3.832	96.168	0.052	
374.08	12.08	30.96689	3.82	96.18	0.04	
381.33	19.33	19.72737	3.826	96.174	0.046	
390.83	28.83	13.55636	3.875	96.125	0.095	
405.5	43.5	9.321839	3.817	96.183	0.037	
412.83	50.83	8.121778	3.79	96.21	0.01	


Drawdown vs Time
TW1 Pumping Test (Drawdown), January 22, 2022
2030 Fourth Line Road, Franktown, ON
WL Elevation (m ad)
97
96.8
96.6
96.4
96.2
96
95.8
95.6
95.4
95.2
95
0
50
100
150
200
250
300
350
400
Elapsed Time (minutes)


Drawdown vs Log Time
TW1 Pumping Test (Drawdown), January 18, 2022
2030 Fourth Line Road, FranktownON
Drawdown (m)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
10
100
1000
Time (minutes)

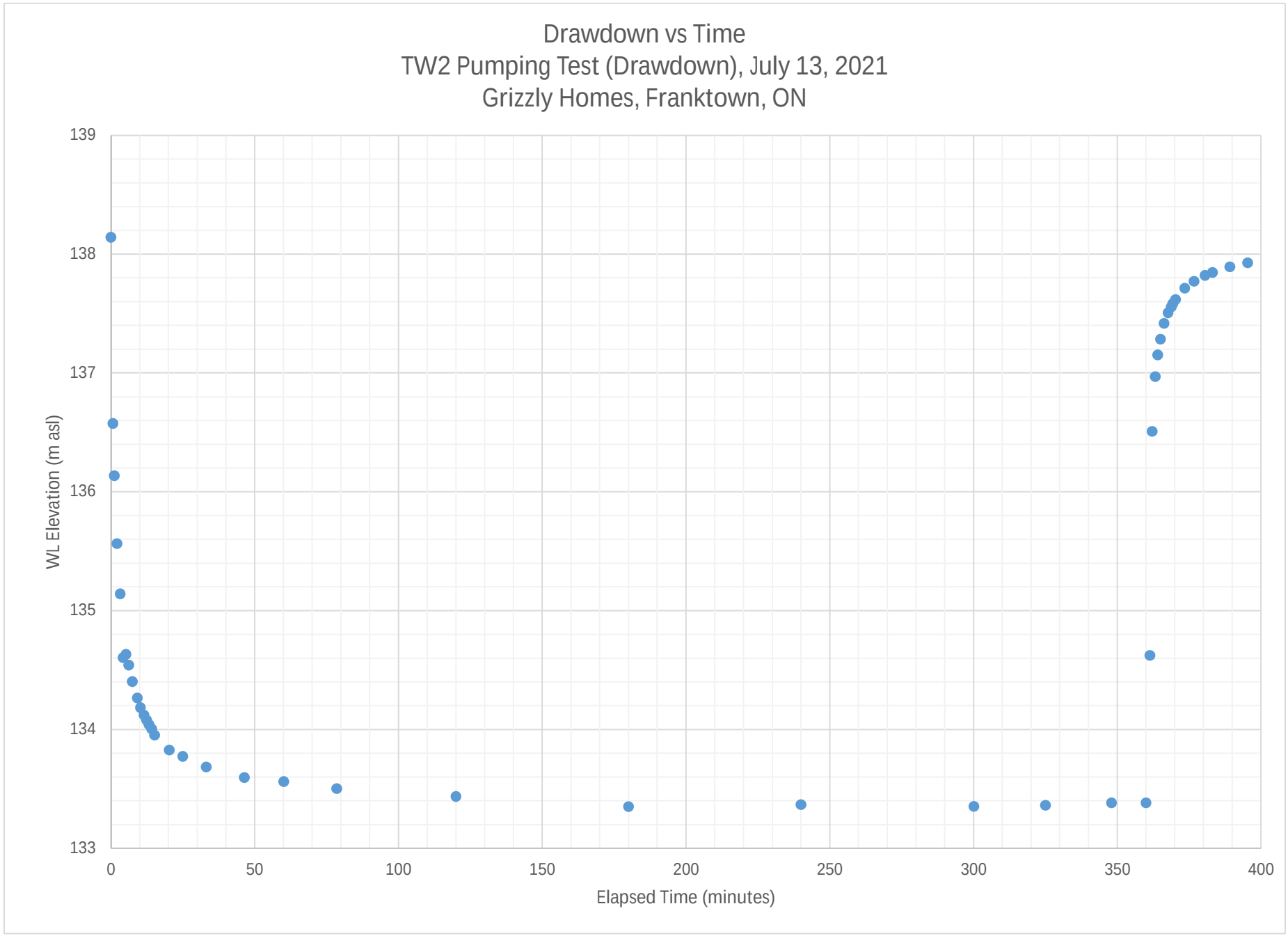

Drawdown vs Log Time
TW1 Pumping Test (Long-Term), January 18, 2022
2030 Fourth Line Road, Franktown ON
Drawdown (m)
Elapsed Time (minutes)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.1
1
10
100
1000
10000
100000
1000000
10000000
18.75 L/min
21 L/min

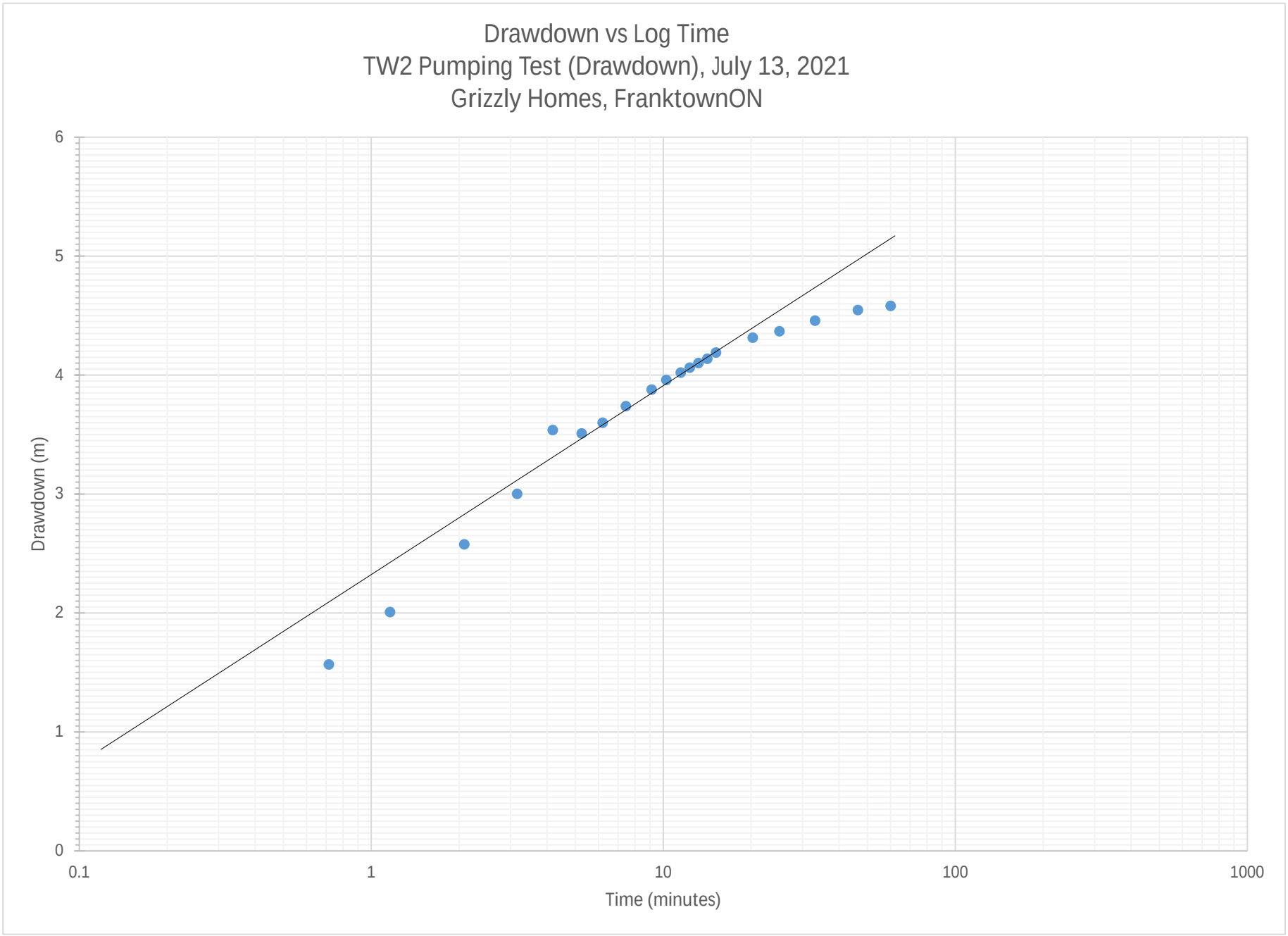

Drawdown vs Log Time
TW1 Pumping Test (Recovery), January 18, 2022
2030 Fourth Line Road, Franktown ON
Drawdown (m)
0.5
0.4
0.3
0.2
0.1
0
1
10
100
1000
t/t'

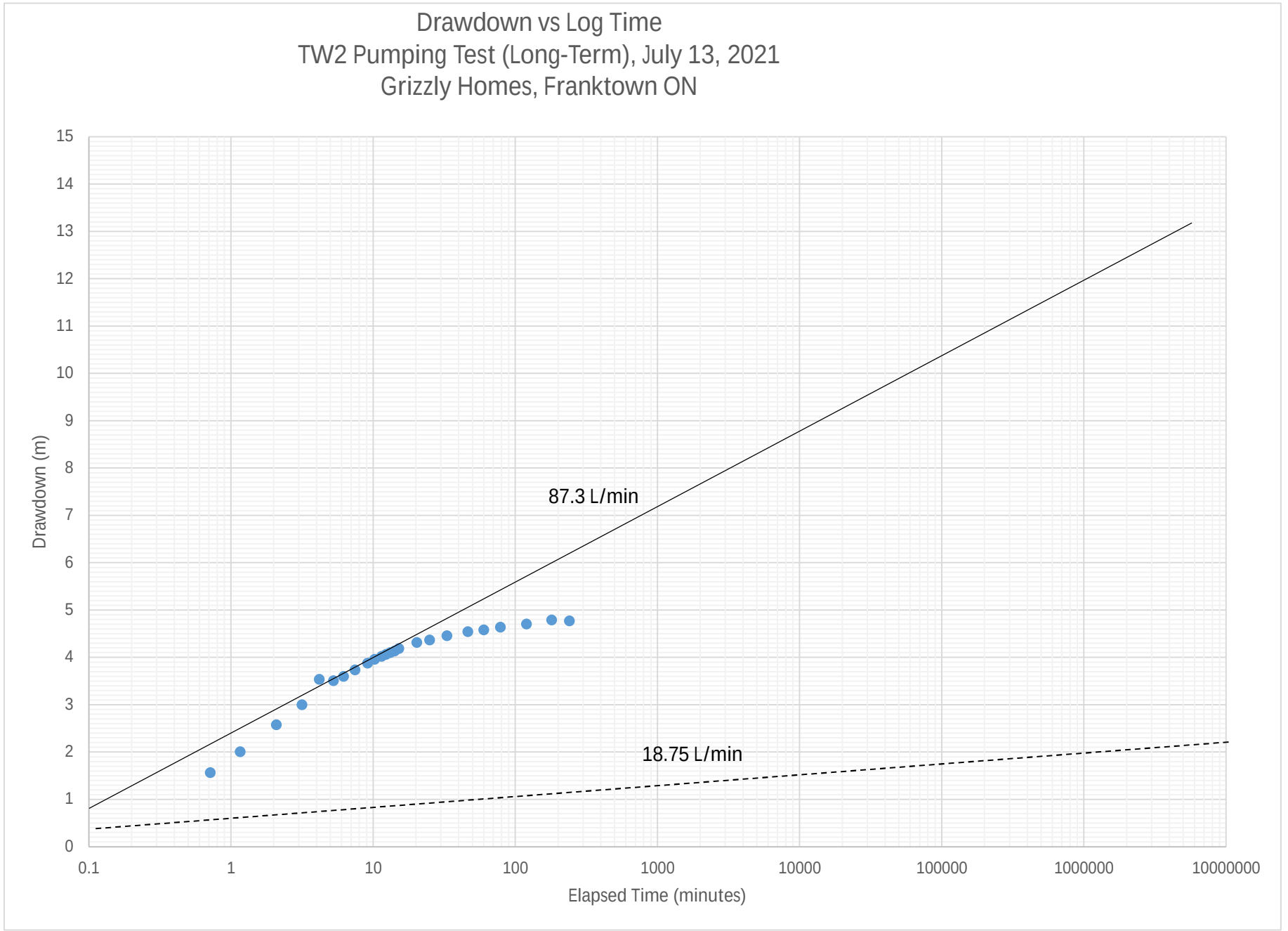
Summary of Water Level Data
Pumping Test - TW2 - July 13, 2021

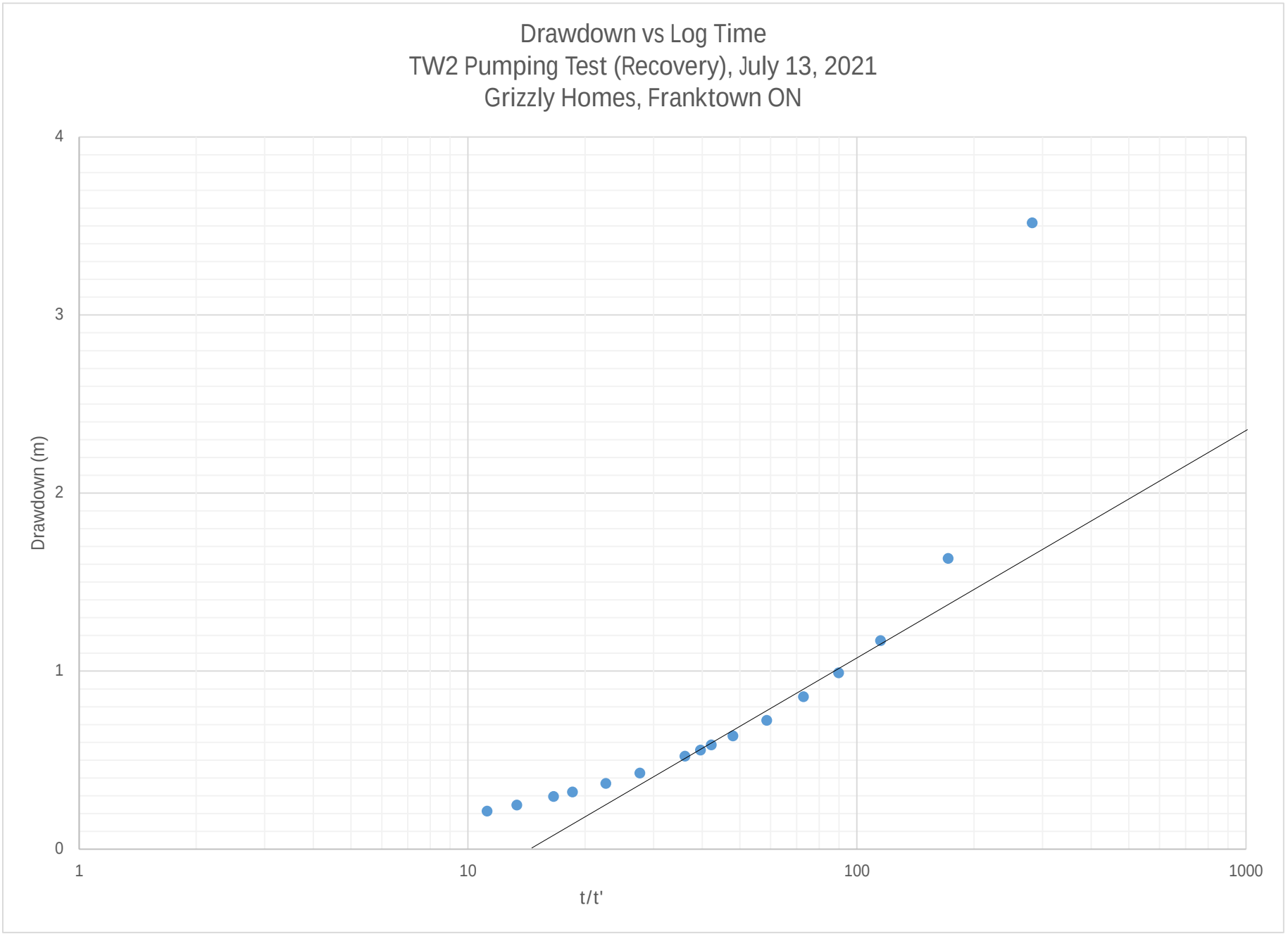
TOC Elevation	142.904	m ASL
Static Water Level	4.762	m BTOC
Stick up (m)	0.626	
Static Water Elevation	138.142	m ASL
95% Recovery	5.00155	m BTOC
	137.90245	m ASL

Elapsed Time (minutes)	Elapsed Time (Recovery)	T/T'	Water Level (m BTOC)	Water Level (m ASL)	Drawdown (m)	Notes
0			4.762	138.142	0	Pumping rate = 87.3 L/min
0.716			6.329	136.575	1.567	
1.16			6.769	136.135	2.007	
2.083			7.339	135.565	2.577	
3.16			7.763	135.141	3.001	
4.183			8.299	134.605	3.537	
5.26			8.271	134.633	3.509	
6.2			8.361	134.543	3.599	
7.45			8.5	134.404	3.738	
9.13			8.639	134.265	3.877	
10.25			8.721	134.183	3.959	
11.48			8.782	134.122	4.02	
12.33			8.824	134.08	4.062	
13.2			8.863	134.041	4.101	
14.16			8.899	134.005	4.137	
15.16			8.951	133.953	4.189	
20.26			9.076	133.828	4.314	
25			9.13	133.774	4.368	
33.11			9.219	133.685	4.457	
46.41			9.308	133.596	4.546	
60.11			9.343	133.561	4.581	Sample TW2-1 @ 9:30 am
78.5			9.402	133.502	4.64	
120			9.467	133.437	4.705	
180			9.553	133.351	4.791	
240			9.536	133.368	4.774	
300.08			9.551	133.353	4.789	
325.03			9.541	133.363	4.779	Sample TW2-2 @ 2:05 pm
348			9.52	133.384	4.758	
360			9.52	133.384	4.758	
361.28	1.28	282.25	8.28	134.624	3.518	Pump off @ 361 min
362.11	2.11	171.6161	6.395	136.509	1.633	
363.16	3.16	114.9241	5.933	136.971	1.171	
364.06	4.06	89.66995	5.752	137.152	0.99	
365.01	5.01	72.85629	5.619	137.285	0.857	
366.25	6.25	58.6	5.486	137.418	0.724	
367.66	7.66	47.99739	5.398	137.506	0.636	
368.73	8.73	42.23711	5.348	137.556	0.586	
369.33	9.33	39.58521	5.319	137.585	0.557	
370.25	10.25	36.12195	5.285	137.619	0.523	
373.5	13.5	27.66667	5.19	137.714	0.428	
376.66	16.66	22.60864	5.131	137.773	0.369	
380.5	20.5	18.56098	5.083	137.821	0.321	
383.08	23.08	16.59792	5.058	137.846	0.296	
389.16	29.16	13.34568	5.01	137.894	0.248	
395.33	35.33	11.18964	4.976	137.928	0.214	


Drawdown vs Time
TW2 Pumping Test (Drawdown), July 13, 2021
Grizzly Homes, Franktown, ON
WL Elevation (m asl)
139
138
137
136
135
134
133
0
50
100
150
200
250
300
350
400
Elapsed Time (minutes)


Drawdown vs Log Time
TW2 Pumping Test (Drawdown), July 13, 2021
Grizzly Homes, FranktownON
Drawdown (m)
0
1
2
3
4
5
6
0.1
1
10
100
1000
Time (minutes)

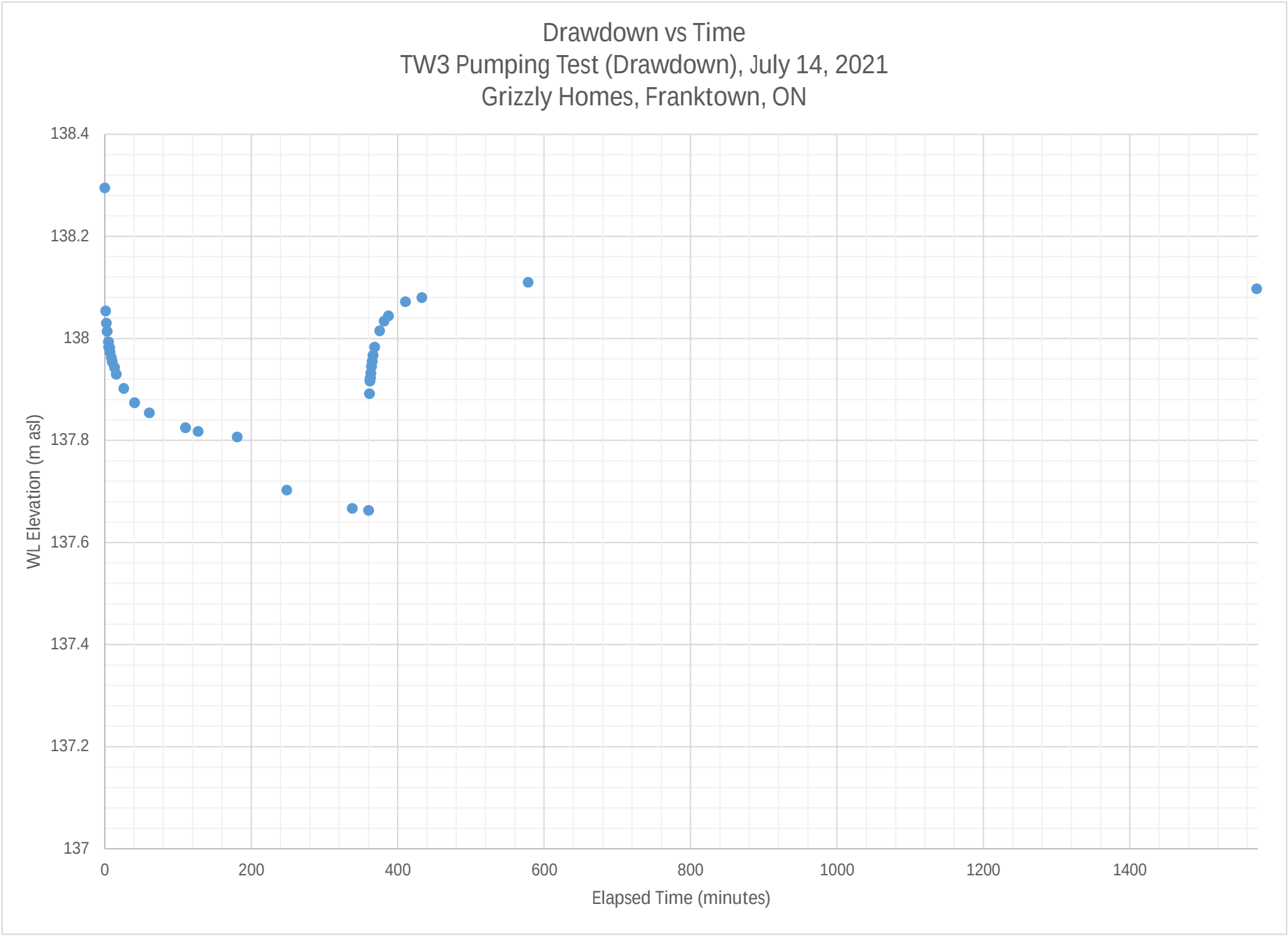

Drawdown vs Log Time
TW2 Pumping Test (Long-Term), July 13, 2021
Grizzly Homes, Franktown ON
Drawdown (m)
Elapsed Time (minutes)
87.3 L/min
18.75 L/min
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
0.1
1
10
100
1000
10000
100000
1000000
10000000

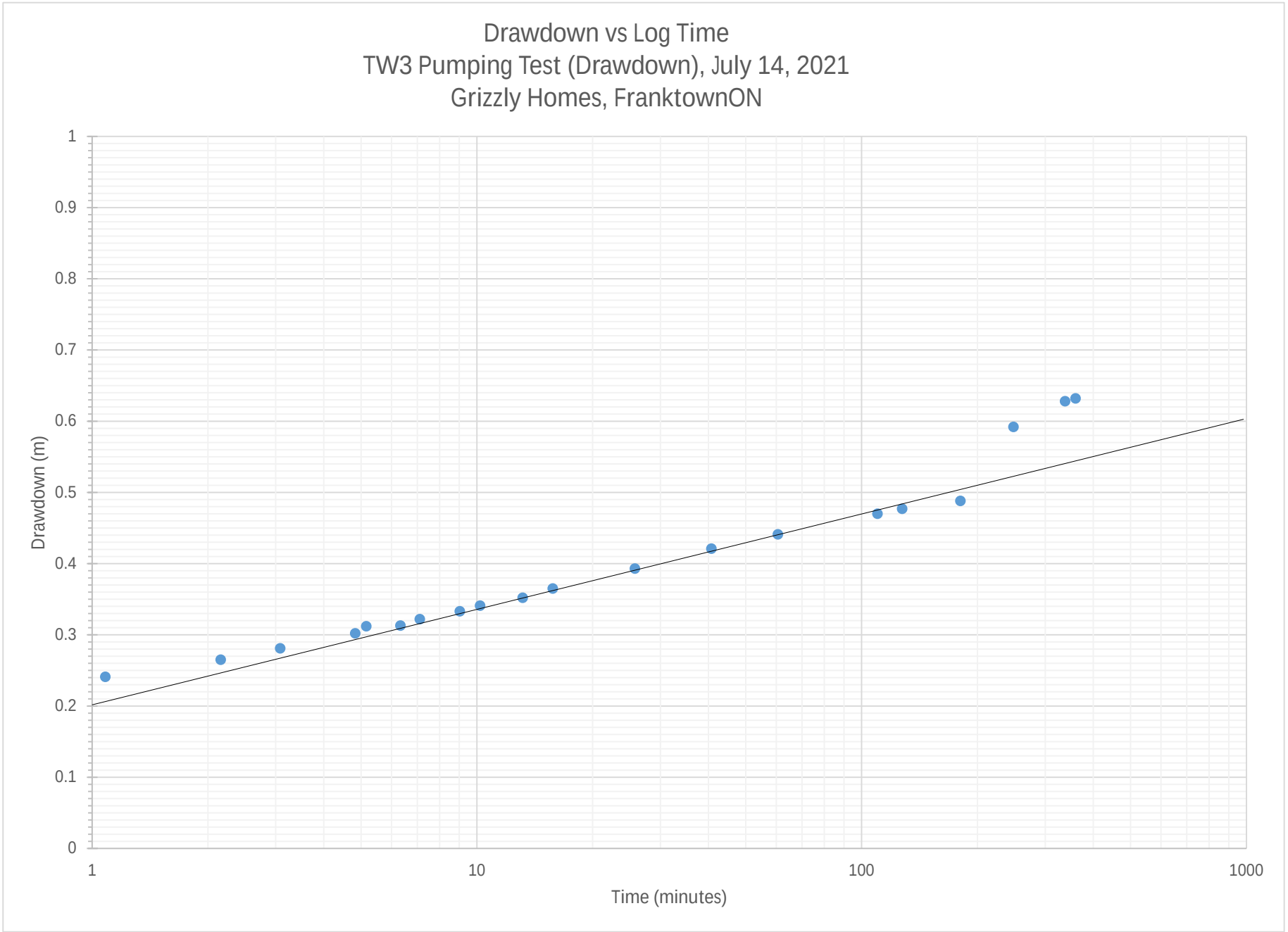

Drawdown vs Log Time
TW2 Pumping Test (Recovery), July 13, 2021
Grizzly Homes, Franktown ON
Drawdown (m)
0
1
2
3
4
1
10
100
1000
t/t'

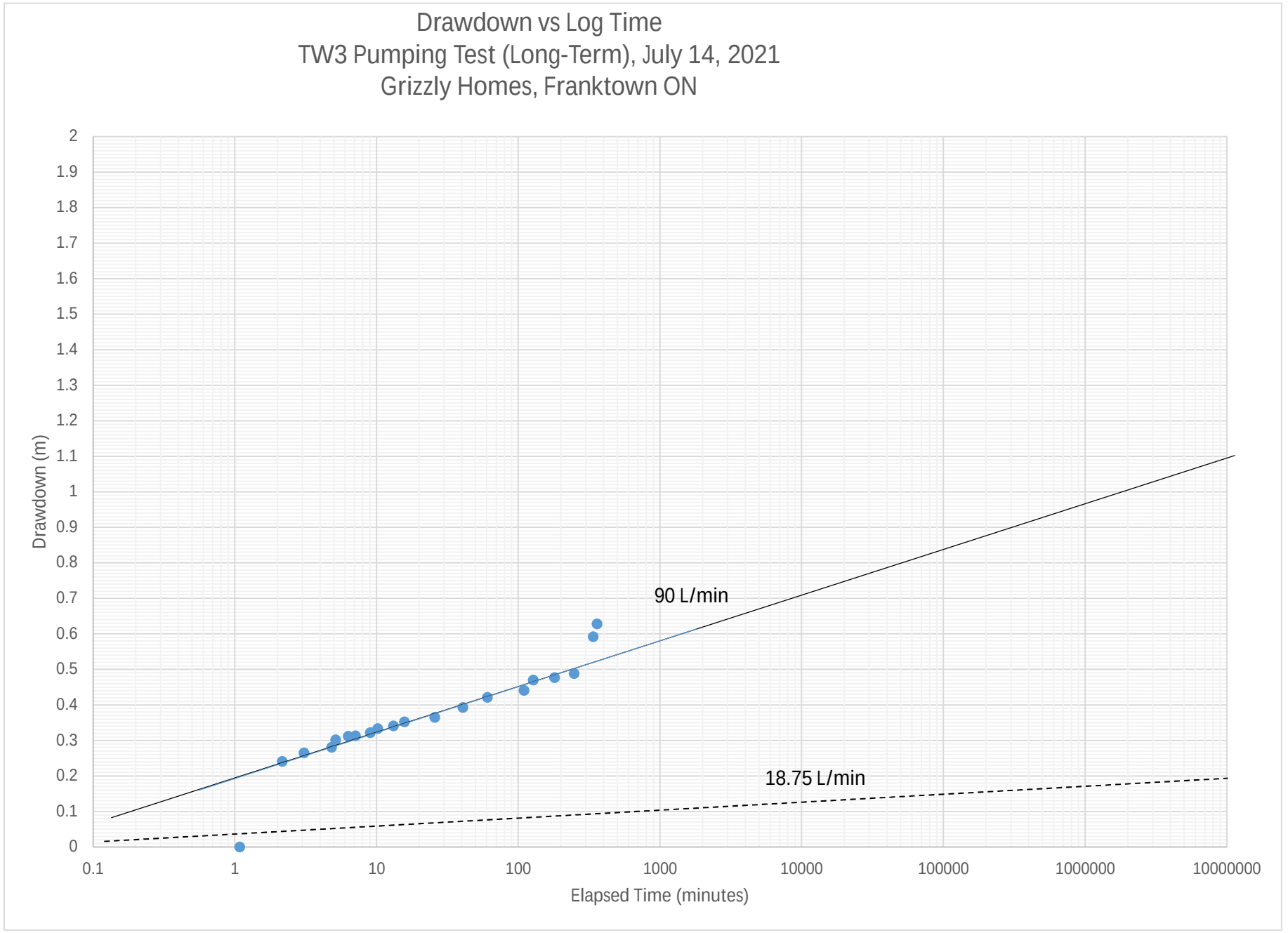
Summary of Water Level Data
Pumping Test - TW3 - July 14, 2021

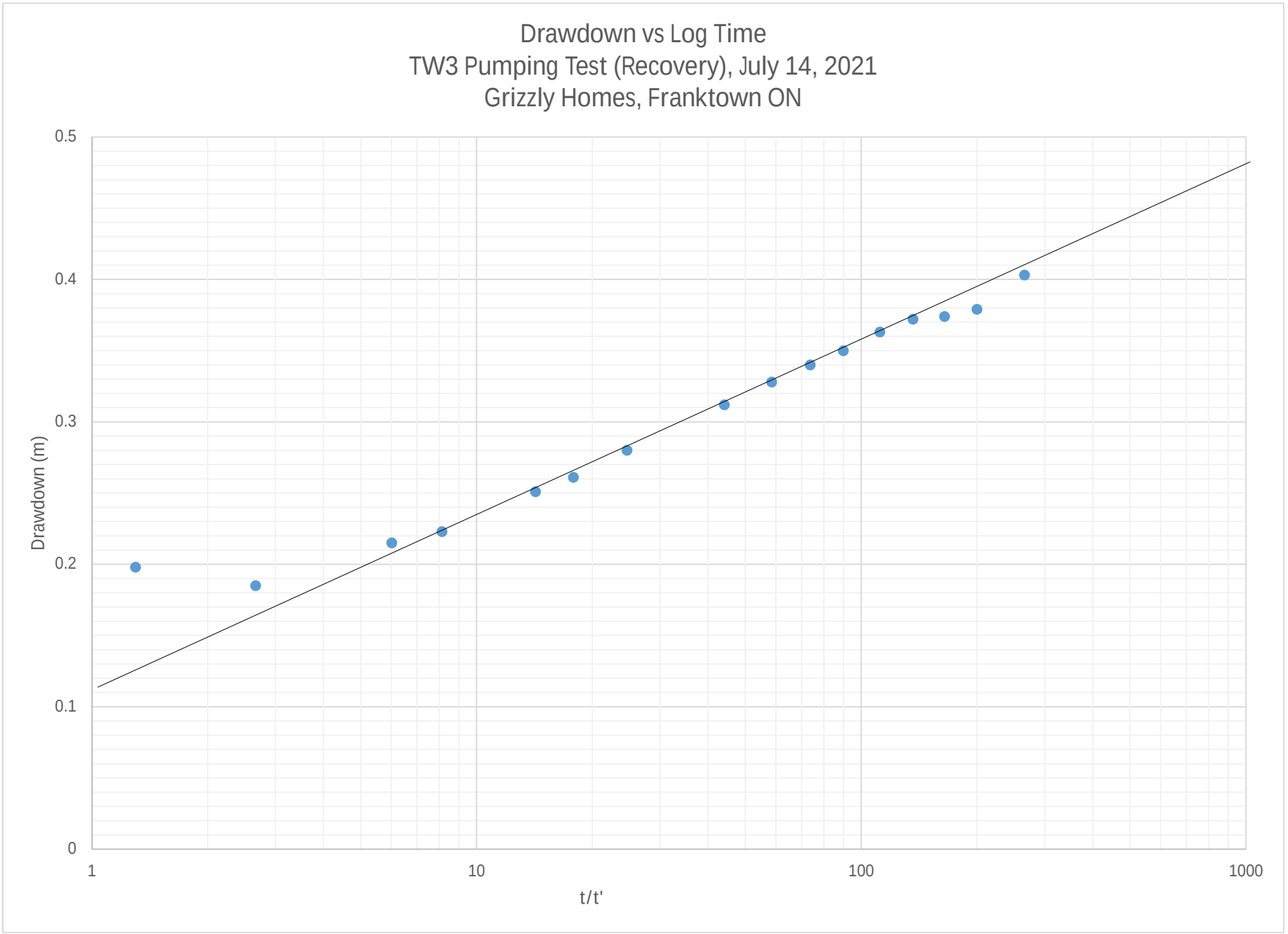
TOC Elevation	147.776	m ASL
Static Water Level	9.481	m BTOC
Stick up	0.637	m
Static Water Elevation	138.295	m ASL
95% Recovery	9.5126	m BTOC
	138.2634	m ASL

Elapsed Time (minutes)	Elapsed Time (Recovery)	T/T'	Water Level (m BTOC)	Water Level (m ASL)	Drawdown (m)	Notes
0			9.481	138.295	0	Pump on @ 8:10
1.083			9.722	138.054	0.241	90 L/min
2.16			9.746	138.03	0.265	
3.083			9.762	138.014	0.281	
4.83			9.783	137.993	0.302	
5.16			9.793	137.983	0.312	
6.33			9.794	137.982	0.313	
7.11			9.803	137.973	0.322	
9.03			9.814	137.962	0.333	
10.2			9.822	137.954	0.341	
13.16			9.833	137.943	0.352	
15.75			9.846	137.93	0.365	
25.76			9.874	137.902	0.393	
40.71			9.902	137.874	0.421	
60.61			9.922	137.854	0.441	Sample 3-1 @ 9:07 (57 min)
110.01			9.951	137.825	0.47	
127.53			9.958	137.818	0.477	
180.66			9.969	137.807	0.488	
248.26			10.073	137.703	0.592	
338			10.109	137.667	0.628	Sample 3-2 @ 1:55 (345 min)
360			10.113	137.663	0.632	
361.36	1.36	265.7059	9.884	137.892	0.403	Pump off @ 361 min
361.81	1.81	199.895	9.86	137.916	0.379	
362.2	2.2	164.6364	9.855	137.921	0.374	
362.66	2.66	136.3383	9.853	137.923	0.372	
363.25	3.25	111.7692	9.844	137.932	0.363	
364.05	4.05	89.88889	9.831	137.945	0.35	
364.95	4.95	73.72727	9.821	137.955	0.34	
366.26	6.26	58.50799	9.809	137.967	0.328	
368.36	8.36	44.0622	9.793	137.983	0.312	
375.25	15.25	24.60656	9.761	138.015	0.28	
381.36	21.36	17.85393	9.742	138.034	0.261	
387.2	27.2	14.23529	9.732	138.044	0.251	
410.5	50.5	8.128713	9.704	138.072	0.223	
432.88	71.88	6.022259	9.696	138.08	0.215	
578	217	2.663594	9.666	138.11	0.185	
1573	1212	1.297855	9.679	138.097	0.198	


Drawdown vs Time
TW3 Pumping Test (Drawdown), July 14, 2021
Grizzly Homes, Franktown, ON
WL Elevation (m asl)
138.4
138.2
138
137.8
137.6
137.4
137.2
137
0
200
400
600
800
1000
1200
1400
Elapsed Time (minutes)


Drawdown vs Log Time
TW3 Pumping Test (Drawdown), July 14, 2021
Grizzly Homes, FranktownON
Drawdown (m)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1
10
100
1000
Time (minutes)

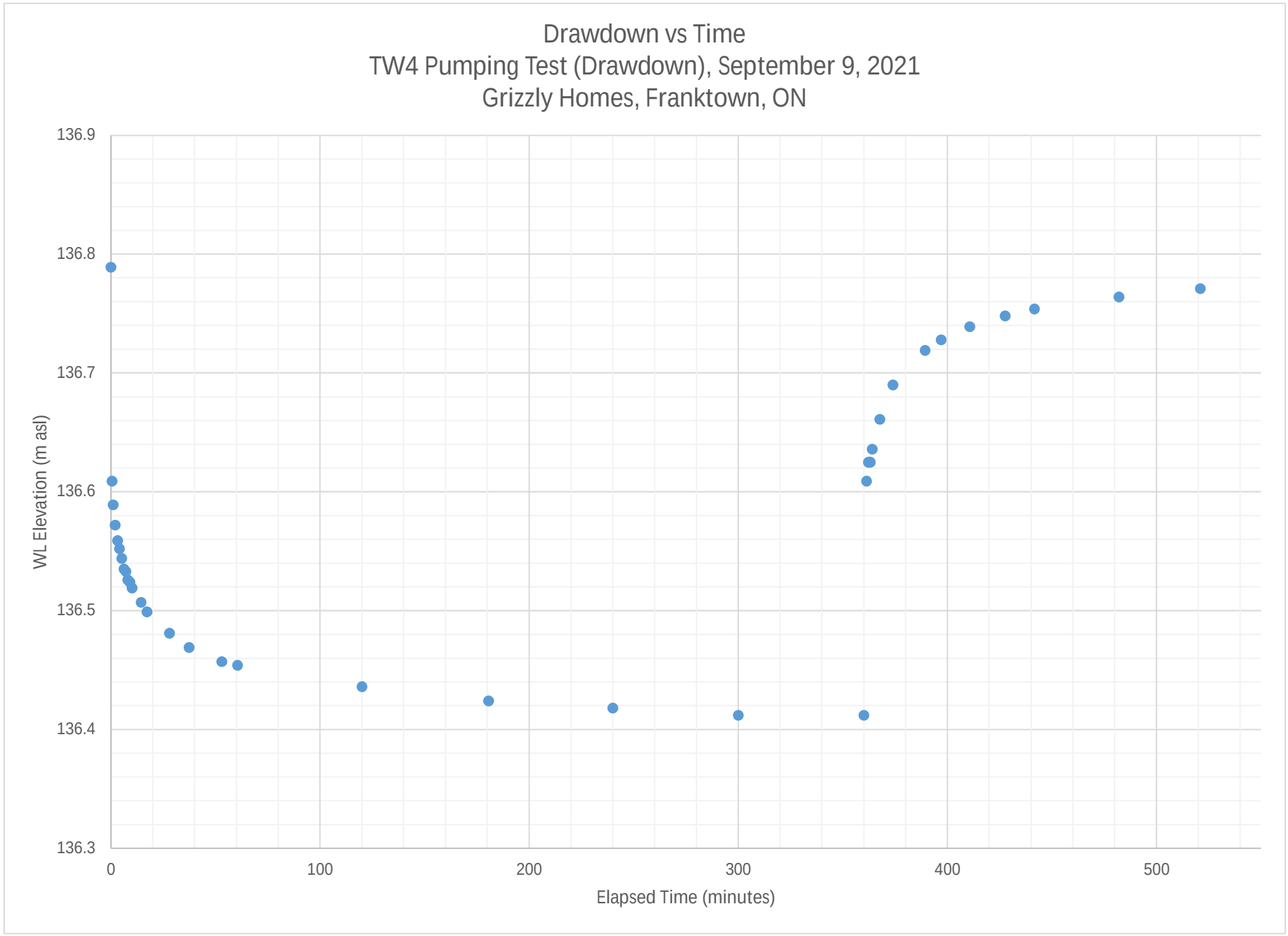

Drawdown vs Log Time
TW3 Pumping Test (Long-Term), July 14, 2021
Grizzly Homes, Franktown ON
Drawdown (m)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
1
10
100
1000
10000
100000
1000000
10000000
Elapsed Time (minutes)
90 L/min
18.75 L/min

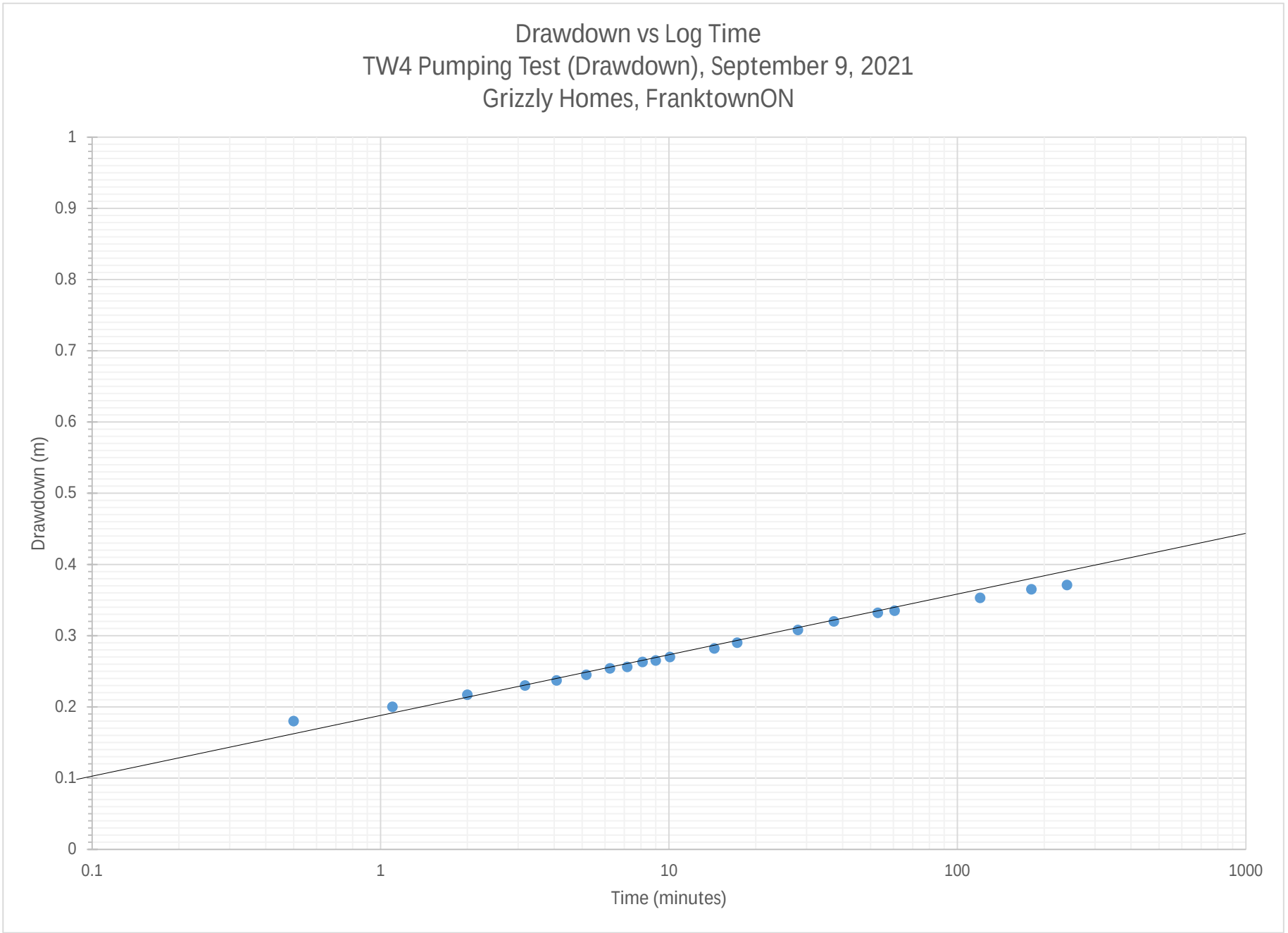

Drawdown vs Log Time
TW3 Pumping Test (Recovery), July 14, 2021
Grizzly Homes, Franktown ON
Drawdown (m)
0.5
0.4
0.3
0.2
0.1
0
1
10
100
1000
t/t'

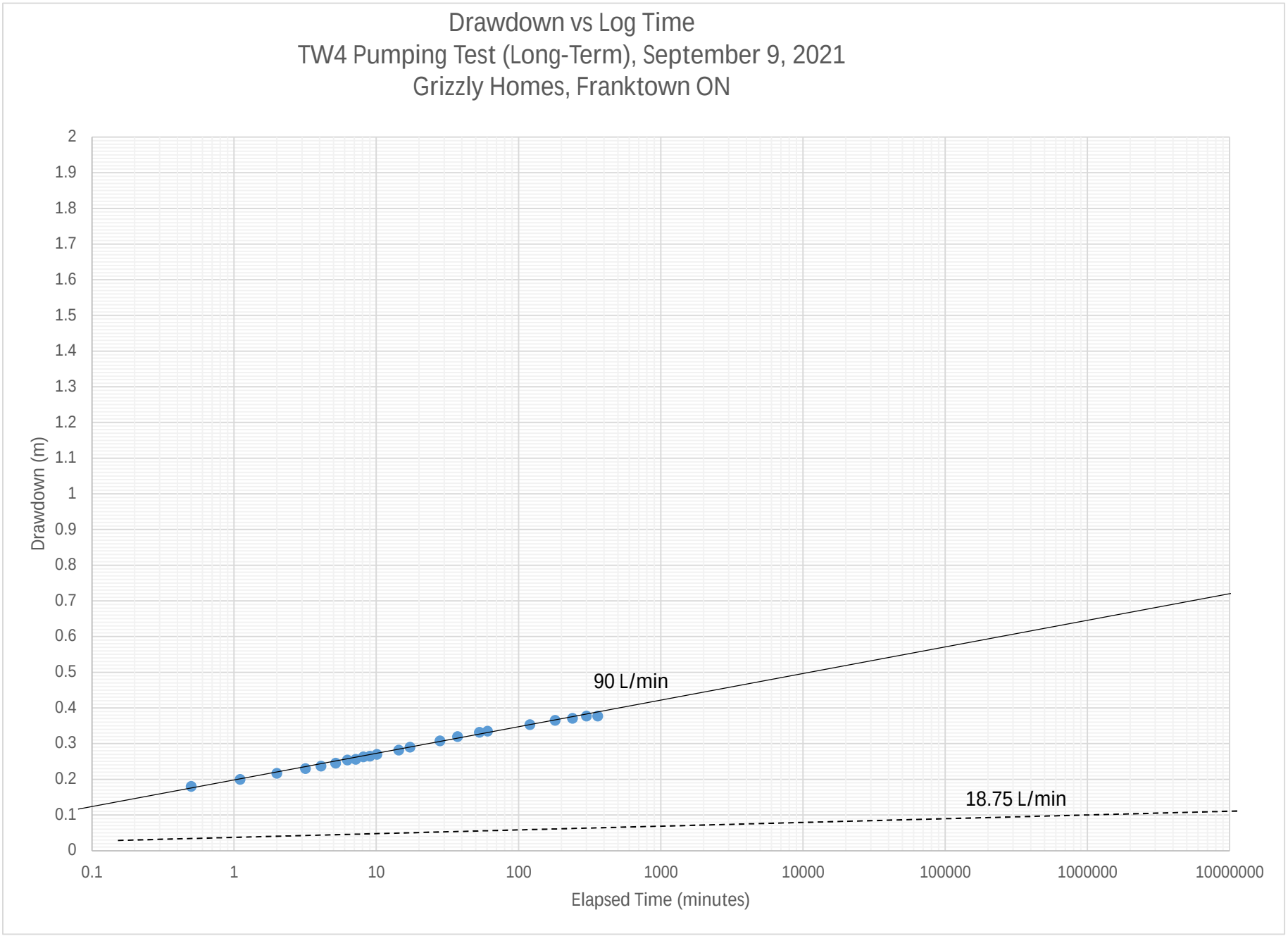
Summary of Water Level Data
Pumping Test - TW4- September 9, 2021

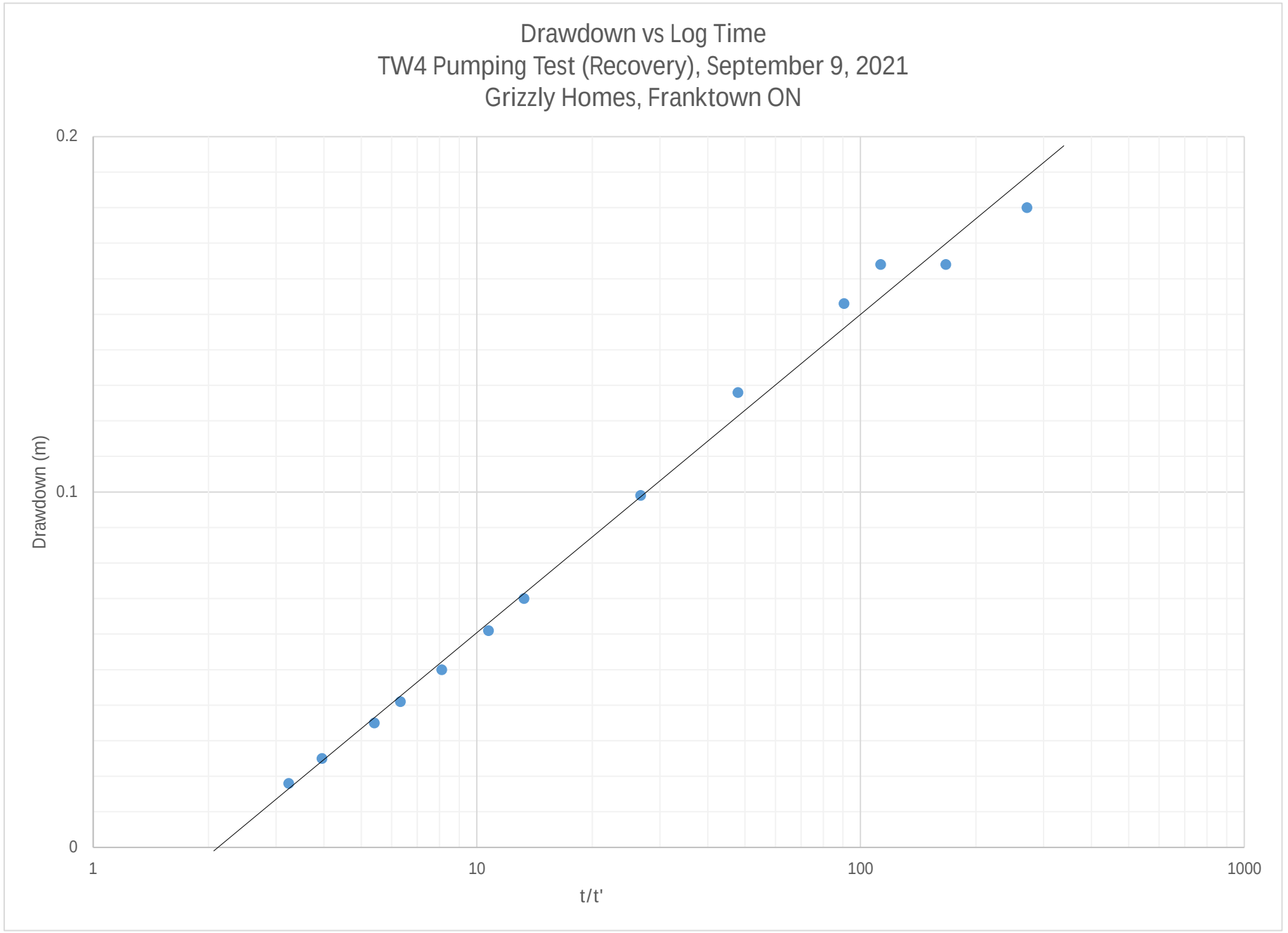
TOC Elevation	148.299	m ASL
Static Water Level	11.51	m BTOC
Stick up	0.648	m
Static Water Elevation	136.789	m ASL
95% Recovery	11.529	m BTOC
	136.77015	m ASL

Elapsed Time (minutes)	Elapsed Time (Recovery)	T/T'	Water Level (m BTOC)	Water Level (m ASL)	Drawdown (m)	Notes
0			11.51	136.789	0	
0.5			11.69	136.609	0.18	Pumping rate = 90 L/min
1.1			11.71	136.589	0.2	
2			11.727	136.572	0.217	
3.17			11.74	136.559	0.23	
4.08			11.747	136.552	0.237	
5.17			11.755	136.544	0.245	
6.25			11.764	136.535	0.254	
7.17			11.766	136.533	0.256	
8.1			11.773	136.526	0.263	
9			11.775	136.524	0.265	
10.08			11.78	136.519	0.27	
14.37			11.792	136.507	0.282	
17.25			11.8	136.499	0.29	
28			11.818	136.481	0.308	
37.33			11.83	136.469	0.32	
53			11.842	136.457	0.332	
60.58			11.845	136.454	0.335	
120			11.863	136.436	0.353	
180.58			11.875	136.424	0.365	
240			11.881	136.418	0.371	
300			11.887	136.412	0.377	
360			11.887	136.412	0.377	
361.33	1.33	271.6767	11.69	136.609	0.18	
362.17	2.17	166.8986	11.674	136.625	0.164	
363.22	3.22	112.8012	11.674	136.625	0.164	
364.02	4.02	90.55224	11.663	136.636	0.153	
367.67	7.67	47.93611	11.638	136.661	0.128	
374	14	26.71429	11.609	136.69	0.099	
389.33	29.33	13.27412	11.58	136.719	0.07	
397	37	10.72973	11.571	136.728	0.061	
410.67	50.67	8.104796	11.56	136.739	0.05	
427.63	67.63	6.323081	11.551	136.748	0.041	
441.67	81.67	5.407983	11.545	136.754	0.035	
482	122	3.95082	11.535	136.764	0.025	
521	161	3.236025	11.528	136.771	0.018	


Drawdown vs Time
TW4 Pumping Test (Drawdown), September 9, 2021
Grizzly Homes, Franktown, ON
136.9
136.8
136.7
136.6
136.5
136.4
136.3
WL Elevation (m asl)
0
100
200
300
400
500
Elapsed Time (minutes)


Drawdown vs Log Time
TW4 Pumping Test (Drawdown), September 9, 2021
Grizzly Homes, FranktownON
Drawdown (m)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
1
10
100
1000
Time (minutes)

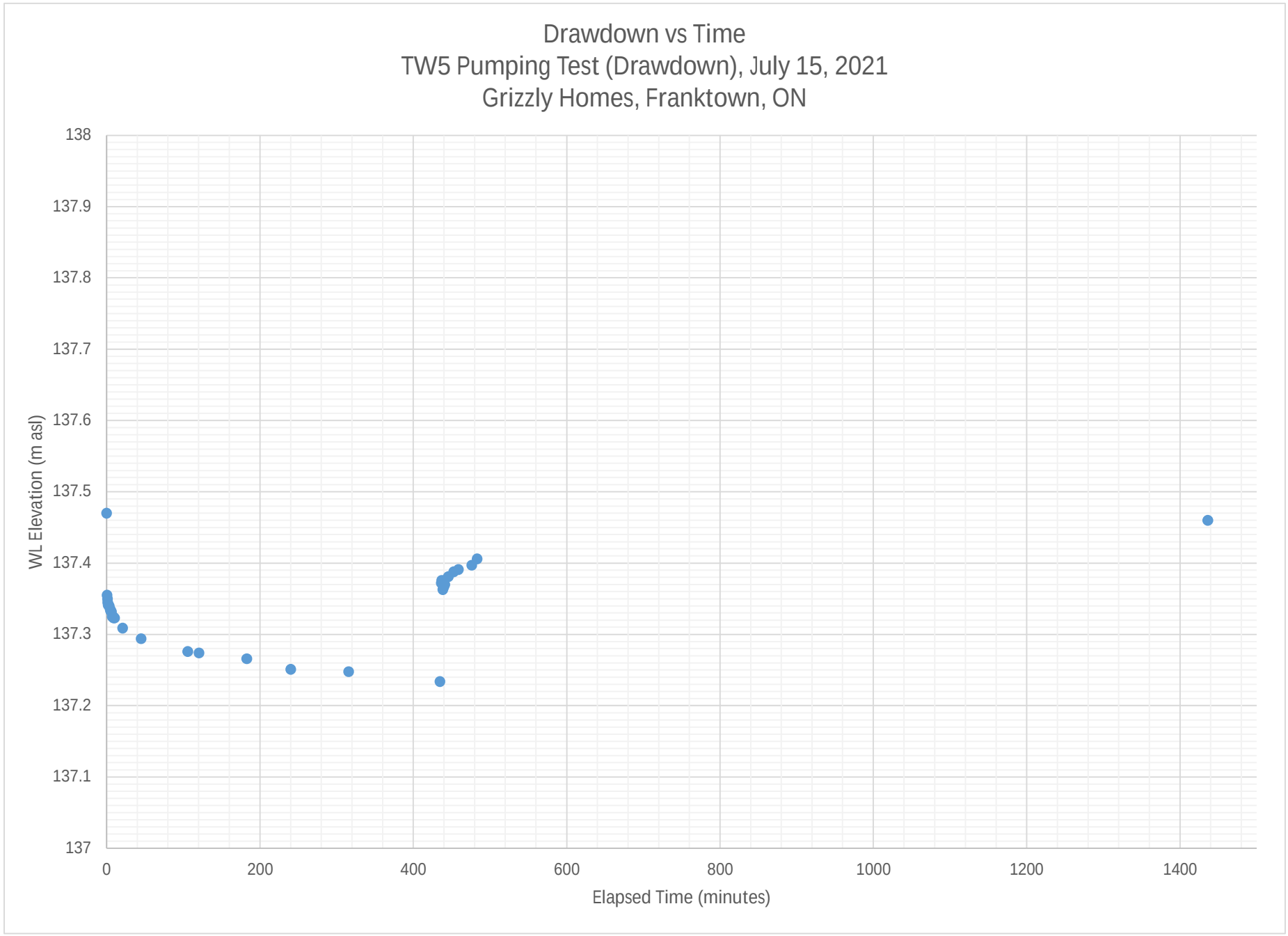

Drawdown vs Log Time
TW4 Pumping Test (Long-Term), September 9, 2021
Grizzly Homes, Franktown ON
Drawdown (m)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.1
1
10
100
1000
10000
100000
1000000
10000000
Elapsed Time (minutes)
90 L/min
18.75 L/min

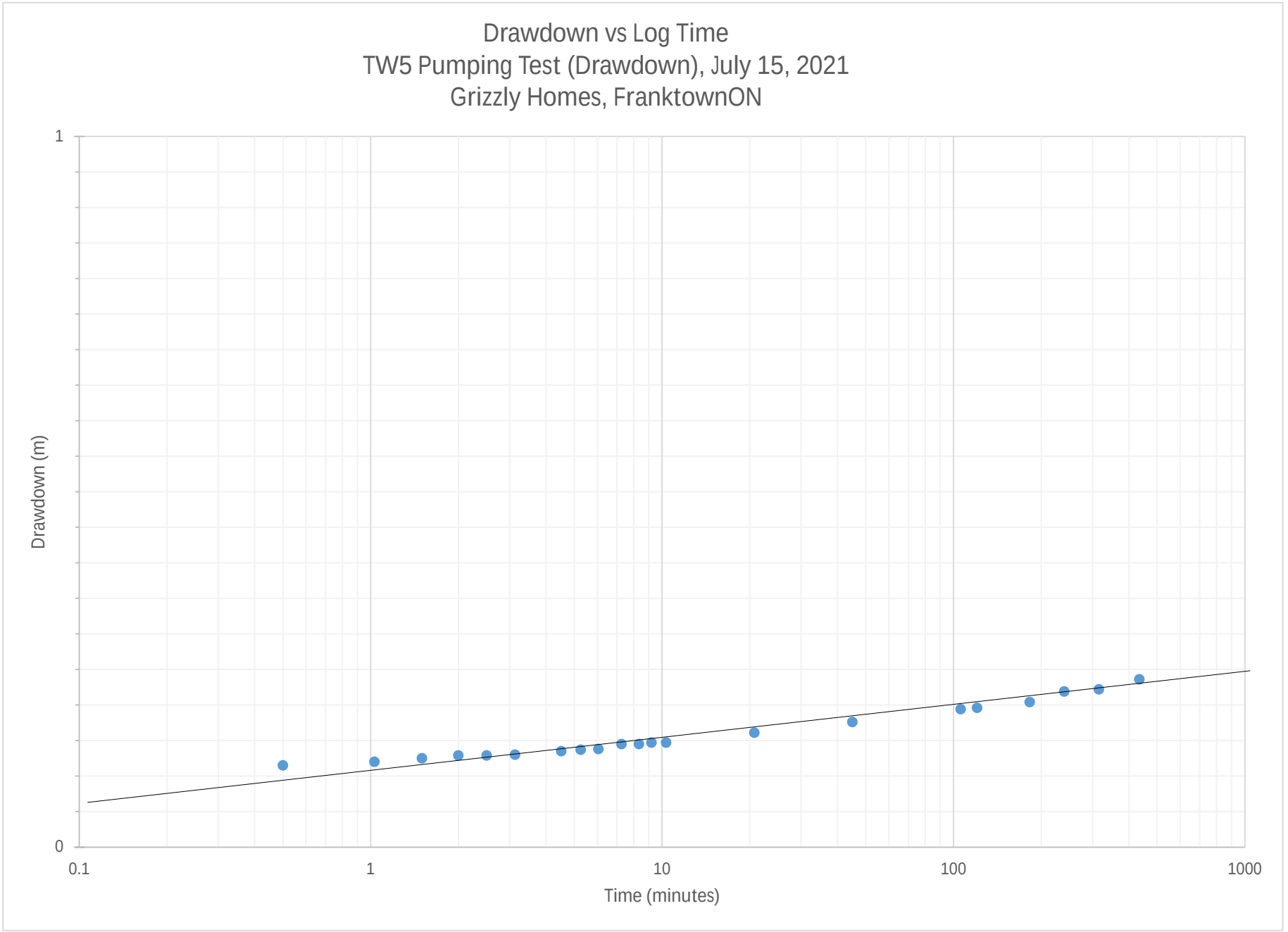

Drawdown vs Log Time
TW4 Pumping Test (Recovery), September 9, 2021
Grizzly Homes, Franktown ON
Drawdown (m)
0.2
0.1
0
1
10
100
1000
t/t'

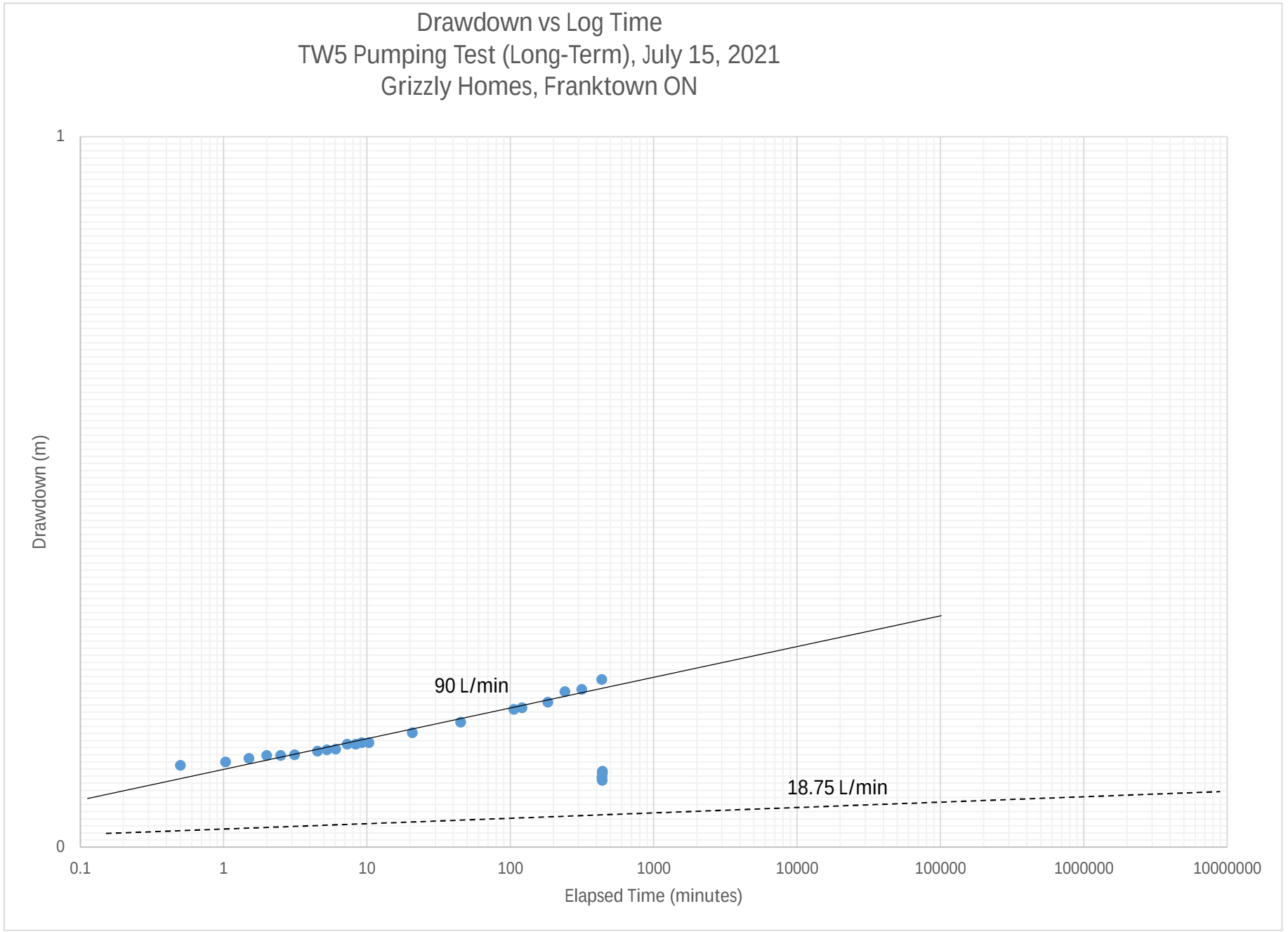
Summary of Water Level Data
Pumping Test - TW5 - July 15, 2021

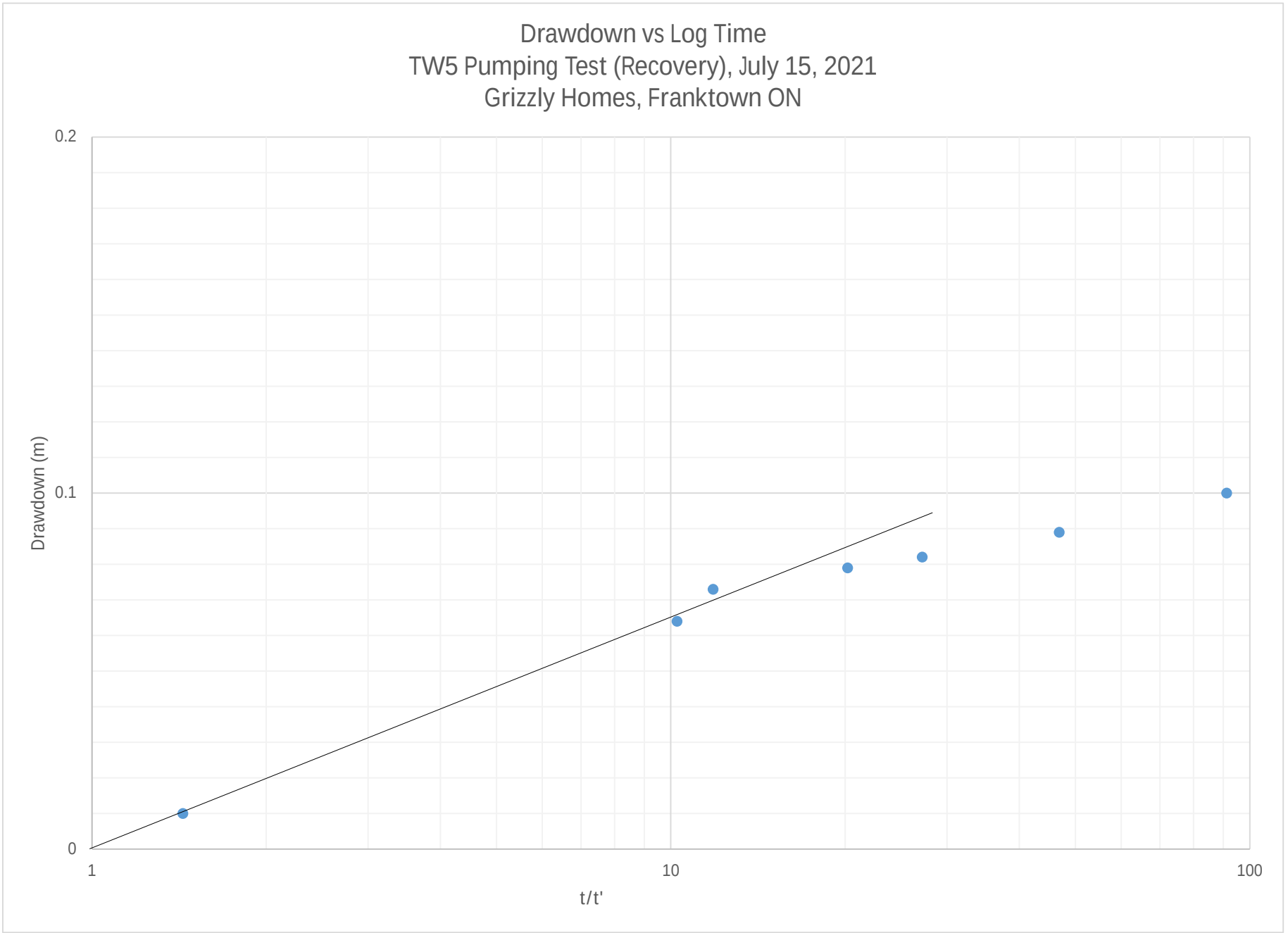
TOC Elevation	148.916	m ASL
Static Water Level	11.446	m BTOC
Stick Up	0.548	m
Static Water Elevation	137.47	m ASL
95% Recovery	11.4578	m BTOC
	137.4582	m ASL

Elapsed Time (minutes)	Elapsed Time (Recovery)	T/T'	Water Level (m BTOC)	Water Level (m ASL)	Drawdown (m)	Notes
0			11.446	137.47	0	Pumping rate = 90 L/min
0.5			11.561	137.355	0.115	
1.03			11.566	137.35	0.12	
1.5			11.571	137.345	0.125	
2			11.575	137.341	0.129	
2.5			11.575	137.341	0.129	
3.13			11.576	137.34	0.13	
4.51			11.581	137.335	0.135	
5.26			11.583	137.333	0.137	
6.05			11.584	137.332	0.138	
7.26			11.591	137.325	0.145	
8.33			11.591	137.325	0.145	
9.2			11.593	137.323	0.147	
10.33			11.593	137.323	0.147	
20.73			11.607	137.309	0.161	
45			11.622	137.294	0.176	Sample TW5-1 @ 8:45 am (50 min)
105.83			11.64	137.276	0.194	
120.6			11.64	137.274	0.196	
182.66			11.65	137.266	0.204	
240			11.665	137.251	0.219	
315.5			11.668	137.248	0.222	Sample TW5-2 @ 1:15 (320 min)
434.61			11.682	137.234	0.236	
436.33			11.544	137.372	0.098	Pump off at 436 min
437	1	437	11.54	137.376	0.094	
438.41	2.41	181.9129	11.553	137.363	0.107	
439.38	3.38	129.9941	11.55	137.366	0.104	
440.83	4.83	91.26915	11.546	137.37	0.1	
445.5	9.5	46.89474	11.535	137.381	0.089	
452.66	16.66	27.17047	11.528	137.388	0.082	
458.7	22.7	20.20705	11.525	137.391	0.079	
476.25	40.25	11.8323	11.519	137.397	0.073	
483.13	47.13	10.25101	11.51	137.406	0.064	
1436	1000	1.436	11.456	137.46	0.01	


Drawdown vs Time
TW5 Pumping Test (Drawdown), July 15, 2021
Grizzly Homes, Franktown, ON
WL Elevation (m asl)
138
137.9
137.8
137.7
137.6
137.5
137.4
137.3
137.2
137.1
137
0
200
400
600
800
1000
1200
1400
Elapsed Time (minutes)


Drawdown vs Log Time
TW5 Pumping Test (Drawdown), July 15, 2021
Grizzly Homes, FranktownON
Drawdown (m)
1
0
0.1
1
10
100
1000
Time (minutes)


Drawdown vs Log Time
TW5 Pumping Test (Long-Term), July 15, 2021
Grizzly Homes, Franktown ON
1
0
Drawdown (m)
90 L/min
18.75 L/min
0.1
1
10
100
1000
10000
100000
1000000
10000000
Elapsed Time (minutes)


Drawdown vs Log Time
TW5 Pumping Test (Recovery), July 15, 2021
Grizzly Homes, Franktown ON
0.2
0.1
0
Drawdown (m)
1
10
100
t/t'

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

APPENDIX F: LABORATORY CERTIFICATES OF ANALYSIS

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Certificate of Analysis

McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.
Carp, ON K0A 1L0
Attn: Monica Black

Client PO: Grizzly Homes
Project: 22-0256
Custody: 15553

Report Date: 25-Jan-2022
Order Date: 19-Jan-2022

Order #: 2204155

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

Paracel ID	Client ID
2204155-01	TW1-1
2204155-02	TW1-2

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 25-Jan-2022

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 19-Jan-2022

Client PO: Grizzly Homes

Project Description: 22-0256

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	19-Jan-22	19-Jan-22
Ammonia, as N	EPA 351.2 - Auto Colour	24-Jan-22	24-Jan-22
Anions	EPA 300.1 - IC	19-Jan-22	19-Jan-22
Colour	SM2120 - Spectrophotometric	19-Jan-22	19-Jan-22
Conductivity	EPA 9050A- probe @25 °C	19-Jan-22	19-Jan-22
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	19-Jan-22	19-Jan-22
E. coli	MOE E3407	19-Jan-22	19-Jan-22
Fecal Coliform	SM 9222D	19-Jan-22	19-Jan-22
Heterotrophic Plate Count	SM 9215C	19-Jan-22	21-Jan-22
Metals, ICP-MS	EPA 200.8 - ICP-MS	20-Jan-22	20-Jan-22
pH	EPA 150.1 - pH probe @25 °C	19-Jan-22	19-Jan-22
Phenolics	EPA 420.2 - Auto Colour, 4AAP	20-Jan-22	20-Jan-22
Hardness	Hardness as CaCO3	20-Jan-22	20-Jan-22
Sulphide	SM 4500SE - Colourimetric	24-Jan-22	24-Jan-22
Tannin/Lignin	SM 5550B - Colourimetric	24-Jan-22	24-Jan-22
Total Coliform	MOE E3407	19-Jan-22	19-Jan-22
Total Dissolved Solids	SM 2540C - gravimetric, filtration	20-Jan-22	21-Jan-22
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	21-Jan-22	21-Jan-22
Turbidity	SM 2130B - Turbidity meter	19-Jan-22	19-Jan-22

Certificate of Analysis

Report Date: 25-Jan-2022

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 19-Jan-2022

Client PO: Grizzly Homes

Project Description: 22-0256

	Client ID:	TW1-1	TW1-2	-	-
	Sample Date:	18-Jan-22 09:52	18-Jan-22 14:22	-	-
	Sample ID:	2204155-01	2204155-02	-	-
	MDL/Units	Drinking Water	Drinking Water	-	-
Microbiological Parameters					
E. coli	1 CFU/100mL	ND [2]	ND	-	-
Fecal Coliforms	1 CFU/100mL	ND	ND	-	-
Total Coliforms	1 CFU/100mL	ND [2]	ND	-	-
Heterotrophic Plate Count	10 CFU/mL	170	70	-	-
General Inorganics					
Alkalinity, total	5 mg/L	254	252	-	-
Ammonia as N	0.01 mg/L	0.04	0.05	-	-
Dissolved Organic Carbon	0.5 mg/L	2.3	2.3	-	-
Colour	2 TCU	17	16	-	-
Conductivity	5 uS/cm	546	528	-	-
Hardness	mg/L	255	256	-	-
pH	0.1 pH Units	7.5	7.5	-	-
Phenolics	0.001 mg/L	<0.001	<0.001	-	-
Total Dissolved Solids	10 mg/L	288	300	-	-
Sulphide	0.02 mg/L	<0.02	<0.02	-	-
Tannin & Lignin	0.1 mg/L	<0.1	<0.1	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.1	<0.1	-	-
Turbidity	0.1 NTU	7.4	5.7	-	-
Anions					
Chloride	1 mg/L	13	12	-	-
Fluoride	0.1 mg/L	0.3	0.3	-	-
Nitrate as N	0.1 mg/L	<0.1	<0.1	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	-	-
Sulphate	1 mg/L	15	14	-	-
Metals					
Calcium	0.1 mg/L	71.0	70.8	-	-
Iron	0.1 mg/L	0.9	0.9	-	-
Magnesium	0.2 mg/L	18.9	19.3	-	-
Manganese	0.005 mg/L	0.078	0.078	-	-
Potassium	0.1 mg/L	2.5	2.5	-	-
Sodium	0.2 mg/L	5.6	5.5	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour	ND	2	TCU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
Metals									
Calcium	ND	0.1	mg/L						
Iron	ND	0.1	mg/L						
Magnesium	ND	0.2	mg/L						
Manganese	ND	0.005	mg/L						
Potassium	ND	0.1	mg/L						
Sodium	ND	0.2	mg/L						
Microbiological Parameters									
E. coli	ND	1	CFU/100mL						
Fecal Coliforms	ND	1	CFU/100mL						
Total Coliforms	ND	1	CFU/100mL						
Heterotrophic Plate Count	ND	10	CFU/mL						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	20.0	1	mg/L	20.1			0.2	10	
Fluoride	0.25	0.1	mg/L	0.24			1.7	10	
Nitrate as N	3.92	0.1	mg/L	3.94			0.5	10	
Nitrite as N	1.69	0.05	mg/L	1.68			0.4	10	
Sulphate	22.0	1	mg/L	22.1			0.3	10	
General Inorganics									
Alkalinity, total	251	5	mg/L	253			1.0	14	
Ammonia as N	0.048	0.01	mg/L	0.048			1.0	17.7	
Dissolved Organic Carbon	1.9	0.5	mg/L	1.4			27.8	37	
Colour	17	2	TCU	16			6.1	12	
Conductivity	574	5	uS/cm	599			4.2	5	
pH	7.6	0.1	pH Units	7.6			0.8	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	146	10	mg/L	152			4.0	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	0.2	0.1	mg/L	0.2			8.7	11	
Total Kjeldahl Nitrogen	0.10	0.1	mg/L	0.10			3.6	16	
Turbidity	7.5	0.1	NTU	7.4			1.2	10	
Metals									
Calcium	90.6	0.1	mg/L	91.3			0.7	20	
Iron	ND	0.1	mg/L	ND			NC	20	
Magnesium	35.1	0.2	mg/L	34.8			0.8	20	
Manganese	0.038	0.005	mg/L	0.037			3.1	20	
Potassium	2.5	0.1	mg/L	2.5			2.0	20	
Sodium	26.5	0.2	mg/L	26.7			0.8	20	
Microbiological Parameters									
Heterotrophic Plate Count	120	10	CFU/mL	170			34.0	30	BAC04

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	29.5	1	mg/L	20.1	94.5	77-123			
Fluoride	1.18	0.1	mg/L	0.24	93.9	79-121			
Nitrate as N	4.83	0.1	mg/L	3.94	88.7	79-120			
Nitrite as N	2.62	0.05	mg/L	1.68	94.5	84-117			
Sulphate	31.6	1	mg/L	22.1	95.1	74-126			
General Inorganics									
Ammonia as N	0.307	0.01	mg/L	0.048	104	81-124			
Dissolved Organic Carbon	12.4	0.5	mg/L	1.4	110	60-133			
Phenolics	0.025	0.001	mg/L	ND	100	67-133			
Total Dissolved Solids	86.0	10	mg/L	ND	86.0	75-125			
Sulphide	0.54	0.02	mg/L	ND	107	79-115			
Tannin & Lignin	1.1	0.1	mg/L	0.2	91.9	71-113			
Total Kjeldahl Nitrogen	2.33	0.1	mg/L	0.10	111	81-126			
Metals									
Calcium	95800	0.1	mg/L	91300	45.4	80-120			QM-07
Iron	2300	0.1	mg/L	12.4	91.5	80-120			
Magnesium	42100	0.2	mg/L	34800	72.8	80-120			QM-07
Manganese	86.9	0.005	mg/L	36.8	100	80-120			
Potassium	11900	0.1	mg/L	2530	93.3	80-120			
Sodium	34100	0.2	mg/L	26700	73.8	80-120			QM-07

Qualifier Notes:

Sample Qualifiers :

2 : A2C - Background counts greater than 200

QC Qualifiers :

BAC04 : Duplicate QC data falls within method prescribed 95% confidence limits.

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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Certificate of Analysis

McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.
Carp, ON K0A 1L0
Attn: Monica Black

Client PO: Grizzly Homes Subdivision
Project: 22-0256
Custody: 60213

Report Date: 16-Jul-2021
Order Date: 13-Jul-2021

Order #: 2129274

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

Paracel ID	Client ID
2129274-01	TW2-1
2129274-02	TW2-2

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 16-Jul-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 13-Jul-2021

Client PO: Grizzly Homes Subdivision

Project Description: 22-0256

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	14-Jul-21	14-Jul-21
Ammonia, as N	EPA 351.2 - Auto Colour	14-Jul-21	14-Jul-21
Anions	EPA 300.1 - IC	14-Jul-21	14-Jul-21
Colour	SM2120 - Spectrophotometric	14-Jul-21	14-Jul-21
Conductivity	EPA 9050A- probe @25 °C	14-Jul-21	14-Jul-21
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	14-Jul-21	14-Jul-21
E. coli	MOE E3407	14-Jul-21	15-Jul-21
Fecal Coliform	SM 9222D	14-Jul-21	15-Jul-21
Heterotrophic Plate Count	SM 9215C	14-Jul-21	16-Jul-21
Metals, ICP-MS	EPA 200.8 - ICP-MS	14-Jul-21	14-Jul-21
pH	EPA 150.1 - pH probe @25 °C	14-Jul-21	14-Jul-21
Phenolics	EPA 420.2 - Auto Colour, 4AAP	14-Jul-21	14-Jul-21
Hardness	Hardness as CaCO3	14-Jul-21	14-Jul-21
Sulphide	SM 4500SE - Colourimetric	15-Jul-21	16-Jul-21
Tannin/Lignin	SM 5550B - Colourimetric	15-Jul-21	15-Jul-21
Total Coliform	MOE E3407	14-Jul-21	15-Jul-21
Total Dissolved Solids	SM 2540C - gravimetric, filtration	14-Jul-21	15-Jul-21
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	14-Jul-21	15-Jul-21
Turbidity	SM 2130B - Turbidity meter	14-Jul-21	14-Jul-21

Certificate of Analysis

Report Date: 16-Jul-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 13-Jul-2021

Client PO: Grizzly Homes Subdivision

Project Description: 22-0256

	Client ID:	TW2-1	TW2-2	-	-
	Sample Date:	13-Jul-21 09:30	13-Jul-21 14:05	-	-
	Sample ID:	2129274-01	2129274-02	-	-
	MDL/Units	Water	Water	-	-
Microbiological Parameters					
E. coli	1 CFU/100 mL	ND	ND	-	-
Fecal Coliforms	1 CFU/100 mL	ND	ND	-	-
Total Coliforms	1 CFU/100 mL	ND	ND	-	-
Heterotrophic Plate Count	10 CFU/mL	<10	<10	-	-
General Inorganics					
Alkalinity, total	5 mg/L	272	269	-	-
Ammonia as N	0.01 mg/L	0.05	0.06	-	-
Dissolved Organic Carbon	0.5 mg/L	2.0	1.8	-	-
Colour	2 TCU	2	3	-	-
Conductivity	5 uS/cm	620	614	-	-
Hardness	mg/L	293	293	-	-
pH	0.1 pH Units	7.7	7.7	-	-
Phenolics	0.001 mg/L	<0.001	<0.001	-	-
Total Dissolved Solids	10 mg/L	332	314	-	-
Sulphide	0.02 mg/L	<0.02	<0.02	-	-
Tannin & Lignin	0.1 mg/L	<0.1	<0.1	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	<0.1	<0.1	-	-
Turbidity	0.1 NTU	12.5	1.2	-	-
Anions					
Chloride	1 mg/L	21	20	-	-
Fluoride	0.1 mg/L	0.2	0.2	-	-
Nitrate as N	0.1 mg/L	0.6	0.5	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	-	-
Sulphate	1 mg/L	16	17	-	-
Metals					
Calcium	0.1 mg/L	80.0	80.3	-	-
Iron	0.1 mg/L	0.3	<0.1	-	-
Magnesium	0.2 mg/L	22.6	22.4	-	-
Manganese	0.005 mg/L	0.053	0.059	-	-
Potassium	0.1 mg/L	3.0	2.7	-	-
Sodium	0.2 mg/L	9.3	8.5	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour	ND	2	TCU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
Metals									
Calcium	ND	0.1	mg/L						
Iron	ND	0.1	mg/L						
Magnesium	ND	0.2	mg/L						
Manganese	ND	0.005	mg/L						
Potassium	ND	0.1	mg/L						
Sodium	ND	0.2	mg/L						
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL						
Fecal Coliforms	ND	1	CFU/100 mL						
Total Coliforms	ND	1	CFU/100 mL						
Heterotrophic Plate Count	ND	10	CFU/mL						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	23.4	1	mg/L	23.4			0.1	10	
Fluoride	0.89	0.1	mg/L	0.89			0.9	10	
Nitrate as N	ND	0.1	mg/L	ND			NC	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Sulphate	47.4	1	mg/L	47.3			0.4	10	
General Inorganics									
Alkalinity, total	30.9	5	mg/L	31.4			1.6	14	
Ammonia as N	0.057	0.01	mg/L	0.049			16.2	17.7	
Dissolved Organic Carbon	2.8	0.5	mg/L	3.2			14.1	37	
Colour	3	2	TCU	3			0.0	12	
Conductivity	151	5	uS/cm	154			1.6	5	
pH	9.1	0.1	pH Units	9.1			0.1	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	80.0	10	mg/L	78.0			2.5	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	ND	0.1	mg/L	ND			NC	11	
Total Kjeldahl Nitrogen	ND	0.1	mg/L	ND			NC	16	
Turbidity	13.0	0.1	NTU	12.5			3.9	10	
Metals									
Calcium	33.2	0.1	mg/L	33.2			0.1	20	
Iron	ND	0.1	mg/L	ND			NC	20	
Magnesium	5.7	0.2	mg/L	6.4			11.0	20	
Manganese	0.108	0.005	mg/L	0.106			1.1	20	
Potassium	1.9	0.1	mg/L	1.9			0.7	20	
Sodium	6.7	0.2	mg/L	6.6			1.0	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL	ND			NC	30	
Fecal Coliforms	ND	1	CFU/100 mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100 mL	ND			NC	30	
Heterotrophic Plate Count	ND	10	CFU/mL	ND			NC	30	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	32.7	1	mg/L	23.4	93.8	77-123			
Fluoride	1.84	0.1	mg/L	0.89	95.4	79-121			
Nitrate as N	1.02	0.1	mg/L	ND	102	79-120			
Nitrite as N	0.926	0.05	mg/L	ND	92.6	84-117			
Sulphate	56.5	1	mg/L	47.3	92.6	74-126			
General Inorganics									
Ammonia as N	0.325	0.01	mg/L	0.049	111	81-124			
Dissolved Organic Carbon	15.6	0.5	mg/L	3.2	123	60-133			
Phenolics	0.025	0.001	mg/L	ND	100	69-132			
Total Dissolved Solids	94.0	10	mg/L	ND	94.0	75-125			
Sulphide	0.50	0.02	mg/L	ND	101	79-115			
Tannin & Lignin	1.0	0.1	mg/L	ND	103	71-113			
Total Kjeldahl Nitrogen	1.97	0.1	mg/L	ND	98.7	81-126			
Metals									
Calcium	41000	0.1	mg/L	33200	78.6	80-120			QM-07
Iron	2360	0.1	mg/L	10.5	94.2	80-120			
Magnesium	14400	0.2	mg/L	6410	79.8	80-120			QM-07
Manganese	151	0.005	mg/L	106	88.5	80-120			
Potassium	11200	0.1	mg/L	1910	92.5	80-120			
Sodium	15400	0.2	mg/L	6600	88.1	80-120			

Qualifier Notes:

Sample Qualifiers :

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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Certificate of Analysis

McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.
Carp, ON K0A 1L0
Attn: Monica Black

Client PO: Grizzly Homes Subdivision
Project: 22-0256
Custody: 60211

Report Date: 19-Jul-2021
Order Date: 14-Jul-2021

Revised Report

Order #: 2129422

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

Paracel ID	Client ID
2129422-01	TW3-1
2129422-02	TW3-2

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 19-Jul-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 14-Jul-2021

Client PO: Grizzly Homes Subdivision

Project Description: 22-0256

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	15-Jul-21	15-Jul-21
Ammonia, as N	EPA 351.2 - Auto Colour	16-Jul-21	16-Jul-21
Anions	EPA 300.1 - IC	15-Jul-21	15-Jul-21
Colour	SM2120 - Spectrophotometric	15-Jul-21	15-Jul-21
Conductivity	EPA 9050A- probe @25 °C	15-Jul-21	15-Jul-21
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	15-Jul-21	15-Jul-21
E. coli	MOE E3407	15-Jul-21	16-Jul-21
Fecal Coliform	SM 9222D	15-Jul-21	16-Jul-21
Heterotrophic Plate Count	SM 9215C	15-Jul-21	17-Jul-21
Metals, ICP-MS	EPA 200.8 - ICP-MS	15-Jul-21	15-Jul-21
pH	EPA 150.1 - pH probe @25 °C	15-Jul-21	15-Jul-21
Phenolics	EPA 420.2 - Auto Colour, 4AAP	16-Jul-21	16-Jul-21
Hardness	Hardness as CaCO3	15-Jul-21	15-Jul-21
Sulphide	SM 4500SE - Colourimetric	15-Jul-21	16-Jul-21
Tannin/Lignin	SM 5550B - Colourimetric	15-Jul-21	15-Jul-21
Total Coliform	MOE E3407	15-Jul-21	16-Jul-21
Total Dissolved Solids	SM 2540C - gravimetric, filtration	15-Jul-21	16-Jul-21
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	15-Jul-21	15-Jul-21
Turbidity	SM 2130B - Turbidity meter	15-Jul-21	15-Jul-21

Certificate of Analysis

Report Date: 19-Jul-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 14-Jul-2021

Client PO: Grizzly Homes Subdivision

Project Description: 22-0256

	Client ID:	TW3-1	TW3-2	-	-
	Sample Date:	14-Jul-21 09:07	14-Jul-21 13:55	-	-
	Sample ID:	2129422-01	2129422-02	-	-
	MDL/Units	Water	Water	-	-
Microbiological Parameters					
E. coli	1 CFU/100 mL	ND	ND	-	-
Fecal Coliforms	1 CFU/100 mL	ND	ND	-	-
Total Coliforms	1 CFU/100 mL	ND	ND	-	-
Heterotrophic Plate Count	10 CFU/mL	<10	<10	-	-
General Inorganics					
Alkalinity, total	5 mg/L	279	280	-	-
Ammonia as N	0.01 mg/L	0.05	0.05	-	-
Dissolved Organic Carbon	0.5 mg/L	0.9	1.0	-	-
Colour	2 TCU	<2	<2	-	-
Conductivity	5 uS/cm	668	678	-	-
Hardness	mg/L	282	283	-	-
pH	0.1 pH Units	7.7	7.7	-	-
Phenolics	0.001 mg/L	<0.001	<0.001	-	-
Total Dissolved Solids	10 mg/L	334	356	-	-
Sulphide	0.02 mg/L	<0.02	<0.02	-	-
Tannin & Lignin	0.1 mg/L	<0.1	<0.1	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.1	<0.1	-	-
Turbidity	0.1 NTU	30.2	6.3	-	-
Anions					
Chloride	1 mg/L	27	28	-	-
Fluoride	0.1 mg/L	<0.1	<0.1	-	-
Nitrate as N	0.1 mg/L	2.5	2.4	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	-	-
Sulphate	1 mg/L	15	15	-	-
Metals					
Calcium	0.1 mg/L	75.7	75.5	-	-
Iron	0.1 mg/L	0.4	0.1	-	-
Magnesium	0.2 mg/L	22.7	22.9	-	-
Manganese	0.005 mg/L	0.026	0.010	-	-
Potassium	0.1 mg/L	4.2	3.6	-	-
Sodium	0.2 mg/L	13.4	13.3	-	-

Certificate of Analysis

Report Date: 19-Jul-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 14-Jul-2021

Client PO: Grizzly Homes Subdivision

Project Description: 22-0256

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour	ND	2	TCU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
Metals									
Calcium	ND	0.1	mg/L						
Iron	ND	0.1	mg/L						
Magnesium	ND	0.2	mg/L						
Manganese	ND	0.005	mg/L						
Potassium	ND	0.1	mg/L						
Sodium	ND	0.2	mg/L						
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL						
Fecal Coliforms	ND	1	CFU/100 mL						
Total Coliforms	ND	1	CFU/100 mL						
Heterotrophic Plate Count	ND	10	CFU/mL						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	27.5	1	mg/L	27.4			0.1	10	
Fluoride	ND	0.1	mg/L	ND			NC	10	
Nitrate as N	2.47	0.1	mg/L	2.47			0.1	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Sulphate	14.7	1	mg/L	14.7			0.0	10	
General Inorganics									
Alkalinity, total	230	5	mg/L	233			1.2	14	
Ammonia as N	0.036	0.01	mg/L	0.037			3.0	18	
Dissolved Organic Carbon	3.4	0.5	mg/L	3.2			5.1	37	
Colour	ND	2	TCU	ND			NC	12	
Conductivity	489	5	uS/cm	496			1.3	5	
pH	9.3	0.1	pH Units	9.3			0.0	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	ND	0.1	mg/L	ND			NC	11	
Total Kjeldahl Nitrogen	ND	0.1	mg/L	0.10			NC	16	
Turbidity	6.4	0.1	NTU	6.3			2.2	10	
Metals									
Calcium	ND	0.1	mg/L	ND			NC	20	
Iron	ND	0.1	mg/L	ND			NC	20	
Magnesium	ND	0.2	mg/L	ND			NC	20	
Manganese	ND	0.005	mg/L	ND			NC	20	
Potassium	0.2	0.1	mg/L	0.2			0.2	20	
Sodium	58.7	0.2	mg/L	58.5			0.3	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL	ND			NC	30	
Fecal Coliforms	ND	1	CFU/100 mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100 mL	ND			NC	30	
Heterotrophic Plate Count	ND	10	CFU/mL	ND			NC	30	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	36.5	1	mg/L	27.4	90.9	77-123			
Fluoride	1.01	0.1	mg/L	ND	101	79-121			
Nitrate as N	3.39	0.1	mg/L	2.47	92.4	79-120			
Nitrite as N	0.973	0.05	mg/L	ND	97.3	84-117			
Sulphate	24.3	1	mg/L	14.7	96.6	74-126			
General Inorganics									
Ammonia as N	0.313	0.01	mg/L	0.037	110	81-124			
Dissolved Organic Carbon	14.7	0.5	mg/L	3.2	115	60-133			
Phenolics	0.023	0.001	mg/L	ND	91.5	69-132			
Total Dissolved Solids	92.0	10	mg/L	ND	92.0	75-125			
Sulphide	0.52	0.02	mg/L	ND	104	79-115			
Tannin & Lignin	1.0	0.1	mg/L	ND	103	71-113			
Total Kjeldahl Nitrogen	1.99	0.1	mg/L	0.10	94.4	81-126			
Metals									
Calcium	9490	0.1	mg/L	36.0	94.6	80-120			
Iron	2370	0.1	mg/L	3.5	94.6	80-120			
Magnesium	9730	0.2	mg/L	9.2	97.2	80-120			
Manganese	48.4	0.005	mg/L	0.136	96.6	80-120			
Potassium	9710	0.1	mg/L	240	94.7	80-120			
Sodium	63600	0.2	mg/L	58500	50.5	80-120			QM-07

Qualifier Notes:

Sample Qualifiers :

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision 1 - This report now includes data for HPC

Other Report Notes:

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

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Certificate of Analysis

McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.
Carp, ON K0A 1L0
Attn: Monica Black

Client PO: Grizzly Homes
Project: 22-0256
Custody: 60208

Report Date: 15-Sep-2021
Order Date: 10-Sep-2021

Order #: 2137462

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

Paracel ID	Client ID
2137462-01	TW4-1
2137462-02	TW4-2

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	10-Sep-21	10-Sep-21
Ammonia, as N	EPA 351.2 - Auto Colour	14-Sep-21	14-Sep-21
Anions	EPA 300.1 - IC	10-Sep-21	11-Sep-21
Colour	SM2120 - Spectrophotometric	10-Sep-21	10-Sep-21
Conductivity	EPA 9050A- probe @25 °C	10-Sep-21	10-Sep-21
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	10-Sep-21	10-Sep-21
E. coli	MOE E3407	10-Sep-21	10-Sep-21
Fecal Coliform	SM 9222D	10-Sep-21	10-Sep-21
Metals, ICP-MS	EPA 200.8 - ICP-MS	13-Sep-21	13-Sep-21
pH	EPA 150.1 - pH probe @25 °C	10-Sep-21	10-Sep-21
Phenolics	EPA 420.2 - Auto Colour, 4AAP	10-Sep-21	10-Sep-21
Hardness	Hardness as CaCO3	13-Sep-21	13-Sep-21
Sulphide	SM 4500SE - Colourimetric	10-Sep-21	10-Sep-21
Tannin/Lignin	SM 5550B - Colourimetric	14-Sep-21	14-Sep-21
Total Coliform	MOE E3407	10-Sep-21	10-Sep-21
Total Dissolved Solids	SM 2540C - gravimetric, filtration	10-Sep-21	13-Sep-21
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	13-Sep-21	15-Sep-21
Turbidity	SM 2130B - Turbidity meter	10-Sep-21	10-Sep-21

Certificate of Analysis

Report Date: 15-Sep-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 10-Sep-2021

Client PO: Grizzly Homes

Project Description: 22-0256

	Client ID:	TW4-1	TW4-2	-	-
	Sample Date:	09-Sep-21 08:55	09-Sep-21 13:45	-	-
	Sample ID:	2137462-01	2137462-02	-	-
	MDL/Units	Drinking Water	Drinking Water	-	-
Microbiological Parameters					
E. coli	1 CFU/100 mL	ND	ND	-	-
Fecal Coliforms	1 CFU/100 mL	ND	ND	-	-
Total Coliforms	1 CFU/100 mL	ND	ND	-	-
General Inorganics					
Alkalinity, total	5 mg/L	269	272	-	-
Ammonia as N	0.01 mg/L	0.01	0.01	-	-
Dissolved Organic Carbon	0.5 mg/L	1.3	0.9	-	-
Colour	2 TCU	<2	<2	-	-
Conductivity	5 uS/cm	621	643	-	-
Hardness	mg/L	286	292	-	-
pH	0.1 pH Units	7.7	7.7	-	-
Phenolics	0.001 mg/L	<0.001	<0.001	-	-
Total Dissolved Solids	10 mg/L	298	340	-	-
Sulphide	0.02 mg/L	<0.02	<0.02	-	-
Tannin & Lignin	0.1 mg/L	<0.1	<0.1	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	<0.1	<0.1	-	-
Turbidity	0.1 NTU	17.0	0.8	-	-
Anions					
Chloride	1 mg/L	30	26	-	-
Fluoride	0.1 mg/L	<0.1	<0.1	-	-
Nitrate as N	0.1 mg/L	1.3	1.6	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	-	-
Sulphate	1 mg/L	16	15	-	-
Metals					
Calcium	0.1 mg/L	79.5	81.3	-	-
Iron	0.1 mg/L	<0.1	<0.1	-	-
Magnesium	0.2 mg/L	21.2	21.7	-	-
Manganese	0.005 mg/L	0.008	<0.005	-	-
Potassium	0.1 mg/L	3.5	3.4	-	-
Sodium	0.2 mg/L	22.2	19.4	-	-

Certificate of Analysis

Report Date: 15-Sep-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 10-Sep-2021

Client PO: Grizzly Homes

Project Description: 22-0256

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Fluoride	ND	0.1	mg/L						
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
Sulphate	ND	1	mg/L						
General Inorganics									
Alkalinity, total	ND	5	mg/L						
Ammonia as N	ND	0.01	mg/L						
Dissolved Organic Carbon	ND	0.5	mg/L						
Colour	ND	2	TCU						
Conductivity	ND	5	uS/cm						
Phenolics	ND	0.001	mg/L						
Total Dissolved Solids	ND	10	mg/L						
Sulphide	ND	0.02	mg/L						
Tannin & Lignin	ND	0.1	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Turbidity	ND	0.1	NTU						
Metals									
Calcium	ND	0.1	mg/L						
Iron	ND	0.1	mg/L						
Magnesium	ND	0.2	mg/L						
Manganese	ND	0.005	mg/L						
Potassium	ND	0.1	mg/L						
Sodium	ND	0.2	mg/L						
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL						
Fecal Coliforms	ND	1	CFU/100 mL						
Total Coliforms	ND	1	CFU/100 mL						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	918	5	mg/L	919			0.1	10	
Fluoride	1.16	0.1	mg/L	1.11			4.1	10	
Nitrate as N	0.15	0.1	mg/L	0.15			1.5	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Sulphate	425	5	mg/L	422			0.6	10	
General Inorganics									
Alkalinity, total	214	5	mg/L	217			1.4	14	
Ammonia as N	0.015	0.01	mg/L	0.014			5.0	17.7	
Dissolved Organic Carbon	ND	0.5	mg/L	ND			NC	37	
Colour	ND	2	TCU	ND			NC	12	
Conductivity	416	5	uS/cm	423			1.7	5	
pH	8.4	0.1	pH Units	8.4			0.1	3.3	
Phenolics	ND	0.001	mg/L	ND			NC	10	
Total Dissolved Solids	76.0	10	mg/L	74.0			2.7	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	ND	0.1	mg/L	ND			NC	11	
Total Kjeldahl Nitrogen	0.35	0.1	mg/L	0.37			5.1	16	
Turbidity	0.9	0.1	NTU	0.8			3.5	10	
Metals									
Calcium	51.3	0.1	mg/L	52.0			1.4	20	
Iron	0.7	0.1	mg/L	0.7			1.4	20	
Magnesium	14.4	0.2	mg/L	14.5			0.6	20	
Manganese	0.020	0.005	mg/L	0.020			0.2	20	
Potassium	0.8	0.1	mg/L	0.8			1.9	20	
Sodium	6.4	0.2	mg/L	6.3			2.2	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL	ND			NC	30	
Fecal Coliforms	ND	1	CFU/100 mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100 mL	ND			NC	30	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	8.98	1	mg/L	ND	89.8	85-115			
Fluoride	0.99	0.1	mg/L	ND	98.7	83-117			
Nitrate as N	0.97	0.1	mg/L	ND	96.7	86-114			
Nitrite as N	1.01	0.05	mg/L	ND	101	85-115			
Sulphate	8.97	1	mg/L	ND	89.7	86-114			
General Inorganics									
Ammonia as N	0.251	0.01	mg/L	0.014	94.9	81-124			
Dissolved Organic Carbon	11.0	0.5	mg/L	ND	110	60-133			
Phenolics	0.026	0.001	mg/L	ND	103	69-132			
Total Dissolved Solids	96.0	10	mg/L	ND	96.0	75-125			
Sulphide	0.54	0.02	mg/L	ND	108	79-115			
Tannin & Lignin	1.1	0.1	mg/L	ND	106	71-113			
Total Kjeldahl Nitrogen	2.28	0.1	mg/L	0.37	95.5	81-126			
Metals									
Calcium	59000	0.1	mg/L	52000	70.9	80-120			QM-07
Iron	2800	0.1	mg/L	667	85.4	80-120			
Magnesium	22500	0.2	mg/L	14500	80.3	80-120			
Manganese	67.0	0.005	mg/L	19.8	94.3	80-120			
Potassium	11300	0.1	mg/L	839	104	80-120			
Sodium	15600	0.2	mg/L	6250	93.3	80-120			

Qualifier Notes:

Login Qualifiers :

Samples received submerged in water, possibly melted ice. This condition can compromise sample integrity.

Applies to samples: TW4-1

Sample Qualifiers :

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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Certificate of Analysis

McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.
RR#3 Carp, ON K0A 1L0
Attn: Andrew MacHardy

Client PO: Grizzly Homes Subdivision
Project: 22-0256
Custody: 60212

Report Date: 16-Jul-2021
Order Date: 15-Jul-2021

Order #: 2129521

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

Paracel ID	Client ID
2129521-01	TW5-1
2129521-02	TW5-2

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 16-Jul-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 15-Jul-2021

Client PO: Grizzly Homes Subdivision

Project Description: 22-0256

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	16-Jul-21	16-Jul-21
Ammonia, as N	EPA 351.2 - Auto Colour	16-Jul-21	16-Jul-21
Anions	EPA 300.1 - IC	15-Jul-21	15-Jul-21
Colour	SM2120 - Spectrophotometric	16-Jul-21	16-Jul-21
Conductivity	EPA 9050A- probe @25 °C	16-Jul-21	16-Jul-21
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	16-Jul-21	16-Jul-21
E. coli	MOE E3407	15-Jul-21	15-Jul-21
Fecal Coliform	SM 9222D	15-Jul-21	15-Jul-21
Metals, ICP-MS	EPA 200.8 - ICP-MS	16-Jul-21	16-Jul-21
pH	EPA 150.1 - pH probe @25 °C	16-Jul-21	16-Jul-21
Phenolics	EPA 420.2 - Auto Colour, 4AAP	16-Jul-21	16-Jul-21
Sulphide	SM 4500SE - Colourimetric	15-Jul-21	16-Jul-21
Tannin/Lignin	SM 5550B - Colourimetric	16-Jul-21	16-Jul-21
Total Coliform	MOE E3407	15-Jul-21	15-Jul-21
Total Dissolved Solids	SM 2540C - gravimetric, filtration	15-Jul-21	16-Jul-21
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	16-Jul-21	16-Jul-21
Turbidity	SM 2130B - Turbidity meter	16-Jul-21	16-Jul-21

Certificate of Analysis

Report Date: 16-Jul-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 15-Jul-2021

Client PO: Grizzly Homes Subdivision

Project Description: 22-0256

	Client ID:	TW5-1	TW5-2	-	-
	Sample Date:	15-Jul-21 08:45	15-Jul-21 13:15	-	-
	Sample ID:	2129521-01	2129521-02	-	-
	MDL/Units	Water	Water	-	-
Microbiological Parameters					
E. coli	1 CFU/100 mL	ND	ND	-	-
Fecal Coliforms	1 CFU/100 mL	ND	ND	-	-
Total Coliforms	1 CFU/100 mL	ND	ND	-	-
General Inorganics					
Alkalinity, total	5 mg/L	264	264	-	-
Ammonia as N	0.01 mg/L	0.04	0.04	-	-
Dissolved Organic Carbon	0.5 mg/L	2.5	1.7	-	-
Colour	2 TCU	3	3	-	-
Conductivity	5 uS/cm	662	667	-	-
pH	0.1 pH Units	7.6	7.7	-	-
Phenolics	0.001 mg/L	<0.001	<0.001	-	-
Total Dissolved Solids	10 mg/L	346	338	-	-
Sulphide	0.02 mg/L	<0.02	<0.02	-	-
Tannin & Lignin	0.1 mg/L	<0.1	<0.1	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	<0.1	<0.1	-	-
Turbidity	0.1 NTU	1.6	0.3	-	-
Anions					
Chloride	1 mg/L	39	39	-	-
Fluoride	0.1 mg/L	<0.1	<0.1	-	-
Nitrate as N	0.1 mg/L	0.9	0.8	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	-	-
Sulphate	1 mg/L	16	16	-	-
Metals					
Calcium	100 ug/L	64500	63900	-	-
Iron	100 ug/L	<100	<100	-	-
Magnesium	200 ug/L	19700	19900	-	-
Manganese	5 ug/L	<5	<5	-	-
Potassium	100 ug/L	1370	1400	-	-
Sodium	200 ug/L	23600	24000	-	-

Certificate of Analysis

Report Date: 16-Jul-2021

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 15-Jul-2021

Client PO: Grizzly Homes Subdivision

Project Description: 22-0256

Method Quality Control: Blank

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

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	27.5	1	mg/L	27.4			0.1	10	
Fluoride	ND	0.1	mg/L	ND			NC	10	
Nitrate as N	2.47	0.1	mg/L	2.47			0.1	10	
Nitrite as N	ND	0.05	mg/L	ND			NC	10	
Sulphate	14.7	1	mg/L	14.7			0.0	10	
General Inorganics									
Alkalinity, total	259	5	mg/L	264			1.6	14	
Ammonia as N	0.036	0.01	mg/L	0.037			3.0	18	
Dissolved Organic Carbon	2.3	0.5	mg/L	2.5			8.7	37	
Colour	3	2	TCU	3			0.0	12	
Conductivity	665	5	uS/cm	662			0.4	5	
pH	7.6	0.1	pH Units	7.6			0.5	3.3	
Phenolics	0.004	0.001	mg/L	ND			NC	10	
Sulphide	ND	0.02	mg/L	ND			NC	10	
Tannin & Lignin	ND	0.1	mg/L	ND			NC	11	
Total Kjeldahl Nitrogen	1.15	0.1	mg/L	1.16			0.3	16	
Turbidity	1.6	0.1	NTU	1.6			3.8	10	
Metals									
Calcium	28100	100	ug/L	28200			0.3	20	
Iron	ND	100	ug/L	ND			NC	20	
Magnesium	7000	200	ug/L	6800			3.0	20	
Manganese	ND	5	ug/L	ND			NC	20	
Potassium	1300	100	ug/L	1300			0.5	20	
Sodium	13000	200	ug/L	13000			0.3	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL	ND			NC	30	BAC14
Fecal Coliforms	ND	1	CFU/100 mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100 mL	ND			NC	30	BAC14

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	36.5	1	mg/L	27.4	90.9	77-123			
Fluoride	1.01	0.1	mg/L	ND	101	79-121			
Nitrate as N	3.39	0.1	mg/L	2.47	92.4	79-120			
Nitrite as N	0.973	0.05	mg/L	ND	97.3	84-117			
Sulphate	24.3	1	mg/L	14.7	96.6	74-126			
General Inorganics									
Ammonia as N	0.313	0.01	mg/L	0.037	110	81-124			
Dissolved Organic Carbon	13.2	0.5	mg/L	2.5	107	60-133			
Phenolics	0.025	0.001	mg/L	ND	100	69-132			
Total Dissolved Solids	92.0	10	mg/L	ND	92.0	75-125			
Sulphide	0.50	0.02	mg/L	ND	101	79-115			
Tannin & Lignin	1.0	0.1	mg/L	ND	101	71-113			
Total Kjeldahl Nitrogen	3.03	0.1	mg/L	1.16	93.7	81-126			
Metals									
Calcium	34200	100	ug/L	28200	60.4	80-120			QM-07
Iron	2000	100	ug/L	ND	79.4	80-120			QM-07
Magnesium	14700	200	ug/L	6800	79.2	80-120			QM-07
Manganese	48.9	5	ug/L	ND	94.1	80-120			
Potassium	9330	100	ug/L	1300	80.2	80-120			
Sodium	19800	200	ug/L	13000	67.7	80-120			QM-07

Qualifier Notes:

Sample Qualifiers :

QC Qualifiers :

BAC14 : A2C - Background counts greater than 200

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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Certificate of Analysis

McIntosh Perry Consulting Eng. (Carp)
115 Walgreen Rd.
Carp, ON K0A 1L0
Attn: Monica Black

Client PO: Grizzly
Project: 22-0256
Custody: 70268

Report Date: 26-Apr-2023
Order Date: 19-Apr-2023

Order #: 2316293

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

Paracel ID	Client ID
2316293-01	TW2
2316293-02	TW1
2316293-03	TW3
2316293-04	TW5
2316293-05	9578 Hwy. 15

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Ammonia, as N	EPA 351.2 - Auto Colour	24-Apr-23	25-Apr-23
Anions	EPA 300.1 - IC	20-Apr-23	20-Apr-23
E. coli	MOE E3407	20-Apr-23	20-Apr-23
Fecal Coliform	SM 9222D	20-Apr-23	20-Apr-23
Phosphorus, total, water	EPA 365.4 - Auto Colour, digestion	20-Apr-23	24-Apr-23
Total Coliform	MOE E3407	20-Apr-23	20-Apr-23
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	20-Apr-23	24-Apr-23
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	21-Apr-23	21-Apr-23

Summary of Criteria Exceedances

(If this page is blank then there are no exceedances)

Only those criteria that a sample exceeds will be highlighted in red

Regulatory Comparison:

Paracel Laboratories has provided regulatory guidelines on this report for informational purposes only and makes no representations or warranties that the data is accurate or reflects the current regulatory values. The user is advised to consult with the appropriate official regulations to evaluate compliance. Sample results that are highlighted have exceeded the selected regulatory limit. Calculated uncertainty estimations have not been applied for determining regulatory exceedances.

Sample	Analyte	MDL / Units	Result	-	-

Certificate of Analysis

Report Date: 26-Apr-2023

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 19-Apr-2023

Client PO: Grizzly

Project Description: 22-0256

	Client ID:	TW2	TW1	TW3	TW5	-	-
	Sample Date:	18-Apr-23 12:00	18-Apr-23 09:45	18-Apr-23 15:45	18-Apr-23 18:30		
	Sample ID:	2316293-01	2316293-02	2316293-03	2316293-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Microbiological Parameters							
E. coli	1 CFU/100mL	ND [1]	ND	ND	ND	-	-
Fecal Coliforms	1 CFU/100mL	ND	ND	ND	ND	-	-
Total Coliforms	1 CFU/100mL	ND [1]	ND	ND	1	-	-
General Inorganics							
Ammonia as N	0.01 mg/L	<0.01	0.02	<0.01	<0.01	-	-
Phosphorus, total	0.01 mg/L	<0.01	<0.01	0.02	<0.01	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	<0.1	<0.1	0.2	<0.1	-	-
Anions							
Nitrate as N	0.1 mg/L	0.5	<0.1	2.8	1.0	-	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	<0.05	<0.05	-	-
Volatiles							
Acetone	5 ug/L	<5.0	-	-	<5.0	-	-
Benzene	0.5 ug/L	<0.5	-	-	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	-	-	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	<0.5	-	-
Chloroethane	1 ug/L	<1.0	-	-	<1.0	-	-
Chloroform	0.5 ug/L	<0.5	-	-	<0.5	-	-
Chloromethane	3 ug/L	<3.0	-	-	<3.0	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	<0.5	-	-
Dichlorodifluoromethane	1 ug/L	<1.0	-	-	<1.0	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	-	-	<0.2	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	<0.5	-	-

	Client ID:	TW2	TW1	TW3	TW5	-	-
	Sample Date:	18-Apr-23 12:00	18-Apr-23 09:45	18-Apr-23 15:45	18-Apr-23 18:30		
	Sample ID:	2316293-01	2316293-02	2316293-03	2316293-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	<0.5	-	-
Hexane	1 ug/L	<1.0	-	-	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5 ug/L	<5.0	-	-	<5.0	-	-
Methyl Butyl Ketone (2-Hexanone)	10 ug/L	<10.0	-	-	<10.0	-	-
Methyl Isobutyl Ketone	5 ug/L	<5.0	-	-	<5.0	-	-
Methyl tert-butyl ether	2 ug/L	<2.0	-	-	<2.0	-	-
Methylene Chloride	5 ug/L	<5.0	-	-	<5.0	-	-
Styrene	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	<0.5	-	-
Toluene	0.5 ug/L	<0.5	-	-	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	<0.5	-	-

	Client ID:	TW2	TW1	TW3	TW5	-	-
	Sample Date:	18-Apr-23 12:00	18-Apr-23 09:45	18-Apr-23 15:45	18-Apr-23 18:30		
	Sample ID:	2316293-01	2316293-02	2316293-03	2316293-04		
	Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
	MDL/Units						
Volatiles							
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	<0.5	-	-
Trichlorofluoromethane	1 ug/L	<1.0	-	-	<1.0	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	-	-	<0.5	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	<0.5	-	-
Toluene-d8	Surrogate	104%	-	-	104%	-	-
4-Bromofluorobenzene	Surrogate	110%	-	-	109%	-	-
Dibromofluoromethane	Surrogate	110%	-	-	109%	-	-

	Client ID:	9578 Hwy. 15				-	-
	Sample Date:	18-Apr-23 10:30					
	Sample ID:	2316293-05					
	Matrix:	Ground Water					
	MDL/Units						
Microbiological Parameters							
E. coli	1 CFU/100mL	ND	-	-	-	-	-
Fecal Coliforms	1 CFU/100mL	ND	-	-	-	-	-
Total Coliforms	1 CFU/100mL	ND	-	-	-	-	-
General Inorganics							
Ammonia as N	0.01 mg/L	<0.01	-	-	-	-	-
Phosphorus, total	0.01 mg/L	<0.01	-	-	-	-	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.1	-	-	-	-	-
Anions							
Nitrate as N	0.1 mg/L	1.2	-	-	-	-	-
Nitrite as N	0.05 mg/L	<0.05	-	-	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions								
Nitrate as N	ND	0.1	mg/L					
Nitrite as N	ND	0.05	mg/L					
General Inorganics								
Ammonia as N	ND	0.01	mg/L					
Phosphorus, total	ND	0.01	mg/L					
Total Kjeldahl Nitrogen	ND	0.1	mg/L					
Microbiological Parameters								
E. coli	ND	1	CFU/100mL					
Fecal Coliforms	ND	1	CFU/100mL					
Total Coliforms	ND	1	CFU/100mL					
Volatiles								
Acetone	ND	5.0	ug/L					
Benzene	ND	0.5	ug/L					
Bromodichloromethane	ND	0.5	ug/L					
Bromoform	ND	0.5	ug/L					
Bromomethane	ND	0.5	ug/L					
Carbon Tetrachloride	ND	0.2	ug/L					
Chlorobenzene	ND	0.5	ug/L					
Chloroethane	ND	1.0	ug/L					
Chloroform	ND	0.5	ug/L					
Chloromethane	ND	3.0	ug/L					
Dibromochloromethane	ND	0.5	ug/L					
Dichlorodifluoromethane	ND	1.0	ug/L					
1,2-Dibromoethane	ND	0.2	ug/L					
1,2-Dichlorobenzene	ND	0.5	ug/L					
1,3-Dichlorobenzene	ND	0.5	ug/L					
1,4-Dichlorobenzene	ND	0.5	ug/L					
1,1-Dichloroethane	ND	0.5	ug/L					
1,2-Dichloroethane	ND	0.5	ug/L					
1,1-Dichloroethylene	ND	0.5	ug/L					
cis-1,2-Dichloroethylene	ND	0.5	ug/L					
trans-1,2-Dichloroethylene	ND	0.5	ug/L					

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichloroethylene, total	ND	0.5	ug/L					
1,2-Dichloropropane	ND	0.5	ug/L					
cis-1,3-Dichloropropylene	ND	0.5	ug/L					
trans-1,3-Dichloropropylene	ND	0.5	ug/L					
1,3-Dichloropropene, total	ND	0.5	ug/L					
Ethylbenzene	ND	0.5	ug/L					
Hexane	ND	1.0	ug/L					
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L					
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L					
Methyl Isobutyl Ketone	ND	5.0	ug/L					
Methyl tert-butyl ether	ND	2.0	ug/L					
Methylene Chloride	ND	5.0	ug/L					
Styrene	ND	0.5	ug/L					
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L					
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L					
Tetrachloroethylene	ND	0.5	ug/L					
Toluene	ND	0.5	ug/L					
1,1,1-Trichloroethane	ND	0.5	ug/L					
1,1,2-Trichloroethane	ND	0.5	ug/L					
Trichloroethylene	ND	0.5	ug/L					
Trichlorofluoromethane	ND	1.0	ug/L					
1,3,5-Trimethylbenzene	ND	0.5	ug/L					
Vinyl chloride	ND	0.5	ug/L					
m,p-Xylenes	ND	0.5	ug/L					
o-Xylene	ND	0.5	ug/L					
Xylenes, total	ND	0.5	ug/L					
Surrogate: 4-Bromofluorobenzene	*86.9*		*ug/L*	*109*	*50-140*			
Surrogate: Dibromofluoromethane	*86.6*		*ug/L*	*108*	*50-140*			
Surrogate: Toluene-d8	*84.2*		*ug/L*	*105*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	0.21	0.1	mg/L	0.21			1.0	20	
Nitrite as N	ND	0.05	mg/L	ND			NC	20	
General Inorganics									
Ammonia as N	0.022	0.01	mg/L	0.021			4.3	18	
Phosphorus, total	4.87	0.02	mg/L	4.83			0.9	15	
Total Kjeldahl Nitrogen	5.87	0.2	mg/L	5.83			0.7	16	
Microbiological Parameters									
E. coli	ND	1	CFU/100mL	ND			NC	30	BAC12
Fecal Coliforms	ND	1	CFU/100mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100mL	ND			NC	30	BAC12
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroethane	ND	1.0	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Chloromethane	ND	3.0	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dibromoethane	ND	0.2	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*87.2*		*ug/L*		*109*	*50-140*			
Surrogate: Dibromofluoromethane	*90.5*		*ug/L*		*113*	*50-140*			
Surrogate: Toluene-d8	*82.3*		*ug/L*		*103*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	1.25	0.1	mg/L	0.21	104	77-126			
Nitrite as N	0.946	0.05	mg/L	ND	94.6	82-115			
General Inorganics									
Ammonia as N	1.05	0.01	mg/L	0.021	103	81-124			
Phosphorus, total	0.943	0.01	mg/L	ND	94.3	80-120			
Total Kjeldahl Nitrogen	0.94	0.1	mg/L	ND	93.8	81-126			
Volatiles									
Acetone	108	5.0	ug/L	ND	108	50-140			
Benzene	38.5	0.5	ug/L	ND	96.4	60-130			
Bromodichloromethane	40.8	0.5	ug/L	ND	102	60-130			
Bromoform	38.0	0.5	ug/L	ND	95.0	60-130			
Bromomethane	36.7	0.5	ug/L	ND	91.8	50-140			
Carbon Tetrachloride	39.9	0.2	ug/L	ND	99.7	60-130			
Chlorobenzene	39.1	0.5	ug/L	ND	97.8	60-130			
Chloroethane	44.5	1.0	ug/L	ND	111	50-140			
Chloroform	30.9	0.5	ug/L	ND	77.4	60-130			
Chloromethane	49.8	3.0	ug/L	ND	124	50-140			
Dibromochloromethane	39.0	0.5	ug/L	ND	97.5	60-130			
Dichlorodifluoromethane	41.7	1.0	ug/L	ND	104	50-140			
1,2-Dibromoethane	40.6	0.2	ug/L	ND	101	60-130			
1,2-Dichlorobenzene	37.3	0.5	ug/L	ND	93.2	60-130			
1,3-Dichlorobenzene	36.7	0.5	ug/L	ND	91.7	60-130			
1,4-Dichlorobenzene	35.4	0.5	ug/L	ND	88.5	60-130			
1,1-Dichloroethane	40.9	0.5	ug/L	ND	102	60-130			
1,2-Dichloroethane	38.9	0.5	ug/L	ND	97.3	60-130			
1,1-Dichloroethylene	38.3	0.5	ug/L	ND	95.7	60-130			
cis-1,2-Dichloroethylene	32.6	0.5	ug/L	ND	81.6	60-130			
trans-1,2-Dichloroethylene	36.0	0.5	ug/L	ND	90.0	60-130			
1,2-Dichloropropane	37.7	0.5	ug/L	ND	94.2	60-130			
cis-1,3-Dichloropropylene	44.5	0.5	ug/L	ND	111	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
trans-1,3-Dichloropropylene	47.3	0.5	ug/L	ND	118	60-130			
Ethylbenzene	38.3	0.5	ug/L	ND	95.7	60-130			
Hexane	41.6	1.0	ug/L	ND	104	60-130			
Methyl Ethyl Ketone (2-Butanone)	109	5.0	ug/L	ND	109	50-140			
Methyl Butyl Ketone (2-Hexanone)	118	10.0	ug/L	ND	118	50-140			
Methyl Isobutyl Ketone	106	5.0	ug/L	ND	106	50-140			
Methyl tert-butyl ether	124	2.0	ug/L	ND	124	50-140			
Methylene Chloride	38.5	5.0	ug/L	ND	96.2	60-130			
Styrene	36.4	0.5	ug/L	ND	91.0	60-130			
1,1,1,2-Tetrachloroethane	41.5	0.5	ug/L	ND	104	60-130			
1,1,2,2-Tetrachloroethane	45.6	0.5	ug/L	ND	114	60-130			
Tetrachloroethylene	39.0	0.5	ug/L	ND	97.4	60-130			
Toluene	39.0	0.5	ug/L	ND	97.6	60-130			
1,1,1-Trichloroethane	40.9	0.5	ug/L	ND	102	60-130			
1,1,2-Trichloroethane	40.0	0.5	ug/L	ND	100	60-130			
Trichloroethylene	37.1	0.5	ug/L	ND	92.7	60-130			
Trichlorofluoromethane	41.0	1.0	ug/L	ND	102	60-130			
1,3,5-Trimethylbenzene	37.6	0.5	ug/L	ND	94.1	60-130			
Vinyl chloride	35.6	0.5	ug/L	ND	89.1	50-140			
m,p-Xylenes	75.3	0.5	ug/L	ND	94.1	60-130			
o-Xylene	37.7	0.5	ug/L	ND	94.3	60-130			
Surrogate: 4-Bromofluorobenzene	*87.0*		*ug/L*		*109*	*50-140*			
Surrogate: Dibromofluoromethane	*74.9*		*ug/L*		*93.7*	*50-140*			
Surrogate: Toluene-d8	*79.9*		*ug/L*		*99.9*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

1: Confluent background colonies on filter: may interfere with target reactions and the analysts' ability to count E. coli & Total Coliform. The target colonies may be under-represented.

QC Qualifiers:

BAC12 Confluent background colonies on filter: may interfere with target reactions and the analysts' ability to count E. coli & Total Coliform. The target colonies may be under-represented.

Sample Data Revisions:

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

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Certificate of Analysis

McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.
Carp, ON K0A 1L0
Attn: Rebecca Leduc

Client PO:
Project: CCO-22-0256
Custody: 70267

Report Date: 26-Apr-2023
Order Date: 20-Apr-2023

Order #: 2316390

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

Paracel ID	Client ID
2316390-01	TW4
2316390-02	220 Perth Rd
2316390-03	9477 HWY 15
2316390-04	9493 HWY 15

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: **McIntosh Perry Consulting Eng. (Carp)**
Client PO:

Report Date: 26-Apr-2023
Order Date: 20-Apr-2023
Project Description: CCO-22-0256

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Ammonia, as N	EPA 351.2 - Auto Colour	24-Apr-23	25-Apr-23
Anions	EPA 300.1 - IC	20-Apr-23	20-Apr-23
E. coli	MOE E3407	20-Apr-23	20-Apr-23
Fecal Coliform	SM 9222D	20-Apr-23	20-Apr-23
Phosphorus, total, water	EPA 365.4 - Auto Colour, digestion	21-Apr-23	24-Apr-23
Total Coliform	MOE E3407	20-Apr-23	20-Apr-23
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	21-Apr-23	24-Apr-23

PARACEL LABORATORIES LTD.

Order #: 2316390

Certificate of Analysis

Client: McIntosh Perry Consulting Eng. (Carp)

Client PO:

Report Date: 26-Apr-2023

Order Date: 20-Apr-2023

Project Description: CCO-22-0256

	Client ID:	TW4	220 Perth Rd	9477 HWY 15	9493 HWY 15
	Sample Date:	19-Apr-23 02:30	19-Apr-23 03:50	19-Apr-23 04:30	19-Apr-23 04:55
	Sample ID:	2316390-01	2316390-02	2316390-03	2316390-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
Microbiological Parameters					
E. coli	1 CFU/100mL	ND	ND	ND	ND
Total Coliforms	1 CFU/100mL	ND	9	1	ND
Fecal Coliforms	1 CFU/100mL	ND	ND	ND	ND
General Inorganics					
Ammonia as N	0.01 mg/L	0.01	<0.01	<0.01	<0.01
Phosphorus, total	0.01 mg/L	<0.01	<0.01	<0.01	<0.01
Total Kjeldahl Nitrogen	0.1 mg/L	<0.1	<0.1	<0.1	<0.1
Anions					
Nitrate as N	0.1 mg/L	0.1	0.4	1.1	1.1
Nitrite as N	0.05 mg/L	<0.05	<0.05	<0.05	<0.05

Certificate of Analysis

Client: **McIntosh Perry Consulting Eng. (Carp)**

Client PO:

Report Date: 26-Apr-2023

Order Date: 20-Apr-2023

Project Description: CCO-22-0256

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
General Inorganics									
Ammonia as N	ND	0.01	mg/L						
Phosphorus, total	ND	0.01	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Microbiological Parameters									
E. coli	ND	1	CFU/100mL						
Total Coliforms	ND	1	CFU/100mL						
Fecal Coliforms	ND	1	CFU/100mL						

Certificate of Analysis

Client: **McIntosh Perry Consulting Eng. (Carp)**

Client PO:

Report Date: 26-Apr-2023

Order Date: 20-Apr-2023

Project Description: CCO-22-0256

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	0.21	0.1	mg/L	0.21			1.0	20	
Nitrite as N	ND	0.05	mg/L	ND			NC	20	
General Inorganics									
Ammonia as N	0.022	0.01	mg/L	0.021			4.3	18	
Phosphorus, total	ND	0.01	mg/L	ND			NC	15	
Total Kjeldahl Nitrogen	ND	0.1	mg/L	ND			NC	16	
Microbiological Parameters									
E. coli	ND	1	CFU/100mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100mL	ND			NC	30	
Fecal Coliforms	ND	1	CFU/100mL	ND			NC	30	

Certificate of Analysis

Client: **McIntosh Perry Consulting Eng. (Carp)**

Client PO:

Report Date: 26-Apr-2023

Order Date: 20-Apr-2023

Project Description: CCO-22-0256

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	1.25	0.1	mg/L	0.21	104	77-126			
Nitrite as N	0.946	0.05	mg/L	ND	94.6	82-115			
General Inorganics									
Ammonia as N	1.05	0.01	mg/L	0.021	103	81-124			
Phosphorus, total	0.955	0.01	mg/L	ND	95.5	80-120			
Total Kjeldahl Nitrogen	0.98	0.1	mg/L	ND	98.3	81-126			

Qualifier Notes:

Sample Qualifiers :

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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Certificate of Analysis

McIntosh Perry Consulting Eng. (Carp)

115 Walgreen Rd.
Carp, ON K0A 1L0
Attn: Monica Black

Client PO: Grizzly Subdivision
Project: 22-0256
Custody: 70175

Report Date: 6-Jun-2023
Order Date: 30-May-2023

Order #: 2322171

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

Paracel ID	Client ID
2322171-01	TW3
2322171-02	TW4
2322171-03	TW5

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 06-Jun-2023

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 30-May-2023

Client PO: Grizzly Subdivision

Project Description: 22-0256

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Ammonia, as N	EPA 351.2 - Auto Colour	5-Jun-23	6-Jun-23
Anions	EPA 300.1 - IC	1-Jun-23	2-Jun-23
E. coli	MOE E3407	30-May-23	30-May-23
Fecal Coliform	SM 9222D	30-May-23	30-May-23
Phosphorus, total, water	EPA 365.4 - Auto Colour, digestion	31-May-23	31-May-23
Total Coliform	MOE E3407	30-May-23	30-May-23
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	31-May-23	31-May-23

Certificate of Analysis

Report Date: 06-Jun-2023

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 30-May-2023

Client PO: Grizzly Subdivision

Project Description: 22-0256

	Client ID:	TW3	TW4	TW5	-
	Sample Date:	29-May-23 12:32	29-May-23 02:45	29-May-23 04:39	-
	Sample ID:	2322171-01	2322171-02	2322171-03	-
	MDL/Units	Ground Water	Ground Water	Ground Water	-
Microbiological Parameters					
E. coli	1 CFU/100mL	ND	ND	ND [1]	-
Total Coliforms	1 CFU/100mL	ND	ND	ND [1]	-
Fecal Coliforms	1 CFU/100mL	ND	ND	ND	-
General Inorganics					
Organic Nitrogen	0.100 mg/L	0.225	0.136	<0.100	-
Ammonia as N	0.01 mg/L	<0.01	0.01	<0.01	-
Phosphorus, total	0.01 mg/L	<0.01	<0.01	<0.01	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.2	0.1	<0.1	-
Anions					
Nitrate as N	0.1 mg/L	2.7	<0.1	0.4	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	<0.05	-

Certificate of Analysis

Report Date: 06-Jun-2023

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 30-May-2023

Client PO: Grizzly Subdivision

Project Description: 22-0256

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
General Inorganics									
Ammonia as N	ND	0.01	mg/L						
Phosphorus, total	ND	0.01	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						
Microbiological Parameters									
E. coli	ND	1	CFU/100mL						
Total Coliforms	ND	1	CFU/100mL						
Fecal Coliforms	ND	1	CFU/100mL						

Certificate of Analysis

Report Date: 06-Jun-2023

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 30-May-2023

Client PO: Grizzly Subdivision

Project Description: 22-0256

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	0.86	0.1	mg/L	0.85			1.3	20	
Nitrite as N	ND	0.05	mg/L	ND			NC	20	
General Inorganics									
Ammonia as N	0.746	0.01	mg/L	0.771			3.2	18	
Phosphorus, total	7.57	0.04	mg/L	7.46			1.5	15	
Total Kjeldahl Nitrogen	67.1	4.0	mg/L	67.7			0.9	16	
Microbiological Parameters									
E. coli	ND	1	CFU/100mL	ND			NC	30	
Total Coliforms	ND	1	CFU/100mL	ND			NC	30	
Fecal Coliforms	ND	1	CFU/100mL	ND			NC	30	

Certificate of Analysis

Report Date: 06-Jun-2023

Client: McIntosh Perry Consulting Eng. (Carp)

Order Date: 30-May-2023

Client PO: Grizzly Subdivision

Project Description: 22-0256

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	1.91	0.1	mg/L	0.85	105	77-126			
Nitrite as N	0.965	0.05	mg/L	ND	96.5	82-115			
General Inorganics									
Ammonia as N	1.80	0.01	mg/L	0.771	103	81-124			
Phosphorus, total	1.03	0.01	mg/L	ND	103	80-120			
Total Kjeldahl Nitrogen	0.93	0.1	mg/L	ND	92.5	81-126			

Qualifier Notes:

Sample Qualifiers :

1 : Greater than 200 CFU of background colonies present. This may interfere with target growth and ability of the analyst to count E. coli & Total Coliform. The target colonies may be under-represented.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

APPENDIX G: CALCULATIONS

McINTOSH PERRY

Transmissivity Calculations

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

T is the transmissivity (m2/day)
Q is the pumping rate during the pumping test (L/min); and,
Δs is the differential for residual drawdown for one log cycle (m)

Test Well 1

T= 2.3 Q / 4π ΔS
T= 2.3 (30.24 m3/day)/4π (1.15 m)
T= 43.3 m2/day

Q = 21.0 L/min
Q=((21.0 L/min)/(1000L))*(60 min)(24 hour)
Q= 30.24 m3/day

Δs = 0.128 m

Test Well 1 Recovery

T= 2.3 Q / 4π ΔS
T= 2.3 (117.792 m3/day)/4π (1.29 m)
T= 55.4 m2/day

Q = 21 L/min
Q=((21 L/min)/(1000L))*(60 min)(24 hour)
Q= 30.24 m3/day

Δs = 0.10 m

Test Well 2

T= 2.3 Q / 4π ΔS
T= 2.3 (117.792 m3/day)/4π (1.15 m)
T= 13.9 m2/day

Q = 81.8 L/min
Q=((81.8 L/min)/(1000L))*(60 min)(24 hour)
Q= 117.79 m3/day

Δs = 1.55 m

Test Well 2 Recovery

T= 2.3 Q / 4π ΔS
T= 2.3 (117.792 m3/day)/4π (1.29 m)
T= 16.7 m2/day

Q = 81.8 L/min
Q=((81.8 L/min)/(1000L))*(60 min)(24 hour)
Q= 117.792 m3/day

Δs = 1.29 m

Test Well 3

T= 2.3 Q / 4π ΔS
T= 2.3 (129.6 m3/day)/4π (0.75 m)
T= 175.8 m2/day

Q = 90 L/min
Q=((90 L/min)/(1000L))*(60 min)(24 hour)
Q= 129.60 m3/day

Δs = 0.135 m

Test Well 3 Recovery

T= 2.3 Q / 4π ΔS
T= 2.3 (129.6 m3/day)/4π (0.42)
T= 192.9 m2/day

Q = 90 L/min
Q=((90 L/min)/(1000L))*(60 min)(24 hour)
Q= 129.60 m3/day

Δs = 0.123 m

Test Well 4

T= 2.3 Q / 4π ΔS
T= 2.3 (129.6 m3/day)/4π (0.75 m)
T= 26.7 m2/day

Q = 90 L/min
Q=((90 L/min)/(1000L))*(60 min)(24 hour)
Q= 129.60 m3/day

Δs = 0.89 m

Test Well 4 Recovery

T= 2.3 Q / 4π ΔS
T= 2.3 (129.6 m3/day)/4π (0.42)
T= 26.4 m2/day

Q = 90 L/min
Q=((90 L/min)/(1000L))*(60 min)(24 hour)
Q= 129.60 m3/day

Δs = 0.9 m

Test Well 5

T= 2.3 Q / 4π ΔS
T= 2.3 (129.6 m3/day)/4π (0.75 m)
T= 474.6 m2/day

Q = 90 L/min
Q=((90 L/min)/(1000L))*(60 min)(24 hour)
Q= 129.60 m3/day

Δs = 0.05 m

Test Well 5 Recovery

T= 2.3 Q / 4π ΔS
T= 2.3 (129.6 m3/day)/4π (0.42)
T= 365.1 m2/day

Q =90 L/min
Q=((90 L/min)/(1000L))*(60 min)(24 hour)
Q= 129.60 m3/day

Δs = 0.065 m

Farvolden Method - Long Term Yeild Calculations

Q20= 0.68 T Ha Sf

Ha= the available water column height (m)
Sf= safety factor
T= Transmissivity (m2/day)

Test Well 1

T= 43.3 m2/day
Q20= 0.68 (43.3 m2/day)(14.51 m)(0.7) Sf= 0.7
pump at 60 ft = 18.29 m btop
Q20= 299.02 m3/day static WL 3.78 m btop
Q20= 299021.5 L/day Ha = 18.29 - 3.78 m
Q20= 207.7 L/min Ha = 14.51 m

Test Well 2

T= 13.9 m2/day
Q20= 0.68 (13.9 m2/day)(23.89 m)(0.7) Sf= 0.7
pump at 80 ft = 24.38 m btop
Q20= 129.8 m3/day static WL 4.762 m btop
Q20= 129827 L/day Ha = 28.6512 - 4.762 m
Q20= 90.2 L/min Ha = 19.62 m

Test Well 3

T= 175.8 m2/day
Q20= 0.68 (175.8 m2/day)(21.0 m)(0.7) Sf= 0.7
pump at 100 ft = 30.48 m btop
Q20= 1757.2 m3/day static WL 9.481 m btop
Q20= 1757213.1 L/day Ha = 33.53 m - 9.481 m
Q20= 1220.3 L/min Ha = 21.00 m

Test Well 4

T= 26.4 m2/day
Q20= 0.68 (26.4 m2/day)(18.97 m)(0.7) Sf= 0.7
pump at 100 ft = 30.48 m btop
Q20= 238.4 m3/day static WL 11.51 m btop
Q20= 238384.6 L/day Ha = 30.48 m - 11.51 m
Q20= 165.5 L/min Ha = 18.97 m

Test Well 5

T= 365.1 m2/day
Q20= 0.68 (365.1 m2/day)(25.13 m)(0.7) Sf= 0.7
pump at 120 ft = 36.58 m btop
Q20= 4366.6 m3/day static WL 11.45 m btop
Q20= 4366587.2 L/day Ha = 30.48 m - 11.45 m
Q20= 3032.4 L/min Ha = 25.13 m

Moell Method - Long Term Yeild Calculations

Q20 = (Q Ha Sf) / (s100 + 5 **Δ**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

Q20= ((30.24 m3/day)(14.51 m)(0.7))/[(0.395 m + 5(0.128 m)]
Q20= 296.8 m3/day
Q20= 296761 L/day
Q20= 206.1 L/min

Q= 30.24 m3/day
Ha = 14.51 m
Sf = 0.7
s100 = 0.395 m
Δs = 0.128 m

Test Well 2

Q20= ((117.79 m3/day)(19.62 m)(0.7))/[(5.52 m + 5(1.55 m)]
Q20= 121.9 m3/day
Q20= 121910.7 L/day
Q20= 84.7 L/min

Q= 117.79 m3/day
Ha = 19.62 m
Sf = 0.7
s100 = 5.52 m
Δs = 1.55 m

Test Well 3

Q20= ((129.6 m3/day)(21.0 m)(0.7))/[(0.47 m + 5(0.135 m)]
Q20= 1663.9 m3/day
Q20= 1663860 L/day
Q20= 1155.5 L/min

Q= 129.60 m3/day
Ha = 21.00 m
Sf = 0.7
s100 = 0.47 m
Δs = 0.135 m

Test Well 4

Q20= ((129.6 m3/day)(18.97 m)(0.7))/[(0.35 m + 5(0.89 m)]
Q20= 358.5 m3/day
Q20= 358533 L/day
Q20= 249.0 L/min

Q= 129.6 m3/day
Ha = 18.97 m
Sf = 0.7
s100 = 0.35
Δs = 0.89

Test Well 5

Q20= ((129.6 m3/day)(25.13 m)(0.7))/[(0.2 m + 5(0.05 m)]
Q20= 5066.2 m3/day
Q20= 5066208 L/day
Q20= 3518.2 L/min

Q= 129.6 m3/day
Ha = 25.13 m
Sf = 0.7
s100 = 0.2
Δs = 0.05

Hydraulic Conductivity

k=T/B
T is the transmissivity (m2/day, the more conservative value is used)
b is the thickness of X m, which corresponds to the interval between the bottom of the casing and the bottom of the well, used as aquifer thickness (m)

TW1			TW2			TW3			TW4			TW5		
Casing length	40 ft		Casing length	42 ft		Casing length	42 ft		Casing length	42 ft		Casing length	42 ft	
Well Depth	81 st		Well Depth	100 ft		Well Depth	120 ft		Well Depth	122 ft		Well Depth	140 ft	
B= 41 ft	12.5	m	B= 58 ft	17.7	m	B= 78 ft	23.8	m	B= 80 ft	24.4	m	B= 98 ft	29.9	m
T= 43.3 m2/day			T = 13.9 m2/day			T=175.8 m2/day			T=26.4 m2/day			T=365.1 m2/day		
T= 0.000501157	m2/s		T= 0.00016088	m2/s		T= 0.002034722	m2/s		T= 0.000305556	m2/s		T= 0.004225694	m2/s	
k= T/B			k= T/B			k= T/B			k= T/B			k= T/B		
k= (0.000501157 m2/s /12.5 m)			k= (0.00012088 m2/s)/(17.7 m)			k= (0.00203472 m/s)/42.67			k= (0.000306 m/s/24.4 m)			k= (0.004226 m/s/29.9 m)		
k= 4.01E-05	m/s		k= 9.10E-06	m/s		k= 8.56E-05	m/s		k= 1.25E-05	m/s		k= 1.41E-04	m/s	

k (avg)= 5.78E-05

Well Interference Calculations

Radial Distance (m)	Number of Wells	Lot #
0.076	1	11
50	1	10
100	1	25
150	1	24
200	0	0
250	2	23,8
300	2	12,7
350	3	22,26,6
400	3	13,14,5
450	4	15,21,27,5
500	4	20,19,28,4
550	4	17,18,29,3
600	3	16,2,30
650	1	1
Total	30	

Note: Adjust radial distances from central well to suite Site. Position theoretical wells at radial distance from central well- one well per lot.

$u = r^2 S / 4 T t$

$s = Q (W(u)) / 4 \pi T$

Q = 450 L/day * 5 persons minimum Q based on Daily Design Flow requirements
Q = 2250 L/day
2.25 m3/day

T	139.08	m2/day	Average Transmissivity value (TW1, TW2, TW3, TW4, TW5)
S	1.00E-04		assumed value based on deep fractured BR aquifer
t	365	days	

	0.076	50	100	150	200	250	300	350	400	450	500	550	600	650
	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9	Case 10	Case 11	Case 12	Case 11	Case 12
u	2.84E-12	1.23E-06	4.92E-06	1.11E-05	1.97E-05	3.08E-05	4.43E-05	6.03E-05	7.88E-05	9.97E-05	1.23E-04	1.49E-04	1.77E-04	2.08E-04
W(u)	26.008	13.030	11.644	10.833	10.258	9.811	9.447	9.139	8.872	8.636	8.425	8.235	8.061	7.901

	Well Radius to Centre of Subdivision (m)	Number of Wells Located at Specified Radius	Predicted Drawdown Caused by Single Well (m)	Drawdown Caused by All Wells at Specified Radial Distance (m)
Case 1	0.076	1	0.033	0.033
Case 2	50	1	0.017	0.017
Case 3	100	1	0.015	0.015
Case 4	150	1	0.014	0.014
Case 5	200	0	0.013	0.000
Case 6	250	2	0.013	0.025
Case 7	300	2	0.012	0.024
Case 8	350	3	0.012	0.035
Case 9	400	3	0.011	0.034
Case 10	450	4	0.011	0.044
Case 11	500	4	0.011	0.043
Case 12	550	4	0.011	0.042
Case 13	600	3	0.010	0.031
Case 14	650	1	0.010	0.010
				0.369

	TW1	TW2	TW3	TW4	TW5
depth of well (m)	24.69	30.48	36.56	37.12	42.67
depth to water level (m)	3.78	4.762	9.481	11.51	11.446
water column height (m)	20.91	25.718	27.079	25.61	31.224

From well records - user input
Calculated by spreadsheet
From modelling data - user input

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

APPENDIX H: LEVEL LOGGER AND BARO LOGGER DATA

McINTOSH PERRY

Serial_number:
1026456
Project ID:
22_0256
Location:
Grizzly_TW5_18Apr23
LEVEL
UNIT: m

	LEVEL LOGGER		BARO LOGGER		
Date	Time	LEVEL	Time	LEVEL	
April 19, 2023	**4:28:56 PM**	**9.3303**	**4:19:29 PM**	**0.6598**	**8.6723**
April 19, 2023	5:28:56 PM	9.3363	5:19:29 PM	0.664	8.6702
April 19, 2023	6:28:56 PM	9.3441	6:19:29 PM	0.6739	8.6654
April 19, 2023	7:28:56 PM	9.3517	7:19:29 PM	0.6863	8.6621
April 19, 2023	8:28:56 PM	9.3535	8:19:29 PM	0.6914	8.6558
April 19, 2023	9:28:56 PM	9.3543	9:19:29 PM	0.6985	8.6521
April 19, 2023	10:28:56 PM	9.3552	10:19:29 PM	0.7031	8.6463
April 19, 2023	11:28:56 PM	9.3491	11:19:29 PM	0.7028	8.6461
April 20, 2023	12:28:56 AM	9.3507	12:19:29 AM	0.7046	8.6402
April 20, 2023	1:28:56 AM	9.3537	1:19:29 AM	0.7135	8.6369
April 20, 2023	2:28:56 AM	9.3519	2:19:29 AM	0.715	8.6362
April 20, 2023	3:28:56 AM	9.352	3:19:29 AM	0.7158	8.6359
April 20, 2023	4:28:56 AM	9.3561	4:19:29 AM	0.7202	8.6279
April 20, 2023	5:28:56 AM	9.3567	5:19:29 AM	0.7288	8.6265
April 20, 2023	6:28:56 AM	9.3546	6:19:29 AM	0.7281	8.6229
April 20, 2023	7:28:56 AM	9.3605	7:19:29 AM	0.7376	8.6163
April 20, 2023	8:28:56 AM	9.3615	8:19:29 AM	0.7452	8.6104
April 20, 2023	9:28:56 AM	9.3544	9:19:29 AM	0.744	8.6016
April 20, 2023	10:28:56 AM	9.3463	10:19:29 AM	0.7447	8.5936
April 20, 2023	11:28:56 AM	9.3312	11:19:29 AM	0.7376	8.5891
April 20, 2023	12:28:56 PM	9.3208	12:19:29 PM	0.7317	8.5888
April 20, 2023	1:28:56 PM	9.3157	1:19:29 PM	0.7269	8.5884
April 20, 2023	2:28:56 PM	9.3103	2:19:29 PM	0.7219	8.5858
April 20, 2023	3:28:56 PM	9.3003	3:19:29 PM	0.7145	8.5843
April 20, 2023	4:28:56 PM	9.2986	4:19:29 PM	0.7143	8.5883
April 20, 2023	5:28:56 PM	9.2983	5:19:29 PM	0.71	8.5843
April 20, 2023	6:28:56 PM	9.2917	6:19:29 PM	0.7074	8.5867
April 20, 2023	7:28:56 PM	9.2852	7:19:29 PM	0.6985	8.5786
April 20, 2023	8:28:56 PM	9.2817	8:19:29 PM	0.7031	8.5772
April 20, 2023	9:28:56 PM	9.2858	9:19:29 PM	0.7086	8.5701
April 20, 2023	10:28:56 PM	9.267	10:19:29 PM	0.6969	8.5651
April 20, 2023	11:28:56 PM	9.2617	11:19:29 PM	0.6966	8.5674
April 21, 2023	12:28:56 AM	9.2569	12:19:29 AM	0.6895	8.5608
April 21, 2023	1:28:56 AM	9.2567	1:19:29 AM	0.6959	8.5463
April 21, 2023	2:28:56 AM	9.2408	2:19:29 AM	0.6945	8.5575
April 21, 2023	3:28:56 AM	9.2413	3:19:29 AM	0.6838	8.5539
April 21, 2023	4:28:56 AM	9.2226	4:19:29 AM	0.6687	8.5517
April 21, 2023	5:28:56 AM	9.2218	5:19:29 AM	0.6701	8.5497
April 21, 2023	6:28:56 AM	9.2138	6:19:29 AM	0.6641	8.544
April 21, 2023	7:28:56 AM	9.2057	7:19:29 AM	0.6617	8.5444
April 21, 2023	8:28:56 AM	9.2008	8:19:29 AM	0.6564	8.5333
April 21, 2023	9:28:56 AM	9.1852	9:19:29 AM	0.6519	8.527
April 21, 2023	10:28:56 AM	9.1737	10:19:29 AM	0.6467	8.5202
April 21, 2023	11:28:56 AM	9.1626	11:19:29 AM	0.6424	8.5142
April 21, 2023	12:28:56 PM	9.1464	12:19:29 PM	0.6322	8.5096
April 21, 2023	1:28:56 PM	9.1376	1:19:29 PM	0.628	8.5087
April 21, 2023	2:28:56 PM	9.1269	2:19:29 PM	0.6182	8.508
April 21, 2023	3:28:56 PM	9.1196	3:19:29 PM	0.6116	8.5099
April 21, 2023	4:28:56 PM	9.1147	4:19:29 PM	0.6048	8.5079
April 21, 2023	5:28:56 PM	9.1095	5:19:29 PM	0.6016	8.5085
April 21, 2023	6:28:56 PM	9.1087	6:19:29 PM	0.6002	8.5063
April 21, 2023	7:28:56 PM	9.1054	7:19:29 PM	0.5991	8.5067
April 21, 2023	8:28:56 PM	9.1113	8:19:29 PM	0.6046	8.4993
April 21, 2023	9:28:56 PM	9.1099	9:19:29 PM	0.6106	8.4974
April 21, 2023	10:28:56 PM	9.1118	10:19:29 PM	0.6144	8.493
April 21, 2023	11:28:56 PM	9.1035	11:19:29 PM	0.6105	8.4932
April 22, 2023	12:28:56 AM	9.1012	12:19:29 AM	0.608	8.4801
April 22, 2023	1:28:56 AM	9.0941	1:19:29 AM	0.614	8.4823
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April 22, 2023	3:28:56 AM	9.0997	3:19:29 AM	0.6114	8.4739
April 22, 2023	4:28:56 AM	9.0804	4:19:29 AM	0.6065	8.4764
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April 22, 2023	10:28:56 AM	9.0197	10:19:29 AM	0.567	8.4503
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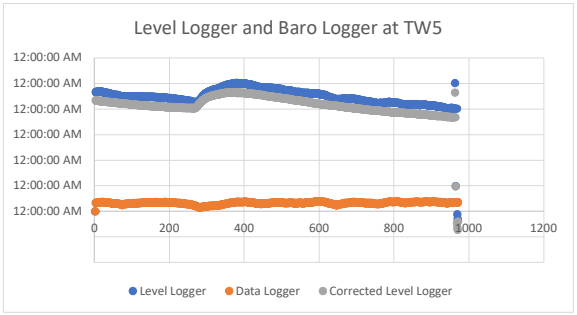
April 22, 2023	12:28:56 PM	8.9922	12:19:29 PM	0.5491	8.4367
April 22, 2023	1:28:56 PM	8.9732	1:19:29 PM	0.5365	8.4364
April 22, 2023	2:28:56 PM	8.9617	2:19:29 PM	0.5253	8.4351
April 22, 2023	3:28:56 PM	8.9591	3:19:29 PM	0.524	8.4332
April 22, 2023	4:28:56 PM	8.9568	4:19:29 PM	0.5236	8.4315
April 22, 2023	5:28:56 PM	8.9559	5:19:29 PM	0.5244	8.4315

8.66 static WL @ TW5



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April 22, 2023	8:28:56 PM	8.9872	8:19:29 PM	0.5607	8.4276
April 22, 2023	9:28:56 PM	8.9991	9:19:29 PM	0.5715	8.4229
April 22, 2023	10:28:56 PM	9.0014	10:19:29 PM	0.5785	8.423
April 22, 2023	11:28:56 PM	9.0011	11:19:29 PM	0.5781	8.4179
April 23, 2023	12:28:56 AM	9.0049	12:19:29 AM	0.587	8.4122
April 23, 2023	1:28:56 AM	9.006	1:19:29 AM	0.5938	8.4114
April 23, 2023	2:28:56 AM	9.0051	2:19:29 AM	0.5937	8.4115
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April 24, 2023	10:28:56 AM	8.9795	10:19:29 AM	0.657	8.3186
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April 25, 2023	9:28:56 AM	8.9696	9:19:29 AM	0.6972	8.2695
April 25, 2023	10:28:56 AM	8.967	10:19:29 AM	0.6975	8.266
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April 25, 2023	4:28:56 PM	8.9496	4:19:29 PM	0.6996	8.2449
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April 26, 2023	8:28:56 PM	8.9026	8:19:29 PM	0.7086	8.1943
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April 28, 2023	9:28:56 AM	8.8326	9:19:29 AM	0.6978	8.1328
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April 30, 2023	7:28:56 PM	8.5148	7:19:29 PM	0.4341	8.0935
April 30, 2023	8:28:56 PM	8.5087	8:19:29 PM	0.4152	8.1132
April 30, 2023	9:28:56 PM	8.5393	9:19:29 PM	0.4261	8.1355
April 30, 2023	10:28:56 PM	8.541	10:19:29 PM	0.4055	8.1687
April 30, 2023	11:28:56 PM	8.5565	11:19:29 PM	0.3878	8.2032
May 1, 2023	12:28:56 AM	8.5769	12:19:29 AM	0.3737	8.2367
May 1, 2023	1:28:56 AM	8.5957	1:19:29 AM	0.359	8.2715
May 1, 2023	2:28:56 AM	8.6189	2:19:29 AM	0.3474	8.3067
May 1, 2023	3:28:56 AM	8.6382	3:19:29 AM	0.3315	8.341
May 1, 2023	4:28:56 AM	8.6628	4:19:29 AM	0.3218	8.3723
May 1, 2023	5:28:56 AM	8.6806	5:19:29 AM	0.3083	8.4071
May 1, 2023	6:28:56 AM	8.7105	6:19:29 AM	0.3034	8.4416
May 1, 2023	7:28:56 AM	8.7412	7:19:29 AM	0.2996	8.4718
May 1, 2023	8:28:56 AM	8.7775	8:19:29 AM	0.3057	8.5038
May 1, 2023	9:28:56 AM	8.8159	9:19:29 AM	0.3121	8.5324
May 1, 2023	10:28:56 AM	8.8567	10:19:29 AM	0.3243	8.5621
May 1, 2023	11:28:56 AM	8.8982	11:19:29 AM	0.3361	8.589
May 1, 2023	12:28:56 PM	8.9385	12:19:29 PM	0.3495	8.6173
May 1, 2023	1:28:56 PM	8.9688	1:19:29 PM	0.3515	8.6465
May 1, 2023	2:28:56 PM	9.0012	2:19:29 PM	0.3547	8.6746
May 1, 2023	3:28:56 PM	9.0327	3:19:29 PM	0.3581	8.7004
May 1, 2023	4:28:56 PM	9.0645	4:19:29 PM	0.3641	8.7254
May 1, 2023	5:28:56 PM	9.0991	5:19:29 PM	0.3737	8.7467
May 1, 2023	6:28:56 PM	9.1288	6:19:29 PM	0.3821	8.7644
May 1, 2023	7:28:56 PM	9.1555	7:19:29 PM	0.3911	8.7852
May 1, 2023	8:28:56 PM	9.1847	8:19:29 PM	0.3995	8.8024
May 1, 2023	9:28:56 PM	9.2091	9:19:29 PM	0.4067	8.8185
May 1, 2023	10:28:56 PM	9.2274	10:19:29 PM	0.4089	8.8379
May 1, 2023	11:28:56 PM	9.2474	11:19:29 PM	0.4095	8.8577
May 2, 2023	12:28:56 AM	9.2677	12:19:29 AM	0.41	8.8766
May 2, 2023	1:28:56 AM	9.2857	1:19:29 AM	0.4091	8.894
May 2, 2023	2:28:56 AM	9.2992	2:19:29 AM	0.4052	8.91
May 2, 2023	3:28:56 AM	9.3171	3:19:29 AM	0.4071	8.9249
May 2, 2023	4:28:56 AM	9.3339	4:19:29 AM	0.409	8.9346
May 2, 2023	5:28:56 AM	9.3469	5:19:29 AM	0.4123	8.9465
May 2, 2023	6:28:56 AM	9.3611	6:19:29 AM	0.4146	8.9583
May 2, 2023	7:28:56 AM	9.3762	7:19:29 AM	0.4179	8.9671
May 2, 2023	8:28:56 AM	9.3875	8:19:29 AM	0.4204	8.9742
May 2, 2023	9:28:56 AM	9.3961	9:19:29 AM	0.4219	8.9835
May 2, 2023	10:28:56 AM	9.4063	10:19:29 AM	0.4228	8.9896
May 2, 2023	11:28:56 AM	9.4144	11:19:29 AM	0.4248	9.0033
May 2, 2023	12:28:56 PM	9.4296	12:19:29 PM	0.4263	9.0151
May 2, 2023	1:28:56 PM	9.4449	1:19:29 PM	0.4298	9.0268
May 2, 2023	2:28:56 PM	9.4571	2:19:29 PM	0.4303	9.0379
May 2, 2023	3:28:56 PM	9.4671	3:19:29 PM	0.4292	9.0484
May 2, 2023	4:28:56 PM	9.482	4:19:29 PM	0.4336	9.0569
May 2, 2023	5:28:56 PM	9.4915	5:19:29 PM	0.4346	9.062
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May 2, 2023	7:28:56 PM	9.5173	7:19:29 PM	0.4483	9.0725
May 2, 2023	8:28:56 PM	9.5275	8:19:29 PM	0.455	9.0779
May 2, 2023	9:28:56 PM	9.5404	9:19:29 PM	0.4625	9.083
May 2, 2023	10:28:56 PM	9.5488	10:19:29 PM	0.4658	9.0905
May 2, 2023	11:28:56 PM	9.554	11:19:29 PM	0.4635	9.0998
May 3, 2023	12:28:56 AM	9.561	12:19:29 AM	0.4612	9.1057
May 3, 2023	1:28:56 AM	9.568	1:19:29 AM	0.4623	9.1132
May 3, 2023	2:28:56 AM	9.5737	2:19:29 AM	0.4605	9.1207
May 3, 2023	3:28:56 AM	9.5778	3:19:29 AM	0.4571	9.1301
May 3, 2023	4:28:56 AM	9.5857	4:19:29 AM	0.4556	9.1347
May 3, 2023	5:28:56 AM	9.5917	5:19:29 AM	0.457	9.1378

May 3, 2023	6:28:56 AM	9.6	6:19:29 AM	0.4622	9.1447
May 3, 2023	7:28:56 AM	9.6121	7:19:29 AM	0.4674	9.1485
May 3, 2023	8:28:56 AM	9.6202	8:19:29 AM	0.4717	9.1497
May 3, 2023	9:28:56 AM	9.627	9:19:29 AM	0.4773	9.1536
May 3, 2023	10:28:56 AM	9.6356	10:19:29 AM	0.482	9.1601
May 3, 2023	11:28:56 AM	9.6497	11:19:29 AM	0.4896	9.1675
May 3, 2023	12:28:56 PM	9.6645	12:19:29 PM	0.497	9.1769
May 3, 2023	1:28:56 PM	9.6775	1:19:29 PM	0.5006	9.1866
May 3, 2023	2:28:56 PM	9.6919	2:19:29 PM	0.5053	9.1957
May 3, 2023	3:28:56 PM	9.7058	3:19:29 PM	0.5101	9.2065
May 3, 2023	4:28:56 PM	9.7232	4:19:29 PM	0.5167	9.2159
May 3, 2023	5:28:56 PM	9.7395	5:19:29 PM	0.5236	9.2217
May 3, 2023	6:28:56 PM	9.7549	6:19:29 PM	0.5332	9.2267
May 3, 2023	7:28:56 PM	9.7688	7:19:29 PM	0.5421	9.2332
May 3, 2023	8:28:56 PM	9.7831	8:19:29 PM	0.5499	9.2364
May 3, 2023	9:28:56 PM	9.793	9:19:29 PM	0.5566	9.2397
May 3, 2023	10:28:56 PM	9.8026	10:19:29 PM	0.5629	9.2454
May 3, 2023	11:28:56 PM	9.8118	11:19:29 PM	0.5664	9.2501
May 4, 2023	12:28:56 AM	9.8203	12:19:29 AM	0.5702	9.2581
May 4, 2023	1:28:56 AM	9.832	1:19:29 AM	0.5739	9.2632
May 4, 2023	2:28:56 AM	9.8409	2:19:29 AM	0.5777	9.2679
May 4, 2023	3:28:56 AM	9.8509	3:19:29 AM	0.583	9.2739
May 4, 2023	4:28:56 AM	9.8622	4:19:29 AM	0.5883	9.2759
May 4, 2023	5:28:56 AM	9.8718	5:19:29 AM	0.5959	9.2767
May 4, 2023	6:28:56 AM	9.8817	6:19:29 AM	0.605	9.2811
May 4, 2023	7:28:56 AM	9.8945	7:19:29 AM	0.6134	9.2797
May 4, 2023	8:28:56 AM	9.9017	8:19:29 AM	0.622	9.2788
May 4, 2023	9:28:56 AM	9.9076	9:19:29 AM	0.6288	9.2773
May 4, 2023	10:28:56 AM	9.9132	10:19:29 AM	0.6359	9.2779
May 4, 2023	11:28:56 AM	9.9199	11:19:29 AM	0.642	9.2769
May 4, 2023	12:28:56 PM	9.9238	12:19:29 PM	0.6469	9.2779
May 4, 2023	1:28:56 PM	9.9282	1:19:29 PM	0.6503	9.2818
May 4, 2023	2:28:56 PM	9.9348	2:19:29 PM	0.653	9.2858
May 4, 2023	3:28:56 PM	9.9431	3:19:29 PM	0.6573	9.2909
May 4, 2023	4:28:56 PM	9.95	4:19:29 PM	0.6591	9.2953
May 4, 2023	5:28:56 PM	9.9607	5:19:29 PM	0.6654	9.2966
May 4, 2023	6:28:56 PM	9.9672	6:19:29 PM	0.6706	9.2988
May 4, 2023	7:28:56 PM	9.9743	7:19:29 PM	0.6755	9.2976
May 4, 2023	8:28:56 PM	9.9796	8:19:29 PM	0.682	9.2965
May 4, 2023	9:28:56 PM	9.9838	9:19:29 PM	0.6873	9.296
May 4, 2023	10:28:56 PM	9.9877	10:19:29 PM	0.6917	9.2964
May 4, 2023	11:28:56 PM	9.9904	11:19:29 PM	0.694	9.2968
May 5, 2023	12:28:56 AM	9.9945	12:19:29 AM	0.6977	9.2982
May 5, 2023	1:28:56 AM	9.9983	1:19:29 AM	0.7001	9.2977
May 5, 2023	2:28:56 AM	10.001	2:19:29 AM	0.7033	9.2989
May 5, 2023	3:28:56 AM	10.0066	3:19:29 AM	0.7077	9.2998
May 5, 2023	4:28:56 AM	10.0101	4:19:29 AM	0.7103	9.3018
May 5, 2023	5:28:56 AM	10.0173	5:19:29 AM	0.7155	9.2981
May 5, 2023	6:28:56 AM	10.0206	6:19:29 AM	0.7225	9.2953
May 5, 2023	7:28:56 AM	10.0267	7:19:29 AM	0.7314	9.2919
May 5, 2023	8:28:56 AM	10.0309	8:19:29 AM	0.739	9.281
May 5, 2023	9:28:56 AM	10.0231	9:19:29 AM	0.7421	9.2805
May 5, 2023	10:28:56 AM	10.026	10:19:29 AM	0.7455	9.2758
May 5, 2023	11:28:56 AM	10.0245	11:19:29 AM	0.7487	9.2724
May 5, 2023	12:28:56 PM	10.0191	12:19:29 PM	0.7467	9.2699
May 5, 2023	1:28:56 PM	10.0155	1:19:29 PM	0.7456	9.2646
May 5, 2023	2:28:56 PM	10.0076	2:19:29 PM	0.743	9.2704
May 5, 2023	3:28:56 PM	10.009	3:19:29 PM	0.7386	9.2748
May 5, 2023	4:28:56 PM	10.01	4:19:29 PM	0.7352	9.2781
May 5, 2023	5:28:56 PM	10.0113	5:19:29 PM	0.7332	9.2787
May 5, 2023	6:28:56 PM	10.0113	6:19:29 PM	0.7326	9.2768
May 5, 2023	7:28:56 PM	10.0108	7:19:29 PM	0.734	9.277
May 5, 2023	8:28:56 PM	10.0133	8:19:29 PM	0.7363	9.2736
May 5, 2023	9:28:56 PM	10.0144	9:19:29 PM	0.7408	9.2708
May 5, 2023	10:28:56 PM	10.0135	10:19:29 PM	0.7427	9.2691
May 5, 2023	11:28:56 PM	10.0112	11:19:29 PM	0.7421	9.2658
May 6, 2023	12:28:56 AM	10.009	12:19:29 AM	0.7432	9.2657
May 6, 2023	1:28:56 AM	10.0073	1:19:29 AM	0.7416	9.2658
May 6, 2023	2:28:56 AM	10.0071	2:19:29 AM	0.7413	9.2653
May 6, 2023	3:28:56 AM	10.0072	3:19:29 AM	0.7419	9.2637
May 6, 2023	4:28:56 AM	10.0082	4:19:29 AM	0.7445	9.2629
May 6, 2023	5:28:56 AM	10.0099	5:19:29 AM	0.747	9.262
May 6, 2023	6:28:56 AM	10.0116	6:19:29 AM	0.7496	9.2567
May 6, 2023	7:28:56 AM	10.0088	7:19:29 AM	0.7521	9.2495
May 6, 2023	8:28:56 AM	10.0031	8:19:29 AM	0.7536	9.2398
May 6, 2023	9:28:56 AM	9.992	9:19:29 AM	0.7522	9.2333
May 6, 2023	10:28:56 AM	9.9809	10:19:29 AM	0.7476	9.2267
May 6, 2023	11:28:56 AM	9.9718	11:19:29 AM	0.7451	9.2216
May 6, 2023	12:28:56 PM	9.9617	12:19:29 PM	0.7401	9.2192
May 6, 2023	1:28:56 PM	9.9539	1:19:29 PM	0.7347	9.2171
May 6, 2023	2:28:56 PM	9.9444	2:19:29 PM	0.7273	9.2163
May 6, 2023	3:28:56 PM	9.9399	3:19:29 PM	0.7236	9.2115
May 6, 2023	4:28:56 PM	9.9279	4:19:29 PM	0.7164	9.2115
May 6, 2023	5:28:56 PM	9.9197	5:19:29 PM	0.7082	9.2158

May 6, 2023	6:28:56 PM	9.92	6:19:29 PM	0.7042	9.2162
May 6, 2023	7:28:56 PM	9.9186	7:19:29 PM	0.7024	9.2149
May 6, 2023	8:28:56 PM	9.9164	8:19:29 PM	0.7015	9.2125
May 6, 2023	9:28:56 PM	9.915	9:19:29 PM	0.7025	9.209
May 6, 2023	10:28:56 PM	9.9077	10:19:29 PM	0.6987	9.2059
May 6, 2023	11:28:56 PM	9.9008	11:19:29 PM	0.6949	9.2019
May 7, 2023	12:28:56 AM	9.8964	12:19:29 AM	0.6945	9.1995
May 7, 2023	1:28:56 AM	9.8902	1:19:29 AM	0.6907	9.1955
May 7, 2023	2:28:56 AM	9.8833	2:19:29 AM	0.6878	9.1962
May 7, 2023	3:28:56 AM	9.8789	3:19:29 AM	0.6827	9.1943
May 7, 2023	4:28:56 AM	9.8729	4:19:29 AM	0.6786	9.1943
May 7, 2023	5:28:56 AM	9.8678	5:19:29 AM	0.6735	9.1915
May 7, 2023	6:28:56 AM	9.8625	6:19:29 AM	0.671	9.187
May 7, 2023	7:28:56 AM	9.855	7:19:29 AM	0.668	9.1798
May 7, 2023	8:28:56 AM	9.8437	8:19:29 AM	0.6639	9.1712
May 7, 2023	9:28:56 AM	9.8312	9:19:29 AM	0.66	9.162
May 7, 2023	10:28:56 AM	9.8196	10:19:29 AM	0.6576	9.1552
May 7, 2023	11:28:56 AM	9.8039	11:19:29 AM	0.6487	9.1481
May 7, 2023	12:28:56 PM	9.7886	12:19:29 PM	0.6405	9.1425
May 7, 2023	1:28:56 PM	9.7733	1:19:29 PM	0.6308	9.1399
May 7, 2023	2:28:56 PM	9.7623	2:19:29 PM	0.6224	9.1358
May 7, 2023	3:28:56 PM	9.7508	3:19:29 PM	0.615	9.1343
May 7, 2023	4:28:56 PM	9.7411	4:19:29 PM	0.6068	9.1341
May 7, 2023	5:28:56 PM	9.7373	5:19:29 PM	0.6032	9.1329
May 7, 2023	6:28:56 PM	9.7333	6:19:29 PM	0.6004	9.1289
May 7, 2023	7:28:56 PM	9.7269	7:19:29 PM	0.598	9.1291
May 7, 2023	8:28:56 PM	9.7257	8:19:29 PM	0.5966	9.1275
May 7, 2023	9:28:56 PM	9.727	9:19:29 PM	0.5995	9.1229
May 7, 2023	10:28:56 PM	9.7224	10:19:29 PM	0.5995	9.1209
May 7, 2023	11:28:56 PM	9.7164	11:19:29 PM	0.5955	9.1178
May 8, 2023	12:28:56 AM	9.7128	12:19:29 AM	0.595	9.1119
May 8, 2023	1:28:56 AM	9.7072	1:19:29 AM	0.5953	9.1118
May 8, 2023	2:28:56 AM	9.7026	2:19:29 AM	0.5908	9.1068
May 8, 2023	3:28:56 AM	9.7016	3:19:29 AM	0.5948	9.1031
May 8, 2023	4:28:56 AM	9.6983	4:19:29 AM	0.5952	9.1013
May 8, 2023	5:28:56 AM	9.6914	5:19:29 AM	0.5901	9.0942
May 8, 2023	6:28:56 AM	9.702	6:19:29 AM	0.6078	9.0882
May 8, 2023	7:28:56 AM	9.7105	7:19:29 AM	0.6223	9.0772
May 8, 2023	8:28:56 AM	9.6979	8:19:29 AM	0.6207	9.0666
May 8, 2023	9:28:56 AM	9.6876	9:19:29 AM	0.621	9.0634
May 8, 2023	10:28:56 AM	9.6902	10:19:29 AM	0.6268	9.0582
May 8, 2023	11:28:56 AM	9.6855	11:19:29 AM	0.6273	9.0488
May 8, 2023	12:28:56 PM	9.6798	12:19:29 PM	0.631	9.0414
May 8, 2023	1:28:56 PM	9.6686	1:19:29 PM	0.6272	9.0396
May 8, 2023	2:28:56 PM	9.662	2:19:29 PM	0.6224	9.0375
May 8, 2023	3:28:56 PM	9.6562	3:19:29 PM	0.6187	9.0347
May 8, 2023	4:28:56 PM	9.6524	4:19:29 PM	0.6177	9.0305
May 8, 2023	5:28:56 PM	9.6505	5:19:29 PM	0.62	9.0306
May 8, 2023	6:28:56 PM	9.6504	6:19:29 PM	0.6198	9.0266
May 8, 2023	7:28:56 PM	9.6486	7:19:29 PM	0.622	9.0272
May 8, 2023	8:28:56 PM	9.6557	8:19:29 PM	0.6285	9.0248
May 8, 2023	9:28:56 PM	9.6606	9:19:29 PM	0.6358	9.0209
May 8, 2023	10:28:56 PM	9.6623	10:19:29 PM	0.6414	9.0186
May 8, 2023	11:28:56 PM	9.6642	11:19:29 PM	0.6456	9.0125
May 9, 2023	12:28:56 AM	9.6634	12:19:29 AM	0.6509	9.009
May 9, 2023	1:28:56 AM	9.6611	1:19:29 AM	0.6521	9.0066
May 9, 2023	2:28:56 AM	9.6572	2:19:29 AM	0.6506	9.0026
May 9, 2023	3:28:56 AM	9.6541	3:19:29 AM	0.6515	8.9992
May 9, 2023	4:28:56 AM	9.6544	4:19:29 AM	0.6552	8.9974
May 9, 2023	5:28:56 AM	9.6553	5:19:29 AM	0.6579	8.9906
May 9, 2023	6:28:56 AM	9.6554	6:19:29 AM	0.6648	8.9863
May 9, 2023	7:28:56 AM	9.658	7:19:29 AM	0.6717	8.9801
May 9, 2023	8:28:56 AM	9.6572	8:19:29 AM	0.6771	8.9726
May 9, 2023	9:28:56 AM	9.6526	9:19:29 AM	0.68	8.9642
May 9, 2023	10:28:56 AM	9.6434	10:19:29 AM	0.6792	8.9573
May 9, 2023	11:28:56 AM	9.6384	11:19:29 AM	0.6811	8.9519
May 9, 2023	12:28:56 PM	9.6336	12:19:29 PM	0.6817	8.9462
May 9, 2023	1:28:56 PM	9.6271	1:19:29 PM	0.6809	8.9398
May 9, 2023	2:28:56 PM	9.6191	2:19:29 PM	0.6793	8.934
May 9, 2023	3:28:56 PM	9.6086	3:19:29 PM	0.6746	8.9291
May 9, 2023	4:28:56 PM	9.6023	4:19:29 PM	0.6732	8.9271
May 9, 2023	5:28:56 PM	9.5988	5:19:29 PM	0.6717	8.9267
May 9, 2023	6:28:56 PM	9.5982	6:19:29 PM	0.6715	8.9226
May 9, 2023	7:28:56 PM	9.5949	7:19:29 PM	0.6723	8.9193
May 9, 2023	8:28:56 PM	9.5941	8:19:29 PM	0.6748	8.9173
May 9, 2023	9:28:56 PM	9.5942	9:19:29 PM	0.6769	8.915
May 9, 2023	10:28:56 PM	9.5929	10:19:29 PM	0.6779	8.9145
May 9, 2023	11:28:56 PM	9.5959	11:19:29 PM	0.6814	8.9105
May 10, 2023	12:28:56 AM	9.5955	12:19:29 AM	0.685	8.9071
May 10, 2023	1:28:56 AM	9.5923	1:19:29 AM	0.6852	8.9053
May 10, 2023	2:28:56 AM	9.5911	2:19:29 AM	0.6858	8.9019
May 10, 2023	3:28:56 AM	9.5883	3:19:29 AM	0.6864	8.8969
May 10, 2023	4:28:56 AM	9.585	4:19:29 AM	0.6881	8.892
May 10, 2023	5:28:56 AM	9.5814	5:19:29 AM	0.6894	8.8846

May 10, 2023	6:28:56 AM	9.5784	6:19:29 AM	0.6938	8.8819
May 10, 2023	7:28:56 AM	9.5828	7:19:29 AM	0.7009	8.8757
May 10, 2023	8:28:56 AM	9.578	8:19:29 AM	0.7023	8.8714
May 10, 2023	9:28:56 AM	9.5742	9:19:29 AM	0.7028	8.8639
May 10, 2023	10:28:56 AM	9.5641	10:19:29 AM	0.7002	8.8571
May 10, 2023	11:28:56 AM	9.5521	11:19:29 AM	0.695	8.8519
May 10, 2023	12:28:56 PM	9.5377	12:19:29 PM	0.6858	8.843
May 10, 2023	1:28:56 PM	9.5206	1:19:29 PM	0.6776	8.8406
May 10, 2023	2:28:56 PM	9.5093	2:19:29 PM	0.6687	8.8318
May 10, 2023	3:28:56 PM	9.4941	3:19:29 PM	0.6623	8.8304
May 10, 2023	4:28:56 PM	9.4844	4:19:29 PM	0.654	8.8247
May 10, 2023	5:28:56 PM	9.4779	5:19:29 PM	0.6532	8.8199
May 10, 2023	6:28:56 PM	9.4732	6:19:29 PM	0.6533	8.8174
May 10, 2023	7:28:56 PM	9.4688	7:19:29 PM	0.6514	8.8142
May 10, 2023	8:28:56 PM	9.4672	8:19:29 PM	0.653	8.8109
May 10, 2023	9:28:56 PM	9.4694	9:19:29 PM	0.6585	8.807
May 10, 2023	10:28:56 PM	9.4695	10:19:29 PM	0.6625	8.8051
May 10, 2023	11:28:56 PM	9.4683	11:19:29 PM	0.6632	8.8046
May 11, 2023	12:28:56 AM	9.4679	12:19:29 AM	0.6633	8.8019
May 11, 2023	1:28:56 AM	9.4649	1:19:29 AM	0.663	8.7985
May 11, 2023	2:28:56 AM	9.4598	2:19:29 AM	0.6613	8.7951
May 11, 2023	3:28:56 AM	9.4564	3:19:29 AM	0.6613	8.7925
May 11, 2023	4:28:56 AM	9.4558	4:19:29 AM	0.6633	8.7866
May 11, 2023	5:28:56 AM	9.4523	5:19:29 AM	0.6657	8.7822
May 11, 2023	6:28:56 AM	9.4544	6:19:29 AM	0.6722	8.7763
May 11, 2023	7:28:56 AM	9.4582	7:19:29 AM	0.6819	8.7714
May 11, 2023	8:28:56 AM	9.4547	8:19:29 AM	0.6833	8.7675
May 11, 2023	9:28:56 AM	9.4444	9:19:29 AM	0.6769	8.76
May 11, 2023	10:28:56 AM	9.4399	10:19:29 AM	0.6799	8.7539
May 11, 2023	11:28:56 AM	9.4346	11:19:29 AM	0.6807	8.7465
May 11, 2023	12:28:56 PM	9.4225	12:19:29 PM	0.676	8.7411
May 11, 2023	1:28:56 PM	9.4105	1:19:29 PM	0.6694	8.7334
May 11, 2023	2:28:56 PM	9.3955	2:19:29 PM	0.6621	8.7287
May 11, 2023	3:28:56 PM	9.3844	3:19:29 PM	0.6557	8.7223
May 11, 2023	4:28:56 PM	9.3771	4:19:29 PM	0.6548	8.7173
May 11, 2023	5:28:56 PM	9.3701	5:19:29 PM	0.6528	8.7107
May 11, 2023	6:28:56 PM	9.3566	6:19:29 PM	0.6459	8.7046
May 11, 2023	7:28:56 PM	9.3488	7:19:29 PM	0.6442	8.7025
May 11, 2023	8:28:56 PM	9.3444	8:19:29 PM	0.6419	8.6985
May 11, 2023	9:28:56 PM	9.3415	9:19:29 PM	0.643	8.6963
May 11, 2023	10:28:56 PM	9.3388	10:19:29 PM	0.6425	8.6961
May 11, 2023	11:28:56 PM	9.3376	11:19:29 PM	0.6415	8.6974
May 12, 2023	12:28:56 AM	9.3367	12:19:29 AM	0.6393	8.6962
May 12, 2023	1:28:56 AM	9.3398	1:19:29 AM	0.6436	8.6906
May 12, 2023	2:28:56 AM	9.3442	2:19:29 AM	0.6536	8.6883
May 12, 2023	3:28:56 AM	9.3322	3:19:29 AM	0.6439	8.6846
May 12, 2023	4:28:56 AM	9.3322	4:19:29 AM	0.6476	8.6794
May 12, 2023	5:28:56 AM	9.3314	5:19:29 AM	0.652	8.6725
May 12, 2023	6:28:56 AM	9.3321	6:19:29 AM	0.6596	8.6672
May 12, 2023	7:28:56 AM	9.3337	7:19:29 AM	0.6665	8.6622
May 12, 2023	8:28:56 AM	9.3296	8:19:29 AM	0.6674	8.6566
May 12, 2023	9:28:56 AM	9.3277	9:19:29 AM	0.6711	8.6504
May 12, 2023	10:28:56 AM	9.3231	10:19:29 AM	0.6727	8.6462
May 12, 2023	11:28:56 AM	9.3157	11:19:29 AM	0.6695	8.6422
May 12, 2023	12:28:56 PM	9.3086	12:19:29 PM	0.6664	8.6371
May 12, 2023	1:28:56 PM	9.3004	1:19:29 PM	0.6633	8.6332
May 12, 2023	2:28:56 PM	9.2909	2:19:29 PM	0.6577	8.627
May 12, 2023	3:28:56 PM	9.2804	3:19:29 PM	0.6534	8.6223
May 12, 2023	4:28:56 PM	9.2709	4:19:29 PM	0.6486	8.6175
May 12, 2023	5:28:56 PM	9.2645	5:19:29 PM	0.647	8.6122
May 12, 2023	6:28:56 PM	9.2594	6:19:29 PM	0.6472	8.6059
May 12, 2023	7:28:56 PM	9.2533	7:19:29 PM	0.6474	8.6034
May 12, 2023	8:28:56 PM	9.2526	8:19:29 PM	0.6492	8.5997
May 12, 2023	9:28:56 PM	9.2549	9:19:29 PM	0.6552	8.5938
May 12, 2023	10:28:56 PM	9.2562	10:19:29 PM	0.6624	8.5929
May 12, 2023	11:28:56 PM	9.2566	11:19:29 PM	0.6637	8.5921
May 13, 2023	12:28:56 AM	9.2624	12:19:29 AM	0.6703	8.588
May 13, 2023	1:28:56 AM	9.265	1:19:29 AM	0.677	8.5844
May 13, 2023	2:28:56 AM	9.2683	2:19:29 AM	0.6839	8.5802
May 13, 2023	3:28:56 AM	9.2662	3:19:29 AM	0.686	8.5784
May 13, 2023	4:28:56 AM	9.2701	4:19:29 AM	0.6917	8.5748
May 13, 2023	5:28:56 AM	9.2693	5:19:29 AM	0.6945	8.5687
May 13, 2023	6:28:56 AM	9.2708	6:19:29 AM	0.7021	8.5597
May 13, 2023	7:28:56 AM	9.2667	7:19:29 AM	0.707	8.5525
May 13, 2023	8:28:56 AM	9.257	8:19:29 AM	0.7045	8.546
May 13, 2023	9:28:56 AM	9.2505	9:19:29 AM	0.7045	8.5411
May 13, 2023	10:28:56 AM	9.2422	10:19:29 AM	0.7011	8.5348
May 13, 2023	11:28:56 AM	9.2371	11:19:29 AM	0.7023	8.5308
May 13, 2023	12:28:56 PM	9.2305	12:19:29 PM	0.6997	8.521
May 13, 2023	1:28:56 PM	9.2183	1:19:29 PM	0.6973	8.5138
May 13, 2023	2:28:56 PM	9.2112	2:19:29 PM	0.6974	8.5113
May 13, 2023	3:28:56 PM	9.212	3:19:29 PM	0.7007	8.5084
May 13, 2023	4:28:56 PM	9.209	4:19:29 PM	0.7006	8.502
May 13, 2023	5:28:56 PM	9.207	5:19:29 PM	0.705	8.4984

May 13, 2023	6:28:56 PM	9.2077	6:19:29 PM	0.7093	8.4899
May 13, 2023	7:28:56 PM	9.206	7:19:29 PM	0.7161	8.4842
May 13, 2023	8:28:56 PM	9.2068	8:19:29 PM	0.7226	8.4797
May 13, 2023	9:28:56 PM	9.213	9:19:29 PM	0.7333	8.4745
May 13, 2023	10:28:56 PM	9.2174	10:19:29 PM	0.7429	8.4735
May 13, 2023	11:28:56 PM	9.2181	11:19:29 PM	0.7446	8.4724
May 14, 2023	12:28:56 AM	9.2199	12:19:29 AM	0.7475	8.4713
May 14, 2023	1:28:56 AM	9.2234	1:19:29 AM	0.7521	8.4728
May 14, 2023	2:28:56 AM	9.2255	2:19:29 AM	0.7527	8.4678
May 14, 2023	3:28:56 AM	9.2269	3:19:29 AM	0.7591	8.4668
May 14, 2023	4:28:56 AM	9.2281	4:19:29 AM	0.7613	8.4624
May 14, 2023	5:28:56 AM	9.2305	5:19:29 AM	0.7681	8.4575
May 14, 2023	6:28:56 AM	9.2322	6:19:29 AM	0.7747	8.4468
May 14, 2023	7:28:56 AM	9.2281	7:19:29 AM	0.7813	8.4371
May 14, 2023	8:28:56 AM	9.2201	8:19:29 AM	0.783	8.427
May 14, 2023	9:28:56 AM	9.212	9:19:29 AM	0.785	8.4233
May 14, 2023	10:28:56 AM	9.2057	10:19:29 AM	0.7824	8.4202
May 14, 2023	11:28:56 AM	9.1993	11:19:29 AM	0.7791	8.4178
May 14, 2023	12:28:56 PM	9.1955	12:19:29 PM	0.7777	8.4132
May 14, 2023	1:28:56 PM	9.1853	1:19:29 PM	0.7721	8.4134
May 14, 2023	2:28:56 PM	9.1795	2:19:29 PM	0.7661	8.406
May 14, 2023	3:28:56 PM	9.1714	3:19:29 PM	0.7654	8.405
May 14, 2023	4:28:56 PM	9.165	4:19:29 PM	0.76	8.3941
May 14, 2023	5:28:56 PM	9.1508	5:19:29 PM	0.7567	8.3844
May 14, 2023	6:28:56 PM	9.14	6:19:29 PM	0.7556	8.3751
May 14, 2023	7:28:56 PM	9.1318	7:19:29 PM	0.7567	8.3699
May 14, 2023	8:28:56 PM	9.1294	8:19:29 PM	0.7595	8.3682
May 14, 2023	9:28:56 PM	9.1277	9:19:29 PM	0.7595	8.3667
May 14, 2023	10:28:56 PM	9.1292	10:19:29 PM	0.7625	8.3676
May 14, 2023	11:28:56 PM	9.1282	11:19:29 PM	0.7606	8.3683
May 15, 2023	12:28:56 AM	9.1231	12:19:29 AM	0.7548	8.3675
May 15, 2023	1:28:56 AM	9.1199	1:19:29 AM	0.7524	8.3688
May 15, 2023	2:28:56 AM	9.1157	2:19:29 AM	0.7469	8.367
May 15, 2023	3:28:56 AM	9.1105	3:19:29 AM	0.7435	8.3672
May 15, 2023	4:28:56 AM	9.1063	4:19:29 AM	0.7391	8.3633
May 15, 2023	5:28:56 AM	9.0997	5:19:29 AM	0.7364	8.3566
May 15, 2023	6:28:56 AM	9.0894	6:19:29 AM	0.7328	8.3498
May 15, 2023	7:28:56 AM	9.0809	7:19:29 AM	0.7311	8.3415
May 15, 2023	8:28:56 AM	9.0676	8:19:29 AM	0.7261	8.3369
May 15, 2023	9:28:56 AM	9.0551	9:19:29 AM	0.7182	8.3314
May 15, 2023	10:28:56 AM	9.0374	10:19:29 AM	0.706	8.33
May 15, 2023	11:28:56 AM	9.0239	11:19:29 AM	0.6939	8.3293
May 15, 2023	12:28:56 PM	9.0076	12:19:29 PM	0.6783	8.3296
May 15, 2023	1:28:56 PM	8.9922	1:19:29 PM	0.6626	8.3269
May 15, 2023	2:28:56 PM	8.9785	2:19:29 PM	0.6516	8.3271
May 15, 2023	3:28:56 PM	8.962	3:19:29 PM	0.6349	8.3193
May 15, 2023	4:28:56 PM	8.9432	4:19:29 PM	0.6239	8.319
May 15, 2023	5:28:56 PM	8.9325	5:19:29 PM	0.6135	8.3127
May 15, 2023	6:28:56 PM	8.9217	6:19:29 PM	0.609	8.302
May 15, 2023	7:28:56 PM	8.912	7:19:29 PM	0.61	8.3012
May 15, 2023	8:28:56 PM	8.9067	8:19:29 PM	0.6055	8.2975
May 15, 2023	9:28:56 PM	8.9021	9:19:29 PM	0.6046	8.2934
May 15, 2023	10:28:56 PM	8.8967	10:19:29 PM	0.6033	8.2906
May 15, 2023	11:28:56 PM	8.8911	11:19:29 PM	0.6005	8.2918
May 16, 2023	12:28:56 AM	8.8832	12:19:29 AM	0.5914	8.2926
May 16, 2023	1:28:56 AM	8.8755	1:19:29 AM	0.5829	8.2933
May 16, 2023	2:28:56 AM	8.8671	2:19:29 AM	0.5738	8.2905
May 16, 2023	3:28:56 AM	8.8546	3:19:29 AM	0.5641	8.2888
May 16, 2023	4:28:56 AM	8.8464	4:19:29 AM	0.5576	8.2871
May 16, 2023	5:28:56 AM	8.8369	5:19:29 AM	0.5498	8.2806
May 16, 2023	6:28:56 AM	8.8247	6:19:29 AM	0.5441	8.2764
May 16, 2023	7:28:56 AM	8.8153	7:19:29 AM	0.5389	8.27
May 16, 2023	8:28:56 AM	8.8031	8:19:29 AM	0.5331	8.2636
May 16, 2023	9:28:56 AM	8.7837	9:19:29 AM	0.5201	8.2605
May 16, 2023	10:28:56 AM	8.77	10:19:29 AM	0.5095	8.2559
May 16, 2023	11:28:56 AM	8.7545	11:19:29 AM	0.4986	8.2543
May 16, 2023	12:28:56 PM	8.742	12:19:29 PM	0.4877	8.2495
May 16, 2023	1:28:56 PM	8.7301	1:19:29 PM	0.4806	8.2501
May 16, 2023	2:28:56 PM	8.7518	2:19:29 PM	0.5017	8.2408
May 16, 2023	3:28:56 PM	8.759	3:19:29 PM	0.5182	8.2427
May 16, 2023	4:28:56 PM	8.7701	4:19:29 PM	0.5274	8.2384
May 16, 2023	5:28:56 PM	8.7739	5:19:29 PM	0.5355	8.2338
May 16, 2023	6:28:56 PM	8.7772	6:19:29 PM	0.5434	8.225
May 16, 2023	7:28:56 PM	8.7753	7:19:29 PM	0.5503	8.2215
May 16, 2023	8:28:56 PM	8.778	8:19:29 PM	0.5565	8.2146
May 16, 2023	9:28:56 PM	8.7786	9:19:29 PM	0.564	8.2106
May 16, 2023	10:28:56 PM	8.7821	10:19:29 PM	0.5715	8.2076
May 16, 2023	11:28:56 PM	8.7841	11:19:29 PM	0.5765	8.2066
May 17, 2023	12:28:56 AM	8.7871	12:19:29 AM	0.5805	8.2047
May 17, 2023	1:28:56 AM	8.7911	1:19:29 AM	0.5864	8.2039
May 17, 2023	2:28:56 AM	8.7943	2:19:29 AM	0.5904	8.2015
May 17, 2023	3:28:56 AM	8.7964	3:19:29 AM	0.5949	8.1996
May 17, 2023	4:28:56 AM	8.8008	4:19:29 AM	0.6012	8.195
May 17, 2023	5:28:56 AM	8.8059	5:19:29 AM	0.6109	8.1883

May 17, 2023	6:28:56 AM	8.806	6:19:29 AM	0.6177	8.1809
May 17, 2023	7:28:56 AM	8.8092	7:19:29 AM	0.6283	8.173
May 17, 2023	8:28:56 AM	8.8109	8:19:29 AM	0.6379	8.1614
May 17, 2023	9:28:56 AM	8.8071	9:19:29 AM	0.6457	8.1546
May 17, 2023	10:28:56 AM	8.8061	10:19:29 AM	0.6515	8.1495
May 17, 2023	11:28:56 AM	8.8056	11:19:29 AM	0.6561	8.1462
May 17, 2023	12:28:56 PM	8.8046	12:19:29 PM	0.6584	8.1419
May 17, 2023	1:28:56 PM	8.8019	1:19:29 PM	0.66	8.138
May 17, 2023	2:28:56 PM	8.7965	2:19:29 PM	0.6585	8.1349
May 17, 2023	3:28:56 PM	8.7956	3:19:29 PM	0.6607	8.1318
May 17, 2023	4:28:56 PM	8.7916	4:19:29 PM	0.6598	8.1344
May 17, 2023	5:28:56 PM	8.795	5:19:29 PM	0.6606	8.1321
May 17, 2023	6:28:56 PM	8.7949	6:19:29 PM	0.6628	8.1277
May 17, 2023	7:28:56 PM	8.794	7:19:29 PM	0.6663	8.1233
May 17, 2023	8:28:56 PM	8.796	8:19:29 PM	0.6727	8.1195
May 17, 2023	9:28:56 PM	8.801	9:19:29 PM	0.6815	8.1138
May 17, 2023	10:28:56 PM	8.8025	10:19:29 PM	0.6887	8.1105
May 17, 2023	11:28:56 PM	8.8013	11:19:29 PM	0.6908	8.1111
May 18, 2023	12:28:56 AM	8.8055	12:19:29 AM	0.6944	8.108
May 18, 2023	1:28:56 AM	8.8072	1:19:29 AM	0.6992	8.1062
May 18, 2023	2:28:56 AM	8.8098	2:19:29 AM	0.7036	8.1049
May 18, 2023	3:28:56 AM	8.8121	3:19:29 AM	0.7072	8.102
May 18, 2023	4:28:56 AM	8.8148	4:19:29 AM	0.7128	8.0989
May 18, 2023	5:28:56 AM	8.8149	5:19:29 AM	0.716	8.0898
May 18, 2023	6:28:56 AM	8.8144	6:19:29 AM	0.7246	8.0877
May 18, 2023	7:28:56 AM	8.8194	7:19:29 AM	0.7317	8.0749
May 18, 2023	8:28:56 AM	8.814	8:19:29 AM	0.7391	8.0698
May 18, 2023	9:28:56 AM	8.8122	9:19:29 AM	0.7424	8.0635
May 18, 2023	10:28:56 AM	8.807	10:19:29 AM	0.7435	8.0585
May 18, 2023	11:28:56 AM	8.8007	11:19:29 AM	0.7422	8.0533
May 18, 2023	12:28:56 PM	8.7909	12:19:29 PM	0.7376	8.0512
May 18, 2023	1:28:56 PM	8.7846	1:19:29 PM	0.7334	8.0506
May 18, 2023	2:28:56 PM	8.7777	2:19:29 PM	0.7271	8.0509
May 18, 2023	3:28:56 PM	8.7724	3:19:29 PM	0.7215	8.0514
May 18, 2023	4:28:56 PM	8.7683	4:19:29 PM	0.7169	8.052
May 18, 2023	5:28:56 PM	8.7643	5:19:29 PM	0.7123	8.0496
May 18, 2023	6:28:56 PM	8.7623	6:19:29 PM	0.7127	8.0463
May 18, 2023	7:28:56 PM	8.7584	7:19:29 PM	0.7121	8.0407
May 18, 2023	8:28:56 PM	8.7505	8:19:29 PM	0.7098	8.0361
May 18, 2023	9:28:56 PM	8.7468	9:19:29 PM	0.7107	8.0324
May 18, 2023	10:28:56 PM	8.7453	10:19:29 PM	0.7129	8.0289
May 18, 2023	11:28:56 PM	8.7384	11:19:29 PM	0.7095	8.0272
May 19, 2023	12:28:56 AM	8.7322	12:19:29 AM	0.705	8.0264
May 19, 2023	1:28:56 AM	8.7246	1:19:29 AM	0.6982	8.0224
May 19, 2023	2:28:56 AM	8.7151	2:19:29 AM	0.6927	8.0235
May 19, 2023	3:28:56 AM	8.7071	3:19:29 AM	0.6836	8.0234
May 19, 2023	4:28:56 AM	8.7037	4:19:29 AM	0.6803	8.0215
May 19, 2023	5:28:56 AM	8.701	5:19:29 AM	0.6795	8.0118
May 19, 2023	6:28:56 AM	8.6951	6:19:29 AM	0.6833	8.0082
May 19, 2023	7:28:56 AM	8.6934	7:19:29 AM	0.6852	7.9999
May 19, 2023	8:28:56 AM	8.6841	8:19:29 AM	0.6842	7.9938
May 19, 2023	9:28:56 AM	8.6772	9:19:29 AM	0.6834	7.9886
May 19, 2023	10:28:56 AM	8.6698	10:19:29 AM	0.6812	7.981
May 19, 2023	11:28:56 AM	8.6585	11:19:29 AM	0.6775	7.9753
May 19, 2023	12:28:56 PM	8.647	12:19:29 PM	0.6717	7.9729
May 19, 2023	1:28:56 PM	8.6395	1:19:29 PM	0.6666	7.969
May 19, 2023	2:28:56 PM	8.6301	2:19:29 PM	0.6611	7.9685
May 19, 2023	3:28:56 PM	8.6262	3:19:29 PM	0.6577	7.9674
May 19, 2023	4:28:56 PM	8.6216	4:19:29 PM	0.6542	7.9698
May 19, 2023	5:28:56 PM	8.6196	5:19:29 PM	0.6498	7.9657
May 19, 2023	6:28:56 PM	8.6129	6:19:29 PM	0.6472	7.9632
May 19, 2023	7:28:56 PM	8.6141	7:19:29 PM	0.6509	7.9607
May 19, 2023	8:28:56 PM	8.6122	8:19:29 PM	0.6515	7.9581
May 19, 2023	9:28:56 PM	8.6141	9:19:29 PM	0.656	7.9539
May 19, 2023	10:28:56 PM	8.6114	10:19:29 PM	0.6575	7.9493
May 19, 2023	11:28:56 PM	8.6067	11:19:29 PM	0.6574	7.9432
May 20, 2023	12:28:56 AM	8.6012	12:19:29 AM	0.658	7.9416
May 20, 2023	1:28:56 AM	8.5961	1:19:29 AM	0.6545	7.9389
May 20, 2023	2:28:56 AM	8.5915	2:19:29 AM	0.6526	7.9391
May 20, 2023	3:28:56 AM	8.5866	3:19:29 AM	0.6475	7.9363
May 20, 2023	4:28:56 AM	8.5841	4:19:29 AM	0.6478	7.9345
May 20, 2023	5:28:56 AM	8.5801	5:19:29 AM	0.6456	7.9322
May 20, 2023	6:28:56 AM	8.5778	6:19:29 AM	0.6456	7.928
May 20, 2023	7:28:56 AM	8.5729	7:19:29 AM	0.6449	7.9206
May 20, 2023	8:28:56 AM	8.5636	8:19:29 AM	0.643	7.9127
May 20, 2023	9:28:56 AM	8.5544	9:19:29 AM	0.6417	7.9086
May 20, 2023	10:28:56 AM	8.5486	10:19:29 AM	0.64	7.9027
May 20, 2023	11:28:56 AM	8.543	11:19:29 AM	0.6403	7.9024
May 20, 2023	12:28:56 PM	8.5343	12:19:29 PM	0.6319	7.9002
May 20, 2023	1:28:56 PM	8.5247	1:19:29 PM	0.6245	7.8976
May 20, 2023	2:28:56 PM	8.5196	2:19:29 PM	0.622	7.8965
May 20, 2023	3:28:56 PM	8.515	3:19:29 PM	0.6185	7.8992
May 20, 2023	4:28:56 PM	8.5133	4:19:29 PM	0.6141	7.9019
May 20, 2023	5:28:56 PM	8.5074	5:19:29 PM	0.6055	7.9026

May 20, 2023	6:28:56 PM	8.5026	6:19:29 PM	0.6	7.9056
May 20, 2023	7:28:56 PM	8.5007	7:19:29 PM	0.5951	7.9005
May 20, 2023	8:28:56 PM	8.4967	8:19:29 PM	0.5962	7.8975
May 20, 2023	9:28:56 PM	8.4897	9:19:29 PM	0.5922	7.8999
May 20, 2023	10:28:56 PM	8.4848	10:19:29 PM	0.5849	7.8958
May 20, 2023	11:28:56 PM	8.4796	11:19:29 PM	0.5838	7.8959
May 21, 2023	12:28:56 AM	8.4778	12:19:29 AM	0.5819	7.8929
May 21, 2023	1:28:56 AM	8.4757	1:19:29 AM	0.5828	7.8897
May 21, 2023	2:28:56 AM	8.4757	2:19:29 AM	0.586	7.8882
May 21, 2023	3:28:56 AM	8.4674	3:19:29 AM	0.5792	7.8875
May 21, 2023	4:28:56 AM	8.4679	4:19:29 AM	0.5804	7.8871
May 21, 2023	5:28:56 AM	8.4692	5:19:29 AM	0.5821	7.8883
May 21, 2023	6:28:56 AM	8.4783	6:19:29 AM	0.59	7.882
May 21, 2023	7:28:56 AM	8.4839	7:19:29 AM	0.6019	7.8742
May 21, 2023	8:28:56 AM	8.4834	8:19:29 AM	0.6092	7.8669
May 21, 2023	9:28:56 AM	8.4837	9:19:29 AM	0.6168	7.8583
May 21, 2023	10:28:56 AM	8.4858	10:19:29 AM	0.6275	7.853
May 21, 2023	11:28:56 AM	8.4831	11:19:29 AM	0.6301	7.843
May 21, 2023	12:28:56 PM	8.4802	12:19:29 PM	0.6372	7.8382
May 21, 2023	1:28:56 PM	8.4742	1:19:29 PM	0.636	7.836
May 21, 2023	2:28:56 PM	8.4728	2:19:29 PM	0.6368	7.8343
May 21, 2023	3:28:56 PM	8.4739	3:19:29 PM	0.6396	7.8321
May 21, 2023	4:28:56 PM	8.4733	4:19:29 PM	0.6412	7.8309
May 21, 2023	5:28:56 PM	8.4811	5:19:29 PM	0.6502	7.8275
May 21, 2023	6:28:56 PM	8.4836	6:19:29 PM	0.6561	7.8281
May 21, 2023	7:28:56 PM	8.4929	7:19:29 PM	0.6648	7.8248
May 21, 2023	8:28:56 PM	8.4996	8:19:29 PM	0.6748	7.8243
May 21, 2023	9:28:56 PM	8.5103	9:19:29 PM	0.686	7.8201
May 21, 2023	10:28:56 PM	8.5178	10:19:29 PM	0.6977	7.8199
May 21, 2023	11:28:56 PM	8.5231	11:19:29 PM	0.7032	7.8171
May 22, 2023	12:28:56 AM	8.5256	12:19:29 AM	0.7085	7.8157
May 22, 2023	1:28:56 AM	8.5312	1:19:29 AM	0.7155	7.8136
May 22, 2023	2:28:56 AM	8.5335	2:19:29 AM	0.7199	7.8125
May 22, 2023	3:28:56 AM	8.5376	3:19:29 AM	0.7251	7.8108
May 22, 2023	4:28:56 AM	8.5403	4:19:29 AM	0.7295	7.8108
May 22, 2023	5:28:56 AM	8.5468	5:19:29 AM	0.736	7.8084
May 22, 2023	6:28:56 AM	8.5519	6:19:29 AM	0.7435	7.8035
May 22, 2023	7:28:56 AM	8.5569	7:19:29 AM	0.7534	7.7993
May 22, 2023	8:28:56 AM	8.5581	8:19:29 AM	0.7588	7.7918
May 22, 2023	9:28:56 AM	8.5529	9:19:29 AM	0.7611	7.7863
May 22, 2023	10:28:56 AM	8.548	10:19:29 AM	0.7617	7.7799
May 22, 2023	11:28:56 AM	8.5415	11:19:29 AM	0.7616	7.7738
May 22, 2023	12:28:56 PM	8.5331	12:19:29 PM	0.7593	7.7679
May 22, 2023	1:28:56 PM	8.5245	1:19:29 PM	0.7566	7.7637
May 22, 2023	2:28:56 PM	8.5165	2:19:29 PM	0.7528	7.7593
May 22, 2023	3:28:56 PM	8.5079	3:19:29 PM	0.7486	7.7505
May 22, 2023	4:28:56 PM	8.4944	4:19:29 PM	0.7439	7.7409
May 22, 2023	5:28:56 PM	8.4824	5:19:29 PM	0.7415	7.749
May 22, 2023	6:28:56 PM	8.4904	6:19:29 PM	0.7414	7.7506
May 22, 2023	7:28:56 PM	8.4936	7:19:29 PM	0.743	7.7487
May 22, 2023	8:28:56 PM	8.4929	8:19:29 PM	0.7442	7.7469
May 22, 2023	9:28:56 PM	8.4959	9:19:29 PM	0.749	7.7461
May 22, 2023	10:28:56 PM	8.498	10:19:29 PM	0.7519	7.7453
May 22, 2023	11:28:56 PM	8.4953	11:19:29 PM	0.75	7.7467
May 23, 2023	12:28:56 AM	8.4953	12:19:29 AM	0.7486	7.7447
May 23, 2023	1:28:56 AM	8.4909	1:19:29 AM	0.7462	7.7434
May 23, 2023	2:28:56 AM	8.4901	2:19:29 AM	0.7467	7.7445
May 23, 2023	3:28:56 AM	8.4916	3:19:29 AM	0.7471	7.7432
May 23, 2023	4:28:56 AM	8.491	4:19:29 AM	0.7478	7.7424
May 23, 2023	5:28:56 AM	8.4923	5:19:29 AM	0.7499	7.7372
May 23, 2023	6:28:56 AM	8.4881	6:19:29 AM	0.7509	7.7344
May 23, 2023	7:28:56 AM	8.4883	7:19:29 AM	0.7539	7.7292
May 23, 2023	8:28:56 AM	8.4847	8:19:29 AM	0.7555	7.7247
May 23, 2023	9:28:56 AM	8.4789	9:19:29 AM	0.7542	7.7221
May 23, 2023	10:28:56 AM	8.4729	10:19:29 AM	0.7508	7.7168
May 23, 2023	11:28:56 AM	8.4654	11:19:29 AM	0.7486	7.7129
May 23, 2023	12:28:56 PM	8.4528	12:19:29 PM	0.7399	7.7088
May 23, 2023	1:28:56 PM	8.4404	1:19:29 PM	0.7316	7.7061
May 23, 2023	2:28:56 PM	8.4287	2:19:29 PM	0.7226	7.7042
May 23, 2023	3:28:56 PM	8.4192	3:19:29 PM	0.715	7.7046
May 23, 2023	4:28:56 PM	8.4113	4:19:29 PM	0.7067	7.7031
May 23, 2023	5:28:56 PM	8.4016	5:19:29 PM	0.6985	7.7014
May 23, 2023	6:28:56 PM	8.394	6:19:29 PM	0.6926	7.7018
May 23, 2023	7:28:56 PM	8.3878	7:19:29 PM	0.686	7.6995
May 23, 2023	8:28:56 PM	8.3823	8:19:29 PM	0.6828	7.6963
May 23, 2023	9:28:56 PM	8.3764	9:19:29 PM	0.6801	7.6982
May 23, 2023	10:28:56 PM	8.3762	10:19:29 PM	0.678	7.698
May 23, 2023	11:28:56 PM	8.372	11:19:29 PM	0.674	7.6991
May 24, 2023	12:28:56 AM	8.3686	12:19:29 AM	0.6695	7.6945
May 24, 2023	1:28:56 AM	8.3583	1:19:29 AM	0.6638	7.6931
May 24, 2023	2:28:56 AM	8.3536	2:19:29 AM	0.6605	7.695
May 24, 2023	3:28:56 AM	8.3555	3:19:29 AM	0.6605	7.6927
May 24, 2023	4:28:56 AM	8.3562	4:19:29 AM	0.6635	7.6902
May 24, 2023	5:28:56 AM	8.354	5:19:29 AM	0.6638	7.6861

May 24, 2023	6:28:56 AM	8.3495	6:19:29 AM	0.6634	7.6853
May 24, 2023	7:28:56 AM	8.3585	7:19:29 AM	0.6732	7.6828
May 24, 2023	8:28:56 AM	8.3633	8:19:29 AM	0.6805	7.6747
May 24, 2023	9:28:56 AM	8.3603	9:19:29 AM	0.6856	7.6777
May 24, 2023	10:28:56 AM	8.3703	10:19:29 AM	0.6926	7.6745
May 24, 2023	11:28:56 AM	8.3773	11:19:29 AM	0.7028	7.6682
May 24, 2023	12:28:56 PM	8.3761	12:19:29 PM	0.7079	7.6638
May 24, 2023	1:28:56 PM	8.3732	1:19:29 PM	0.7094	7.6614
May 24, 2023	2:28:56 PM	8.3708	2:19:29 PM	0.7094	7.6565
May 24, 2023	3:28:56 PM	8.3673	3:19:29 PM	0.7108	7.6534
May 24, 2023	4:28:56 PM	8.3681	4:19:29 PM	0.7147	7.6527
May 24, 2023	5:28:56 PM	8.3675	5:19:29 PM	0.7148	7.6515
May 24, 2023	6:28:56 PM	8.3706	6:19:29 PM	0.7191	7.649
May 24, 2023	7:28:56 PM	8.375	7:19:29 PM	0.726	7.6485
May 24, 2023	8:28:56 PM	8.3807	8:19:29 PM	0.7322	7.6474
May 24, 2023	9:28:56 PM	8.3831	9:19:29 PM	0.7357	7.6478
May 24, 2023	10:28:56 PM	8.3856	10:19:29 PM	0.7378	7.6471
May 24, 2023	11:28:56 PM	8.3866	11:19:29 PM	0.7395	7.6454
May 25, 2023	12:28:56 AM	8.3883	12:19:29 AM	0.7429	7.6458
May 25, 2023	1:28:56 AM	8.3877	1:19:29 AM	0.7419	7.6462
May 25, 2023	2:28:56 AM	8.3881	2:19:29 AM	0.7419	7.6437
May 25, 2023	3:28:56 AM	8.3856	3:19:29 AM	0.7419	7.6418
May 25, 2023	4:28:56 AM	8.386	4:19:29 AM	0.7442	7.6408
May 25, 2023	5:28:56 AM	8.3868	5:19:29 AM	0.746	7.6345
May 25, 2023	6:28:56 AM	8.3847	6:19:29 AM	0.7502	7.6311
May 25, 2023	7:28:56 AM	8.385	7:19:29 AM	0.7539	7.6297
May 25, 2023	8:28:56 AM	8.3865	8:19:29 AM	0.7568	7.6259
May 25, 2023	9:28:56 AM	8.3858	9:19:29 AM	0.7599	7.6232
May 25, 2023	10:28:56 AM	8.381	10:19:29 AM	0.7578	7.6187
May 25, 2023	11:28:56 AM	8.3731	11:19:29 AM	0.7544	7.6147
May 25, 2023	12:28:56 PM	8.3658	12:19:29 PM	0.7511	7.6106
May 25, 2023	1:28:56 PM	8.3572	1:19:29 PM	0.7466	7.6069
May 25, 2023	2:28:56 PM	8.3518	2:19:29 PM	0.7449	7.6033
May 25, 2023	3:28:56 PM	8.3425	3:19:29 PM	0.7392	7.5961
May 25, 2023	4:28:56 PM	8.3315	4:19:29 PM	0.7354	7.5949
May 25, 2023	5:28:56 PM	8.3238	5:19:29 PM	0.7289	7.5945
May 25, 2023	6:28:56 PM	8.3185	6:19:29 PM	0.724	7.5946
May 25, 2023	7:28:56 PM	8.3194	7:19:29 PM	0.7248	7.5947
May 25, 2023	8:28:56 PM	8.3254	8:19:29 PM	0.7307	7.5943
May 25, 2023	9:28:56 PM	8.3294	9:19:29 PM	0.7351	7.5928
May 25, 2023	10:28:56 PM	8.3311	10:19:29 PM	0.7383	7.5922
May 25, 2023	11:28:56 PM	8.3309	11:19:29 PM	0.7387	7.5943
May 26, 2023	12:28:56 AM	8.3336	12:19:29 AM	0.7393	7.5933
May 26, 2023	1:28:56 AM	8.3323	1:19:29 AM	0.739	7.5931
May 26, 2023	2:28:56 AM	8.3316	2:19:29 AM	0.7385	7.5912
May 26, 2023	3:28:56 AM	8.3321	3:19:29 AM	0.7409	7.5895
May 26, 2023	4:28:56 AM	8.3331	4:19:29 AM	0.7436	7.5869
May 26, 2023	5:28:56 AM	8.3349	5:19:29 AM	0.748	7.5796
May 26, 2023	6:28:56 AM	8.3338	6:19:29 AM	0.7542	7.5776
May 26, 2023	7:28:56 AM	8.34	7:19:29 AM	0.7624	7.5745
May 26, 2023	8:28:56 AM	8.3413	8:19:29 AM	0.7668	7.5688
May 26, 2023	9:28:56 AM	8.3394	9:19:29 AM	0.7706	7.5664
May 26, 2023	10:28:56 AM	8.3356	10:19:29 AM	0.7692	7.5619
May 26, 2023	11:28:56 AM	8.33	11:19:29 AM	0.7681	7.56
May 26, 2023	12:28:56 PM	8.3218	12:19:29 PM	0.7618	7.5546
May 26, 2023	1:28:56 PM	8.3115	1:19:29 PM	0.7569	7.5502
May 26, 2023	2:28:56 PM	8.3048	2:19:29 PM	0.7546	7.5491
May 26, 2023	3:28:56 PM	8.3004	3:19:29 PM	0.7513	7.5448
May 26, 2023	4:28:56 PM	8.295	4:19:29 PM	0.7502	7.5389
May 26, 2023	5:28:56 PM	8.2871	5:19:29 PM	0.7482	7.5357
May 26, 2023	6:28:56 PM	8.2807	6:19:29 PM	0.745	7.5333
May 26, 2023	7:28:56 PM	8.2736	7:19:29 PM	0.7403	7.5307
May 26, 2023	8:28:56 PM	8.2714	8:19:29 PM	0.7407	7.531
May 26, 2023	9:28:56 PM	8.2712	9:19:29 PM	0.7402	7.5307
May 26, 2023	10:28:56 PM	8.2757	10:19:29 PM	0.745	7.5293
May 26, 2023	11:28:56 PM	8.2774	11:19:29 PM	0.7481	7.5292
May 27, 2023	12:28:56 AM	8.2777	12:19:29 AM	0.7485	7.5288
May 27, 2023	1:28:56 AM	8.2745	1:19:29 AM	0.7457	7.5301
May 27, 2023	2:28:56 AM	8.2769	2:19:29 AM	0.7468	7.5259
May 27, 2023	3:28:56 AM	8.278	3:19:29 AM	0.7521	7.5262
May 27, 2023	4:28:56 AM	8.2795	4:19:29 AM	0.7533	7.526
May 27, 2023	5:28:56 AM	8.2793	5:19:29 AM	0.7533	7.5238
May 27, 2023	6:28:56 AM	8.2814	6:19:29 AM	0.7576	7.5182
May 27, 2023	7:28:56 AM	8.2796	7:19:29 AM	0.7614	7.5116
May 27, 2023	8:28:56 AM	8.2771	8:19:29 AM	0.7655	7.5061
May 27, 2023	9:28:56 AM	8.271	9:19:29 AM	0.7649	7.5007
May 27, 2023	10:28:56 AM	8.2627	10:19:29 AM	0.762	7.4986
May 27, 2023	11:28:56 AM	8.2579	11:19:29 AM	0.7593	7.4953
May 27, 2023	12:28:56 PM	8.2505	12:19:29 PM	0.7552	7.4904
May 27, 2023	1:28:56 PM	8.239	1:19:29 PM	0.7486	7.4849
May 27, 2023	2:28:56 PM	8.227	2:19:29 PM	0.7421	7.4809
May 27, 2023	3:28:56 PM	8.2151	3:19:29 PM	0.7342	7.4687
May 27, 2023	4:28:56 PM	8.1983	4:19:29 PM	0.7296	7.47
May 27, 2023	5:28:56 PM	8.1944	5:19:29 PM	0.7244	7.4649

May 27, 2023	6:28:56 PM	8.1847	6:19:29 PM	0.7198	7.4628
May 27, 2023	7:28:56 PM	8.1811	7:19:29 PM	0.7183	7.4615
May 27, 2023	8:28:56 PM	8.1807	8:19:29 PM	0.7192	7.4592
May 27, 2023	9:28:56 PM	8.1819	9:19:29 PM	0.7227	7.4598
May 27, 2023	10:28:56 PM	8.1824	10:19:29 PM	0.7226	7.4619
May 27, 2023	11:28:56 PM	8.1844	11:19:29 PM	0.7225	7.4618
May 28, 2023	12:28:56 AM	8.1845	12:19:29 AM	0.7227	7.4625
May 28, 2023	1:28:56 AM	8.1825	1:19:29 AM	0.72	7.463
May 28, 2023	2:28:56 AM	8.1809	2:19:29 AM	0.7179	7.4617
May 28, 2023	3:28:56 AM	8.1771	3:19:29 AM	0.7154	7.4601
May 28, 2023	4:28:56 AM	8.1721	4:19:29 AM	0.712	7.4596
May 28, 2023	5:28:56 AM	8.1711	5:19:29 AM	0.7115	7.4594
May 28, 2023	6:28:56 AM	8.1688	6:19:29 AM	0.7094	7.4566
May 28, 2023	7:28:56 AM	8.1623	7:19:29 AM	0.7057	7.4532
May 28, 2023	8:28:56 AM	8.1561	8:19:29 AM	0.7029	7.44
May 28, 2023	9:28:56 AM	8.1408	9:19:29 AM	0.7008	7.4412
May 28, 2023	10:28:56 AM	8.1364	10:19:29 AM	0.6952	7.4339
May 28, 2023	11:28:56 AM	8.1275	11:19:29 AM	0.6936	7.4318
May 28, 2023	12:28:56 PM	8.1207	12:19:29 PM	0.6889	7.4254
May 28, 2023	1:28:56 PM	8.1048	1:19:29 PM	0.6794	7.4141
May 28, 2023	2:28:56 PM	8.0849	2:19:29 PM	0.6708	7.4122
May 28, 2023	3:28:56 PM	8.076	3:19:29 PM	0.6638	7.4074
May 28, 2023	4:28:56 PM	8.065	4:19:29 PM	0.6576	7.4003
May 28, 2023	5:28:56 PM	8.0543	5:19:29 PM	0.654	7.3979
May 28, 2023	6:28:56 PM	8.0468	6:19:29 PM	0.6489	7.395
May 28, 2023	7:28:56 PM	8.04	7:19:29 PM	0.645	7.3915
May 28, 2023	8:28:56 PM	8.0394	8:19:29 PM	0.6479	7.388
May 28, 2023	9:28:56 PM	8.0393	9:19:29 PM	0.6513	7.3855
May 28, 2023	10:28:56 PM	8.0496	10:19:29 PM	0.6641	7.3859
May 28, 2023	11:28:56 PM	8.0476	11:19:29 PM	0.6617	7.3897
May 29, 2023	12:28:56 AM	8.0552	12:19:29 AM	0.6655	7.3882
May 29, 2023	1:28:56 AM	8.0586	1:19:29 AM	0.6704	7.3892
May 29, 2023	2:28:56 AM	8.064	2:19:29 AM	0.6748	7.3887
May 29, 2023	3:28:56 AM	8.0675	3:19:29 AM	0.6788	7.3876
May 29, 2023	4:28:56 AM	8.0698	4:19:29 AM	0.6822	7.3849
May 29, 2023	5:28:56 AM	8.0703	5:19:29 AM	0.6854	7.3774
May 29, 2023	6:28:56 AM	8.0716	6:19:29 AM	0.6942	7.378
May 29, 2023	7:28:56 AM	8.0762	7:19:29 AM	0.6982	7.3726
May 29, 2023	8:28:56 AM	8.0756	8:19:29 AM	0.703	7.366
May 29, 2023	9:28:56 AM	8.072	9:19:29 AM	0.706	7.3622
May 29, 2023	10:28:56 AM	8.0715	10:19:29 AM	0.7093	7.3573
May 29, 2023	11:28:56 AM	8.0643	11:19:29 AM	0.707	7.3531
May 29, 2023	12:28:56 PM	8.0565	12:19:29 PM	0.7034	7.3529
May 29, 2023	1:28:56 PM	8.0537	1:19:29 PM	0.7008	7.3511

MAX	10.0309		9.3018
MIN	8.0393		7.3511
DIFFERENCE	**1.9916**		**1.9507**

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

APPENDIX I: TEST PIT LOGS

McINTOSH PERRY

TEST PIT NUMBER TP1

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION 0.30 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
0.20			
			Sandy gravel/gravelly sand, trace clay (wet)
	SS 1		
0.40			EOH, refusal on bedrock

Bottom of test pit at 0.40 m.

TEST PIT NUMBER TP2

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION 1.08 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
			0.18
			Sandy Gravel/Gravelly sand, some silt/clay with cobbles up to 6 inches (wet)
0.5			
1.0			
1.5	SS 1		1.70
			EOH, refusal on bedrock
			Bottom of test pit at 1.70 m.

GENERAL BH / TP / WELL GRIZZLY HOMES - FRANKTOWN.GPJ GINT STD CANADA LAB.GDT 22-1-11

TEST PIT NUMBER TP3

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION 0.80 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
			0.30
			Sandy gravel/gravelly sand, some silt/clay (gravel size ranging from fine grains up to 10 inches, size increasing with depth) (wet)
0.5			
1.0			
	SS 1		1.45
			EOH, refusal on bedrock
			Bottom of test pit at 1.45 m.

TEST PIT NUMBER TP4

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES Rev.1
AFTER EXCAVATION 3.70 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
			0.20
			Sandy gravel/gravelly sand, trace silt/clay
0.5	SS 2		
			0.55
			Sandy gravel/gravelly sand, trace silt/clay (wet)
	SS 1		0.70
			EOH, refusal on bedrock

Bottom of test pit at 0.70 m.

(Continued Next Page)

TEST PIT NUMBER TP5

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
			0.10
			Red/ brown gravelly sand, trace silt/clay
	SS 1		0.38
			EOH, refusal on bedrock

Bottom of test pit at 0.38 m.

TEST PIT NUMBER TP6

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
0.15			Gravelly sand, trace silt/clay, with some larger weathered bedrock fragments present
0.45	SS 1		EOH, refusal on bedrock

Bottom of test pit at 0.45 m.

TEST PIT NUMBER TP7

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION 0.60 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
			0.20
			Red gravelly sand, trace silt/clay (wet)
0.5			
	SS 1		0.70
			EOH, refusal on bedrock

Bottom of test pit at 0.70 m.

TEST PIT NUMBER TP8

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
		0.05	Topsoil
			Gravelly sand, trace silt/clay
	SS 1	0.25	EOH, refusal on bedrock

Bottom of test pit at 0.25 m.

TEST PIT NUMBER TP9

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
			0.14
			Sandy gravel/gravelly sand, some silt/clay
	SS 1		0.30
			EOH, refusal on bedrock

Bottom of test pit at 0.30 m.

TEST PIT NUMBER TP10

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
0.17			EOH, refusal on bedrock

Bottom of test pit at 0.17 m.

TEST PIT NUMBER TP11

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
0.10			
			Brown/ red gravelly sand, trace silt/clay
	SS 1		
0.30			
			EOH, refusal on bedrock

Bottom of test pit at 0.30 m.

TEST PIT NUMBER TP12

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
			0.25
	SS 1		Brown gravelly sand, trace silt/clay
			0.40
0.5			Grey silty gravelly sand, trace clay
	SS 2		0.60
			EOH, refusal on bedrock

Bottom of test pit at 0.60 m.

TEST PIT NUMBER TP13

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION 0.73 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
			0.30
			Brown gravelly sand, trace silt/clay
0.5			
			0.65
			Grey silty gravelly sand, trace clay with cobbles up to 4 inches (wet)
			0.85
			EOH, refusal on bedrock

Bottom of test pit at 0.85 m.

TEST PIT NUMBER TP14

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION ---

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
0.5			0.60
			Silty gravelly sand, trace clay (very dry, crumbly)
1.0	SS 1		1.20
			EOH, refusal on bedrock

Bottom of test pit at 1.20 m.

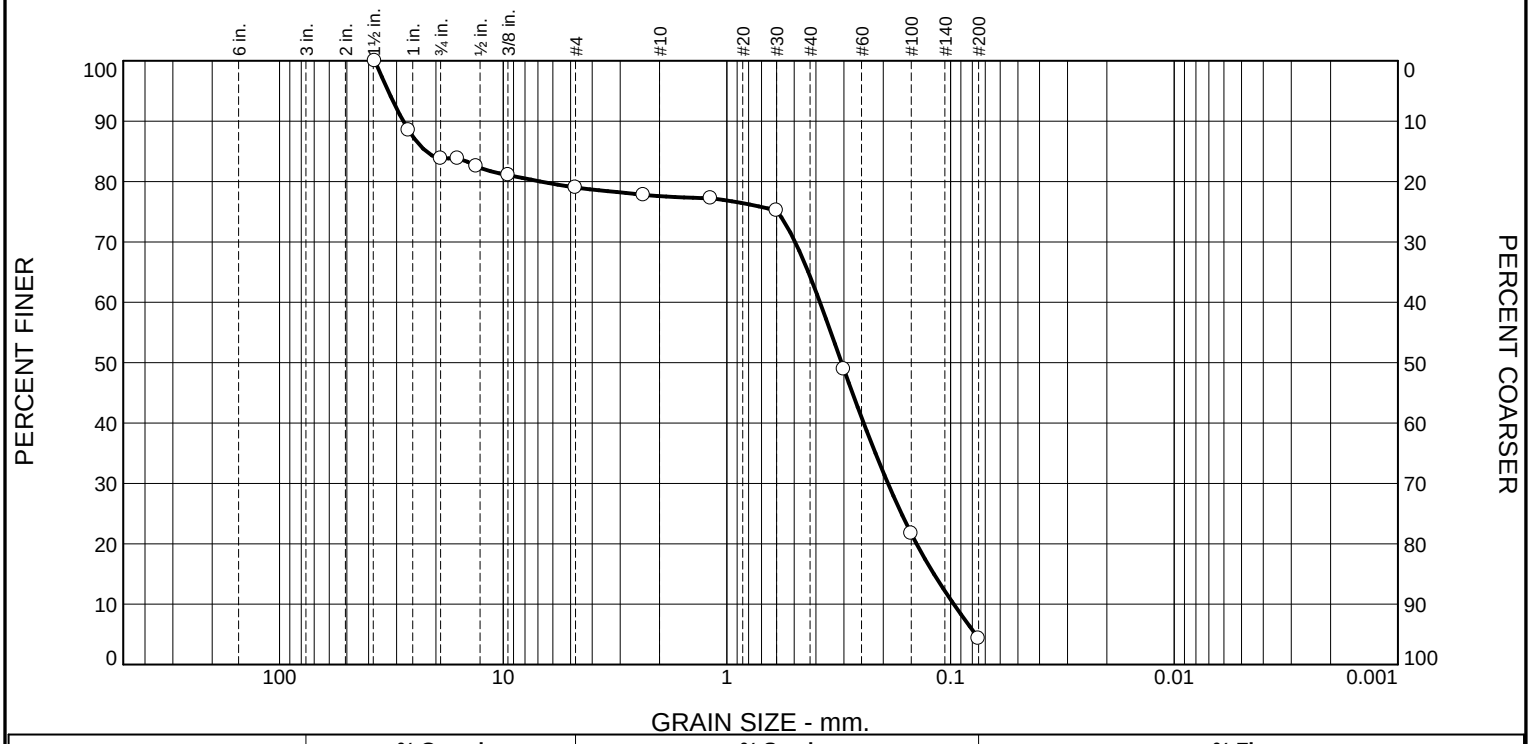
TEST PIT NUMBER TP15

Mcintosh Perry
115 Walgreen Road
Carp K0A 1L0

CLIENT Grizzly Homes
PROJECT NAME Franktown Subdivision Review
PROJECT NUMBER CCO-22-0256
PROJECT LOCATION
DATE STARTED 21-12-14 **COMPLETED** 21-12-14
GROUND ELEVATION **TEST PIT SIZE** 1m
EXCAVATION CONTRACTOR Grizzly Homes
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 303E CR
AT TIME OF EXCAVATION ---
LOGGED BY EW **CHECKED BY** PL
AT END OF EXCAVATION ---
NOTES **Rev.1**
AFTER EXCAVATION 0.50 m

DEPTH (m)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION
			Topsoil
			0.25
			Gravelly sand, trace silt/clay, with cobbles (wet)
0.5			▼
	SS 1		0.65
			EOH, refusal on bedrock
			Bottom of test pit at 0.65 m.

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.2	4.8	1.4	13.3	60.0	4.3	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
37.5mm	100.0		
26.5mm	88.5		
19.0mm	83.8		
16.0mm	83.8		
13.2mm	82.6		
9.5mm	81.1		
4.75mm	79.0		
2.36mm	77.8		
1.18mm	77.2		
0.600mm	75.2		
0.300mm	48.9		
0.150mm	21.7		
0.075mm	4.3		

* (no specification provided)

Material Description

Gravelly Sand trace Silt/Clay

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SP **AASHTO (M 145)=**

Coefficients

D_{90}= 27.9823 D_{85}= 22.1134 D_{60}= 0.3837
D_{50}= 0.3072 D_{30}= 0.1906 D_{15}= 0.1187
D_{10}= 0.0968 C_u= 3.97 C_c= 0.98

Remarks

F.M.=2.55

Date Received: Apr 24,2023 **Date Tested:** Apr 25,2023

Tested By: J.H-J

Checked By: J.Hopwood-Jones

Title: Lab Manager

Location: TP6
Sample Number: SS-1 **Depth:** 0.45m

Date Sampled: Dec 14,2021

McINTOSH PERRY

Client: Grizzly Homes
Project: Grizzly homes

Project No: CCO-220256 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

2023-05-01

Client: Grizzly Homes
Project: Grizzly homes
Project Number: CCO-220256
Location: TP6
Depth: 0.45m
Sample Number: SS-1
Material Description: Gravelly Sand trace Silt/Clay
Sample Date: Dec 14,2021
Date Received: Apr 24,2023
USCS Classification: SP
Tested By: J.H-J
Test Date: Apr 25,2023
Checked By: J.Hopwood-Jones
Title: Lab Manager

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer	Percent Retained
715.03	0.00	0.00	37.5mm	0.00	100.0	0.0
			26.5mm	82.09	88.5	11.5
			19.0mm	115.60	83.8	16.2
			16.0mm	115.60	83.8	16.2
			13.2mm	124.73	82.6	17.4
			9.5mm	135.37	81.1	18.9
			4.75mm	150.00	79.0	21.0
			2.36mm	158.82	77.8	22.2
			1.18mm	162.78	77.2	22.8
			0.600mm	177.39	75.2	24.8
			0.300mm	365.16	48.9	51.1
			0.150mm	559.87	21.7	78.3
			0.075mm	684.11	4.3	95.7

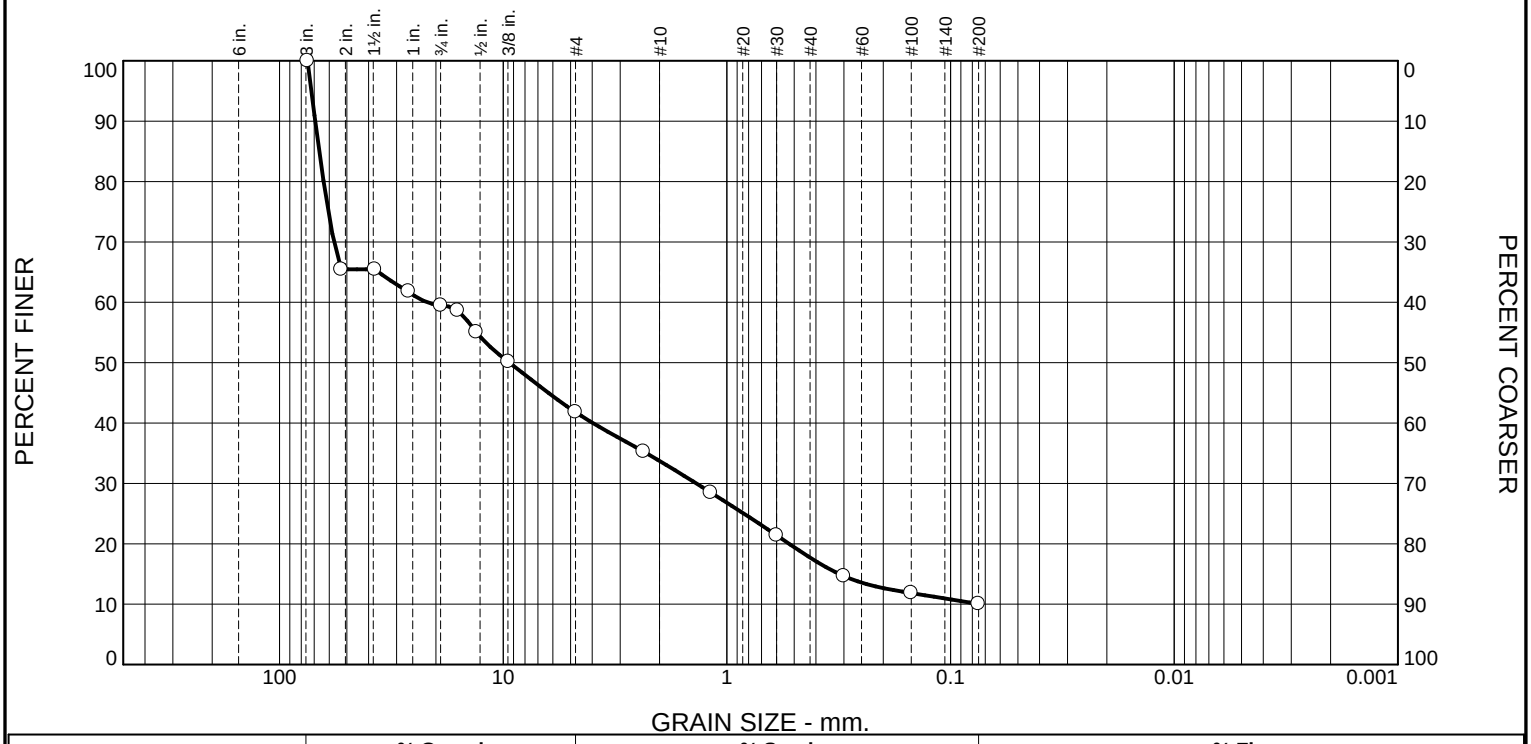
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	16.2	4.8	21.0	1.4	13.3	60.0	74.7			4.3

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0774	0.0968	0.1187	0.1419	0.1906	0.2446	0.3072	0.3837	6.7881	22.1134	27.9823	32.6677

Fineness Modulus	C_u	C_c
2.55	3.97	0.98

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	40.5	17.7	8.1	16.0	7.7	10.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
75.0mm	100.0		
53.0mm	65.5		
37.5mm	65.5		
26.5mm	61.8		
19.0mm	59.5		
16.0mm	58.6		
13.2mm	55.1		
9.5mm	50.2		
4.75mm	41.8		
2.36mm	35.3		
1.18mm	28.5		
0.600mm	21.4		
0.300mm	14.6		
0.150mm	11.8		
0.075mm	10.0		

* (no specification provided)

Material Description

Sandy Gravel some Silt/Clay

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= AASHTO (M 145)=

Coefficients

D_{90}= 69.2577 D_{85}= 66.4308 D_{60}= 21.8530
D_{50}= 9.3771 D_{30}= 1.3706 D_{15}= 0.3148
D_{10}= C_u= C_c=

Remarks

F.M.=5.71

Date Received: Apr 24,2023 **Date Tested:** Apr 25,2023

Tested By: J.H-J

Checked By: J.Hopwood-Jones

Title: Lab Manager

Location: TP2
Sample Number: SS-1 **Depth:** 1.70m

Date Sampled: Dec 14,2021

McINTOSH PERRY

Client: Grizzly Homes
Project: Grizzly homes

Project No: CCO-220256 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

2023-05-01

Client: Grizzly Homes
Project: Grizzly homes
Project Number: CCO-220256
Location: TP2
Depth: 1.70m
Sample Number: SS-1
Material Description: Sandy Gravel some Silt/Clay
Sample Date: Dec 14,2021
Date Received: Apr 24,2023
Tested By: J.H-J
Test Date: Apr 25,2023
Checked By: J.Hopwood-Jones
Title: Lab Manager

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer	Percent Retained
1798.84	0.00	0.00	75.0mm	0.00	100.0	0.0
			53.0mm	621.39	65.5	34.5
			37.5mm	621.39	65.5	34.5
			26.5mm	687.02	61.8	38.2
			19.0mm	728.60	59.5	40.5
			16.0mm	744.14	58.6	41.4
			13.2mm	808.28	55.1	44.9
			9.5mm	896.47	50.2	49.8
			4.75mm	1046.86	41.8	58.2
			2.36mm	1164.31	35.3	64.7
			1.18mm	1286.51	28.5	71.5
			0.600mm	1413.57	21.4	78.6
			0.300mm	1535.32	14.6	85.4
			0.150mm	1585.80	11.8	88.2
			0.075mm	1618.37	10.0	90.0

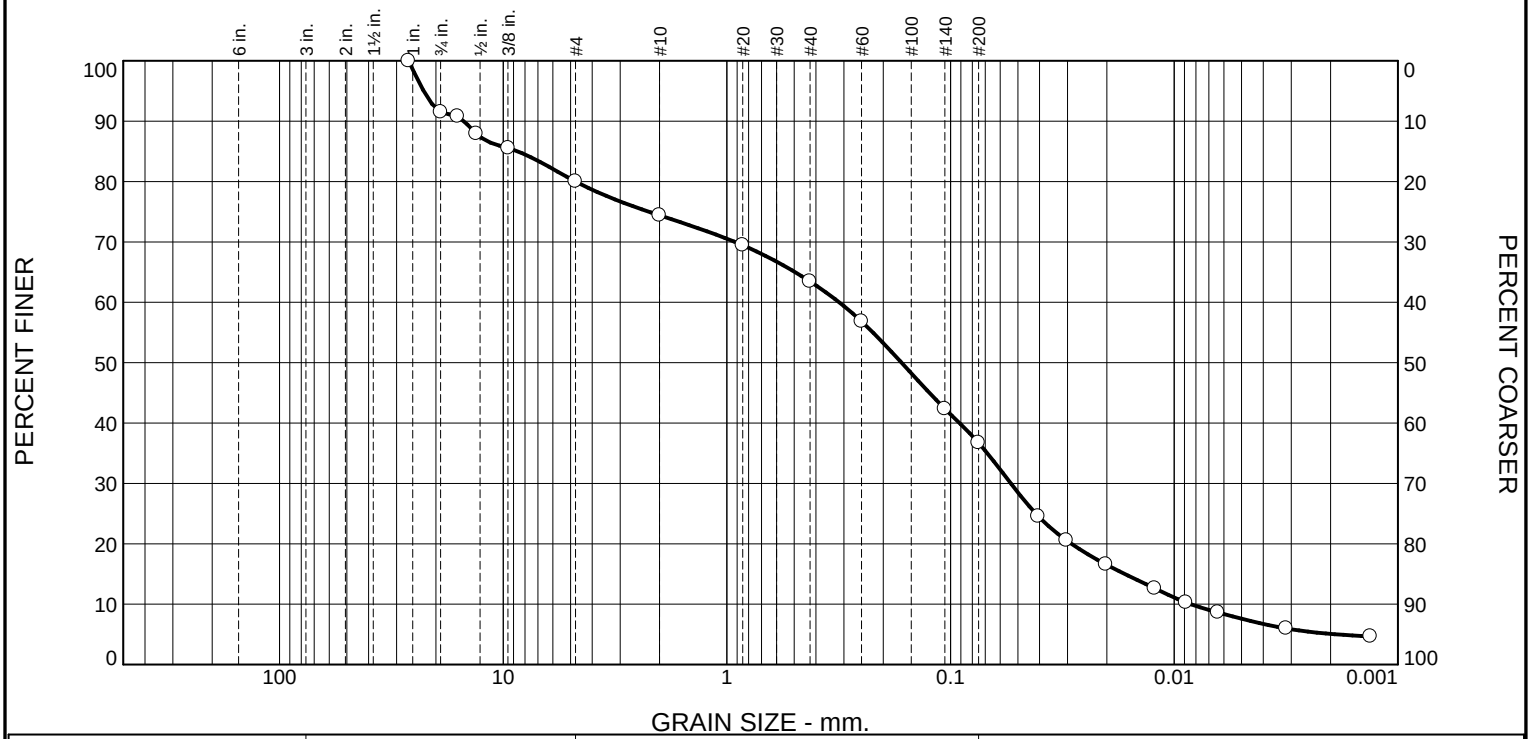
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	40.5	17.7	58.2	8.1	16.0	7.7	31.8			10.0

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.3148	0.5269	1.3706	3.9717	9.3771	21.8530	63.5502	66.4308	69.2577	72.0964

Fineness Modulus
5.71

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.5	11.5	5.6	10.9	26.8	29.1	7.6

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
26.5mm	100.0		
19.0mm	91.5		
16.0mm	90.8		
13.2mm	87.9		
9.5mm	85.6		
4.75mm	80.0		
2.00mm	74.4		
0.850mm	69.5		
0.425mm	63.5		
0.250mm	56.8		
0.106mm	42.4		
0.075mm	36.7		
0.0405 mm.	24.6		
0.0303 mm.	20.6		
0.0202 mm.	16.6		
0.0122 mm.	12.6		
0.0089 mm.	10.3		
0.0064 mm.	8.6		
0.0032 mm.	6.0		
0.0013 mm.	4.6		

* (no specification provided)

Material Description

Silty Gravelly Sand trace Clay

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= **AASHTO (M 145)=**

Coefficients

D_{90}= 14.9684 D_{85}= 8.6139 D_{60}= 0.3150
D_{50}= 0.1656 D_{30}= 0.0538 D_{15}= 0.0166
D_{10}= 0.0084 C_u= 37.32 C_c= 1.09

Remarks

Note: Specific Gravity of Soil is Assumed.
F.M.=2.22

Date Received: Apr 24,2023 **Date Tested:** Apr 27,2023

Tested By: J.H-J

Checked By: J.Hopwood-Jones

Title: Lab Manager

Location: TP12
Sample Number: SS-2 **Depth:** 0.60m

Date Sampled: Dec 14,2021

McINTOSH PERRY

Client: Grizzly Homes
Project: Grizzly homes

Project No: CCO-220256 **Figure**

GRAIN SIZE DISTRIBUTION TEST DATA

2023-05-01

Client: Grizzly Homes
Project: Grizzly homes
Project Number: CCO-220256
Location: TP12
Depth: 0.60m **Sample Number:** SS-2
Material Description: Silty Gravelly Sand trace Clay
Sample Date: Dec 14,2021
Date Received: Apr 24,2023
Testing Remarks: Note: Specific Gravity of Soil is Assumed.
Tested By: J.H-J **Test Date:** Apr 27,2023
Checked By: J.Hopwood-Jones **Title:** Lab Manager

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer	Percent Retained
869.79	0.00	0.00	26.5mm	0.00	100.0	0.0
			19.0mm	73.93	91.5	8.5
			16.0mm	79.99	90.8	9.2
			13.2mm	105.01	87.9	12.1
			9.5mm	125.68	85.6	14.4
			4.75mm	173.82	80.0	20.0
			2.00mm	222.60	74.4	25.6
109.14	0.00	0.00	0.850mm	7.26	69.5	30.5
			0.425mm	16.07	63.5	36.5
			0.250mm	25.80	56.8	43.2
			0.106mm	47.02	42.4	57.6
			0.075mm	55.28	36.7	63.3

Hydrometer Test Data

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample = 74.4

Weight of hydrometer sample =109.14

Table of composite correction values:

Temp., deg. C:	19.2	20.3	20.4
Comp. corr.:	-3.0	-3.0	-3.5

Meniscus correction only = -1.0

Specific gravity of solids = 2.775

Hydrometer type = 152H

Hydrometer effective depth equation: L = 16.6007 **-** 0.187 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer	Percent Retained
1.00	19.2	40.0	37.0	0.0133	39.0	9.3	0.0405	24.6	75.4
2.00	19.2	34.0	31.0	0.0133	33.0	10.4	0.0303	20.6	79.4
5.00	19.2	28.0	25.0	0.0133	27.0	11.6	0.0202	16.6	83.4
15.00	19.2	22.0	19.0	0.0133	21.0	12.7	0.0122	12.6	87.4
30.00	19.2	18.5	15.5	0.0133	17.5	13.3	0.0089	10.3	89.7
60.00	19.2	16.0	13.0	0.0133	15.0	13.8	0.0064	8.6	91.4
250.00	20.3	12.0	9.0	0.0131	11.0	14.5	0.0032	6.0	94.0
1440.00	20.4	10.5	7.0	0.0131	9.5	14.8	0.0013	4.6	95.4

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	8.5	11.5	20.0	5.6	10.9	26.8	43.3	29.1	7.6	36.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0019	0.0084	0.0166	0.0288	0.0538	0.0913	0.1656	0.3150	4.7411	8.6139	14.9684	22.6848

Fineness Modulus	C_u	C_c
2.22	37.32	1.09

HYDROGEOLOGICAL ASSESSMENT AND TERRAIN ANALYSIS
GRIZZLY HOMES SUBDIVISION, BECKWITH, ONTARIO

APPENDIX J: NITRATE ATTENUATION CALCULATIONS

McINTOSH PERRY

CCO-22-0256
Grizzly Homes, Franktown, ON
Nitrate Loading Calculations Jul.25.2023

Land Area

	A_{total}	268,562.80	m2
	A_{imperv}	27,119.90	m2
	Infiltrating Area	89.9%	
	A_{perv}	241,442.90	m2

Water Surplus (W_s)

Precipitation		943.4	mm/yr
Evapotranspiration		609.5239	mm/yr
W_s = Precipitation - Evapotranspiration	W_s	333.8761	mm/yr
		0.333876	m/yr

Infiltration Factor (I_f) per MOEE 1995

Topo		0.18750	(0.7% average slope)
Soil		0.3113	
Cover		0.15	Mix of woodland and cultivated land
	I_f =	0.649	

Infiltration (I)

$I=W_s * I_f$	I =	0.216619	m/yr
Runoff = W_s - I	Runoff =	0.117257	m/yr

Dilution Water Available (D_w)

$D_{w,perv} = A_{perv} * I$	D_w =	52301.08	m3/yr
		143290.63	L/day
$Runoff_{perv} = A_{perv}*W_s*(1-I_f)$	$Runoff_{perv}$ =	28310.94	m3/yr
$Runoff_{imperv} = A_{imper}*Ws$	$Runoff_{imperv}$ =	9054.69	m3/yr
$Runoff_{total} = Runoff_{perv} + Runoff_{imper}$	$Runoff_{total}$ =	37365.63	m3/yr
	Runoff Reduction % =	0%	*(if using LID for stormwater management)*
	Runoff Reduction =	0.00	m3/yr
$D_{w\,(final)} = D_{w,perv}$ + Runoff Reduction	$D_{w\,(final)}$ =	52301.08	m3/yr
	$D_{w\,(final)}$ =	143290.63	L/day

Nitrate Concentrations

Background Nitrate Concentration (C_b)	C_b =	2.8	mg/L
Max Boundary Nitrate Concentration (C_{boun})	C_{boun} =	10	mg/L
Effluent Nitrate Concentration (C_e)	C_e =	40	mg/L
	Nitrate Reduction	0%	*(if CAN/BNQ 3680-600 N-I or NSF/ANSI 245 applies)*
	$C_{e\,(final)}$ =	40	mg/L

Effluent Loading (Q_e)

	Q_e =	1000	L/day/Residential Lot

Maximum Allowable Number of Lots (N)

or

Calculated Nitrate Concentration (C_w)

$N = [D_w * (C_b - C_{boun})] / [Q_e * (C_{boun} - C_b - C_e)]$

N = 31.454

N= 30 lots

$C_w = [(C_e*Q_e*N) / ((Q_e*N) + D_w)] + C_b$

C_w = 9.725 mg/L

$C_w <= C_{boun}$, 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*I^3 - 771 *10^-7*I^2 +179*10^-4 * I + 492*10^-3

I = sum (Tm/5)^1.514

Stn: Ottawa MacDonald -Cartier Int'l A (YOW)
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