



Hydrogeological Assessment, 1066 Syer Line, Fraserville, ON

October 15, 2021

Prepared for:
Township of Cavan Monaghan

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1.0 Introduction

Cambium Inc. (Cambium) was retained by Township of Cavan Monaghan (Client) to complete a hydrogeological assessment in support of proposed land use changes at 1066 Syer Line, Fraserville, ON (Site) from agricultural to employment to allow for alternative uses on the property.

This hydrogeological assessment was completed in support of the proposed land use change and includes a general review of available geological / hydrogeological information, installation of two (2) new supply wells, 6-hour pumping tests at each new well, and water quality analysis of the supply water in accordance with the Ministry of the Environment and Climate Change (MECP) guideline D-5-5, specifically Section 4.4. Additionally, adjacent property owners within 500 m of the site were given the opportunity to have their well monitored during each pumping test.

As part of the scope of work, Cambium was also retained to complete an environmental impact study (EIS) which was provided under a separate cover (Cambium Inc., 2021)

1.1 Site Description

The Site is roughly triangular and is approximately 34 hectares (~84 acres). The Site is mainly open fields and contains a watercourse that is designated as a natural linkage (NL) by the County of Peterborough (County) which runs through the southeastern corner of the Site and flows northeast off-site.

The Site is currently built upon with a vacant residence, two barns, two silos, and several small storage structures; the existing development is provided water and wastewater servicing by private on-site systems. The Site is designated as a Countryside Area as per Section 5 of the Official Plan for the Township of Cavan Monaghan (Cavan Monaghan, 2013); the Site is outside of the boundaries of the Oak Ridges Moraine Plan Area. The current zoning at the Site is mainly Agricultural (A) with a portion of the southeast corner zoned at Natural Linkage (NL) where an unnamed watercourse flows northeasterly across the Site, and the very northwestern portion is also zoned NL. The Site is bordered by Syer Line to the south, rural residential (RR)



and rural employment (M2) to the west, Ontario Highway 115 to the north, and RR and A to the east. Additionally, the east of the Site, the area surrounding the unnamed waterbody is zoned as NL and Natural Core (NC). The proposed re-zoning at the Site would have the zoning of the Site change to M2.

An existing site plan is included in Figure 1 and additional land information is included in Appendix A.



2.0 Methodology

This section outlines the methodology followed to complete the hydrogeological assessment.

2.1 Well Installation

Cambium, on behalf of the Client, retained the services of Lone Star Drilling & Elevator Caisson Ltd. to install the two supply wells.

2.1.1 Well 1

Well 1 (MECP Tag # A323405) was installed approximately 35 m north of the northeastern corner of the existing residential dwelling on July 06, 2021. Well 1 was installed to a depth of 33.53 mbgs, with an open bedrock hole extending from 28.85 mbgs to 33.53 mbgs. Well 1 was chlorinated upon completion. During installation, sediments described as coarsening down sequences of sand were encountered from ground surface to a depth of 14.33 mbgs, underlain by sandy till to 22.86 mbgs. A water-bearing gravel layer was encountered between 22.86 mbgs to 24.99 mbgs, underlain by a dense silty gravel till to 28.35 mbgs. Below the basal till, limestone bedrock was encountered and continued until the well termination at 33.53 mbgs.

The well driller's recommended pumping rate was 36 L/min.

The coordinates of Well 1 are UTM Zone 17 T and 703595 mE / 4896550 mN. The ground elevation at PW1 is 210 metres above sea level (masl). The top of casing of PW1 was determined to be 211 masl. The wellhead stickup of PW1 is 1.17 m. The well record of Well 1 will be forwarded to the Township once received from the Driller. The location of Well 1 is provided on Figure 1.

2.1.2 Well 2

Well 2 (MECP Tag # A323403) was installed approximately 12 m east of Well 1 on July 07, 2021. Well 2 was installed to a depth of 24.99 mbgs, with the screen extending from 22.86 mbgs to 24.99 mbgs. Well 2 was chlorinated upon completion. The stratigraphy of the sediment is the same as Well 1 and terminates in the dense gravel till at 28.35 mbgs.



The well driller's recommended pumping rate was 90 L/min. The coordinates of Well 2 are Zone 17 T and 703608 mE / 4896557 mN. The ground elevation at PW1 was 210 metres above sea level (masl). The top of casing of PW1 was determined to be 211 masl. The wellhead stickup of PW1 is 1.14 m. The well record of Well 2 will be forwarded to the Township once received from the Driller. The location of Well 2 is provided on Figure 1.

2.2 Groundwater Monitoring Network

The Client owns the property at 1256 Syer Line, which includes an abandoned dwelling. The supply well that services this property was included in the pumping test monitoring program. The location of this off-site well included in the monitoring network is outlined on Figure 2.

Pumping Test

2.2.1 Well 1

The pumping test of Well 1 commenced on July 19, 2021 at 9:25 and ceased the same day at 15:42 (a total of 6+ hours). The pump was installed to a depth of approximately 23.50 mbgs. The water withdrawal rate was maintained at an average rate of 32.0 L/min. Discharge water was directed to open field to the south of the vacant residential dwelling.

The water level of Well 1 was monitored at pre-determined time intervals for the duration of the pumping test using Solinst water level tape. Throughout the pumping test, the water levels of Well 2 and the existing on-site dug well were monitored. The water level of the off-site supply well at 1256 Syer Line was also monitored for the duration of the pumping test with a Solinst pressure transducer level logger.

A groundwater sample was collected from the discharge of Well 1 at 15:25 on July 19, 2021 and sent to SGS Canada Inc. in Lakefield (SGS) for analysis. The groundwater sample was analyzed for general organic and inorganic chemistry (including bacterial analyses). The concentration of free chlorine in water discharged from Well 1 was determined to be below detectable limits prior to sampling.



2.2.2 Well 2

The pumping test of Well 2 commenced on July 15, 2021 at 10:55 and ceased the same day at 16:56 (a total of 6 hours). The pump was installed to a depth of approximately 25.35 mbgs. The water withdrawal rate was maintained at an average rate of 82.5 L/min. Discharge water was directed to the open field south of the well to the east of the vacant residential dwelling.

The water level of Well 2 was monitored for the duration of the pumping test using Solinst water level tape. Throughout the pumping test, the water levels of Well 1 and the existing on-site dug well were monitored. The water levels of the off-site supply well were also monitored for the duration of the pumping test with a Solinst pressure transducer level logger.

A groundwater sample was collected from the discharge of Well 2 at 16:30 on July 15, 2021 and sent to SGS for analysis. The groundwater sample was analyzed for general organic and inorganic chemistry (including bacterial analyses). The concentration of free chlorine in water discharged from Well 2 was determined to be below detectable limits prior to sampling.



3.0 Geological and Hydrogeological Setting

The Site exhibits a gently rolling hilly topography, with the highest elevation being approximately 210 metre above sea level (masl) where the vacant dwelling and newly installed supply wells are located, and a gentle downwards slope in all directions from the built-up area.

The Site is located within the Cavan Creek subwatershed, a component of the Otonabee Region Watershed. Surface water drainage for the majority of the property drains towards the unnamed watercourse in the southeastern corner of the Site, which flows northeast off-site; however, surface water to the north of the vacant dwelling flows northeastward towards a wetland just off-site to the northeast. All surface water ultimately discharges into Cavan Creek approximately 3km northeast of the Site.

The Site is located in the physiographic region known as the Peterborough Drumlin Field. The Peterborough Drumlin Field is approximately 4,530 km² and extends from Hastings County in the east to Simcoe County in the west. This physiographic region contains approximately 3,000 drumlins in addition to many other drumlinoid hills and surface flutings of the till sheet. In general, the drumlins are composed of sand, gravel and boulder till and are separated by low-lying wetlands areas composed of fine-grained soils (Chapman, L.J. and D.F. Putnam, 1984).

According to Miscellaneous Release – Data 128 from the Ontario Geological Survey (Ontario Geological Survey, 2010) the following overburden and soils are located in the in the area of the Site:

- Course-grained glaciolacustrine deposits – foreshore and basinal deposits
- Modern alluvial deposits – clay, silt, sand, gravel, may contain organic remains

Recent updates to the local sedimentology indicate that the unit encountered at the surface is likely recent reworked lacustrine deposits (sediments originally laid down during glacial advance that were disturbed by meltwaters and sorted prior to redistribution as “reworked lacustrine deposits”, typically resulting in the removal of finer sediments from the underlying till) from the recession of the last glaciation. The underlying units correspond to Newmarket Till, a sandy till as described in literature, with layers of sorted sediments formed in glacial meltwater



channels known as valley infill sediments or Inter-Newmarket Sediments (INS). These valleys were incised in to the Newmarket till under glacial lobes and extreme water pressures, and later buried by more recent sediments and glacial advances. These INS formations are thought to be the source of the highly productive well at 1256 Syer Line, and although they can be regionally extensive, their locations are difficult to anticipate. Well 2 is interpreted to be screened across one such feature, albeit much less productive and not likely hydraulically connected to the more productive INS feature screened in the test well at 1256 Syer Line. That said, there is a potential that other areas on the site could encounter a thicker and more productive INS feature. Recent interpretations indicate these are typically located in low lying areas near steep sided valley walls or one sided valleys represented by highlands adjacent to lowlands. Following these assumptions, additional INS features would be more prominent in the low lands adjacent to the onsite drainage features.

According to Miscellaneous Release – Data 219 from the Ontario Geological Survey (Ontario Geological Survey, 2007), the bedrock in the area of the Site consists of Middle Ordovician rocks from the Simcoe Group. The Site is composed of nodular and black laminated limestone of the Lindsay Formation. This bedrock formation is not typically a high yielding water bearing host and known locally for poorer quality (aesthetically) groundwater containing increased iron and sulphur concentrations that affect colour and taste.

3.1 Water Well Records

The Ministry of Environment Conservation and Parks (MECP) Water Well Information System (WWIS) was accessed to review water well records in the area of the Site. There were nine water well records located within approximately 500 m of the Site (Figure 3). The following water well records were identified:

- Eight (8) water well records for drilled wells
- One (1) water well records for a dug well – existing well on Site

As per the MECP records, the soil profile generally consisted of >1 m of topsoil, underlain by grey to brown sandy clay, sometimes combined with gravel; periodic solely clay and solely gravel layers were also reported. Two (2) of the drilled wells were advanced into bedrock



composed of limestone; the bedrock contact was found approximately 22 mbgs. Bedrock continued until well termination. Water bearing sediments were identified within overburden between 6.7 to 68.6 mbgs, averaging 22.3 mbgs. Water bearing strata were also identified within 2 m below the overburden – bedrock contact. The depth of the bedrock contact and description of overburden provided by the well records was similar to the conditions encountered on-site as part of well installation at Site.

The average static water level of the drilled wells was 7.75 mbgs, and static water level of the dug well was 5.49 mbgs. The recommended flow rate ranged from 4 gallon per minute (gpm, assumed to be US gallons per minute) to 12 gpm, averaging 7 gpm. Further information summarized from the water well records are listed below in Table 1.

Table 1 Water Well Record Information

		Total Depth (mbgs)	Depth Water Encountered (m)	Depth Installed into Bedrock (m)	Static Water Level (mbgs)	Recommended Pumping Rate (gpm)
Drilled Wells Count:8	Min	12.59	10.06	1.22	0.00	5.00
	Max	68.58	68.58	1.83	30.48	12.00
	Avg.	25.19	24.1	1.52	7.75	7.38
Dug Wells Count:1	Min	6.71	6.71	-	5.49	4.00
	Max	6.71	6.71	-	5.49	4.00
	Avg.	6.71	6.71	-	5.49	4.00

Water well record 5117898 was plotted to the north of the vacant dwelling on-Site. This record indicates the well was installed to a depth of approximately 6.71 mbgs in brown sand. This well was observed during Cambium’s Site visits and was monitored for the duration of the pumping tests.

3.2 Vulnerable and Regulated Areas

As per the Ministry of the Environment, Conservation and Parks (Ministry) Source Water Protection Information Atlas (SPIA) the Site is within the following areas:

- Significant Groundwater Recharge Area (SGRA)
- Highly Vulnerable Aquifer (HVA)
- Intake Protection Zone 3 (IPZ-3)



These delineations could influence the type of development and or construction practices for future developments as follows:

SGRAs exist where water from surface more easily infiltrates the ground to recharge an aquifer that is used for municipal or other drinking water supplies. An SGRA helps maintain the water level in an aquifer that supplied drinking water (including private wells) and has a higher than average recharge comparatively across the Source Protection Area. Any future development at the Site will have to ensure that the post-development water balance maintains an acceptable amount of impervious area to allow for infiltration of surface water into the SGRA. If impervious areas are reduced due to development, groundwater recharge should be maintained through the implementation of LID measures, such as enhanced infiltration, where practicable.

HVAs are aquifers that are more sensitive to contamination. This should be taken into account for the proposed development. If the groundwater or surface water will be affected by the construction or day-to-day activities of a future development, the stormwater and dewatering discharge may need to be treated before it can return to the natural surface water / groundwater receiver.

An IPZ-3 is an area of land and water around a municipal intake pipe that contributes source water to a drinking system. The zone 3 designation means that contaminants could reach the intake of a Municipal Drinking Water System and after a large storm. As with the HVA requirements, contaminated groundwater and surface water from the development may have to be treated prior to reaching the natural receiver.

The Site is located within regulated areas, as per Otonabee Region Conservation Authority (ORCA) information and therefore any development at the Site would require submission to the ORCA prior to commencement. The SPIA mapping is updated as necessary and available at www.swpip.ca.



3.3 Hydrogeological Conditions

Based off of the wells drilled for this work program, the shallow overburden sediment at Site is sandy to 14.3 mbgs where it is underlain by dry, sandy till to 22.9 mbgs and a gravel water bearing unit to 28.3 mbgs, where bedrock was encountered. Based off information from the MECP WWIS and installation of the wells for this work program, three aquifers exist on site. The upper unit is an unconfined sand unit that will likely produce in the range of 100L/min, during well advancement the drilling was paused to allow a rough estimate of yield and quality at 14m depth. This unit wasn't screened during this program, however the onsite dug well likely just penetrated the top of this unconfined unit. The upper unit appeared clearer with less suspended sediment than the two deeper units, however would be more susceptible to drought conditions and surface contamination. The second or middle unit is a confined, overburden aquifer that occurs within a gravel layer between 22.86 mbgs to 24.99 mbgs and represents sediments reworked under glacial pressures and melt water within the overall sandy till unit (Newmarket Till). This unit has a cloudy appearance owing to the silt content in the host till deposit where these channel infill sediments were incised. The deeper unit is a bedrock contact aquifer that occurs at, or just below, the overburden – bedrock contact. The connectivity of the middle overburden aquifer and the deeper aquifer systems was not apparent from drilling. However, it is likely that there is some degree of hydraulic connection between the shallow overburden aquifer and the underlying bedrock aquifer given the pumping responses observed in the wells when the.

Shallow unconfined groundwater flow is assumed to follow the overlying topography at Site. It is assumed that the unconfined overburden groundwater discharges to surface and therefore will ultimately flow eastwards to Cavan Creek as discussed in Section 3.0. The onsite deeper groundwater flow was not available from onsite information but typically flows towards regional discharge locations in this case the Ottonabee River to the east.



4.0 Results

This section presents the results of the pumping tests and the groundwater quality comparison against parameters outlined by the Ontario Drinking Water Quality Standard (ODWQS)

4.1.1 Well 1

The static water level of Well 1 was 5.91 mtop (which corresponds to a depth of 4.74 mbgs) just prior to the pumping test. The pumping test commenced at 9:25 am on July 19, 2021 at a rate of 32 Litres per minute (L/min). Within 10 minutes after the commencement of the pumping test, the water level of PW1 lowered to 9.74 mtop. After the initial 10-minute interval the water level of Well 1 lowered consistently until the end of the pumping test to a level of 11.89 mtop. The depth of drawdown achieved at Well 1 upon completion of the pumping test was 5.98 m (at 3:38 pm on July 19, 2021). The pumping rate was maintained at an average rate of 32 L/min throughout the test, which equated to approximately 11,520 L of water withdrawn within a 6-hour period. The Specific Capacity of Well 1 during this 6-hour pumping test was calculated to be 5.35 L/min/m. The theoretical yield of well 1, given a probable intake of 32m and a static level of 5.9m allows for 26.1 m of drawdown, is 139 L/min.

Upon completion of the pumping test the water level of Well 1 was allowed to recover. By 4:52 pm on July 19, 2021 the water level in Well 1 recovered to 6.37 mtop (or 92% recovery to pre-test static conditions). The water level responses of Well 1 during the pumping test are provided on a time/drawdown plot in Figure 4.

The drawdown data recorded from Well 1 were imported into AquiferTest Pro™ and processed to determined transmissivity and hydraulic conductivity.

The transmissivity was calculated to be 50 m²/day; the hydraulic conductivity was 2.70 x 10⁻⁴ m/s. The results of the aquifer test analyses are outlined below in Table 2. The AquiferTest Pro™ results are included in Appendix C.



4.1.2 Well 2

The static water level of Well 2 was 5.60 mtop (which corresponds to a depth of 4.46 mbgs) just prior to the pumping test. The pumping test commenced at 10:55 am on July 15, 2021 at a rate of 82.5 L/min. Within 10 minutes after the commencement of the pumping test, the water level of PW1 lowered to 11.09 mtop. After the initial 10-minute interval the water level of Well 2 lowered consistently until the end of the pumping test to a level of 20.84 mtop. The depth of drawdown achieved at Well 2 upon completion of the pumping test was 15.24 m (at 4:55 pm on July 15, 2021). The pumping rate was maintained at an average rate of 82.5 L/min throughout the test, which equated to approximately 29,700 L of water withdrawn within a 6-hour period. The Specific Capacity of Well 2 during this 6-hour pumping test was calculated to be 5.41 L/min/m. The theoretical yield of well 2, given a probable intake of 23 m and a static level of 5.6 m allows for 26.1 m of drawdown, is 94 L/min.

Upon completion of the pumping test the water level of Well 2 was allowed to recover. By 5:55 pm on July 15, 2021 the water level in Well 2 recovered to 8.76 mtop (or 79% recovery to pre-test static conditions). The water level responses of Well 2 during the pumping test are provided on a time/drawdown plot in Figure 5.

The drawdown data recorded from Well 2 were imported into AquiferTest Pro™ and processed to determined transmissivity and hydraulic conductivity.

The transmissivity was calculated to be 7 m²/day; the hydraulic conductivity was 1.65 x 10⁻⁵ m/s. The results of the aquifer test analyses are outlined below in Table 2. The AquiferTest Pro™ results are included in Appendix C.

Table 2: Aquifer Test Pro Results

Well	Transmissivity (m ² /day)	Hydraulic Conductivity (m/s)
Well 1	50	2.70 x 10 ⁻⁴
Well 2	7	1.65 x 10 ⁻⁵

4.2 Surrounding Well Influences

The water level of the two other on-Site supply wells were monitored during each pumping test. The existing dug well on-Site (Well Record # 5117898) exhibited no influence during



either of the pumping tests; the water level remained static at 4.92 mtop (which corresponds to a depth of 4.98 mbgs)

Well 2 showed a minor influence during the pumping test for Well 1. The total influence at Well 2 during this time was a maximum drawdown of 0.32 m, which is considered a negligible amount.

Well 1 showed a significant influence during the pumping test for Well 2. The total influence at Well 2 during pumping of Well 1 was a maximum drawdown of 5.18 m, which is comparable to the amount of drawdown exhibited during the actual pumping test for Well 1 (5.98 m).

The total fluctuation observed at the well located at 1256 Syer line did not exceed 5 cm during either pump test, there was no observed influence at this well which was located 1.5 km to the east.

The observed interference indicates the intermediate aquifer is hydraulically connected to the bedrock interface aquifer, this was not unexpected as the vertical separation between the two water bearing units was only 3.6 m. The upper unconfined aquifer appears to be hydraulically isolated from the lower two aquifers, and as such both aquifers could be pumped simultaneously where needed.

Water level fluctuations are included in a time/water level hydrograph on Figure 4 and Figure 5.

4.3 Extrapolated Drawdown

The water levels recorded near the end of the pumping test (when a stable lowering was recorded) were extrapolated to 1 year and 20 years on a logarithmic time scale. This approach assumed that a pumping rate of 32.0 L/min is maintained continuously during a 1 year and 20-year period for Well 1 and a pumping rate of 82.5 L/min is maintained continuously during a 1 year and 20-year period for Well 2. This kind of assessment is valuable in estimating long-term impacts related to water withdrawal at a well.



Table 3: Results of Drawdown Extrapolation

Well	Time Frame	Extrapolated Drawdown (m)	Available Drawdown (m)
Well 1	Beginning of Test	-	23.09
	End of Test	5.98	17.11
	1 Year	8.34	14.75
	20 Years	10.09	13.00
Well 2	Beginning of Test	-	17.55
	End of Test	15.24	2.31
	1 Year	35.04	N/A
	20 Years	45.65	N/A

Note: Extrapolated drawdown indicates the expected drawdown from the static water level of each respective well

The results of the extrapolated drawdown analysis assume that if the constant water withdrawal observed during the pumping test continued indefinitely, the depths of drawdown would be estimated to be 8.34 m after 1 year of constant pumping, and 10.09 m after 20 years of constant pumping. The corresponding depths of available drawdown for the 1- and 20-year periods would be estimated to be 14.75 m and 13.00 m, respectively. For Well 2, it was clear from the extrapolated drawdown analysis that the pumping rate (82.5 L/min) was unsustainable for any period longer than 6 hours. The estimated depths of available drawdown after sustained pumping are considered to be suitable for a water supply at Well 1. For Well 2, a lower recommended pumping rate similar to that of Well 1 should be considered for a sustainable long-term pumping rate.

4.4 Vertical Gradient

The vertical difference between the two water bearing zones (intermediate and bedrock interface) indicate a slight downward gradient. This suggests that migration of waters and any dissolved contaminant would migrate downwards from the intermediate to the deeper aquifer.

4.5 Groundwater Quality

A groundwater sample was collected from Well 1 and Well 2 near the end of each respective pumping test; these samples were analysed for general organic and inorganic chemistry,



including bacteria analysis. Duplicate samples of each well were collected for bacteria analysis.

The water sample at Well 1 was collected just prior to the end of the pumping test at 3:20 pm on February 19, 2021 and the water sample at Well 2 was collected just prior to the end of the pumping test at 4:25 pm on February 15, 2021. Field observations noted that the water sampled from both wells was cloudy and opaque with no odour; sediment remained permanently in suspension. Field parameters were analysed for in the field and are summarized in Table 4.

Table 4: Water Quality Field Parameters

Well	Time	Oxidation-Reduction Potential (mV)	Conductivity (µS/cm)	pH	Temperature (°C)
Well 1	3:20 pm	132	420	8.56	16.1
Well 2	4:25 pm	125	350	8.04	17.1

Bolded values exceed ODWQS criteria

The groundwater samples were analysed by SGS and compared to the Ontario Drinking Water Quality Standard (ODWQS)(Ministry of Environment, 2006).

Water quality results are attached in Appendix D and exceedances are reported in Table 5:

Table 5 Groundwater Quality

Parameter	Well 1	ODWQS (mg/L)
Hardness	113	100
Sodium	45.9	20
Total Coliform ¹	2	0
Parameter	Well 2	PWQO Criteria (mg/L)
Hardness	167	100

1. Exceedance report in the duplicate sample only

The pH exceedance reported in the field for pH at Well 1 was not reported during the lab analysis; pH is interpreted as being within ODWQS criteria for both wells. Total Coliform exceeded the ODWQS criteria in the duplicate sample at Well 1. Because there was no total coliform reported from the original Well 1 sample, it is interpreted that the exceedance associated with the duplicate is from field contamination while sampling. Hardness exceeded the ODWQS criteria at both Well 1 and Well 2 suggesting that drinking water from the supply wells should be treated for hardness with an ion exchange softener prior to use to avoid scale



buildup in plumbing and appliances. The suspended solids observed in both of the wells would require a filtration unit, though prolonged pumping should create an effective gravel pack as sediment is removed and source water should clear up with time.



5.0 Conclusions and Recommendations

Cambium completed a pumping test of the two newly installed wells at the Site. Well 1 was screened between depths of 28.35 mbgs to 33.53 mbgs and is considered to be installed in a confined bedrock contact aquifer that occurs immediately below the overburden – bedrock contact. Well 2 was screened between depths of 22.86 mbgs to 24.99 mbgs and is considered to be installed in a confined overburden aquifer that occurs between 22.86 mbgs to 24.99 mbgs. A third upper aquifer was encountered during drilling, and is partially penetrated by the onsite dug well, this well was observed to produce clear water at a rate of 100 L/min but was not isolated with a well for further testing during this campaign due to budgetary constraints.

Water withdrawal occurred for a continuous 6-hour period during both pumping tests; the rate for Well 1 was 32 L/min and the rate for Well 2 was 82.5 L/min. In total, 11,520 L and 29,700 L of water was withdrawn from the wells respectively. The Specific Capacity of Well 1 during the 6-hour pumping test was 5.35 L/min/m, and the Specific Capacity of Well 2 was 5.41 L/min/m, resulting in a theoretical yield of 139 L/min and 94 L/min respectively (the difference between them is a result of the available drawdown / depth). The proven continual pumping rate of 32L/min was observed when extrapolating drawdown in Well 1, Well 2 was pumped in excess of its maximum sustainable rate as was evidenced by the failure of this well to reach an equilibrated pumping level. While additional testing may indicate a higher combined yield, a maximum rate of 32L/min is appropriate for preliminary planning purposes from the intermediate and bedrock contact aquifer. The upper unconfined aquifer may not be present across the site in the thicknesses observed, however; where it is an additional 100L/min is available for future uses.

Upon completion of the pumping test for Well 1, approximately 11,520 L was pumped from the well and a maximum drawdown of 5.98 m was recorded (leaving approximately 17.11 m of available drawdown in the well). The Test Well was also pumped at a rate of 32 L/min for the entirety of the test. The extrapolated depths of drawdown indicated that the overburden aquifer should be able to sustain long-term water withdrawal. The time of year studied (mid-summer) does not represent the peak of water table fluctuations, and the water level is



expected to rise in the spring months, further increasing the available drawdown in the well. As such, the groundwater resources available at Well 1 (i.e., overburden – bedrock contact aquifer) are considered to be suitable for industrial water supply.

Upon completion of the pumping test for Well 2, approximately 29,700 L was pumped from the well and a maximum drawdown of 15.24 m was recorded (leaving approximately 2.31 m of available drawdown in the well). The Test Well was also pumped at the peak demand rate of 82.5 L/min for the entirety of the test. While the tested rate was sustainable for the 6 hours, the steady decline in pumping levels indicate the well would not be able to sustain this rate for much longer and should be pumped at a lower rate (<50LPM) or deepened to include the bedrock contact aquifer to approach the upper theoretical yields of ~139L/min.

The Dug Well that was located near-by showed minimal to no response to the water withdrawal at the Test Well, as such no impacts to the groundwater users within 500 m (or further) from the Site who obtain water from the upper aquifer are anticipated upon the future development of the Site. There were no deeper wells identified within the MECP WWIS database within 500m of the site. Future testing for development specific wells should include off-site monitoring if available.

The results of the groundwater sampling indicated that turbidity, total coliforms and hardness exceeded their corresponding ODWQS criteria. Additionally, the total fraction of aluminum, iron and manganese exceeded the ODWQS criteria, however the dissolved fraction of these metals did not. Cambium recommends that the groundwater be treated with appropriate filtration and softened prior to use. Cambium also recommends that the grading plan ensure that run-off is conveyed away from the well and both onsite and adjacent septic systems are installed with the maximum amount of separation possible, particularly if sourcing the groundwater supply from the upper shallow aquifer.

Upon development of the Site, Well 1 and Well 2 could be used as water supply wells. The pump in Well 1 should be installed to a depth of 32 mtop and the pump at Well 2 should be installed to a depth of 23 mtop. The water level of both wells should be monitored to determine long term water withdrawal influences, monitoring frequencies should be accordant with the



anticipated demand (i.e. more frequently where higher demands are anticipated). The depth of the pump should be adjusted as needed. An additional unconfined aquifer exists from surface to 14 m deep and should be considered for use prior to advancing to the deeper units, the unit may not be present across the site but where encountered has the potential to provide clear water. This unit would not likely require filtration but could require disinfection given the unconfined nature of the water bearing sediments and the potential for surface contaminants to migrate to the aquifer after development.

The proven extrapolated long term pumping rate of 32L/min or 46,000L/day is considered sustainable and appropriate for planning purposes in the absence of further testing. The choice of targeting one water bearing unit over the other would be a site based decision, however; the deeper unit would likely be a more practical choice, given the greater available drawdown and resulting yield.

As an example of future industrial development, a factory - excluding production or process water demands, requires 75 L/day/employee (factory without showers) or 125 L/day/employee (factory with showers). In other words, the perpetual pumping of the intermediate aquifer (Well 1), as tested at 32L/min (46,000L/day), could supply up to 613 employees without showers, or 368 with showers. Additional supply is available from the upper unconfined aquifer (on-site dug well) which could, given the limited observations during drilling advancement, support a water demand up to 100L/min or 144,000 L/day.

In summary, there is ample proven supply for industrial uses that do not require process or washing water across the site. There is an indicated additional and isolated supply potential from the upper unit which could support either non-process water industrial development, or industrial uses that require process water up to ~144,000L/day. Cambium recommends a further testing program to provide proven water quality and quantity from the upper unconfined aquifer as well as the occurrence of the upper unconfined aquifer across the site.



Cambium Inc.

Nicole Heikoop, M.Sc., GIT
Technician

MEB/nmh

Mike Bingham, P.Geo.
Senior Project Manager/Hydrogeologist

\\camfile\Projects\12900 to 12999\12971-002 Township of Cavan-Monaghan - HydroG - 1066 Syer Line\Deliverables\REPORT - HG\Final\2021-10-15 HydroG Assessment, 1066 Syer Line, Fraserville, ON_FINAL.docx



6.0 References

Cambium Inc. (2021). *Environmental Impact Study - 1066 Syer Line, Cavan-Monaghan, County of Peterborough, Ontario.*

Cambium Inc. (2021). *Geotechnical Investigation Report - 380 High Street, Collingwood, Ontario.*

Chapman, L.J. and D.F. Putnam. (1984). *The Physiography of Southern Ontario: Ontario Geological Survey, Special Volume 2.*

Ministry of Environment. (1996). *Procedure D-5-5, Technical Guideline For Private Wells: Water Supply Assessment.*

Ministry of Environment. (2006). *Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines.*

Ontario Geological Survey. (2007). *Paleozoic Geology of Southern Ontario; Miscellaneous Release - Data 219.*

Ontario Geological Survey. (2010). *Surficial geology of Southern Ontario; Miscellaneous Release - Data 128 - Revised.*



7.0 Standard Limitations

Limited Warranty

In performing work on behalf of a client, Cambium relies on its client to provide instructions on the scope of its retainer and, on that basis, Cambium determines the precise nature of the work to be performed. Cambium undertakes all work in accordance with applicable accepted industry practices and standards. Unless required under local laws, other than as expressly stated herein, no other warranties or conditions, either expressed or implied, are made regarding the services, work or reports provided.

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The findings and results presented in reports prepared by Cambium are based on the materials and information provided by the client to Cambium and on the facts, conditions and circumstances encountered by Cambium during the performance of the work requested by the client. In formulating its findings and results into a report, Cambium assumes that the information and materials provided by the client or obtained by Cambium from the client or otherwise are factual, accurate and represent a true depiction of the circumstances that exist. Cambium relies on its client to inform Cambium if there are changes to any such information and materials. Cambium does not review, analyze or attempt to verify the accuracy or completeness of the information or materials provided, or circumstances encountered, other than in accordance with applicable accepted industry practice. Cambium will not be responsible for matters arising from incomplete, incorrect or misleading information or from facts or circumstances that are not fully disclosed to or that are concealed from Cambium during the provision of services, work or reports.

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Site Assessments

A site assessment is created using data and information collected during the investigation of a site and based on conditions encountered at the time and particular locations at which fieldwork is conducted. The information, sample results and data collected represent the conditions only at the specific times at which and at those specific locations from which the information, samples and data were obtained and the information, sample results and data may vary at other locations and times. To the extent that Cambium's work or report considers any locations or times other than those from which information, sample results and data was specifically received, the work or report is based on a reasonable extrapolation from such information, sample results and data but the actual conditions encountered may vary from those extrapolations.

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Appended Figures



HYDROGEOLOGICAL INVESTIGATION
 TOWNSHIP OF CAVAN-MONAGHAN
 1066 Syer Line,
 Fraserville, Ontario

LEGEND

-  Drilled Well
-  Dug Well
-  Site (approximate)

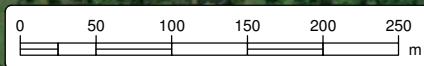
Notes:
 - Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
 - Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
 - Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

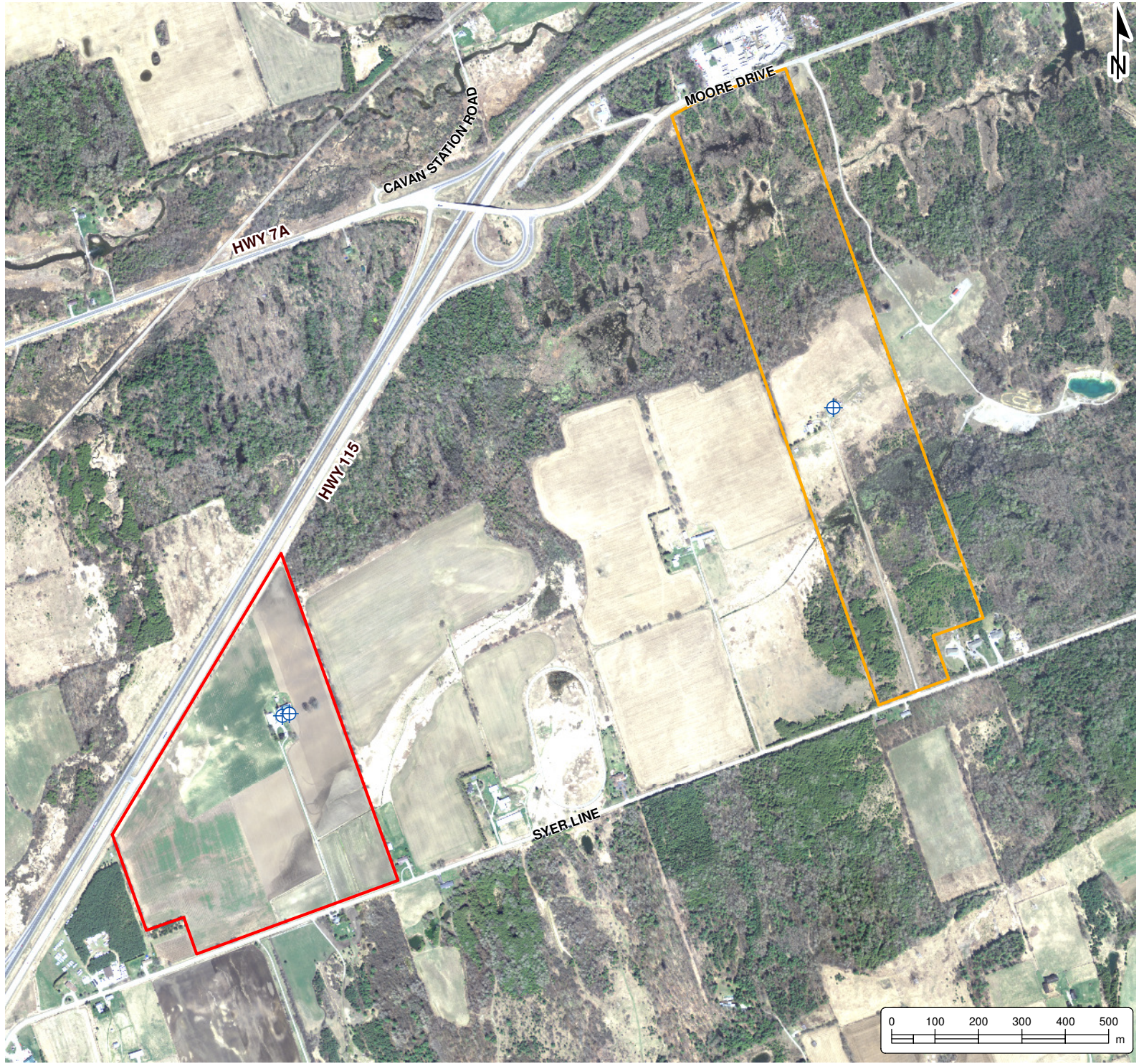


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 Peterborough, Ontario, K9H 1E5
 Tel: (705) 742.7900 Fax: (705) 742.7907
 www.cambium-inc.com

SITE PLAN




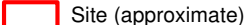
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Scale:	1:5,000	Rev.:	
Created by:	MAT	Checked by:	MB
		Figure:	1





HYDROGEOLOGICAL INVESTIGATION
 TOWNSHIP OF CAVAN-MONAGHAN
 1066 Syer Line,
 Fraserville, Ontario

LEGEND

-  Drilled Well
-  Dug Well
-  1256 Syer Line
-  Site (approximate)

Notes:
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 - Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
 - Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

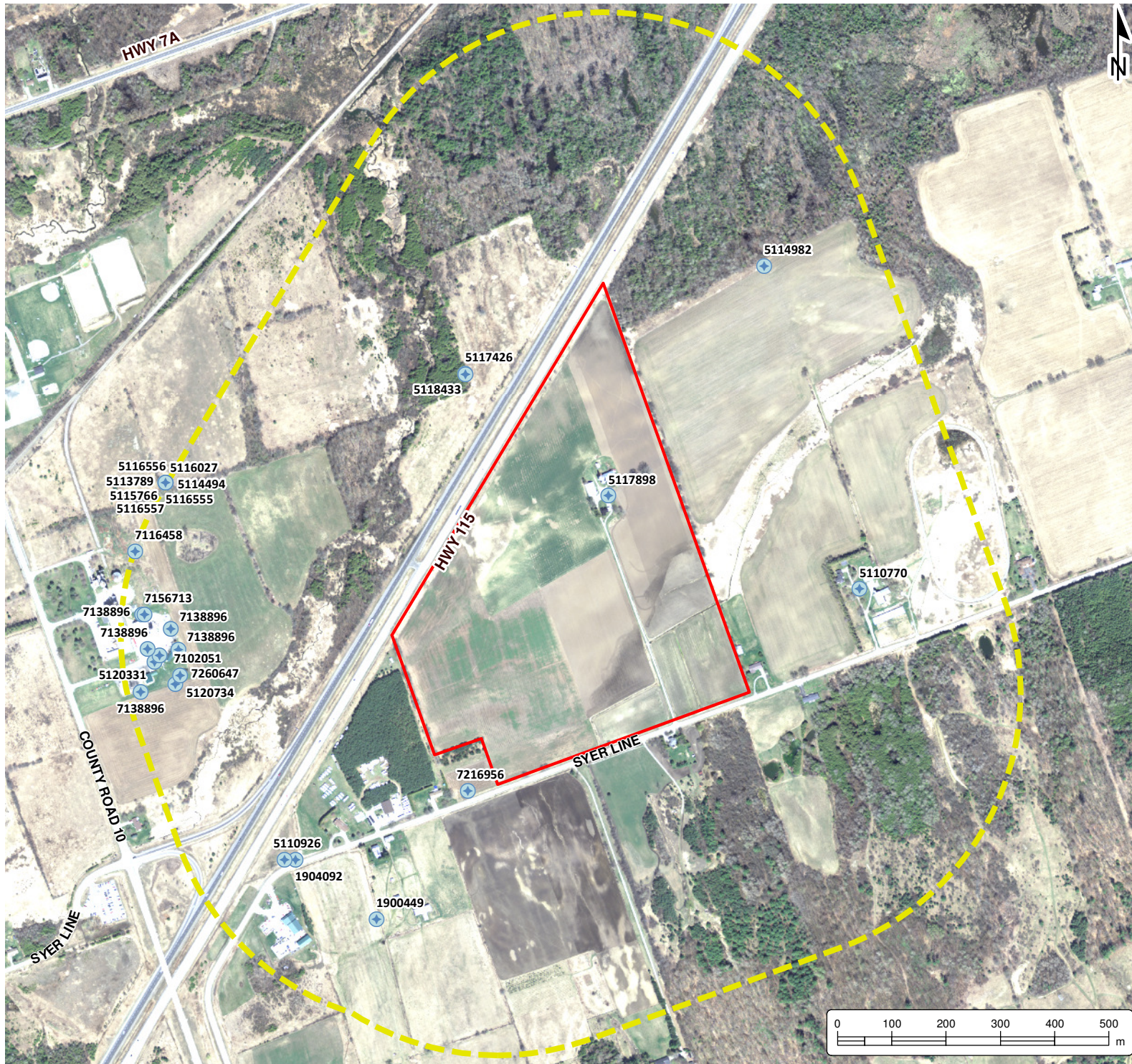


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OFF-SITE GROUNDWATER MONITORING NETWORK




Project No.:	12971-002	Date:	August 2021
Scale:	1:12,500	Rev.:	
Created by:	MAT	Projection:	NAD 1983 UTM Zone 17N
Checked by:	MB	Figure:	2

O:\GIS\MXD\17-2000-1299\12971-002_Township of Cavan-Monaghan - HydroG - 1066 Syer Line 2021-08-18 FIG 2 - Off-Site Groundwater Monitoring Network.mxd



HYDROGEOLOGICAL INVESTIGATION
 TOWNSHIP OF CAVAN-MONAGHAN
 1066 Syer Line,
 Fraserville, Ontario

LEGEND

-  MECP Well Record
-  500m Study Area
-  Site (approximate)

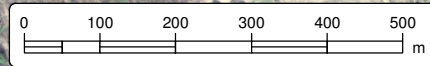
Notes:
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**WATER WELL RECORDS
 WITHIN 500m OF SITE**

Project No.:	12971-002	Date:	August 2021
Scale:	1:10,000	Rev.:	
Created by:	MAT	Projection:	NAD 1983 UTM Zone 17N
Checked by:	MB	Figure:	3



O:\GIS\MXD\172000-1299\12971-002_Township of Cavan-Monaghan - HydroG - 1066 Syer Line 2021-08-18 FIG 3 - Water Well Records within 500m of Site.mxd

Figure 4: Water Level Fluctuations - July 19

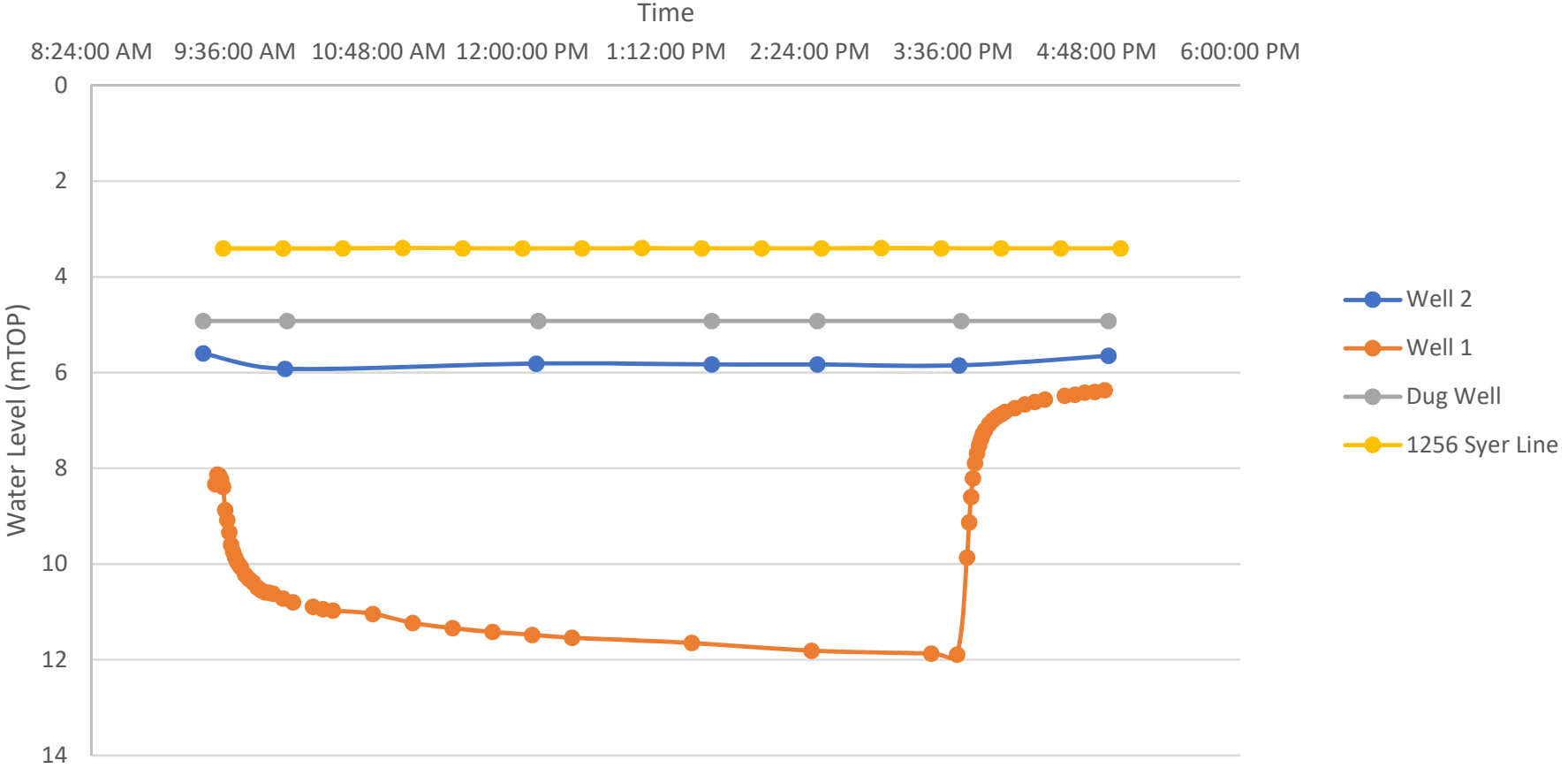
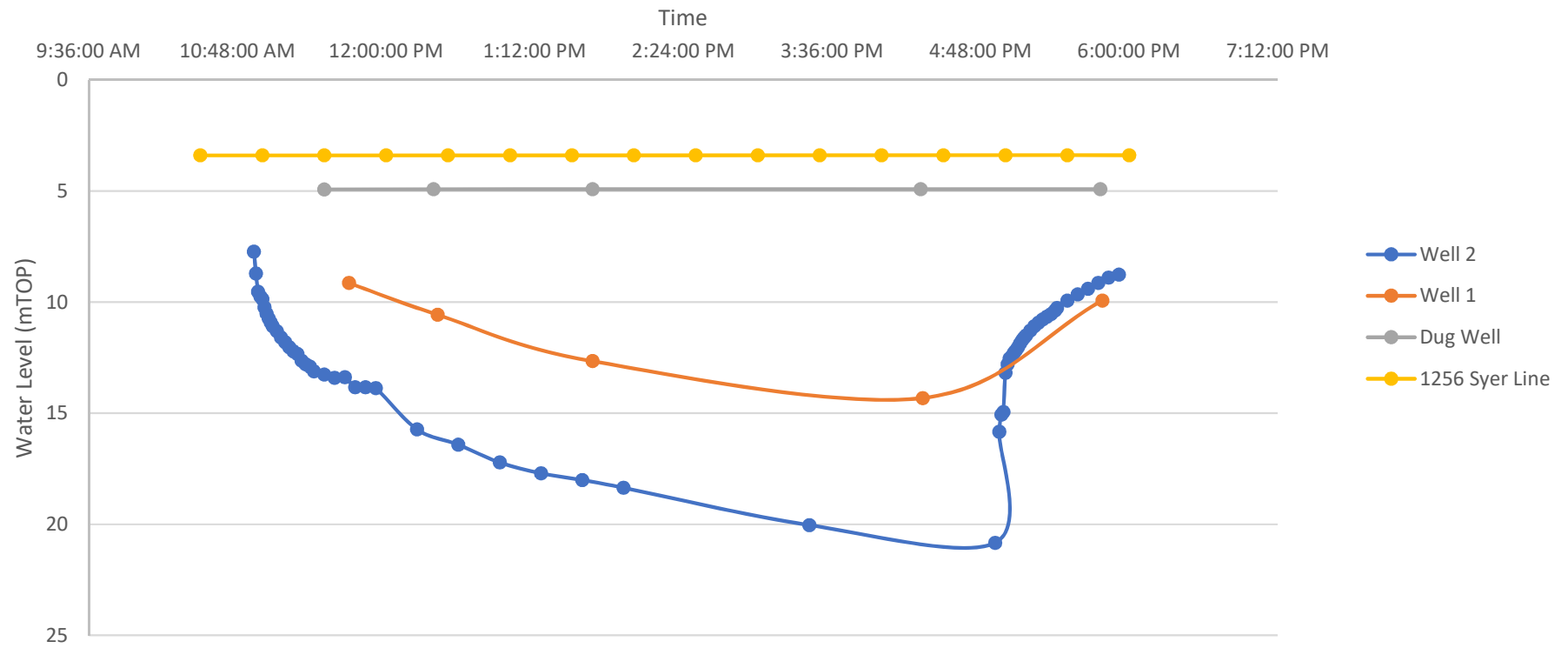


Figure 5: Water Level Fluctuations - July 15



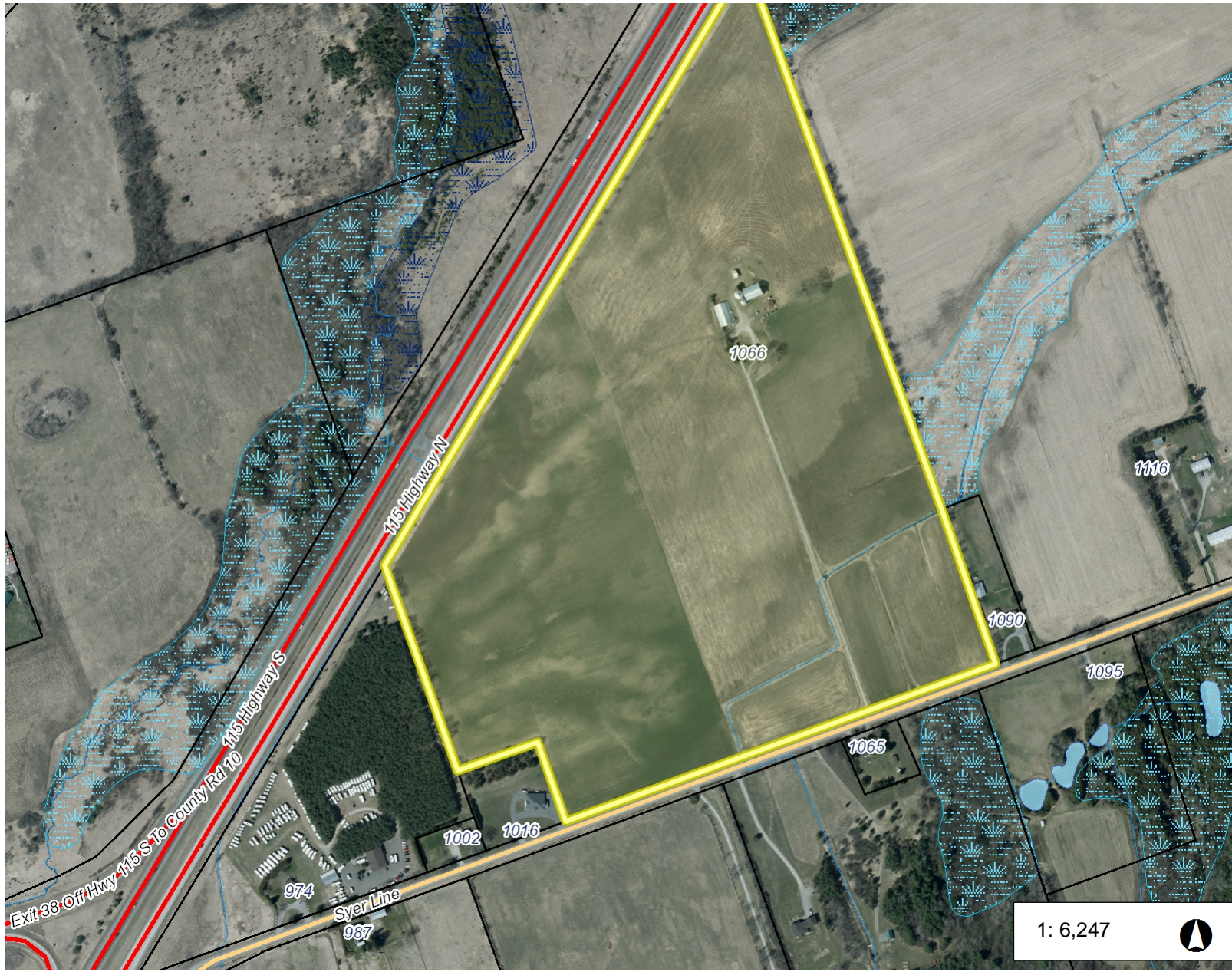
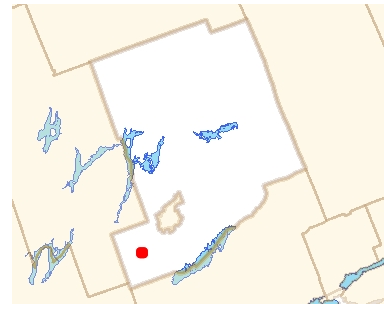


Appendix A

Land Information



1066 Syer Line - Aerial



Legend

- Roads < 50,000**
 - PRIV ; Private; PRIV
 - City Arterial
 - City Collector and Local
 - City Owned Unclassified
 - Provincial
 - County
 - Township
 - Water Access Only
- Outside Roads < 50,000**
 - Major Roads
 - Local Roads
- Peterborough Proposed Bypass
- First Nations
- Civic Address
- Parcel Fabric
- Parcel First Nations - Canada I
- Rivers
 - Intermittent
 - Permanent
- Clean Water Act Policies Apply
- Provincially Significant Wetland
- Locally Significant Wetlands
- Non-evaluated Wetlands
- Lakes - Local Scale
- Municipal Boundary - Upper Ti
 - <all other values>
 - COUNTY OF PETERBOROUGH

1: 6,247

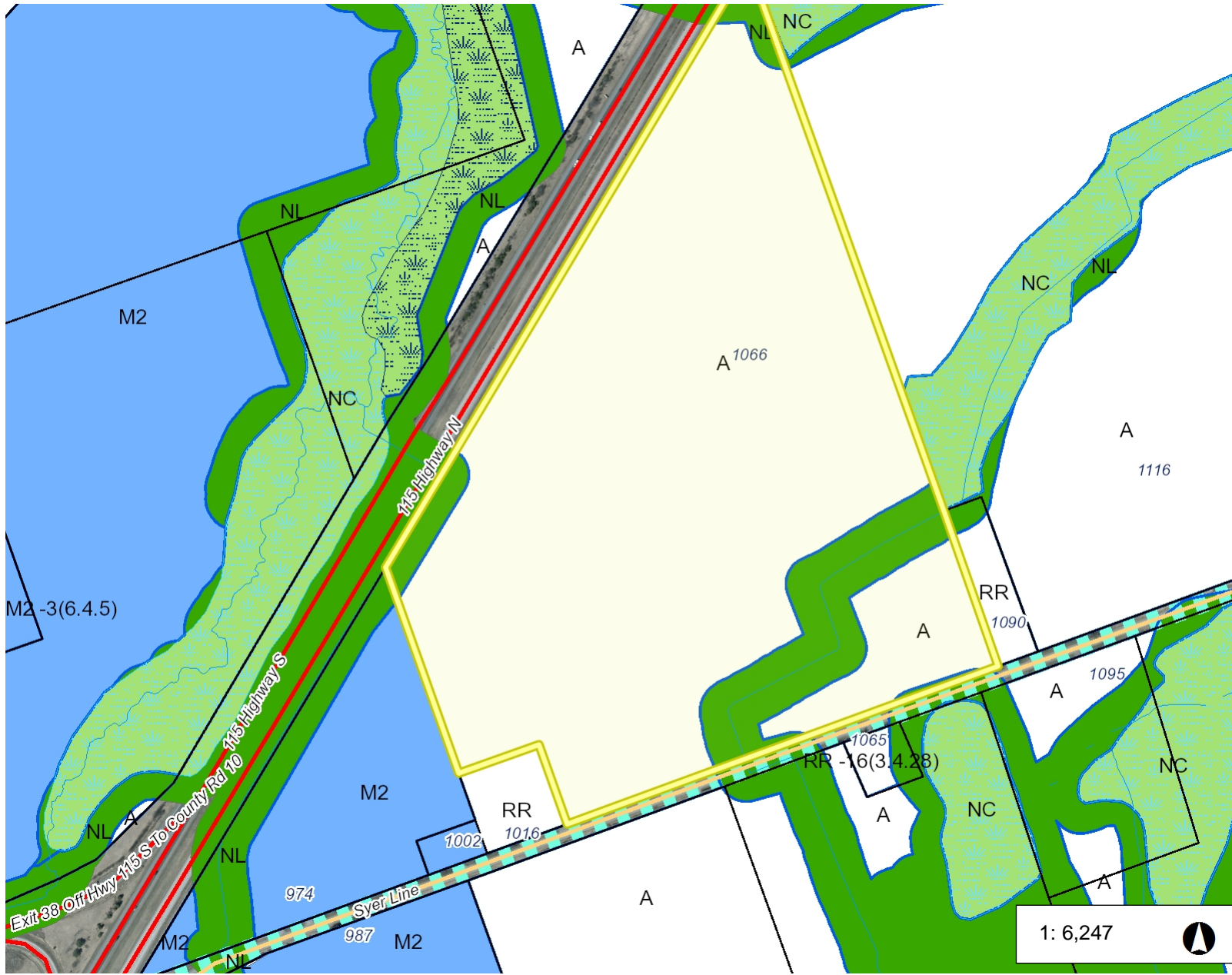
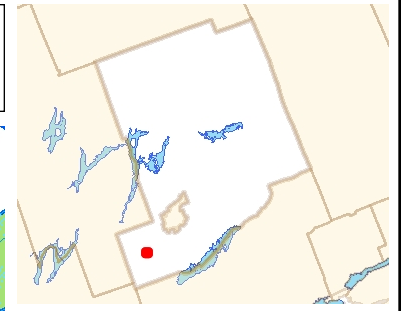


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THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes



1066 Syer Line - Zoning and Designation



Legend

- Roads < 50,000**
 - PRIV ; Private; PRIV
 - City Arterial
 - City Collector and Local
 - City Owned Unclassified
 - Provincial
 - County
 - Township
 - Water Access Only
- Outside Roads < 50,000**
 - Major Roads
 - Local Roads
- Peterborough Proposed Bypass
- First Nations
- Civic Address
- Parcel Fabric
- Parcel First Nations - Canada I
- Rivers
 - Intermittent
 - Permanent
- Clean Water Act Policies Apply
- Provincially Significant Wetland
- Locally Significant Wetlands
- Non-evaluated Wetlands
- Special Policy Area
- Oak Ridges Moraine
- Cavan Monaghan Zoning
- ORM EPR

1: 6,247

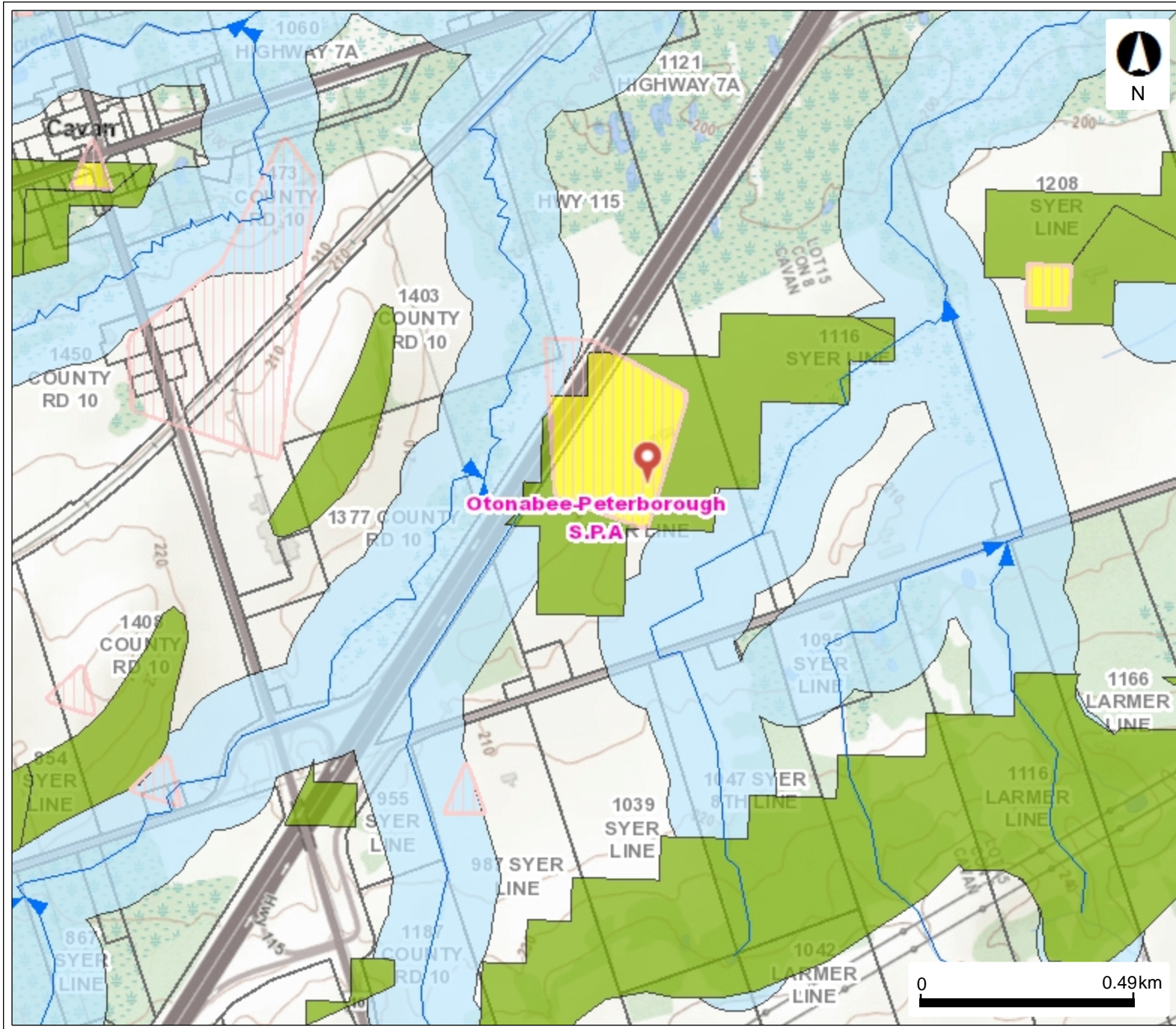


This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Notes

SPIA Map



Legend

- Source Protection Areas
- ▶ Watercourse Direction
- Highly Vulnerable Aquifers
- Significant Groundwater Recharge Area
- 0
- 2
- 4
- 6
- Intake Protection Zone 3
- Assessment Parcel

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Environment, Conservation and Parks (MECP) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.



Appendix B

Local Water Well Records

(New on-site well records to be provided when received)



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

11

5114982

MUNICIP 51024

CON 108

COUNTY OR DISTRICT [REDACTED] TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Milbrook CON. BLOCK, TRACT, SURVEY, ETC. 8 LOT 25-27 15
DATE COMPLETED 48-53 DAY 30n MO 11 YR 90

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)					
GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
Brown	Sand		Soft	0	8
Lt. Br.	Clay	Gravel & Stones	Packed	8	29
Grey	Clay	Gravel & Stones	PACKED	29	45
Grey	Gravel	Sand & Stones	Layered & Hard	45	56
Brown	Coarse Water Gravel & Sand		Loose	56	57
Chlorinated Well					

31 32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
15-18	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6-1/4	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	0	57
17-18	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC			20-23
24-25	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
	INCHES	FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN	41-44
	FEET	

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD 10 PUMP 2 BAILER

PUMPING RATE 11-14 5 gpm 2 15-16 HOURS 00 17-18 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING			
19-21	22-24	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
12 FEET	47 FEET	47 FEET	47 FEET	47 FEET	47 FEET

IF FLOWING, GIVE RATE _____ GPM

PUMP INTAKE SET AT 38-41 52 FEET

WATER AT END OF TEST 42 CLEAR 2 CLOUDY

RECOMMENDED PUMP TYPE SHALLOW DEEP

RECOMMENDED PUMP SETTING 43-45 52 FEET

RECOMMENDED PUMPING RATE 46-49 5 GPM

LOCATION OF WELL

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

DRILLERS REMARKS

CRID

78683

FINAL STATUS OF WELL

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

WATER USE

1 DOMESTIC 5 COMMERCIAL
2 STOCK 6 MUNICIPAL
3 IRRIGATION 7 PUBLIC SUPPLY
4 INDUSTRIAL 8 COOLING OR AIR CONDITIONING
 OTHER 9 NOT USED

METHOD OF CONSTRUCTION

1 CABLE TOOL 5 BORING
2 ROTARY (CONVENTIONAL) 6 DIAMOND
3 ROTARY (REVERSE) 7 JETTING
4 ROTARY (AIR) 8 DRIVING
5 AIR PERCUSSION DIGGING OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR Herb Lang Well Drilling Ltd. WELL CONTRACTOR'S LICENCE NUMBER 3367
ADDRESS R.R. #1 Omeme, Ontario

NAME OF WELL TECHNICIAN Jerb Lang WELL TECHNICIAN'S LICENCE NUMBER T0002

SIGNATURE OF TECHNICIAN/CONTRACTOR [Signature] SUBMISSION DATE DAY 30 MO 11 YR 90

OFFICE USE ONLY

DATA SOURCE 58 CONTRACTOR 59-62 3367 DATE RECEIVED 63-68 80 DEC 28 1990

DATE OF INSPECTION INSPECTOR

REMARKS

CSS.ES



UTM 17 703149 E

5 R 44895530 N

Elev. 5 R 0700

The Ontario Water Resources Commission Act

WATER WELL RECORD

Basin 24 County or District Durham

Township, Village, Town or City Cavan

Con. 7 Lot 13

Date completed 6 June 1962
(day month year)

Address R.R. #1, Traver Hill

GROUND WATER BRANSBY
No. 19
AUG 27 1962
ONTARIO WATER RESOURCES COMMISSION

Casing and Screen Record

Inside diameter of casing 6 1/4"
Total length of casing 35'
Type of screen none
Length of screen -
Depth to top of screen -
Diameter of finished hole 6 1/4"

Pumping Test

Static level 22'
Test-pumping rate 30 G.P.M.
Pumping level 26
Duration of test pumping 3 hrs.
Water clear or cloudy at end of test clear
Recommended pumping rate 10 G.P.M.
with pump setting of 30 feet below ground surface

Well Log

Overburden and Bedrock Record

Clay 7' 1/2
grey sand
coarse gravel

Water Record

From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
<u>3</u>	<u>33</u>		
<u>23</u>	<u>33</u>		
<u>33</u>	<u>42</u>	<u>33-42'</u>	<u>fresh</u>

For what purpose(s) is the water to be used?
Farm

Is well on upland, in valley, or on hillside?

Drilling or Boring Firm A. H. Faulkner

Address 687 Main St. Peterboro

Licence Number 579

Name of Driller or Borer A. Babcock

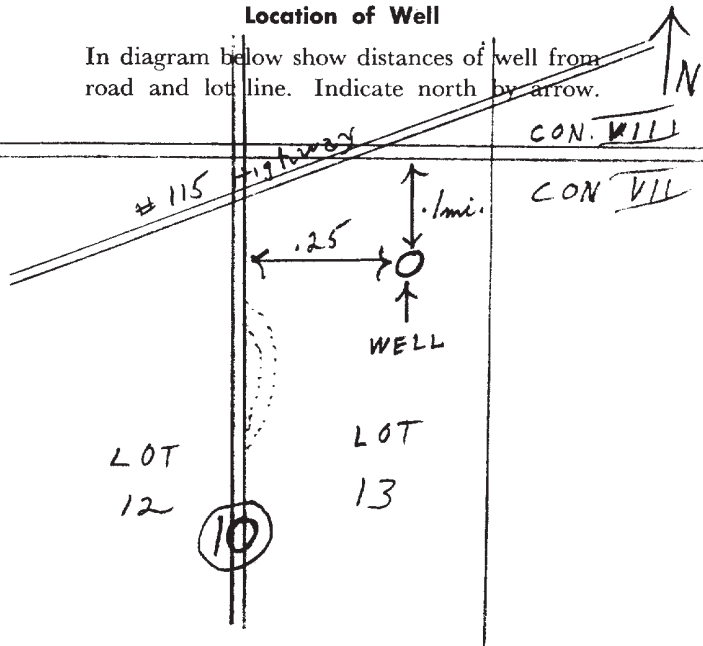
Address R.R. #4, Peterboro

Date Aug. 24/62

A. H. Faulkner
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.





Ontario

WATER WELL RECORD

31 D 12

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

COUNTY OR DISTRICT: Retreat TOWNSHIP, BOROUG, CITY, TOWN, VILLAGE: Cavan CON., BLOCK, TRACT, SURVEY, ETC.: 8 LOT: 013

ELEVATION: 9700 BASIN CODE: 5 24

DATE COMPLETED: 10 DAY: 30 MO: Oct YR: 74

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
<u>Brown</u>	<u>sandy clay</u>	<u>gravel</u>	<u>soft</u>	<u>0</u>	<u>60</u>
			<u>hard</u>	<u>60</u>	<u>62</u>

31 006061058185 0062 1173

41 WATER RECORD

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

51 CASING & OPEN HOLE RECORD

INSIDE OPEN INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
<u>6 1/2</u>	<u>STEEL</u>	<u>1/8</u>	<u>0</u>	<u>62</u>
<u>6</u>	<u>STEEL</u>		<u>20-23</u>	
<u>24-25</u>	<u>STEEL</u>		<u>27-30</u>	

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET		MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
FROM	TO	
<u>10-13</u>	<u>16-17</u>	
<u>18-21</u>	<u>22-25</u>	
<u>26-29</u>	<u>30-33</u>	

71 PUMPING TEST

PUMPING TEST METHOD: 1 PUMP 2 WAILER

PUMPING RATE: 0030 GPM

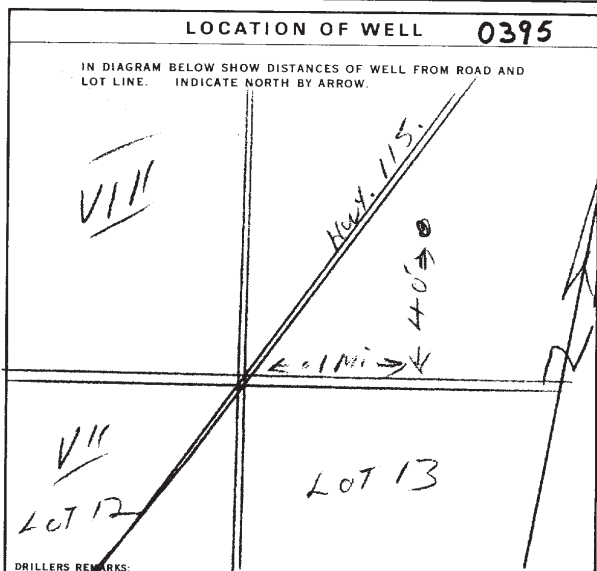
DURATION OF PUMPING: 02 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING			
<u>022</u>	<u>030</u>	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
<u>022</u>	<u>030</u>	<u>030</u>	<u>030</u>	<u>030</u>	<u>030</u>

RECOMMENDED PUMP TYPE: MALLOW DEEP

RECOMMENDED PUMP SETTING: 030

RECOMMENDED PUMPING RATE: 0005 GPM



54 FINAL STATUS OF WELL: 1 WATER SUPPLY

55-56 WATER USE: 1 DOMESTIC

57 METHOD OF DRILLING: 1 CABLE TOOL

CONTRACTOR: Wm. Sanderson LICENCE NUMBER: 4713

ADDRESS: 34 Banchooood Dr. Fenborough Ont

NAME OF DRILLER OR BORE: D. Fisher LICENCE NUMBER: 2121

SIGNATURE OF CONTRACTOR: Wm. Sanderson SUBMISSION DATE: DAY 26 MO. 02 YR. 75

OFFICE USE ONLY

DATA SOURCE: 1 CONTRACTOR: 4713 DATE RECEIVED: 130375

DATE OF INSPECTION: _____ INSPECTOR: _____

REMARKS: _____

WI



Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

3101e

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

11

5110770

MUNICIPALITY 51024

CON

08

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC.	LOT
	CAHAN	8	015
DATE COMPLETED		DAY	MO
FRASIERVILLE		13	09
ELEVATION		RC	YR
896.140		5	82
BASIN CODE		II	IV
24			

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
BLACK	TOP SOIL			0	1
Yellow	CLAY			1	8
Grey	CLAY	STONES		8	31
Grey	CLAY	STONES	GRAVEL	31	39
Brown	SAND (COARSE)	(CLAY BALLS)		39	41.3

MOE VE-17

921407 ft

31 0001802 0008505 000120512 00092051211 000161005

32

41 WATER RECORD

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

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
9.6	STEEL	1.99	0	11.3
17-18	STEEL		20-23	
24-25	STEEL		27-30	

SCREEN

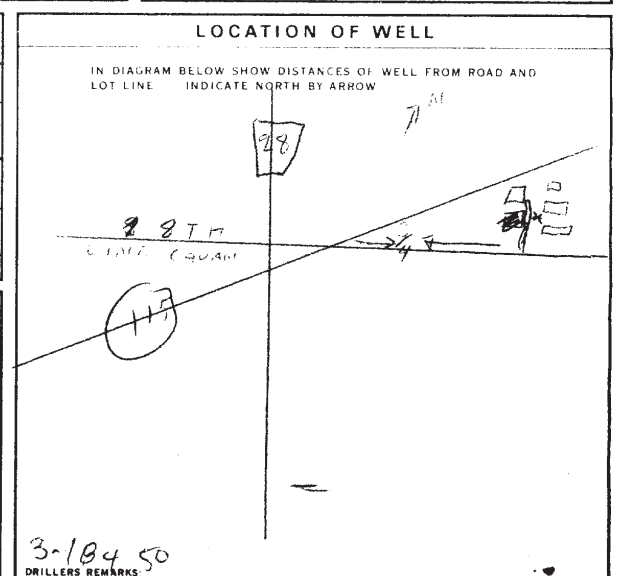
SIZE OF OPENING (SLOT NO. 1)	DIAMETER	LENGTH
	INCHES	FEET
		41-44
		FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

1 <input type="checkbox"/> PUMP	2 <input checked="" type="checkbox"/> BAILEY	3 <input type="checkbox"/> OTHER
4 <input type="checkbox"/> PUMPING	5 <input type="checkbox"/> RECOVERY	6 <input type="checkbox"/> OTHER
7 <input type="checkbox"/> PUMPING	8 <input type="checkbox"/> RECOVERY	9 <input type="checkbox"/> OTHER
10 <input type="checkbox"/> PUMPING	11 <input type="checkbox"/> RECOVERY	12 <input type="checkbox"/> OTHER
13 <input type="checkbox"/> PUMPING	14 <input type="checkbox"/> RECOVERY	15 <input type="checkbox"/> OTHER
16 <input type="checkbox"/> PUMPING	17 <input type="checkbox"/> RECOVERY	18 <input type="checkbox"/> OTHER
19 <input type="checkbox"/> PUMPING	20 <input type="checkbox"/> RECOVERY	21 <input type="checkbox"/> OTHER
22 <input type="checkbox"/> PUMPING	23 <input type="checkbox"/> RECOVERY	24 <input type="checkbox"/> OTHER
25 <input type="checkbox"/> PUMPING	26 <input type="checkbox"/> RECOVERY	27 <input type="checkbox"/> OTHER
28 <input type="checkbox"/> PUMPING	29 <input type="checkbox"/> RECOVERY	30 <input type="checkbox"/> OTHER
31 <input type="checkbox"/> PUMPING	32 <input type="checkbox"/> RECOVERY	33 <input type="checkbox"/> OTHER
34 <input type="checkbox"/> PUMPING	35 <input type="checkbox"/> RECOVERY	36 <input type="checkbox"/> OTHER
37 <input type="checkbox"/> PUMPING	38 <input type="checkbox"/> RECOVERY	39 <input type="checkbox"/> OTHER
40 <input type="checkbox"/> PUMPING	41 <input type="checkbox"/> RECOVERY	42 <input type="checkbox"/> OTHER
43 <input type="checkbox"/> PUMPING	44 <input type="checkbox"/> RECOVERY	45 <input type="checkbox"/> OTHER
46 <input type="checkbox"/> PUMPING	47 <input type="checkbox"/> RECOVERY	48 <input type="checkbox"/> OTHER
49 <input type="checkbox"/> PUMPING	50 <input type="checkbox"/> RECOVERY	51 <input type="checkbox"/> OTHER
52 <input type="checkbox"/> PUMPING	53 <input type="checkbox"/> RECOVERY	54 <input type="checkbox"/> OTHER
55 <input type="checkbox"/> PUMPING	56 <input type="checkbox"/> RECOVERY	57 <input type="checkbox"/> OTHER
58 <input type="checkbox"/> PUMPING	59 <input type="checkbox"/> RECOVERY	60 <input type="checkbox"/> OTHER
61 <input type="checkbox"/> PUMPING	62 <input type="checkbox"/> RECOVERY	63 <input type="checkbox"/> OTHER
64 <input type="checkbox"/> PUMPING	65 <input type="checkbox"/> RECOVERY	66 <input type="checkbox"/> OTHER
67 <input type="checkbox"/> PUMPING	68 <input type="checkbox"/> RECOVERY	69 <input type="checkbox"/> OTHER
70 <input type="checkbox"/> PUMPING	71 <input type="checkbox"/> RECOVERY	72 <input type="checkbox"/> OTHER



FINAL STATUS OF WELL

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

WATER USE

1 DOMESTIC
2 STOCK
3 IRRIGATION
4 INDUSTRIAL
5 COMMERCIAL
6 MUNICIPAL
7 PUBLIC SUPPLY
8 COOLING OR AIR CONDITIONING
9 NOT USED

METHOD OF DRILLING

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

CONTRACTOR

NAME OF WELL CONTRACTOR: NELSON ENGINEERING - SONS LTD
LICENCE NUMBER: 1921
ADDRESS: RR# 2 CAHAN

NAME OF DRILLER OR BORER: NELS ROBERTSON
LICENCE NUMBER: [blank]
SIGNATURE OF CONTRACTOR: [Signature]
SUBMISSION DATE: DAY 13 NO 9 YR 82

OFFICE USE ONLY

DATE SOURCE: 1
CONTRACTOR: 1921
DATE RECEIVED: 12 05 82
DATE OF INSPECTION: [blank]
INSPECTOR: [blank]
REMARKS: [blank]

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11

5117426

Municipality 51024 Con. CON 08

County or District: [Redacted] Township/Borough/City/Town/Village: **Cavan** Con block tract survey, etc.: **8 Plan 117 14** Lot: **14**

Address: **Cavan, Ontario** Date completed: **3 day 2 month 97**

Northing RC Elevation RC Basin Code

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)					
General colour	Most common material	Other materials	General description	Depth - feet	
				From	To
Brown	Top Soil		Soft	0	2
Brown	Clay	Stones	Packed	2	18
Grey	Hard Pan		Cemented	18	73
Brown	Gravel & Water		Loose	73	75

31
32

WATER RECORD

Water found at - feet: **75**

Kind of water: Fresh Salty

Minerals: Sulphur Minerals Gas

Tested: Untested

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet	
			From	To
6-1/4	Steel	.188	0	75

SCREEN

Sizes of opening (Slot No.): _____ Diameter: _____ Length: _____

Material and type: _____ Depth at top of screen: _____

PLUGGING & SEALING RECORD

Annular space: Abandonment:

Depth set at - feet: **0** to **15**

Material and type: **Bentonite (Holeplug)**

PUMPING TEST

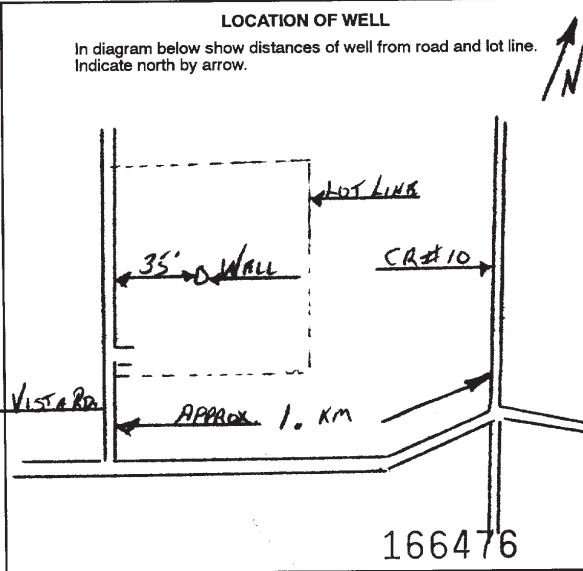
Pumping test method: Pump Bailor

Pumping rate: **10** GPM Duration of pumping: **30** hours

Static level	Water level end of pumping	Water levels during Pumping				Recovery
19-21	22-24	15 minutes	30 minutes	45 minutes	60 minutes	35-37
0 feet	60 feet	39 feet	53 feet	60 feet	60 feet	

Recommended pump type: Shallow Deep

Recommended pump setting: **70** feet Recommended pump rate: **7** GPM



FINAL STATUS OF WELL

Water supply: Abandoned, insufficient supply Unfinished

Observation well: Abandoned, poor quality Replacement well

Test hole: Abandoned (Other)

Recharge well: Dewatering

WATER USE

Domestic: Commercial Not used

Stock: Municipal Other

Irrigation: Public supply

Industrial: Cooling & air conditioning

METHOD OF CONSTRUCTION

Cable tool: Air percussion Driving

Rotary (conventional): Boring Digging

Rotary (reverse): Diamond Other

Rotary (air): Jetting

Name of Well Contractor: **Herb Lang Well Drilling Ltd.** Well Contractor's Licence No.: **3367**

Address: **R.R. #1 Omeme, Ontario**

Name of Well Technician: **Dave Fisher** Well Technician's Licence No.: **T-0231**

Signature of Technician/Contractor: *[Signature]* Submission date: **3 mo 2 yr 97**

MINISTRY USE ONLY

Data source: **3367** Contractor: **3367** Date received: **FEB 26 1997**

Date of inspection: _____ Inspector: _____

Remarks: _____

CSS. S

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

PETERBOROUGH

11

5117898

Municipality 51024 Con. 08
10 14 15 22 23 24

County or District Cavan	Township/Borough/City/Town/Village Peterboro	Con block tract survey, etc. 8	Lot 14
Address RR#1 Eversville Ont		Date completed 03 09 1998 day month year	
Northing		Elevation	
RC		Basin Code	

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)					
General colour	Most common material	Other materials	General description	Depth - feet	
				From	To
			Cleaned out Well Brown - Sand	0-22	0-21
			Cemented Tile Joint's with Cement + Seal Bond	0	10

31
32

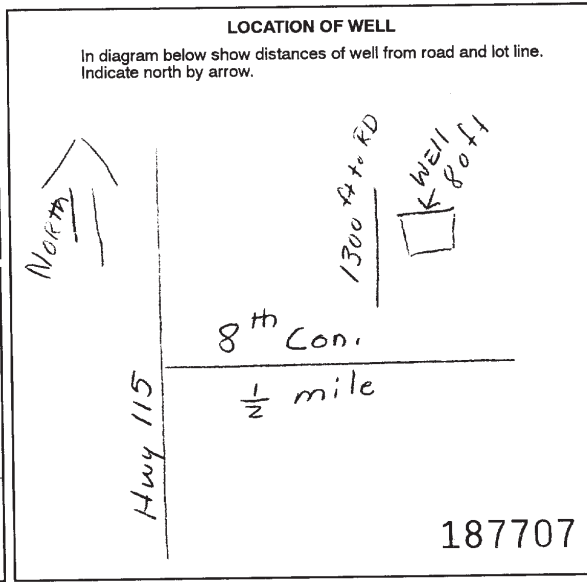
41 WATER RECORD	
Water found at - feet	Kind of water
0-22	<input checked="" type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas
	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas
	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas
	<input type="checkbox"/> Fresh <input type="checkbox"/> Salty <input type="checkbox"/> Sulphur <input type="checkbox"/> Minerals <input type="checkbox"/> Gas

51 CASING & OPEN HOLE RECORD				
Inside diam inches	Material	Wall thickness inches	Depth - feet	
			From	To
30"	<input type="checkbox"/> Steel <input type="checkbox"/> Galvanized <input type="checkbox"/> Concrete <input type="checkbox"/> Open hole <input type="checkbox"/> Plastic	3"	0	22
	<input type="checkbox"/> Steel <input type="checkbox"/> Galvanized <input type="checkbox"/> Concrete <input type="checkbox"/> Open hole <input type="checkbox"/> Plastic			
	<input type="checkbox"/> Steel <input type="checkbox"/> Galvanized <input type="checkbox"/> Concrete <input type="checkbox"/> Open hole <input type="checkbox"/> Plastic			

SCREEN	Sizes of opening (Slot No.)	Diameter inches	Length feet

61 PLUGGING & SEALING RECORD	
Depth set at - feet	
From	To

71 PUMPING TEST	
Pumping test method <input checked="" type="checkbox"/> Pump <input type="checkbox"/> Bailer	Pumping rate 25 GPM
Duration of pumping 3 Hours	Water levels during
Static level 0-18 feet	15 minutes 0-19 feet
Water level end of pumping 0-22 feet	30 minutes 0-18 feet
	45 minutes 0-18 feet
	60 minutes 0-18 feet
If flowing give rate 0-20 GPM	Pump intake set at 0-20 feet
Recommended pump type <input checked="" type="checkbox"/> Shallow <input type="checkbox"/> Deep	Water at end of test <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Cloudy
	Recommended pump rate 4 GPM



FINAL STATUS OF WELL	
<input checked="" type="checkbox"/> Water supply	<input type="checkbox"/> Abandoned, insufficient supply
<input type="checkbox"/> Observation well	<input type="checkbox"/> Abandoned, poor quality
<input type="checkbox"/> Test hole	<input type="checkbox"/> Abandoned (Other)
<input type="checkbox"/> Recharge well	<input type="checkbox"/> Dewatering

WATER USE	
<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Commercial
<input type="checkbox"/> Stock	<input type="checkbox"/> Municipal
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Public supply
<input type="checkbox"/> Industrial	<input type="checkbox"/> Cooling & air conditioning

METHOD OF CONSTRUCTION	
<input checked="" type="checkbox"/> Cable tool	<input type="checkbox"/> Air percussion
<input type="checkbox"/> Rotary (conventional)	<input type="checkbox"/> Boring
<input type="checkbox"/> Rotary (reverse)	<input type="checkbox"/> Diamond
<input type="checkbox"/> Rotary (air)	<input type="checkbox"/> Jetting

Cleaned out Well
Pully winch

Name of Well Contractor Richard Lott	Well Contractor's Licence No. 6874	Date received SEP 29 1998
Address 398 Surrey Dr Oshawa Ont L1G6H1		Inspector
Name of Well Technician Richard Lott	Well Technician's Licence No. T 2424	Remarks
Signature of Technician/Contractor Richard Lott	Submission date 09 29 1998 day mo yr	CSS. S9

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11

5118433

Municipality 51024 Con. COX 08

County or District: **Peterborough**
 Township/Borough/City/Town/Village: **Cavan**
 Con block tract survey, etc.: **8** Lot: **14**
 Address: **R.R. #2 Omemee, Ontario**
 Date completed: **24** day, **3** month, **2000** year

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)					
General colour	Most common material	Other materials	General description	Depth - feet	
				From	To
Dk. Br.	Top Soil		Loose	0	1
Dk. Br.	Sand	Clay Gravel	Packed	1	15
Grey	Gravel	Clay Sand	Packed	15	36
Grey	Stone	Gravel Sand	Packed	36	57
Grey	Clay	Gravel	Packed	57	108
Grey	Clay		Dense	108	148
Brown	Sand	Clay	Packed	148	164
Grey	Clay	Sand	Packed	164	222
Brown	Gravel Sand	Water	Porous	222	225

31
32

41 WATER RECORD

Water found at - feet	Kind of water
10-13	1 <input checked="" type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty
15-16	1 <input type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty
20-23	1 <input type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty
25-28	1 <input type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty
30-33	1 <input type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet	
			From	To
6-1/4	1 <input checked="" type="checkbox"/> Steel 2 <input type="checkbox"/> Galvanized 3 <input type="checkbox"/> Concrete 4 <input type="checkbox"/> Open hole 5 <input type="checkbox"/> Plastic	.188	0	225
17-18	1 <input type="checkbox"/> Steel 2 <input type="checkbox"/> Galvanized 3 <input type="checkbox"/> Concrete 4 <input type="checkbox"/> Open hole 5 <input type="checkbox"/> Plastic			20-23
24-25	1 <input type="checkbox"/> Steel 2 <input type="checkbox"/> Galvanized 3 <input type="checkbox"/> Concrete 4 <input type="checkbox"/> Open hole 5 <input type="checkbox"/> Plastic			27-30

SCREEN RECORD

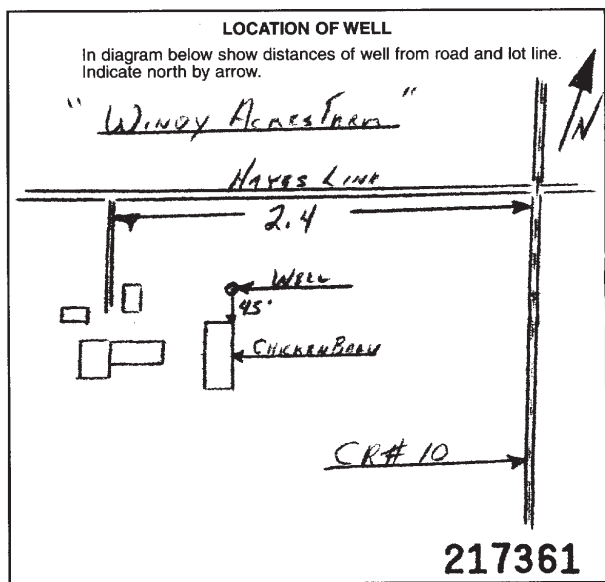
Sizes of opening (Slot No.)	Diameter inches	Length feet

61 PLUGGING & SEALING RECORD

Depth set at - feet	Material and type (Cement grout, bentonite, etc.)
15	Holeplug

71 PUMPING TEST

Pumping test method	Pumping rate GPM	Duration of pumping Hours	Static level	Water level end of pumping	Water levels during	Water at end of test
1 <input type="checkbox"/> Pump 2 <input checked="" type="checkbox"/> Bailor	10	5	100 feet	125 feet	125 feet (15 min), 125 feet (30 min), 125 feet (45 min), 125 feet (60 min)	Clear



FINAL STATUS OF WELL

1 Water supply
2 Observation well
3 Test hole
4 Recharge well

5 Abandoned, insufficient supply
6 Abandoned, poor quality
7 Abandoned (Other)
8 Dewatering

9 Unfinished
10 Replacement well

WATER USE

1 Domestic
2 Stock
3 Irrigation
4 Industrial

5 Commercial
6 Municipal
7 Public supply
8 Cooling & air conditioning

9 Not use
10 Other

METHOD OF CONSTRUCTION

1 Cable tool
2 Rotary (conventional)
3 Rotary (reverse)
4 Rotary (air)

5 Air percussion
6 Boring
7 Diamond
8 Jetting

9 Driving
10 Digging
11 Other

Name of Well Contractor: **Herb Lang Well Drilling Ltd.** Well Contractor's Licence No.: **3367**
 Address: **R.R. #1 Omemee, Ontario**
 Name of Well Technician: **John Lang** Well Technician's Licence No.: **T-2111**
 Signature of Technician/Contractor: *John Lang* Submission date: **27** day, **3** mo, **00** yr

MINISTRY USE ONLY

Data source: **3367** Date received: **MAY 16 2000**
 Date of inspection: _____ Inspector: _____
 Remarks: _____
CSS.ES0

Measurements recorded in: Metric Imperial

Address of Well Location (Street Number/Name) Syer Line		Township Cavan	Lot 14	Concession 8
County/District/Municipality Peterborough		City/Town/Village Millbrook	Province Ontario	Postal Code L0A 1G0
UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	
NAD 83	17 7 03 3 33	4 89 59 9 0		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)				
General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From To
Brown	Clay	gravel		0 18
Gray	Clay	layer sand		18 56
Gray	Clay			56 65
Gray	Clay	gravel	hard	65 74
Gray	Limestone			74 78

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

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

Construction Record - Casing				Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From To	<input checked="" type="checkbox"/> Water Supply	<input type="checkbox"/> Replacement Well
6 1/4"	Steel	.188	+2 74		
6"	Openhole		74 78	<input type="checkbox"/> Dewatering Well	<input type="checkbox"/> Observation and/or Monitoring Hole

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

Water Details		Hole Diameter	
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Depth (m/ft) From To	Diameter (cm/in)
74 f (m/ft)	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify	0 20	3"
		20 78	6"

Well Contractor and Well Technician Information			
Business Name of Well Contractor G.Hart & Sons Well Drilling Ltd.		Well Contractor's Licence No. 2662	
Business Address (Street Number/Name) Box 850, 142 County Rd 8		Municipality Fenelon Falls	
Province ON	Postal Code K0M 1N0	Business E-mail Address ghart@ghart.ca	
Bus. Telephone No. (inc. area code) 705 887-3831		Name of Well Technician (Last Name, First Name) Lean Jim	
Well Technician's Licence No. T-0546		Signature of Technician and/or Contractor <i>Lean Jim</i>	
		Date Submitted 20140210	

Results of Well Yield Testing				
After test of well yield, water was: <input checked="" type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify	Draw Down		Recovery	
	Time (min)	Water Level (m/ft)	Time (min)	Water Level (m/ft)
If pumping discontinued, give reason: Pump intake set at (m/ft) 55 ft. Pumping rate (l/min / GPM) 5 gpm Duration of pumping 1 hrs + min Final water level end of pumping (m/ft) 27.0 ft. If flowing give rate (l/min / GPM)	Static Level	14.4		
	1	16.9	1	23.6
	2	18.6	2	21.0
	3	19.6	3	-
	4	20.5	4	17.8
	5	21.1	5	16.8
10	23.4	10	15.0	
15	24.6	15	14.9	
20	25.3	20	14.7	
25	25.8	25	14.5	
30	26.1	30	14.5	
40	26.6	40	14.4	
50	26.8	50	↓	
60	27.0	60	↓	

Map of Well Location	
Please provide a map below following instructions on the back.	
Comments: ↓ Mill Brook	
Well owner's information package delivered <input type="checkbox"/> Yes <input type="checkbox"/> No	Date Package Delivered 2014 01 17
Date Work Completed 2014 01 17	Ministry Use Only Audit No. Z 182881
Received FEB 26 2014	



Appendix C
AquiferTest Pro Results



194 Sophia St.
Peterborough, ON
K9H1E5

Pumping Test Analysis Report

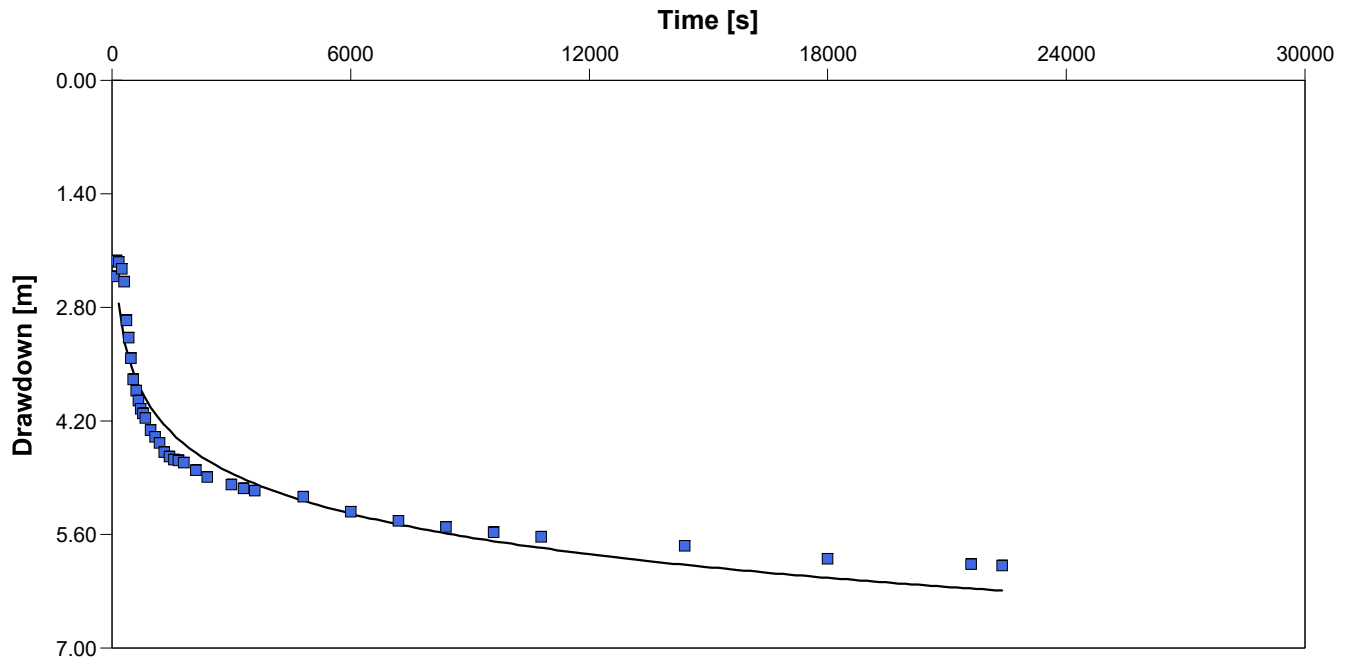
C

Project: Hydrogeological Assessment, 1066 Syer Line, Fraserville, ON

Number: 12971-002

Client: Township of Cavan-Monaghan

Location: Fraserville, ON	Pumping Test: Pumping Test 1 - Well 1	Pumping Well: Well 1
Test Conducted by: N. Heikoop		Test Date: 7/19/2021
Analysis Performed by: N. Heikoop	Pump Test - Well 1	Analysis Date: 7/27/2021
Aquifer Thickness: 2.13 m	Discharge Rate: 82.5 [U.S. gal/min]	



Calculation using Theis

Observation Well	Transmissivity [m ² /s]	Hydraulic Conductivity [m/s]	Storage coefficient	Radial Distance to PW [m]
Well 1	5.75×10^{-4}	2.70×10^{-4}	8.28×10^{-1}	0.08



194 Sophia St.
Peterborough, ON
K9H1E5

Pumping Test Analysis Report

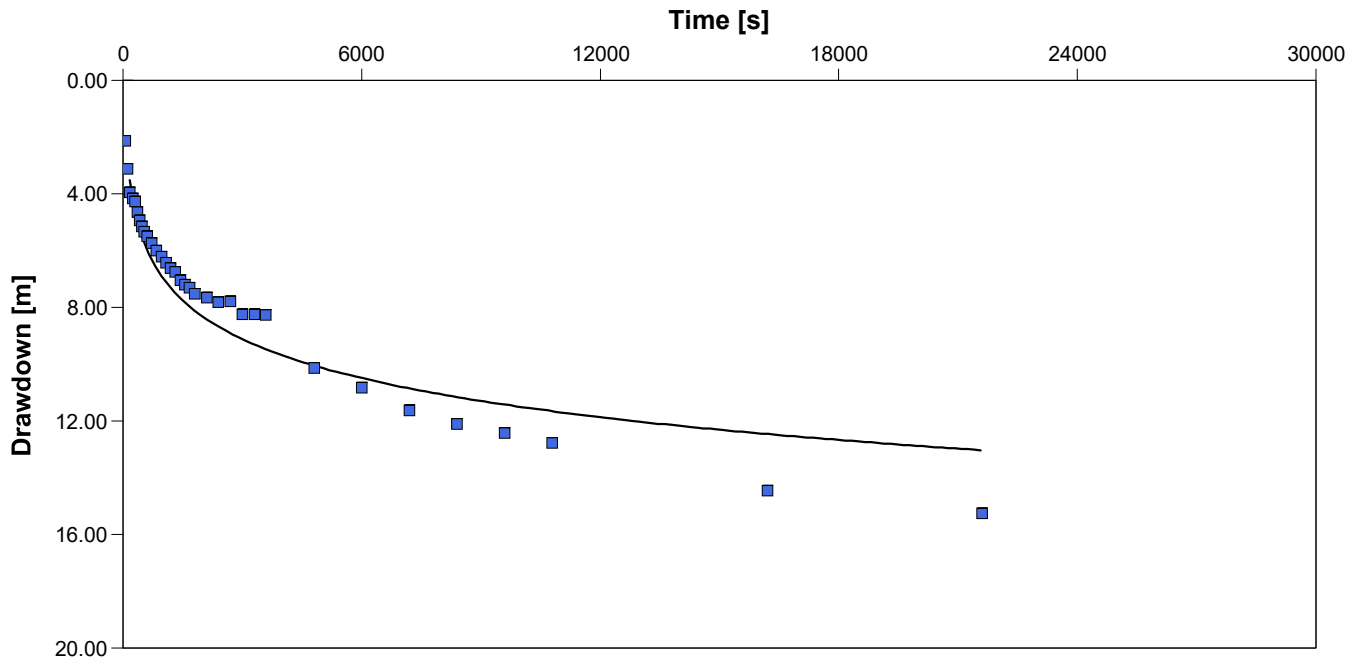
C

Project: Hydrogeological Assessment, 1066 Syer Line, Fraserville, ON

Number: 12971-002

Client: Township of Cavan-Monaghan

Location: Fraserville, ON	Pumping Test: Pumping Test 1 - Well 2	Pumping Well: Well 2
Test Conducted by: N. Heikoop		Test Date: 7/15/2021
Analysis Performed by: N. Heikoop	Pump Test - Well 2	Analysis Date: 7/27/2021
Aquifer Thickness: 4.90 m	Discharge Rate: 32 [U.S. gal/min]	



Calculation using Theis

Observation Well	Transmissivity [m ² /s]	Hydraulic Conductivity [m/s]	Storage coefficient	Radial Distance to PW [m]
Well 2	8.08×10^{-5}	1.65×10^{-5}	9.90×10^{-1}	0.08



Appendix D
Laboratory Water Quality Results



FINAL REPORT

CA14883-JUL21 R

12971-002, 1066 Syer Line, Fraserville

Prepared for

Cambium Inc.

First Page

CLIENT DETAILS		LABORATORY DETAILS	
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Email	mike.bingham@cambium-inc.com; file@cambium-inc.com	Email	
Project	12971-002, 1066 Syer Line, Fraserville	SGS Reference	CA14883-JUL21
Order Number		Received	07/20/2021
Samples	Ground Water (2)	Approved	07/27/2021
		Report Number	CA14883-JUL21 R
		Date Reported	07/27/2021

COMMENTS

Temperature of Sample upon Receipt: 10 degrees C
Cooling Agent Present:No
Custody Seal Present:No

Chain of Custody Number:025569

SIGNATORIES

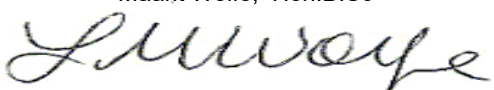
Maarit Wolfe, Hon.B.Sc


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FINAL REPORT

CA14883-JUL21 R

Client: Cambium Inc.

Project: 12971-002, 1066 Syer Line, Fraserville

Project Manager: Mike Bingham

Samplers: N. Heikosy

PACKAGE: **General Chemistry (WATER)**

Sample Number 9
Sample Name Well 1
Sample Matrix Ground Water
Sample Date 19/07/2021

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

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

Parameter	Units	RL	L1	L2	Result
General Chemistry					
Biochemical Oxygen Demand (BOD5)	mg/L	2			< 4 †
Dissolved Oxygen	mg/L	1			10
Total Suspended Solids	mg/L	2			5
Conductivity	uS/cm	2			442
Alkalinity	mg/L as CaCO3	2	500		137
Temperature @ pH	°C	0			18.5
Acidity	mg/L as CaCO3	2			< 2
Total Dissolved Solids	mg/L	30	500		234
Organic Nitrogen	mg/L	0.05	0.15		0.15
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			0.56
Ammonia+Ammonium (N)	as N mg/L	0.04			0.41
Unionized Ammonia	mg/L as N	0.001			0.020
Hydrogen Sulphide	ug/L	6	50		< 6
Sulphide	µg/L	6			< 6
Dissolved Organic Carbon	mg/L	1	5		1
Total Organic Carbon	mg/L	1			< 1



FINAL REPORT

CA14883-JUL21 R

Client: Cambium Inc.

Project: 12971-002, 1066 Syer Line, Fraserville

Project Manager: Mike Bingham

Samplers: N. Heikosy

PACKAGE: **Metals and Inorganics (WATER)**

Sample Number 9
Sample Name Well 1
Sample Matrix Ground Water
Sample Date 19/07/2021

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

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

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics					
Nitrite (as N)	as N mg/L	0.003			0.003#<MDL
Nitrate (as N)	as N mg/L	0.006			0.006#<MDL
Nitrate + Nitrite (as N)	as N mg/L	0.006			0.006#<MDL
Hardness (dissolved)	mg/L as CaCO3	0.05	100		113
Aluminum (dissolved)	mg/L	0.001			0.003
Arsenic (dissolved)	mg/L	0.0002		0.01	< 0.0002
Barium (dissolved)	mg/L	0.00002		1	0.446
Boron (dissolved)	mg/L	0.002		5	0.111
Calcium (dissolved)	mg/L	0.01			23.6
Cadmium (dissolved)	mg/L	0.000003		0.005	0.000007
Chromium (dissolved)	mg/L	0.00008		0.05	< 0.00008
Copper (dissolved)	mg/L	0.0002	1		0.0008
Iron (dissolved)	mg/L	0.007	0.3		< 0.007
Sodium (dissolved)	mg/L	0.01	200	20	45.9
Magnesium (dissolved)	mg/L	0.001			13.1
Manganese (dissolved)	mg/L	0.00001	0.05		0.00373
Lead (dissolved)	mg/L	0.00009		0.01	< 0.00009
Antimony (dissolved)	mg/L	0.0009		0.006	< 0.0009
Selenium (dissolved)	mg/L	0.00004		0.05	< 0.00004
Uranium (dissolved)	mg/L	0.000002		0.02	0.000014
Zinc (dissolved)	mg/L	0.002	5		0.002



FINAL REPORT

CA14883-JUL21 R

Client: Cambium Inc.

Project: 12971-002, 1066 Syer Line, Fraserville

Project Manager: Mike Bingham

Samplers: N. Heikosy

PACKAGE: **Microbiology (WATER)**

Sample Number	9	10
Sample Name	Well 1	Well 1 Dup
Sample Matrix	Ground Water	Ground Water
Sample Date	19/07/2021	19/07/2021

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

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

Parameter	Units	RL	L1	L2	Result	Result
Microbiology						
Total Coliform	cfu/100mL	0		0	0	2
E. Coli	cfu/100mL	0		0	0	0
Total Coliform Background	cfu/100mL	0			540	760
Heterotrophic Plate Count (HPC)	cfu/1mL	0			189	161
Fecal Coliform	cfu/100mL	0			0	0
Other (ORP)						
pH	No unit	5	8.5		8.17	

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG /	ODWS_MAC /
				WATER / - - Table 4	WATER / - - Table
				- Drinking Water -	1,2 and 3 -
				Reg O.169_03	Drinking Water -
					Reg O.169_03
				L1	L2

Well 1

Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	113	100	
Sodium (dissolved)	SM 3030/EPA 200.8	mg/L	45.9		20

Well 1 Dup

Total Coliform	OMOE MICROMFDC-E3407A	cfu/100mL	2		0
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FINAL REPORT

CA14883-JUL21 R

QC SUMMARY

Acidity

Method: SM 2310 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Acidity	EWL0337-JUL21	mg/L as CaCO3	2	2	ND	20	98	90	110	NA		

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0337-JUL21	mg/L as CaCO3	2	< 2	0	20	106	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-IENVISFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0220-JUL21	mg/L	0.04	<0.04	ND	10	99	90	110	100	75 125	



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CA14883-JUL21 R

QC SUMMARY

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-IENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate + Nitrite (as N)	DIO0330-JUL21	mg/L	0.006	<0.006	NA		NA			NA		
Nitrite (as N)	DIO0330-JUL21	mg/L	0.003	<0.003	ND	20	96	90	110	83	75	125
Nitrate (as N)	DIO0330-JUL21	mg/L	0.006	<0.006	0	20	106	90	110	91	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0035-JUL21	mg/L	2	< 2	14	30	101	70	130	NV	70	130



FINAL REPORT

CA14883-JUL21 R

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-ENVISFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0236-JUL21	mg/L	1	<1	1	10	93	90	110	109	75	125
Total Organic Carbon	SKA0236-JUL21	mg/L	1	<1	1	10	93	90	110	109	75	125

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-ENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0337-JUL21	uS/cm	2	< 2	0	20	98	90	110	NA		



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CA14883-JUL21 R

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-IENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Aluminum (dissolved)	EMS0147-JUL21	mg/L	0.001	<0.001	6	20	94	90	110	103	70	130
Arsenic (dissolved)	EMS0147-JUL21	mg/L	0.0002	<0.0002	5	20	100	90	110	115	70	130
Barium (dissolved)	EMS0147-JUL21	mg/L	0.00002	<0.00002	1	20	93	90	110	93	70	130
Boron (dissolved)	EMS0147-JUL21	mg/L	0.002	<0.002	5	20	100	90	110	92	70	130
Calcium (dissolved)	EMS0147-JUL21	mg/L	0.01	<0.01	4	20	97	90	110	99	70	130
Cadmium (dissolved)	EMS0147-JUL21	mg/L	0.000003	<0.000003	10	20	98	90	110	97	70	130
Chromium (dissolved)	EMS0147-JUL21	mg/L	0.00008	<0.00008	ND	20	97	90	110	95	70	130
Copper (dissolved)	EMS0147-JUL21	mg/L	0.0002	<0.0002	ND	20	95	90	110	90	70	130
Iron (dissolved)	EMS0147-JUL21	mg/L	0.007	<0.007	5	20	99	90	110	100	70	130
Magnesium (dissolved)	EMS0147-JUL21	mg/L	0.001	0.001	6	20	102	90	110	96	70	130
Manganese (dissolved)	EMS0147-JUL21	mg/L	0.00001	<0.00001	3	20	99	90	110	99	70	130
Sodium (dissolved)	EMS0147-JUL21	mg/L	0.01	<0.01	9	20	102	90	110	98	70	130
Lead (dissolved)	EMS0147-JUL21	mg/L	0.00009	<0.00001	1	20	100	90	110	108	70	130
Antimony (dissolved)	EMS0147-JUL21	mg/L	0.0009	<0.0009	ND	20	100	90	110	101	70	130
Selenium (dissolved)	EMS0147-JUL21	mg/L	0.00004	<0.00004	3	20	103	90	110	99	70	130
Uranium (dissolved)	EMS0147-JUL21	mg/L	0.000002	<0.000002	6	20	95	90	110	84	70	130
Zinc (dissolved)	EMS0147-JUL21	mg/L	0.002	<0.002	5	20	97	90	110	98	70	130

QC SUMMARY

Microbiology

Method: OMOE MICROMFDC-E3407A | Internal ref.: ME-CA-IENVIMIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Coliform Background	BAC9332-JUL21	cfu/100mL	-	ACCEPTED	ACCEPTED	D						
E. Coli	BAC9332-JUL21	cfu/100mL	-	ACCEPTED	ACCEPTED	D						
Fecal Coliform	BAC9332-JUL21	cfu/100mL	-	ACCEPTED	ACCEPTED	D						
Heterotrophic Plate Count (HPC)	BAC9332-JUL21	cfu/1mL	-	ACCEPTED	ACCEPTED	D						
Total Coliform	BAC9332-JUL21	cfu/100mL	-	ACCEPTED	ACCEPTED	D						

pH

Method: SM 4500 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0337-JUL21	No unit	5	NA	0		101			NA		



FINAL REPORT

CA14883-JUL21 R

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-IENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0323-JUL21	mg/L	30	<30	ND	20	98	90	110	NA		

Sulphide by SFA

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	SKA0221-JUL21	ug/L	6	<0.006	ND	20	88	80	120	NA	75	125

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-IENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0367-JUL21	mg/L	2	< 2	2	10	100	90	110	NA		

QC SUMMARY

Total Nitrogen

Method: SM 4500-N C/4500-NO3- F | Internal ref.: ME-CA-IENVISFA-LAK-AN-002

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Kjeldahl Nitrogen (N)	SKA0219-JUL21	mg/L	0.05	<0.05	1	10	102	90	110	102	75	125

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
 ↑ Reporting limit raised.
 ↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

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-- End of Analytical Report --



FINAL REPORT

CA14139-JUL21 R

12971-001, 1066 Syer Line, Fraserville ON

Prepared for

Cambium Inc.

First Page

CLIENT DETAILS		LABORATORY DETAILS	
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Project	12971-001, 1066 Syer Line, Fraserville ON	SGS Reference	CA14139-JUL21
Order Number		Received	07/14/2021
Samples	Ground Water (2)	Approved	07/21/2021
		Report Number	CA14139-JUL21 R
		Date Reported	07/21/2021

COMMENTS

MAC - Maximum Acceptable Concentration
 AO/OG - Aesthetic Objective / Operational Guideline
 MDL - SGS Method Detection Limit

Dioxins/Furans - sub-contracted to Wellington Laboratories.
 Radionuclides - sub-contracted to Bequerel Laboratories.
 Note: Cyanide reported as total cyanide. The total cyanide incorporates all species of cyanide including free cyanide.

SIGNATORIES

Jill Campbell, B.Sc.,GISAS

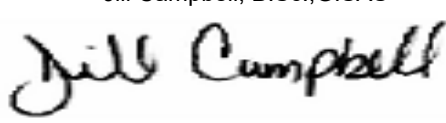


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FINAL REPORT

CA14139-JUL21 R

Client: Cambium Inc.

Project: 12971-001, 1066 Syer Line, Fraserville ON

Project Manager: Mike Bingham

Samplers: N. Heikosy

PACKAGE: **General Chemistry (WATER)**

Sample Number 9
Sample Name Well 2
Sample Matrix Ground Water
Sample Date 14/07/2021

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

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

Parameter	Units	RL	L1	L2	Result
General Chemistry					
Biochemical Oxygen Demand (BOD5)	mg/L	2			< 4 †
Dissolved Oxygen	mg/L	1			5.3
Total Suspended Solids	mg/L	2			269
Conductivity	uS/cm	2			373
Alkalinity	mg/L as CaCO3	2	500		206
Temperature @ pH	°C	0			19.2
Acidity	mg/L as CaCO3	2			< 2
Total Dissolved Solids	mg/L	30	500		229
Organic Nitrogen	mg/L	0.05	0.15		< 0.05
Total Kjeldahl Nitrogen (N)	as N mg/L	0.05			0.18
Ammonia+Ammonium (N)	as N mg/L	0.04			0.15
Unionized Ammonia	mg/L as N	0.001			0.005
Hydrogen Sulphide	ug/L	6	50		< 6
Sulphide	µg/L	6			< 6
Dissolved Organic Carbon	mg/L	1	5		2
Total Organic Carbon	mg/L	1			1



FINAL REPORT

CA14139-JUL21 R

Client: Cambium Inc.

Project: 12971-001, 1066 Syer Line, Fraserville ON

Project Manager: Mike Bingham

Samplers: N. Heikosy

PACKAGE: **Metals and Inorganics (WATER)**

Sample Number 9
Sample Name Well 2
Sample Matrix Ground Water
Sample Date 14/07/2021

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

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

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics					
Nitrite (as N)	as N mg/L	0.003		1	<0.003
Nitrate (as N)	as N mg/L	0.006		10	<0.006
Nitrate + Nitrite (as N)	as N mg/L	0.006			<0.006
Hardness (dissolved)	mg/L as CaCO3	0.05	100		167
Aluminum (dissolved)	mg/L	0.001			< 0.001
Arsenic (dissolved)	mg/L	0.0002		0.01	< 0.0002
Barium (dissolved)	mg/L	0.00002		1	0.593
Boron (dissolved)	mg/L	0.002		5	0.052
Calcium (dissolved)	mg/L	0.01			40.1
Cadmium (dissolved)	mg/L	0.000003		0.005	< 0.000003
Chromium (dissolved)	mg/L	0.00008		0.05	< 0.00008
Copper (dissolved)	mg/L	0.0002	1		< 0.0002
Iron (dissolved)	mg/L	0.007	0.3		< 0.007
Sodium (dissolved)	mg/L	0.01	200	20	19.9
Magnesium (dissolved)	mg/L	0.001			16.3
Manganese (dissolved)	mg/L	0.00001	0.05		0.0121
Lead (dissolved)	mg/L	0.00009		0.01	< 0.00009
Antimony (dissolved)	mg/L	0.0009		0.006	< 0.0009
Selenium (dissolved)	mg/L	0.00004		0.05	< 0.00004
Uranium (dissolved)	mg/L	0.000002		0.02	0.000612
Zinc (dissolved)	mg/L	0.002	5		< 0.002



FINAL REPORT

CA14139-JUL21 R

Client: Cambium Inc.

Project: 12971-001, 1066 Syer Line, Fraserville ON

Project Manager: Mike Bingham

Samplers: N. Heikosy

PACKAGE: **Microbiology (WATER)**

Sample Number	9	10
Sample Name	Well 2	Well 2 Dup
Sample Matrix	Ground Water	Ground Water
Sample Date	14/07/2021	14/07/2021

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

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

Parameter	Units	RL	L1	L2	Result	Result
Microbiology						
Total Coliform	cfu/100mL	0		0	0	0
E. Coli	cfu/100mL	0		0	0	0
Total Coliform Background	cfu/100mL	0			1340	2000
Heterotrophic Plate Count (HPC)	cfu/1mL	0			220	260
Fecal Coliform	cfu/100mL	0			0	0
Other (ORP)						
pH	No unit	5	8.5		7.93	

EXCEEDANCE SUMMARY

Parameter	Method	Units	Result	ODWS_AO_OG /	ODWS_MAC /
				WATER / - - Table 4	WATER / - - Table
				- Drinking Water -	1,2 and 3 -
				Reg O.169_03	Drinking Water -
					Reg O.169_03
				L1	L2

Well 2

Hardness (dissolved)	SM 3030/EPA 200.7	mg/L as CaCO3	167	100
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FINAL REPORT

CA14139-JUL21 R

QC SUMMARY

Acidity

Method: SM 2310 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Acidity	EWL0269-JUL21	mg/L as CaCO3	2	3	ND	20	98	90	110	NA		

Alkalinity

Method: SM 2320 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Alkalinity	EWL0269-JUL21	mg/L as CaCO3	2	< 2	1	20	98	80	120	NA		

Ammonia by SFA

Method: SM 4500 | Internal ref.: ME-CA-IENVISFA-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Ammonia+Ammonium (N)	SKA0174-JUL21	mg/L	0.04	<0.04	3	10	102	90	110	101	75 125	



FINAL REPORT

CA14139-JUL21 R

QC SUMMARY

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-IENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Nitrate + Nitrite (as N)	DIO0270-JUL21	mg/L	0.006	<0.006	NA		NA			NA		
Nitrite (as N)	DIO0270-JUL21	mg/L	0.003	<0.003	ND	20	100	90	110	101	75	125
Nitrate (as N)	DIO0270-JUL21	mg/L	0.006	<0.006	0	20	98	90	110	99	75	125

Biochemical Oxygen Demand

Method: SM 5210 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-007

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Biochemical Oxygen Demand (BOD5)	BOD0025-JUL21	mg/L	2	< 2	5	30	99	70	130	80	70	130



FINAL REPORT

CA14139-JUL21 R

QC SUMMARY

Carbon by SFA

Method: SM 5310 | Internal ref.: ME-CA-ENVISFA-LAK-AN-009

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Dissolved Organic Carbon	SKA0157-JUL21	mg/L	1	<1	5	10	106	90	110	112	75	125
Total Organic Carbon	SKA0157-JUL21	mg/L	1	<1	5	10	106	90	110	112	75	125

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-ENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0269-JUL21	uS/cm	2	< 2	3	20	98	90	110	NA		



FINAL REPORT

CA14139-JUL21 R

QC SUMMARY

Metals in aqueous samples - ICP-MS

Method: SM 3030/EPA 200.8 | Internal ref.: ME-CA-ENVISPE-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Aluminum (dissolved)	EMS0076-JUL21	mg/L	0.001	<0.001	4	20	105	90	110	111	70	130
Arsenic (dissolved)	EMS0076-JUL21	mg/L	0.0002	<0.0002	2	20	102	90	110	104	70	130
Barium (dissolved)	EMS0076-JUL21	mg/L	0.00002	<0.00002	1	20	103	90	110	102	70	130
Boron (dissolved)	EMS0076-JUL21	mg/L	0.002	<0.002	6	20	105	90	110	109	70	130
Calcium (dissolved)	EMS0076-JUL21	mg/L	0.01	<0.01	1	20	103	90	110	104	70	130
Cadmium (dissolved)	EMS0076-JUL21	mg/L	0.000003	<0.000003	0	20	101	90	110	108	70	130
Chromium (dissolved)	EMS0076-JUL21	mg/L	0.00008	<0.00008	12	20	103	90	110	104	70	130
Copper (dissolved)	EMS0076-JUL21	mg/L	0.0002	<0.0002	12	20	102	90	110	107	70	130
Iron (dissolved)	EMS0076-JUL21	mg/L	0.007	<0.007	0	20	105	90	110	100	70	130
Magnesium (dissolved)	EMS0076-JUL21	mg/L	0.001	<0.001	4	20	107	90	110	104	70	130
Manganese (dissolved)	EMS0076-JUL21	mg/L	0.00001	<0.00001	4	20	103	90	110	104	70	130
Sodium (dissolved)	EMS0076-JUL21	mg/L	0.01	<0.01	5	20	104	90	110	103	70	130
Lead (dissolved)	EMS0076-JUL21	mg/L	0.00009	<0.00001	2	20	108	90	110	108	70	130
Antimony (dissolved)	EMS0076-JUL21	mg/L	0.0009	<0.0009	ND	20	101	90	110	97	70	130
Selenium (dissolved)	EMS0076-JUL21	mg/L	0.00004	<0.00004	3	20	101	90	110	102	70	130
Uranium (dissolved)	EMS0076-JUL21	mg/L	0.000002	<0.000002	2	20	93	90	110	94	70	130
Zinc (dissolved)	EMS0076-JUL21	mg/L	0.002	<0.002	15	20	98	90	110	95	70	130

QC SUMMARY

Microbiology

Method: OMOE MICROMFDC-E3407A | Internal ref.: ME-CA-IENVIMIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Coliform Background	BAC9274-JUL21	cfu/100mL	-	ACCEPTED	N/A							
E. Coli	BAC9274-JUL21	cfu/100mL	-	ACCEPTED	ACCEPTED							
Fecal Coliform	BAC9274-JUL21	cfu/100mL	-	ACCEPTED	ACCEPTED							
Heterotrophic Plate Count (HPC)	BAC9274-JUL21	cfu/1mL	-	ACCEPTED	ACCEPTED							
Total Coliform	BAC9274-JUL21	cfu/100mL	-	ACCEPTED	ACCEPTED							

pH

Method: SM 4500 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0269-JUL21	No unit	5	NA	0		101			NA		



FINAL REPORT

CA14139-JUL21 R

QC SUMMARY

Solids Analysis

Method: SM 2540C | Internal ref.: ME-CA-IENVIEWL-LAK-AN-005

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Dissolved Solids	EWL0254-JUL21	mg/L	30	<30	7	20	96	90	110	NA		

Sulphide by SFA

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

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	SKA0166-JUL21	ug/L	6	<0.006	ND	20	107	80	120	NA	75	125

Suspended Solids

Method: SM 2540D | Internal ref.: ME-CA-IENVIEWL-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Total Suspended Solids	EWL0281-JUL21	mg/L	2	< 2	0	10	95	90	110	NA		

QC SUMMARY

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
 ↑ Reporting limit raised.
 ↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

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-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

Laboratory Information Section - Lab use only

Received By: Kathryn Meland
 Received Date: 07/14/21 (mm/dd/yy)
 Received Time: 19:00 (hr : min)

Received By (signature): [Signature]
 Custody Seal Present: Yes No
 Custody Seal Intact: Yes No

Cooling Agent Present: Yes No Type: ICE
 Temperature Upon Receipt: (C) 13.13.14

LAB LIMS # CA14137-9/21

REPORT INFORMATION

Company: Cambium Inc.
 Contact: Nike Bingham
 Address: 7455phic st
Petersburg ON
 Phone: 705 742 7900
 Fax: _____
 Email: nike.bingham@Cambium-inc.com

INVOICE INFORMATION

Company: _____
 Contact: _____
 Address: _____
 Phone: _____
 Email: _____

REGULATIONS

O.Reg 153/04 O.Reg 406/19
 Table 1 Res/Park Soil Texture: _____
 Table 2 Ind/Com Coarse _____
 Table 3 Agr/Other Medium/Fine _____
 Table _____ Appx. _____
 Soil Volume <350m3 350m3

Sewer By-Law:

Sanitary _____
 Storm _____
 Other: DDWS
 MISA _____
 ODWS Not Reportable - See note

RECORD OF SITE CONDITION (RSC)

YES NO

SAMPLE IDENTIFICATION

Well ID	DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX
1 Well 2	07/14/21	16:30	11	GW
2 Well 2 Dup			2	
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Field Filtered (Y/N) N

Metals & Inorganics
 incl CrVI, CN, Hg, pH, (B,HWS), EC, SAR, soil) (Cl, Na-water)

Full Metals Suite
 ICP metals plus B(HWS-soil only) Hg, CrVI

ICP Metals only
 Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Pb, Mo, Ni,

PAHs only

SVOCs
 all incl PAHs, ABNs, CPs

PCBs Total Aroclor

F1-F4 + BTEX

F1-F4 only
 no BTEX

VOCs
 all incl BTEX

BTEX only

Pesticides
 Organochlorine or specify other

Other (please specify)
X Asperguate
X Bacteria
X Lab filtered metals

Sewer Use:
 Specify pkg:

Water Characterization Pkg
 General Extended
 DCP BCP BAP BBN BBN BBN

SPLP Specify tests

TC1P Specify tests

ANALYSIS REQUESTED

M & I **SVOC** **PCB** **PHC** **VOC** **Pest** **Other** (please specify) **SPLP** **TC1P**

Turnaround Time (TAT) REQUIRED
 Regular TAT (5-7 days)
 Rush TAT (Additional Charges May Apply): 1 Day 2 Days 3 Days 4 Days
 PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE PRIOR TO SUBMISSION

NOTE: DRINKING (POTABLE) WATER SAMPLES FOR HUMAN CONSUMPTION MUST BE SUBMITTED WITH SGS DRINKING WATER CHAIN OF CUSTODY

Quotation #: 2021952
 Project #: 12971-001
 P.O. #: _____
 Site Location/ID: 1066 Syer line, Friesville

COMMENTS:

Aliquot lab filtered metals from general bottle.

Signature: [Signature]
 Date: 2021/07/14 (mm/dd/yy)

Signature: [Signature]
 Date: _____ (mm/dd/yy)

Signature: _____
 Date: _____ (mm/dd/yy)

Signature: _____
 Date: _____ (mm/dd/yy)

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