HYDROGEOLOGICAL REVIEW
MABERLY PINES SUBDIVISION
REVISED REPORT 2022
CONTRACT #2021-PD-002

Prepared for:

The Corporation of Tay Valley Township
217 Harper Road
Perth, ON K7H 3C6

Prepared by:

BluMetric Environmental Inc.
The Tower – The Woolen Mill
4 Cataraqui Street
Kingston, ON K7K 1Z7

Project Number: 220037
October 27, 2022

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217 Harper Road
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Attention: Amanda Mabo, Clerk
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1. INTRODUCTION

BluMetric Environmental Inc. (BluMetric®) was retained by Tay Valley Township (TVT) to conduct a review of hydrogeological conditions at the Maberly Pines Subdivision located approximately three kilometres south of the Village of Maberly, Ontario, on the northeast side of Bolingbrook Road (see Figure 1), as they pertain to further lot development under current regulations and guideline requirements.

The Maberly Pines Subdivision was investigated by Water and Earth Science Associates Limited (WESA) in 1979 (Maberly Pines Subdivision, Terrain, Hydrogeological and Ecological Analysis, WESA, 1979 – a copy is included as Appendix A). The development was subsequently approved, and all 56 lots were sold to individual owners. Since that time, six of the lots have been developed, two partially developed and two have had building permits issued (as of the time of project initiation in October 2021). There are currently 49 vacant lots issued through By-Law NO. 2021-033 to Amend By-Law No. 2002-121, as amended Plan 21 Lakeside Living, Maberly Pines, Geographic Township of South Sherbrooke.

Concerns regarding development in line with current regulations and guidelines lead TVT to consult with the Mississippi Valley Conservation Authority (MVCA) and the Rideau Valley Conservation Authority (RVCA) regarding approvals for further development permissions. It was noted that the WESA, 1979 report pre-dates and does not fully address the current guidelines regarding the assessment of water quality, quantity, and nitrate impact assessment for the development. The Ministry of the Environment, Conservation and Parks (MECP, formerly MOE) has developed additional requirements for assessment since the late 1970's including Procedure D-5-4: Technical Guideline for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment (1996), and Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment (1996). These are the current guidelines used by MVCA and RVCA for the review of Hydrogeological Reports submitted in support of Subdivision Plan Application Approval within the County of Lanark, Ontario.

The Township's request for a hydrogeological review of the Maberly Pines Subdivision was implemented by BluMetric to meet the following objectives.

1.1 OBJECTIVES

The objectives of this study as defined in the Request for Proposal (2021-PD-002) from TVT are as follows:

- Determine if there is sufficient groundwater available at the subdivision for development as residential lots.
- Determine if the groundwater at the subdivision is potable and of acceptable water quality.
- Determine if the hydrogeological features at the subdivision will allow development on all of the lots with sufficient capacity to support the installation of septic systems.
- Produce two conceptual lot layout plans identifying the recommended locations of wells, septic systems and dwellings based inferred groundwater flow direction and site constraints:
  - Conventional lot layout plan (Figure 3) is intended to meet "as closely as possible" the current Ministry of the Environment Conservation and Parks (MECP) regulations (i.e., Procedures D-5-4 and D-5-5) that would be required if the subdivision was developed using conventional Class 4 sewage systems.
  - Restricted lot layout plan (Figure 4) introduces measures to address the lot constraints on the private servicing, to mitigate potential impacts to well water quality.

1.2 SITE DESCRIPTION

The Maberly Pines Estate encompasses a total area of approximately 76.8 hectares and is comprised of undulating terrain (see Figures 2 and 3 for topographic contours at the site and surrounding lands) including bedrock ridges with interspersed lowland areas, and ponds. Existing development at the subdivision includes several access roads and residences on some of the lots. Most of the subdivision is forested land. Surrounding land uses within 500 m of the site include forested areas, cottages and some rural residences, lakes, and Bolingbroke Road. All existing development in the area utilizes private individual water supply and individual septic sewer systems as municipal servicing is not available.

The site is hilly, and elevations range from of approximately 206 m asl south of the entrance road (Pond Lane) to approximately 190 m asl at the unnamed lake that extends into the northwestern end of the subdivision. Onsite drainage is by infiltration and overland flow towards the unnamed lake and ponds within the southeastern end of the subdivision. Topographic contours are included in Figure 2.

1.3 SUBDIVISION

The Maberly Pines subdivision was created by a developer identified as 'Lakeside Living' (no longer operating) and was approved by the Provincial Government in 1980. The subdivision includes 56 lots as indicated on Figures 3 and 4 (Conceptual Lot Development Plans) and a topographic survey plan dated 1980 (Appendix B). The status of development of the lots is as follows:

- Five developed lots
  - One permanent residence (Lot 20)
  - Four seasonal residences (Lots 6, 24, 47, and 55)
- Two permitted lots (Lots 23 and 35)
- Vacant lots as per By-Law NO. 2021-033, Plan 21
  - Lots 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 54, 56

The minimum lot size at the subdivision is 0.47 hectares. The maximum lot size is 3.2 hectares and the average lot size is 1.1 hectares. Currently, most of the developed lots at the site are serviced by individual on-site wells and individual on-site wastewater treatment systems (OWTS). This form of servicing is consistent with the established hierarchy prescribed in the Ontario Provincial Policy Statement and is consistent with the established neighbouring rural estate lot developments.

It is anticipated that development of each lot will include a three-bedroom dwelling serviced by a drilled well and onsite septic system or composting toilet systems.

2. METHODOLOGY

2.1 BACKGROUND INFORMATION REVIEW

A review of information pertaining to the site was conducted, including the following:

- Water well records from the Ontario water well information system (WWIS) database.
- Geological information from the Ontario Geological Survey online databases.
- A report titled 'Maberly Pines Subdivision, Terrain, Hydrogeological and Ecological Analysis' (WESA, 1979), including:
  - Topographic survey of the site conducted by Geo. W. Bracken Ltd. of Smiths Falls Ontario in 1980.
  - Terrain analysis data and grain size analysis.

2.2 GROUNDWATER SAMPLING AND ANALYSIS

TVT assisted BluMetric with contacting existing well owners at the Maberly Pines subdivision to determine suitable groundwater sampling locations and to identify recently installed wells within the subdivision and on neighboring properties within 500 metres.

BluMetric conducted groundwater sampling at the existing wells at 2003 Pond Lane (Lot 20) on November 23, 2021 (the well location and address is indicated on Figure 2). Attempts were made to obtain permission to sample at other locations, but the owners were not available as the seasonal cottages were unoccupied at the time of the site visit. Some of the lots did not appear to have wells (e.g. Lots 1 and 2 have some basic structures (sheds), and Lot 47 appears to have a dwelling and septic but neighbours indicated that it does not have a well).

BluMetric conducted further groundwater sampling on June 4, 2022. Groundwater samples were obtained from the wells at 601 Rainbow Lane, and 4452 Bolingbroke Road (the well locations and addresses are indicated on Figure 2).

BluMetric conducted an aquifer/well yield test at the new well at Lot 35 (202 Red Pine Road) on September 27, 2022 (see details of pumping test of this well designated TW1 below). The well was chlorinated at the time of drilling and prior to testing. Field testing during the pumping test indicated detectable concentrations of residual chlorine after four hours pumping. After ten hours of pumping, the free chlorine residual concentration reduced to 'non-detectable' (i.e., below the field meter detection limit of 0.1 mg/L). Groundwater samples were collected at the middle and end of the pumping test.

All well water samples were submitted for comprehensive testing of bacteriological, chemical and physical water quality parameters consistent with standard 'Subdivision Water Supply' suite of parameters in accordance with Ontario Ministry of Environment, Conservation and Parks (MECP) Procedure D-5-5. The groundwater samples were submitted for analysis of Ontario Regulation 153 listed metals including strontium. The sample from 2003 Pond Lane was also submitted for analysis of volatile organic compounds (VOCs) as requested by RVCA.

All samples were collected unfiltered and were placed directly into clean bottles supplied by the analytical laboratory. Samples were placed immediately into a cooler with ice and were transported directly to the Caduceon laboratory in Kingston. All samples were received by the laboratory within 12 hours of collection. Caduceon is fully accredited by the Canadian Association for Laboratory Accreditation (CALA).

2.3 Well Owner Interviews

An effort was made to interview well owners about their well and septic systems. A standard form was used to conduct each brief interview. The form includes standard questions about the well location, water quality, water quantity and potential environmental concerns. Well owner interviews were conducted at 601 Rainbow Lane, 4416 Bolingbroke Road and 4452 Bolingbroke Road. The interview forms are included in Appendix C.

2.4 Aquifer Testing

A new test well (TW1) was installed on Lot 35 (202 Red Pine Rd) on September 16, 2022. A water well record data entry sheet submitted to MECP by Wilf Hall Drilling of McDonalds Corners Ontario for TW1 is included in Appendix E (well tag # A356272). The well has a depth of 93 m below ground surface (bgs) and was constructed with 6 m of 6-inch (0.15 m) diameter steel casing below surface and extends 0.6 m above ground surface. **Please Note:** BluMetric provided written instructions to the well owner in several emails prior to drilling to include 12 m of steel casing in the new well. Unfortunately, this instruction was not communicated to the driller when it came time to have the well installed.

BluMetric conducted a pumping test at TW1 on September 27, 2022. The well at 2003 Pond Lane (approximately 220 m from TW1) was used as an observation well. Water levels were recorded during aquifer testing by manual methods (electronic water level tape) and with pressure transducer/datalogger units (Solinst Level Logger™). At the end of the pumping test TW1 was allowed to recover and water levels were recorded until >95% recovery was obtained.

2.5 Conceptual Site Development Plans

An assessment of the suitability for development of each lot was conducted. Two development scenarios were considered, including:

- Lot layout and servicing using conventional septic systems.
- Lot layout and servicing using a combination of conventional and alternative septic systems.

3. GEOLOGY AND HYDROGEOLOGY

3.1 GEOLOGY

Surficial geological mapping information from the Ontario Geological Survey (OGS) indicates the site has bedrock drift over Precambrian terrain (OGS, 2022).

Site reconnaissance by WESA in 1979 identified surficial soils as a glacial till ground moraine covering much of the area. The till was characterized as a non-homogeneous veneer of angular granitic pebbles and cobbles in a silty sand matrix that is discontinuous across the site (WESA, 1979). WESA described areas of poorly stratified pebbly sand up to 5 metres in thickness. Parts of the site have exposed bedrock escarpments, ridges, and knobs. A terrain map included with the WESA (1979) report is provided as Appendix D (information from the terrain map is included in Figure 3, Conceptual Lot Development Plan A – Conventional Private Services).

WESA (1979) submitted one characteristic soil sample for grain size analysis. The soil is described by WESA as 'glacial till ground moraine'. The permeability of the soil sample was determined using a falling head permeameter method to be 2.4 $x10^{-4}$ cm/sec = 68.9 min/cm.

Bedrock geology mapping information from the OGS shows that the site is in the Central Grenville Metasedimentary belt of the Precambrian Canadian Shield. The bedrock units are mafic to ultramafic plutonic rocks that have undergone metamorphism. The rock types within this unit include diorite, gabbro, peridotite, pyroxenite, and anorthosite. This unit is bordered to the north and south by felsic plutonic rocks.

3.2 HYDROGEOLOGY

In the Tay Valley Township area, the most important water supply 'aquifers' typically occur within the Precambrian bedrock. Permeability within these strata is controlled by fractures (i.e. flow is not considered to be within a 'porous media') and aquifer conditions are heterogenous.

The site is geographically situated between the highest point of the Rideau Watershed (Carnahan Lake) and the Ottawa River where an elevation change of 204 metres distinguishes the modal groundwater flow direction to be to the north/northeast (RVCA, 2021). The direction of groundwater flow in the bedrock aquifer beneath the site is interpreted to be to the northeast. Topography fluctuates in the area thereby causing groundwater recharge pathways to flow in directions dictated by slope orientations and topographic lowlands as depicted in WESA, 1979. To further this interpretation, the site is situated along the central and northern aspect of a peninsular topographic high with lowlands to the north, east, and south leading to the likelihood that locally, radial groundwater recharge flow directions occur.

There is potential for interaction between surface water features and the bedrock aquifer. Shallow ponds occur on and around the subdivision with several smaller ponds located amongst the undeveloped lots. A portion of the groundwater recharge at the site is probably from surface water. The ponds are situated at a higher elevations than water bearing fractures in bedrock as indicated by the water well records. The degree of recharge via subvertical bedrock fractures beneath ponds in the area is probably dependant on the interconnectivity of fractures with the water bearing bedrock fractures that typically occur at depths of greater than 12 m bgs (based on water well record information).

3.3 Water Well Records

A review of available MECP Water Well Records in the vicinity of the site was undertaken as part this study. This information was compared to water well records collected and reviewed by WESA in 1979. The water well records that were reviewed for this study are included in Appendix E.

A total of 17 water well records were identified within 500 m of the subdivision, as indicated on Figure 3. Overburden thickness, depth of casing, aquifer interception points and well yield related information were reviewed in detail and included in a summary table (Table 1).

Table 1: MECP Water Well Records Summary

Well ID	Year Drilled	Well Depth (mbgs)	Overburden Depth (m)	Overburden Materials	Casing Depth (mbgs)	Static Water Level (mbgs)	Depth to Water Bearing Fractures (mbgs)	Static Water Level (mbgs)	1hr Test Pump Rate (L/min)	Drawdown (m)	Recommended Pumping Rate (L/min)	Water Quality / Comments
3503579	1973	24.4	2.4	Peat (black earth)	6.7	5.48	22.5	5.5	90.9	57.0	68.2	Fresh/Clear
3506287	1981	45.7	5.5	Sand	7.0	2.74	43.3	2.7	9.1	42.7	9.1	Fresh/Clear
3506755	1983	68.6	2.7	Sand	6.7	4.88	64.0	4.9	9.1	63.7	9.1	Fresh/Clear
3506756	1983	19.5	0.9	Sand and boulders	6.7	5.48	18.3	5.5	18.2	NA	18.2	Fresh/Clear
3506757	1983	68.6	0.6	Sand and stone	7.0	6.70	64.0	6.7	4.5	43.3	9.1	Fresh/Clear
3507365	1985	56.4	1.2	Sand and stone	6.7	9.75	44.8 / 55.5	9.8	18.2	37.5	18.2	Fresh/Clear
3507887	1987	26.5	1.8	Sand and stone	6.7	4.57		4.6	31.8	NA	31.8	Fresh/Clear
3509525	1990	61.0	4.6	Gravel and stone	6.7	5.49	59.4	5.5	13.6	16.5	13.6	Fresh/Clear
3510061	1991	49.7	1.8	Clay (hardpan)	6.7	18.28	48.2	18.3	36.4	27.4	36.4	Fresh
3510138	1991	48.2	1.2	Sand and stone	6.7	6.10	38.4 / 46.3	6.1	36.4	33.5	36.4	Fresh
3513257	2001	61.0	0.5	Sand	6.7	9.45	21.3	9.5	18.2	31.7	18.2	Fresh
3514498	2004	42.7	2.1	Sand / gravel / stone	6.7	7.92	15.2	7.9	18.2	3.2	18.0	Not tested / Cloudy
7046732	2007	67.1	1.5	Gravel / boulders	6.7	10.15	64.6	10.2	30.0	9.8	25.0	Not tested / Cloudy
7048408	2007	35.1	0.9	Sand	6.7	10.60	32.9	10.6	45.0	17.4	35.0	Not tested / Cloudy
7158460	2010	42.7	0.6	Peat (black earth)	6.1	7.30	12.0 / 36.0	7.3	27.0	4.1	25.0	
7189149	2012	121.9	1.2	Sand and stone	6.7	6.40		6.4	13.6	37.0	9.1	Not tested
7364472	2020	73.2	1.2	Sand and stone	6.7	11.11	68.6	11.1	18.2	28.0	13.6	Not tested / Cloudy

A review of water well records within 500 m of the subdivision provided the following information regarding water quantity:

- All of the well records indicate drilled wells that extend into bedrock.
- The overburden unit varied in thickness from 0.5 m to 5.5 m and the average thickness is 1.8 m. The overburden material is mostly sand and stone with some gravel and boulders.
- 11 well records have indicative pumping rate that are greater than the peak demand rate of 15 L/min expected for a 3-bedroom home per Procedure D-5-5.
- Six well records have indicative pumping rate (i.e. the suggested pumping rate based on an initial short term pumping test by driller) that are less than the expected peak demand flow rate (15 L/min).
- Water bearing fractures in bedrock occur from 12 to 72 m below ground surface.
- 11 well records indicate fresh water. Six well records indicate the water was not tested. There are no indications of poor water quality in any of the well records.

The information was correlated regarding wells records, known site conditions and well interview forms. The following wells are cross referenced in Appendix E:

- 2003 Pond Lane well (a standard well records form was provided by owner, but the record is not included in the MECP online database, and no well ID number has been allocated).
    - TD = 87 m / 6 m steel casing / fresh / 8 GPM (36 L/min)
- 4452 Bolingbroke Road well. Well record #7189149.
    - TD = 122 m / 6 m steel casing / untested / 2 GPM (9 L/min)
    - Occupancy = 2 persons / domestic use and garden watering
- 4416 Bolingbroke Road well. Well record #7046732.
    - TD = 67 m / 6.7 m steel casing / untested / 5.5 GPM (25 L/min)
    - Occupancy = 2 persons / domestic and transfer to permanent residence
- Well record #3513257 may correspond to the well on Lot 23.

3.4 HYDROGEOLOGICAL SENSITIVITY

The terrain analysis by WESA (1979, see Appendix D) shows that surficial soil thickness varies significantly across the site and there are areas of exposed bedrock at surface.

The water well records show that water bearing fractures in bedrock were all encountered at depths greater than 12 m below ground surface (bgs) so the upper bedrock does appear to provide some degree of isolation between the discontinuous overburden and the bedrock aquifer zone.

The bedrock aquifer at the site is a 'hydro-stratigraphic fracture zone' within the Precambrian bedrock. The relatively unfractured upper bedrock unit provides a measure of protection for the deeper water bearing fracture zones, and potentially impedes the infiltration of potentially contaminated water from the surface and in the overburden unit.

The subdivision does not occur within a zone that has been identified by OGS as potentially karstic, and no karst related features have been identified at the site. The site is considered hydrogeologically sensitive due to the discontinuous and generally thin layer of soil cover. Discontinuous thin soil coverage has a limited ability to filter and prevent contaminants from entering groundwater recharge pathways. Protective measures for well construction and septic system design are provided below to mitigate the potential for surface derived water quality impacts to the fractured bedrock hydro-stratigraphic zone.

3.5 WATER QUALITY

Local groundwater quality was evaluated through the collection of samples from three onsite water wells (2003 Pond Lane and 202 Red Pine Road and TW1 at 202 Red Pine Road) and two offsite water wells (601 Rainbow Lane and 4452 Bolingbroke Road). The well locations are indicated on see Figure 3.

The groundwater quality analytical results for the initial phases of sampling (November 2021 and June 2022) are summarized in Table 2 and are compared to the limits indicated in the Ontario Drinking Water Standards, Objectives, and Guidelines (ODWSOG) (MOE, 2003). Analytical results for metals are compared to ODWSOG limits and the criteria listed for potable groundwater use conditions under O. Reg. 153 (MECP, 2011) in Table 3. Analytical results for VOCs are compared to the criteria listed for potable groundwater use conditions under O. Reg. 153 in Table 4. Laboratory certificates of analysis are included in Appendix F.

Table 2: Groundwater Quality – Onsite and Offsite Wells

Parameter	Units	RDL	Regulation		Sample ID: 2003-01	Sample ID: 3506756	Sample ID: A134690
					2003 Pond Lane	601 Rainbow Lane	4452 Bolingbroke Road
			ODWSOG		23-Nov-21	4-Jun-22	4-Jul-22
			Limit	Type of Objective			
Microbiological Parameters							
E. Coli	CFU/100 mL	1	0	MAC	0	0	0
Fecal Coliforms	CFU/100 mL	1	not specified		0	0	0
Total Coliforms	CFU/100 mL	1	0	MAC	0	**>200**	0
Heterotrophic Plate Count	CFU/100 mL	10	not specified	MAC	-	230	<10
General Chemistry							
Alkalinity, total	mg/L	5	500	OG	234	127	101
Hardness	mg/L	1	100	OG	**213**	**143**	62
Dissolved Organic Carbon	mg/L	0.5	5	AO	-	2.1	1.2
Colour	TCU	2	5	AO	<2	-	-
Conductivity	uS/cm	5	not specified		476	283	735
Fluoride	mg/L	0.1	1.5	MAC	0.2	<0.1	<0.1
pH	pH Units	0.1	6.5 - 8.5	AO	8.12	7.5	7.97
Phenols	mg/L	0.001	not specified			<0.001	<0.001
Total Dissolved Solids	mg/L	1	500	AO	246	145	383
Sulphide	mg/L	0.01	0.05	AO	-	<0.01	<0.01
Tannin & Lignin	mg/L	0.1	not specified		-	<0.5	<0.5
Sulphate	mg/L	1	500	AO	18	15	231
Turbidity	NTU	0.1	5	AO	0.2	0.1	0.2
Chloride	mg/L	1	250	AO	7.2	2.5	11.5
Ammonia as N	mg/L	0.01	not specified		0.02	<0.01	<0.01
Total Kjeldahl Nitrogen	mg/L	0.1	not specified		-	0.1	-
Nitrate as N	mg/L	0.1	10	MAC	<0.10	0.8	<0.1
Nitrite as N	mg/L	0.1	1	MAC	<0.10	<0.1	<0.1
Phosphorus	mg/L	0.002	not specified		-	<0.002	-
Organic Nitrogen	mg/L	0.1	not specified		-	0.1	-
Metals							
Calcium (Ca)	mg/L	0.1			55.8	36.8	19.8
Iron (Fe)	mg/L	0.1	0.3	AO	<0.005	<0.005	<0.005
Magnesium (Mg)	mg/L	0.2			18	12.5	2.99
Manganese (Mn)	mg/L	0.005	0.05	AO	0.018	0.001	<0.001
Potassium (K)	mg/L	0.1			2.8	5.2	1.3
Sodium (Na)	mg/L	0.2	20 / 200	MA / AO	**28.7**	2.1	**141**
Field Parameters							
Conductivity	uS/cm	1			488.5	283	729
pH	pH units	0.01	6.5 - 8.5	AO	6.99	6.72	7.7
Chlorine (residual)	mg/L	0	0		0	0	0
Turbidity	NTFU	0	5	AO	NA	**2**	**8.29**
Temperature	°C	0.1			8.9	11.3	11.3

Bold and shaded indicates results exceed criteria

RDL - Reported Detection Limit '-' – Not Tested/Reported

MA = Medical officer of health advisory if sodium exceeds 20 mg/L. Sodium AO is 200 mg/L

Ontario Ministry of Environment (MOE), 2003/2022. Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) (June 2003). As amended.

The following observations are noted regarding the analytical data summarized in Table 2:

- **Total coliforms** >200 at the 601 Rainbow Lane well.
    - Well owner was contacted, and it was confirmed that the well was not being used a source of potable water. The owner recently installed a UV treatment system and indicated that the water quality is now satisfactory.
- **Hardness** exceeding the aesthetic objective (AO) limit at the 203 Pond Lane well and the 601 Rainbow Lane well.
    - At the measured concentrations, the water is considered to be moderately hard, which is typical of many wells throughout south-eastern Ontario. Hardness is a measure of the dissolved calcium and magnesium in water and is expressed as the equivalent quantity of calcium carbonate. Hardness can lead to the formation of scale deposits and can form excessive scum (MOE, 2003). Water treatment recommendations for hardness are provided below.
- **Sodium** exceeding the medical notification limit at the 2003 Pond Lane well and the 4452 Bolingbroke Road well.
    - Sodium intake from drinking water could be a significant concern for people with hypertension or congestive heart disease. The result exceeds the 'medical notification limit' of 20 mg/L for persons on a sodium reduced diet. The ODWSOG document (MOE, 2003) indicates that a concentration of sodium in drinking water that exceeds 20 mg/L is to be reported to the local Medical Officer of health "so that this information can be communicated to local physicians for their use with patients on sodium restricted diets".
- **Field turbidity** measured at the time of sampling of the 4452 Bolingbroke well was elevated but the laboratory measured turbidity was acceptable. This may have been due to an issue with the field turbidity meter.

Table 3: Groundwater Quality (Metals) – Onsite and Offsite Wells

Parameter	Units	MDL	Regulation			Sample ID: 2003-01	Sample ID: 3506756	Sample ID: A134690
						2003 Pond Lane	601 Rainbow Lane	4452 Bolingbroke Road
			ODWSOG		O. Reg. 153	23-Nov-21	4-Jul-22	4-Jul-22
			Objective	Type of Objective	Table 6			
Metals								
Antimony (Sb)	mg/L	0.0005	0.006	IMAC	0.006	<0.0001	<0.0001	<0.0001
Arsenic (As)	mg/L	0.001	0.01	IMAC	0.025	<0.0001	<0.0001	0.0002
Barium (Ba)	mg/L	0.001	1	MAC	1	0.086	0.045	0.024
Beryllium (Be)	mg/L	0.0005			0.004	<0.0001	<0.0001	<0.0001
Boron (B)	mg/L	0.01	5	IMAC	5	0.153	0.008	0.895
Cadmium (Cd)	mg/L	0.0001	0.005	MAC	0.0021	<0.000015	<0.000015	<0.000015
Calcium (Ca)	mg/L	0.1				55.8	36.8	19.8
Chromium (Cr)	mg/L	0.001	0.05	MAC	0.05	<0.002	<0.002	<0.002
Cobalt (Co)	mg/L	0.0002			0.0038	0.0001	<0.0001	<0.0001
Copper (Cu)	mg/L	0.001	1	AO	0.069	0.019	0.028	0.008
Iron (Fe)	mg/L	0.1	0.3	AO		<0.005	<0.005	<0.005
Lead (Pb)	mg/L	0.0001	0.01	MAC	0.01	0.00018	0.00021	0.0002
Magnesium (Mg)	mg/L	0.2				18	12.5	2.99
Manganese (Mn)	mg/L	0.005	0.05	AO		0.018	0.001	<0.001
Molybdenum (Mo)	mg/L	0.005				0.0008	0.0004	0.003
Nickel (Ni)	mg/L	0.005			0.1	<0.0002	0.0004	0.0003
Potassium (K)	mg/L	0.1				2.8	5.2	1.3
Selenium (Se)	mg/L	0.001	0.05		0.01	<0.001	<0.001	0.001
Silver (Ag)	mg/L	0.0001			0.0012	<0.0001	0.0001	0.0001
Sodium (Na)	mg/L	0.2	200			28.7	2.1	141
Strontium (Sr)	mg/L	0.001				0.557		
Thallium (Tl)	mg/L	0.0001			0.002	<0.00005	<0.00005	<0.00005
Uranium (U)	mg/L	0.0001	0.02		0.02	0.00198	0.0001	0.00169
Vanadium (V)	mg/L	0.001			0.0062	0.0002	0.0003	0.0004
Zinc (Zn)	mg/L	0.01	5		0.89	0.006	<0.005	0.008

Bold and shaded indicates results exceed criteria

RDL - Reported Detectio '-' – Not Tested/Reported

MA = Medical officer of health advisory if sodium exceeds 20 mg/L. Sodium AO is 200 mg/L

Ontario Ministry of Environment (MOE), 2003/2022. Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) (June 2003). As amended.

O.Reg 153 Table 6 - MECP, 2011. Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Site Condition Standards for Soil and Groundwater. Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition

The analytical results for metals parameters were all well below the limits indicated in ODWSOG and O. Reg. 153.

The RVCA review comments relating to the November 2021 study for this site by BluMetric indicated that strontium in groundwater is a concern in the area where the Maberly Pines subdivision is located. No specific limits are indicated for natural strontium in groundwater in the OSWSOG or O. Reg. 153 documents. Health Canada (2018) has proposed a maximum acceptable concentration (MAC) of 7 mg/L for strontium in drinking water, based on bone effects in rats and other scientific studies. The result for strontium in the sample from the well at 2003 Pond lane is below the proposed Health Canada limit.

Table 4: Groundwater Quality (VOCs) – Onsite and Offsite Wells

Parameter	Units	RDL	Regulation			Sample ID: 2003-01
						2003 Pond Lane
			ODWSOG		O. Reg. 153	23-Nov-21
			Limit	Type of Objective	Table 6	
Volatile Organic Compounds						
Acetone	µg/L	30	-	-	2700	<30
Benzene	µg/L	0.5	1.0 µg/L	MAC	5	<0.5
Bromodichloromethane	µg/L	2	-	-	16	<2
Bromoform	µg/L	5	-	-	25	<5
Bromomethane	µg/L	0.5	-	-	0.89	<0.5
Carbon Tetrachloride	µg/L	0.2	-	-	0.79	<0.2
Monochlorobenzene	µg/L	0.5	-	-	-	<0.5
Chloroform	µg/L	1	-	-	2.4	<1
Dibromochloromethane	µg/L	2	-	-	25	<2
Dichlorobenzene, 1, 2-	µg/L	0.5	200 µg/L	MAC	3	<0.5
Dichlorobenzene, 1, 3-	µg/L	0.5	-	-	59	<0.5
Dichlorobenzene, 1, 4-	µg/L	0.5	5.0 µg/L	MAC	1	<0.5
Dichlorodifluoromethane	µg/L	2	-	-	590	<2
Dichloroethane, 1, 1-	µg/L	0.5	-	-	5	<0.5
Dichloroethane, 1, 2-	µg/L	0.5	5.0 µg/L	MAC	1.6	<0.5
Dichloroethylene, 1, 1-	µg/L	0.5	14.0 µg/L	MAC	1.6	<0.5
Dichloroethene, cis-1, 2-	µg/L	0.5	-	-	-	<0.5
Dichloroethene, trans-1, 2-	µg/L	0.5	-	-	-	<0.5
Dichloropropane, 1, 2-	µg/L	0.5	-	-	5	<0.5
Dichloropropene, cis-1,3-	µg/L	0.5	-	-	-	<0.5
Dichloropropene, trans-1,3-	µg/L	0.5	-	-	-	<0.5
Dichloropropene, trans-1,3-	µg/L	0.5	-	-	-	<0.5
Dichloropropene 1,3- cis+trans	µg/L	0.5	-	-	-	<0.5
Ethylbenzene	µg/L	0.5	140 µg/L	MAC	2.4	<0.5
Dibromoethane, 1,2-	µg/L	0.2	-	-	-	<0.2
Hexane	µg/L	5	-	-	51	<5
Methyl Ethyl Ketone	µg/L	20	-	-	1800	<20
Methyl Isobutyl Ketone	µg/L	20	-	-	640	<20
Methyl-t-butyl Ether	µg/L	2	-	-	15	<2
Dichloromethane	µg/L	5	-	-	50	<5
Styrene	µg/L	0.5	-	-	5.4	<0.5
Tetrachloroethane, 1, 1, 1, 2-	µg/L	0.5	-	-	1.1	<0.5
Tetrachloroethane, 1, 1, 2, 2-	µg/L	0.5	-	-	1	<0.5
Tetrachloroethylene	µg/L	0.5	10 µg/L	MAC	1.6	<0.5
Toluene	µg/L	0.5	60 µg/L	MAC	22	<0.5
Trichloroethane, 1, 1, 1-	µg/L	0.5	-	-	200	<0.5
Trichloroethane, 1, 1, 2-	µg/L	0.5	-	-	4.7	<0.5
Trichloroethylene	µg/L	0.5	5.0 µg/L	MAC	1.6	<0.5
Trichlorofluoromethane	µg/L	5	-	-	150	<5
Vinyl Chloride	µg/L	0.2	1.0 µg/L	MAC	0.5	<0.2
Xylene, m, p-	µg/L	1	-	-	-	<1
Xylene, o-	µg/L	0.5	-	-	-	<.5
Xylene, m, p, o-	µg/L	1.1	-	-	-	<1.1
Bold and shaded indicates results exceed criteria						
RDL - Reported Detection Limit	'-' – Not Tested/Reported					
Ontario Ministry of Environment (MOE), 2003/2022. Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) (June 2003). As amended.						
O.Reg 153 Table 6 - MECP, 2011. Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Site Condition Standards for Soil and Groundwater. Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition						

All results for VOC parameters were below the method detection limits for each parameter (i.e. all results were non-detectible). Results for VOC testing are included in the Laboratory Certificate of Analysis for the sample from 2003 Pond Lane in Appendix F.

The groundwater quality analytical results for samples collected during the pumping test at TW1 (new 202 Red Pine Road well) which was conducted on September 27, 2022 are summarized in Table 5 in comparison ODWSOG limits. The analytical results from TW1 indicate that untreated water quality is generally acceptable. There were no exceedances of the applicable health related parameter limits of the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG).

Table 5: Groundwater Quality – TW1 (202 Red Pine Road well)

PARAMETER	*Units*	*RDL*	*ODWSOG*	TW1 (202 Red Pine Rd)	
				27-Sep-22	27-Sep-22
				4 Hour	10 Hour
Microbiological Parameters (Health)					
Escherichia Coli	ct/100 mL	0	0[MAC]	0	0
Faecal Coliforms	ct/100 mL	0	not specified	0	0
Heterotrophic Plate Count	ct/100 mL	0	not specified	<10	<10
Total Coliforms	ct/100 mL	0	0[MAC]	0	0
Chemical Parameters (Health)					
Fluoride	mg/L	0.1	1.5[MAC]	0.2	0.2
N-NH3 (Ammonia)	mg/L	0.01	not specified	<0.01	<0.01
N-NO2 (Nitrite)	mg/L	0.1	1[MAC]	<0.1	<0.1
N-NO3 (Nitrate)	mg/L	0.1	10[MAC]	<0.1	<0.1
Total Kjeldahl Nitrogen	mg/L	0.1	not specified	<0.1	0.3
Turbidity (Lab)	NTU	0.1	1[MAC] / 5 [AO]	0.8	0.7
Chemical Parameters with Aesthetic Objectives/ Operational Guidelines					
pH	no units	1	6.5-8.5[AO]	8.10	8.05
Hardness as CaCO3	mg/L	1	100[OG]	**201**	**206**
Alkalinity (as CaCO3)	mg/L	5	500[OG]	221	237
TDS (COND - CALC)	mg/L	1	500[AO]	232	248
Calcium	mg/L	0.02	-	51.4	52.7
Chloride	mg/L	0.5	250[AO]	3.0	3.0
Colour	TCU	2	5[AO]	<2	<2
Conductivity	uS/cm	1	-	450	479
DOC	mg/L	0.2	5[AO]	3.3	3.0
Hydrogen Sulphide	mg/L	0.01	0.05[AO]	<0.01	<0.01
Phenols	mg/L	0.001	-	<0.001	<0.001
Sulphate	mg/L	1	500[AO]	26	24
Tannin & Lignin	mg/L	0.5	-	<0.5	<0.5
Magnesium	mg/L	0.02	-	17.6	18.2
Potassium	mg/L	0.1	-	3.0	3.1
Sodium	mg/L	0.2	20[MA] / 200[AO]	13.1	17.9
Iron	mg/L	0.005	0.3[AO]	0.039	0.027
Manganese	mg/L	0.001	0.05[AO]	0.042	**0.050**
Field Parameters					
pH	no units	0.01	6.5-8.5[AO]	7.62	7.6
Chlorine Residual	mg/L	0.01	<0	0.57	0.0
Conductivity	uS/cm	0.1	-	643	658
Turbidity	NTU	0.01	1[MAC] / 5 [AO]	**4.0**	**1.2**
Colour	TCU	10	5[AO]	**70**	**40**
Temperature (°C)	oC	0.1	-	9.7	9.8

Bold and shaded indicates results exceed criteria

RDL - Reported Detection Limit '-' – Not Tested/Reported

Hydrogen Sulphide is reported as a calculated value based on the Sulphide concentration determined by colorimetric method.

MA = Medical officer of health advisory if sodium exceeds 20 mg/L. Sodium AO is 200 mg/L

Ontario Ministry of Environment (MOE), 2003/2022. Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) (June 2003). As amended.

The following exceedances of ODWSOG operational guidelines, aesthetic objectives and medical advisory limit for sodium are noted:

Hardness

At the measured concentrations, the water is considered to be moderately hard, which is typical of wells throughout south-eastern Ontario. Hardness is a measure of the dissolved calcium and magnesium in water and is expressed as the equivalent quantity of calcium carbonate. Hardness can lead to the formation of scale deposits and can form excessive scum (MOE, 2003). Water treatment recommendations for hardness are provided in Section 5.1 below.

Manganese

The ODWSOG (MOE, 2003) indicates that manganese (like iron) can stain laundry and fixtures. At high concentrations manganese can cause an undesirable taste in beverages. Manganese is present in some groundwater when there are chemically reducing underground conditions in combination with naturally occurring manganese minerals. Manganese can occur seasonally in surface waters due to anaerobic decay in sediments. Water treatment recommendations for manganese are provided in Section 5.1 below.

The field turbidity measured at the time of sampling of the TW1 was slightly elevated, but the laboratory turbidity results were acceptable. The field readings for colour were also elevated but the laboratory results were non-detectable.

It is BluMetric's professional opinion based on the water sampling completed at the test well (TW1) and nearby wells that a water supply of groundwater with adequate water quality is available from the local bedrock aquifer.

3.6 Water Quantity

TW1 was pumped by BluMetric on September 27, 2022, for a continuous period of ten hours at a flow rate of 11.5 L/min. An observation well at 2003 Pond Lane was monitored during the pumping test. A well record for the well at 2003 Pond Lane well is identified in Appendix E. The record was provided by the well owner but does not appear to be included in the MECP well records database. Two other wells (601 Rainbow Lane, and 4452 Bolingbroke Road) were also monitored during the pumping test. The observation well at 2003 Pond Lane is approximately 87 m deep and has 6 m of 6-inch ID steel well casing extending into bedrock.

A total drawdown of 17.38 m was measured at TW1 after ten hours of pumping. Drawdown in the pumping well was initially rapid, then started to stabilize after approximately two hours and continued to draw down gradually at a slower rate after that. No significant drawdown was

identified at the observation well. Electronically logged drawdown data from the observation well at 2003 Pond Lane shows multiple periods of short-term pumping by the property owner, but no indication of drawdown associated with pumping of TW1. It took 84 minutes to achieve 95% recovery at TW1.

The pumping test data was analyzed using Aquifer Test Pro™ software. Aquifer parameters were analyzed using drawdown and recovery data and the Theis method of analysis (Theis, 1935). Pumping test drawdown and recovery curves for the pumping wells and selected observations wells are included in Appendix G. Table 6 provides a summary of pumping test details and aquifer analysis results. Aquifer transmissivity is estimated to be approximately 4 m^2/day based on the recovery data. Hydraulic conductivity is estimated to be approximately $4.7x10^{-7}$ m/sec which is within the normal range for Precambrian meta-plutonic bedrock in southeastern Ontario.

Table 6: Pumping Test and Aquifer Summary

PUMPING TESTS AND AQUIFER ANALYSIS SUMMARY												
Well ID	Total Depth (m bgs)	Test date	Pumping rate (L/min)	Duration of test (hours)	Static water level (mbtoc)	Drawdown (m)	Available DD	Percent of availabe DD used	Time to 95% Recovery (mins)	Hydraulic Conductivity (K in m/sec)	Transmissivity (m^2/day)	
											Pumping	Recovery
TW1	93	27-Sep-22	11.4	10	10.40	17.38	82.60	21%	84	4.7E-07	0.7	4

The suitability of the test well (TW1) to provide an adequate quantity of water was assessed using the methodology provided in Procedure D-5-5, which indicates the number of people per house is the number of bedrooms plus one. For the purpose of this study, it is assumed that new houses will be a three-bedroom single family homes, so the number of persons will be four. Procedure D-5-5 indicates the minimum 'per-person water requirement' is 450 L/day, which is 1,800 L/day per house (or per well).

Procedure D-5-5 indicates that 'peak demand' occurs over a 120-minute period and is to be based on a per person usage rate of 3.75 L/min during that period. Using this information, the 'peak demand rate' per house is 3.75 x 4 = 15 L/min. The pumping rate used for the pumping tests was below the estimated 'peak demand rate', but the pumping test only used approximately 21% of the available drawdown in the well. The total volume of water pumped over ten hours was approximately 6,900 L, and the well recovered in 84 mins. The standing well bore volume is estimated to be 1,460 L. This information shows that the peak demand rate can be easily accommodated by the well.

The Canadian Mortgage and Housing Corporation's Household Guide to Water Efficiency (CMHC, 2000, revised 2014) indicates that the average daily residential water use in Ontario is 225 L per person per day (1,125 L/day for a four-bedroom house). Ontario Building Code requirements (OBC, 2022) for water conservation specify that toilet and shower consumption must

now comply with lower use requirements (OBC Table 7.6.4.2.A & B and Table 7.6.4.1). Based on the new requirements, toilet water demand is assumed to be 4.8 L/flush. Shower consumption is assumed to be 7.6 L/min. Toilet use accounts for approximately 25% of total domestic water use, and shower use accounts for approximately 20% (CMHC, 2014). The OBC efficiencies will result in an average per person domestic water usage of 163 L/day. This suggests that the daily household water demand could often be less than 1,000 L/day.

A determination of the long-term safe yield (i.e. Q20 safe yield pumping rate) of the test well was calculated using the methods described by Fervolden (1959) and Maathius & van der Kamp (2006). The inputs and results of the calculation are presented in Table 7. The results of the 20-year safe yield analysis show that the wells could be pumped at more than 17 L/min continuously without causing an adverse impact to surrounding well users.

Table 7: Safe Yield Summary

Q20 Safe Yield Analysis	
Well ID	TW1
Transmissivity (m^2/d)	0.7
Average Test Pumping Rate (L/min)	11.5
Average Test Pumping Rate (m^3/day)	17
Available Drawdown (m)	82.6
Drawdown at 100 mins (m)	11.646
Maximum Test Drawdown (m)	17.38
Drawdown at 20 years (extrapolated)	38.0
% of available drawdown	46%
Specific Capacity (L/min/m)	1
Q20 safe well yield (m^3/day)Farvolden	28
Q20 safe well yield (m^3/day) Maarthius & van der Kamp	25
Q20 safe well yield (L/min) Maarthius & van der Kamp	17
Farvolden, 1959	
Maathius & van der Kamp, 2006	

Due to the nature of the fractured bedrock aquifer at the site and variable yields reported in MECP water well records, some future wells may not intersect suitable water bearing fracture networks and may not provide an adequate yield for normal residential use. For low yielding wells, hydro-fracturing and/or additional water storage at surface may be required to meet peak demand requirements.

In order to protect the bedrock aquifer at the site, any permanent occupancy greater than four persons per lot should not be permitted. Future development must not include any high-volume water uses, and 'bed and breakfast' use should not be permitted.

Each new well should be subject to a minimum 6-hour pumping test conducted after it is installed. Nearby wells should be monitored for drawdown during each test if feasible. Any observed well interference should be included in a determination of the optimal pumping rate for each new well. An assessment of any requirement for additional surface storage should be conducted based on the pumping test information. This work should be completed by an Ontario licensed Engineer or Geoscientist with suitable experience.

If any new well is deemed to be incapable of providing an adequate supply or use with supplemental storage (i.e. extremely low yield), it should be decommissioned according to the requirements of O. Reg. 903.

4. DEVELOPMENT CONSIDERATIONS

4.1 WATER TREATMENT

The water within the bedrock aquifer has elevated hardness. A standard residential grade water softener can be installed to remove hardness in the raw water. Conventional water softeners will introduce sodium into the water supply, and it may be appropriate to bypass the water softener with a separate tap for drinking water.

The water within the overburden aquifer has elevated manganese. The concentration of manganese measured at TW1 is well below the treatability limit. Installation of a residential grade water softener would reduce the concentration manganese to an acceptable level. Alternatively, the groundwater can be treated using a greensand filter.

4.2 FUTURE WELL CONSTRUCTION

New lots in the subdivision will be serviced by individual drilled water supply wells completed in the Precambrian bedrock. The wells must be installed by a licensed well contractor in accordance with Ontario Regulation 903. As indicated on Figure 4 and Figure 5, water supply wells must be constructed up gradient of the septic system locations. All new water supply wells on the subdivision should be located more than 30 m from surface water courses and water bodies (ponds and lakes) as per best practices indicated by the MVCA.

The water well records show that well yields of 15 L/min or greater can be obtained from wells in the bedrock aquifer (i.e. sufficient for a three-bedroom dwelling) in wells that 20 and 70 m in depth. As a measure to address potentially sensitive hydrogeological conditions it is recommended that the steel well casing be installed and grouted into place to a minimum depth of 12 m (40 feet) into bedrock.

The annular space between the well casing and the drilled hole should be sealed with high early strength cement grout, prepared with 4% bentonite. The objective of the procedure is to prevent contamination of the bedrock aquifer via infiltration through the well annular space. Further to this, O. Reg. 903 requires the well contractor to install a suitable sealant around the base of the well casing where it intersects the bedrock. The following recommendations provide additional measures to ensure water supply wells are protected from surface derived contaminants:

- A 10-inch (0.25 m) diameter hole should be drilled through the overburden and at least 12 m into bedrock.
- New 6-inch (0.15 m) diameter steel casing should be installed in the drilled hole. Steel casing must extend 12 m into bedrock.
- Ontario Reg. 903 well placement requirements and grouting procedures should be followed to ensure that surface derived contaminants cannot enter the well.
- The well casing must extend at least 40 cm (16 inches) above ground surface. The ground surface must be graded away from the well.

It is recommended that the newly constructed wells be pumped for a minimum of six hours after construction to ensure adequate well development and to reduce groundwater turbidity to acceptable levels before connection to the residences plumbing system.

All new wells should be chlorinated after completion of well development produce a free chlorine residual of at least 50 mg/L (ppm). The chlorine should be mixed with the standing water in the casing using a procedure that will result in the thorough vertical mixing of the chlorine over the entire depth of the well.

Each well should be completed with a submersible pump, pitless adaptor and vented vermin proof well cap. The grading around the well casing should be slightly elevated to direct surface runoff away from the well. The casing should project approximately 400 mm above the mounded soil within 3 m in all directions from the casing.

Further to above, the installed water well must be maintained by the well owner as per the requirements under Ontario Reg. 903 (and subsequent amendments). Well maintenance requirements are provided in Chapter 11 of the MECP document, "Water Supply Wells – Requirements and Best Management Practices" (Revised April 2015) available at:

https://www.ontario.ca/document/water-supply-wells-requirements-and-best-practices
Please note that a minimum setback distance of 30 m must be maintained between any water body high water line and any new drilled well.

4.3 Surface Storage for Low Yield Wells

The daily water usage according to Procedure D-5-5 is 1,800 L/day for a three-bedroom dwelling. The peak demand water usage is (15 L x 120 mins) 1,800 L in 120 minutes.

The volume of water that can be stored in each new well (based on 6" diameter well that is 70 m deep) is approximately 1,270 L. As mentioned above, there is a possibility that some future wells may not intersect suitable water bearing fracture networks resulting in yield below the minimum ideal rate (i.e. 15 L/min for a three bedroom house). Depending on the depth of the well, the water stored in the well may not be sufficient to meet peak demand requirements. If such cases present themselves, additional surface storage may be required to satisfy the peak demand flow rate for 120 mins. Additional surface storage can be achieved by installing large capacity pressure tanks and/or a cistern system that ensures the stored water is not susceptible to development of microbiological quality issues (i.e. sealed and flushed after long periods of non-use). In such cases, the amount of surface storage should be determined based on the actual sustainable yield of the well (as determined by a suitable pumping test) and the storage system should be designed by an Ontario licensed professional Engineer.

Future development within the Maberly Pines Subdivision should not include any permanent occupancy exceeding three-bedroom residential houses on each lot, with a maximum occupancy of four persons. This concept was included in the initial hydrogeological assessment of the subdivision by WESA (1979) report, which suggested that future development should preclude any high-volume water uses. The Township should be diligent to ensure any applications for higher occupancy uses within the subdivision such as extra apartments, coach houses, commercial operations (e.g. spas) are not approved. These measures are protective of the available groundwater within the bedrock aquifer and will help to prevent adverse affects associated with further development within the subdivision.

4.4 Wastewater Treatment and Disposal

MECP Procedure D-5-4 (Technical Guidelines for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment, MOEE, 1996) provides a methodology for assessing the risks associated with individual onsite sewage systems. Procedure D-5-4 indicates that developments consisting of lots which average 1 hectare (with no lot being smaller than 0.8 hectares) may not require a detailed hydrogeological assessment if it can be demonstrated that the area is not hydrogeologically sensitive. Although the average lot size in the subdivision is 1.1 hectares, 16 of the lots are less than 0.8 hectares (see Table 5 for lot size details), so a predictive nitrate impact assessment has been provided.

In assessing the impact of the subdivision, the estimate of groundwater recharge, by infiltration from precipitation, is the primary site-specific input parameter. In this regard, assumptions are required to be made with respect to evaporation and evapotranspiration, as well as infiltration and runoff rates. The rate of infiltration will be dependent upon surficial soil types, vegetative ground covers and their distribution, and site topography.

In conducting our assessment, a mean annual precipitation value of 939.8 mm/year from the Godfrey climate station was used (ECCC, 2022). An estimation of infiltration was calculated based on site specific information and the infiltration factors provided in the document MOEE Hydrogeological Technical Information Requirements for Land Development Applications (MOEE, 1995). A Thornthwaite calculation and predictive nitrate impact assessment (PNIA) is provided in Appendix H. The calculation was conducted using conceptual effluent input from all 56 lots in order to present an absolute worst-case scenario.

The cumulative nitrate impact for this subdivision is estimated to be 6.7 mg/L. Background nitrate concentrations in onsite and offsite wells are assumed to be at or below the maximum concentration that was measured at 601 Rainbow Lane (see Table 2) so the additional loading will be well below the provincially mandated limit of 10 mg/L. As such the subdivision as a whole should have an acceptable impact.

4.5 Conceptual Lot Layouts

An assessment of the suitability for development of the remaining lots within the subdivision was conducted, based on two development scenarios:

- Lot layout and servicing using conventional septic systems (not viable under current regulations).
- Lot layout and servicing using a combination of conventional, tertiary treatment septic systems and composting toilets.

Lot servicing based on conventional septic systems was considered as an intermediate step in the process of determining the most appropriate lot serving options for the undeveloped lots within the subdivision. A lot servicing layout based on conventional septic systems is presented in Figure 4 (Conceptual Lot Development Plan A). The figure was used to identify unsuitable servicing conditions on many of the lots due to limitations such as bedrock at surface, steep slopes, proximity to surface water, minimum setbacks from surface water, and setbacks/slope considerations relating to wells and septic beds.

Lot servicing options that take into account restrictions and incorporating alternative servicing options for septic waste are presented in Table 8. The table provides a summary of the lots in terms of development status, lot size, suitability for conventional septic system, and constraints (water bodies, steep slopes, bedrock at surface, proximity to surface water bodies). Figure 5 (Conceptual Lot Development Plan B) reflects the most appropriate solutions that were identified through this process. Lot servicing solutions fall into the following three categories:

- Lots that are suitable for conventional raised septic bed systems.
- Lots that are not suitable for conventional raised septic bed systems due to small lot size (<0.5 hectare), steep slopes (exceeding 25%), or exposed bedrock at surface (over a majority of the site), and where tertiary treatment systems can be implemented. Depending on steepness of slopes, the lot grading will need to be adjusted on some of the lots to accommodate tertiary systems. Imported clean fill may be required on some lots with exposed bedrock at surface to establish a suitable substrate.
- For lots with surface water (lake or pond frontage or pond onsite) and in some cases other constraints (small lot size, steep slopes, or exposed bedrock at surface), composting toilet systems are indicated. These lots will also be subject to a 30 m setback from surface water features for houses and wells.

Please note that partial development of Lot 1 and Lot 6 do not appear to include wells and septic systems at the time of site inspections from public roads, so any future development will be subject to the requirements of this report.

Table 8: Lot Serviceability Summary

Lot #	Area (hectares)	Restrictions / Considerations	Conventional / Restricted	Solutions / Recommendations
1	0.87	Partially developed (observatory only)	Conventional	Raised Bed (if required in future)
2	1.40		Conventional	Raised Bed
3	0.87	Steep slopes	Restricted	Raised Bed / Adjust Grading / Tertiary Treatment
4	0.68		Conventional	Raised Bed
5	0.81		Conventional	Raised Bed
6	0.77	Partially developed (minimal)	Conventional	Raised Bed
7	1.40		Restricted	Composting toilet system
8	1.20	Pond on lot	Restricted	Composting toilet system
9	1.75		Conventional	Raised Bed
10	1.14	Lake frontage	Restricted	Composting toilet system
11	1.16	Lake frontage	Restricted	Composting toilet system
12	0.97	Lake frontage	Restricted	Composting toilet system
13	0.80	Lake frontage	Restricted	Composting toilet system
14	0.81	Lake frontage / Steep slopes	Restricted	Composting toilet system
15	0.98	Lake frontage / Steep slopes	Restricted	Composting toilet system
16	0.91	Lake frontage / Steep slopes / Exposed bedrock	Restricted	Composting toilet system
17	1.06	Lake frontage / Steep slopes / Exposed bedrock	Restricted	Composting toilet system
18	0.91	Lake frontage / Steep slopes / Exposed bedrock / Nearby wells	Restricted	Composting toilet system
19	0.80	Lake frontage / Steep slopes / Exposed bedrock / Nearby wells	Restricted	Composting toilet system
20	1.24	Developed (house, well and septic) - 2003 Pond Lane		
21	0.85		Conventional	Raised Bed
22	0.78		Conventional	Raised Bed
23	1.11	Developed (house, well and septic) - Pond Lane address		
24	1.08	Developed (house, well and septic) - Red Pine Road address		
25	1.26	Lake frontage / Steep slopes / Exposed bedrock	Restricted	Composting toilet system
26	1.18	Lake frontage	Restricted	Composting toilet system
27	0.47	Small Lot	Restricted	Tertiary Treatment
28	0.70	Steep slopes	Restricted	Raised Bed / Adjust Grading / Tertiary Treatment
29	1.08		Conventional	Raised Bed
30	0.62		Conventional	Raised Bed
31	3.25	Pond frontage / Extra large Lot	Restricted	Composting toilet system
32	2.09	Pond frontage	Restricted	Composting toilet system
33	1.54	Pond frontage / Exposed bedrock	Restricted	Composting toilet system
34	0.98	Steep Slopes	Restricted	Composting toilet system
35	0.61	Developed (house and septic) 202 Red Pine Road		
36	0.76	Pond on lot	Restricted	Composting toilet system
37	0.68	Small Lot / Pond on Lot / Nearby wells	Restricted	Composting toilet system
38	0.64	Small Lot / Pond on Lot / Nearby wells	Restricted	Composting toilet system
39	0.85	Pond frontage / Steep slopes	Restricted	Composting toilet system
40	0.83	Pond frontage	Restricted	Composting toilet system
41	1.33	Steep slopes	Restricted	Raised Bed / Adjust Grading / Tertiary Treatment
42	0.64		Conventional	Raised Bed
43	0.69		Conventional	Raised Bed
44	0.65	Pond frontage / Steep slopes	Restricted	Composting toilet system
45	0.95	Pond frontage / Steep slopes	Restricted	Composting toilet system
46	1.03		Conventional	Raised Bed
47	0.74	Developed (house, well and septic) - Red Pine Lane address		
48	0.71		Conventional	Raised Bed
49	1.21	Pond frontage	Restricted	Composting toilet system
50	1.15	Exposed bedrock	Restricted	Composting toilet system
51	1.26	Exposed bedrock	Restricted	Composting toilet system
52	1.01	Steep slopes / Exposed bedrock	Restricted	Composting toilet system
53	1.54	Pond frontage	Restricted	Composting toilet system
54	1.70	Pond frontage	Restricted	Composting toilet system
55	2.37	Developed (house, well and septic) - 4416 Bolingbroke		
56	1.80		Conventional	Raised Bed

4.6 SEWAGE SYSTEM DESIGN

4.6.1 Conventional Raised Bed Systems

Conventional raised bed systems are indicated on lots 1,2,4,5,6,7, 9, 21, 22, 29, 30, 42, 43, 46, 48 and 56.
Based on the assessed terrain conditions (thin overburden), conventional raised septic beds are anticipated for these lots. Any proposed septic system design should be supported by a lot-specific assessment meeting local septic approval requirements.

Based on three-bedroom residences, the septic system is expected to have a daily sewage flow rate of 1,600 L/day (OBC Table 8.2.1.3.A). Given that the lots have soils with a percolation time >50 min/cm, the OBC specified loading rate is 4 L/m^2/day (Table 8.7.4.1.A). The OBC indicates the mantle is to be constructed of suitable leaching bed fill to a depth of at least 250 mm of the loading area and extend at least 15 m beyond the outer distribution pipes in any direction in which the effluent entering the soil will be moving horizontally.

Sewage systems must be designed in accordance with Part 8 of the Ontario Building Code Act, as amended (OBC). The OBC sets out minimum design and construction standards for all approved classes of sewage systems. It is proposed that private services be carefully assessed based on lot size, proximity to surface water bodies, and the slope of the land. Section 8.7.4.2 and 8.7.5.3 of the OBC requirements state that there must be a minimum depth of 900 mm of suitable soil or leaching bed fill present between:

- The base of the filter bed or absorption trenches and native soil with a T-time >50 min/cm
- Bedrock
- High groundwater table.

The lots have either a thin layer of coarse overburden material or a mixture of thin overburden and bedrock. Fully raised Class 4 filter beds and/or absorption trench style leaching beds are indicated. Many of the lots have sloping topography. The maximum allowable slope for septic bed application is a gradient of 4:1 (25% slope). Please note that a water diversion trench is required upgradient of any leaching bed that is developed on a slope greater then 5%.

The following equation was used to determine the horizontal surface area required for leaching beds:

$$L = QT/200$$

Where: Q = The total daily design sewage flow in litres
T = The percolation time of the native soil in min/cm

Assuming a three-bedroom residence where Q is 1,600 L/day and T is >50 min/cm, a total length (L) of distribution pipe required is 400 m. For leaching beds that are part of a Class 4 sewage treatment system, any single distribution pipe can not exceed 30 m in length with a maximum centerline spacing of 1.2 m from adjacent distribution pipes. A total of 14 distribution pipes are required if distribution pipe lengths are 30 m. The resultant footprint of the leeching bed is approximately 210 square metres if distribution pipe centerlines are spaced every 1.5 m.

Wherever possible, leaching beds should be located down gradient from any nearby wells. The OBC stipulates minimum clearance distances for in-ground and raised tile beds. In order to provide a safety margin, it is BluMetric's recommendation that an offset of at least 30 m be observed between an onsite wastewater treatment system and a drilled well. The septic system and bed should be placed in a downgradient or side gradient location relative to the planned well. The minimum clearance distances also apply to wells and sewage systems located on neighbouring lots.

The homeowner is advised to have the on-site wastewater system inspected regularly and to follow a wastewater system management program to minimize the risk of failure and impact to the groundwater. Best management practices are recommended such as regular pumping of the septic system, cursory inspection of break-out, consideration as to what materials are being discharged to the septic. It is recommended that homeowners take all reasonable measures to conserve water and promote infiltration of water into the subsurface within each of their lots. The homeowner shall consult the following guides available at: https://www.oowa.org/homeowner-resources/

- A Guide to Operating & Maintaining Your Septic System
- About Your House: Buying a House with a Well and Septic System

Special attention should be taken with the placement of septic beds on sites with water bodies. A minimum setback distance of 30 m must be maintained between the water body high water line and any septic bed. In some cases (Lots 44 and 45) this will not be possible, so the OBC minimum distance of 15 m must be maintained. These lots are indicated Figure 5.

4.6.2 Tertiary Treatment Systems

Tertiary treatment septic systems are indicated on lots 3, 27, 28 and 41.

Alternative sewage treatment options will need to be implemented on some of the lots that have steep slopes and lot sizes of less than 0.5 hectares, as indicated above. Tertiary treatment systems are indicated for some of the lots as indicated above. These alternative sewage treatment systems employ various technologies from porous bacterial enriched foam and denitrifying lignocellulose mediums to microbial electrochemical septic tanks (MESTs). They are classified as Class 4 sewage systems and are therefore held to the same building code in the OBC.

The following are examples of certified tertiary treatments systems that may be suitable for the sites that are indicated above:

- Waterloo Biofilter – Designed to perform on difficult sites including small remote lots, areas of exposed bedrock, in soils with low permeability, areas with high water tables, and environmentally sensitive areas. There are many applications to suit the needs of the site-specific conditions. Third party tested. Canadian manufactured.
- Ecoflo biofilter by Premier Tech – Designed to perform on difficult sites including small remote lots, areas of exposed bedrock, in soils with low permeability, areas with high water tables, and environmentally sensitive areas. United States manufactured.

Tertiary treatment systems significantly reduce the size of the septic bed footprint allowing for lots with tight clearances and steep slopes to be developed. The highly variable terrain at the site will make the placement of septic systems on some of the lots challenging. Partial regrading of the site may be required on some lots to ensure gradients are less that the maximin allowable gradient (25% slope). Imported fill should be used to raise septic beds no less than 900 mm above native ground surface. Surface water runoff will need to be controlled upgradient of these systems to avoid erosion and ensure systems remain functional. Please note that a water diversion trench is required upgradient of any leaching bed that is developed on a slope greater then 5%.

Lot 52 has steep slopes and exposed bedrock onsite. Importation of clean fill and grading work may be required to provide a suitable substrate for the septic bed on this lot.

Please note that it is not the intent of the Conceptual Lot Development Plan B (Figure 5) to restrict placement of a dwelling on each lot. While the actual configuration and position of the home may change, the relative position of the home, sewage system and well should be maintained. In all cases, wells should be upgradient relative to septic beds, and the indicated minimum separation distances must be taken into account.

Special attention should be taken with the placement of septic beds on sites with water bodies. A minimum setback distance of 30 m must be maintained between the water body high water line and any septic bed.
Any proposed septic system design should be supported by a lot-specific assessment meeting local septic approval requirements.

4.6.3 Composting Toilet Systems

Composting toilet systems are indicated on lots 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 25, 26, 31, 32, 33, 34, 36, 37, 38, 39, 40, 44, 45, 49, 50, 51, 52, 53 and 54.

Please Note: It will be difficult to position a dwelling and well on Lot 44 in order to observe a 30 m setback from surface water, and on lot 45 it will not be possible to maintain a 30 m setback. It is recommended that dwellings and wells on these lots be positioned as far as reasonably possible away from the pond.

Composting toilets convert potentially human waste to composted organic material by the action of microorganisms (bacteria and fungi) which break down the waste under controlled aerobic conditions. Most composting toilets do not use water. A carbon-based additive (e.g. sawdust, coconut coir, or peat moss) is usually added to create air pockets and to promote aerobic decomposition, and provide an optimal carbon-to-nitrogen ratio and reduce odor.

Section 8.1.2.1. of the OBC includes 'composting toilet systems' within its definition of Class I systems (i.e. Class 1 = a chemical toilet, an incinerating toilet, a recirculating toilet, a self-contained portable toilet and all forms of privy including a portable privy, an earth pit privy, a pail privy, a privy vault and a composting toilet system). The OBC does not provide much specific information about requirements for composting toilets, but Section 9.31.4.1. (Required Fixtures) indicates any dwelling with a water distribution system must have a kitchen sink, bathtub/shower stall, and a lavatory/water closet or drainless composting toilet.

Specific guidelines relating to composting toilets are not provided in Ontario. A comprehensive guideline was produced by the British Columbia Ministry of Health, Health Protection Branch (Manual of Composting Toilet and Greywater Practice) in 2016. The 'BC Guidelines' describe the types of systems that are generally available (including systems that divert urine to a holding tank), methods of residual organic matter processing (incineration, curing, onsite disinfection), maintenance standards, installation guidelines, etc.

It is beyond the scope of the current study to provide detailed recommendations for composting toilet systems that may be suitable for the lots where such systems are indicated. From the perspective of this study the main concerns that must be taken into account and controlled are as follows:

- Composting toilet systems must be drainless.
- If a urine diversion system is used, the urine must be retained in a suitable holding tank and must be hauled off site by an Ontario licensed septic waste hauler to a licensed septic waste disposal facility.
- Residual organic matter must be either effectively processed as per BC Guidelines (BCMOH, 2016) in a way that ensures nitrates and phosphorus do not leach out of compost post treatment beds and migrate to surface water bodies / or must be hauled offsite by a licensed septic waste hauler to a licensed septic waste disposal facility.
- Under no circumstances can residual organic matter be discharged to the ground surface at lots within the subdivision, as the potential for runoff and leaching of phosphorus and nitrates to surface water must be strictly avoided.

If composting toilet systems are deemed to be unsuitable (as may be the case due to odour issues and complexity of effective management) to owners of lots where they are indicated the following alternatives may be considered, but must be approved by Tay Valley Township on a case-by-case basis:

- Self contained portable toilet.
    - Waste to be removed by a licensed septic waste hauler to a licensed septic waste disposal site.
- Incinerating toilet.
- If the lot has sufficient soil depth a Class 5 sewage system may be suitable (i.e. a system that uses a holding tank for the retention of sewage at the site where it is produced prior to its collection by a 'hauled sewage system'.
    - Waste to be removed by a licensed septic waste hauler to a licensed septic waste disposal site.

Please Note: Use of an 'earth pit privy' is not suitable and should not be approved.

5. CONCLUSIONS AND RECOMMENDATIONS

The following statements and conclusions are based on the investigation and analysis contained within this report:

- The drilled bedrock well at 202 Red Pine Road (TW1) is suitable for the purpose of characterizing the bedrock aquifer at the subject site.
- New drilled wells on the undeveloped lots have the potential to provide a sufficient quantity of water for residential use. 65 % of the water well records within 500 m of the subdivision indicate yields that are acceptable for servicing of a three-bedroom residence. Some future wells may not intersect interconnected fracture networks that will provide a sufficient yield for normal residential use. If the yield of any future well is insufficient to provide an adequate quantity of water to meet 'peak demand 'requirements, surface storage may be required.
- Each new well should be subject to a 6-hour pumping test and the potential for interference should be assessed and used to determine an optimal pumping rate for each new well. This work and an assessment of the requirement for additional surface storage should be conducted under the guidance of an Ontario licensed Geoscientist or Engineer with suitable experience.
- BluMetric recommends that a database be initiated and maintained for the development by Tay Valley Township that includes well records, pumping test data and well water quality analysis. The data should be reviewed by a licenced hydrogeologist on a biannual basis to ensure the ongoing sustainability of development on private wells within the subdivision.
- Future development within the subdivision must not include any permanent occupancy exceeding three-bedroom residential dwellings on each lot. Any occupancy greater than four persons per lot must not be permitted. Future development must not include any high-volume water uses, and bed and breakfast use should not be permitted.
- The water quality at 202 Red Pine Road (TW1) and 2003 Pond Lane was found to satisfy the health-related limits of the ODWSOG. New drilled wells on the undeveloped lots are expected to provide a sufficient quality of groundwater for the intended residential use.
- Analytical results from wells at 2003 Pond Lane and 202 Red Pine Road show that the only exceedances are for hardness concentrations that are considered generally acceptable for most domestic purposes and can be treated using a conventional water softener system. Manganese was detected at the operational guideline limit at 202 Red Pine Road and can also be treated using a conventional water softener.
- The concentration of sodium in the sample from the well at 2003 Pond Lane exceeds the medical notification limit. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L.

- The site is hydrogeologically sensitive due to discontinuous thin overburden. Water bearing fractures typically occur at depth of greater than 12 m below ground surface, so the upper bedrock unit provides some degree of isolation between the thin overburden and the fractured bedrock aquifer. Protective measures for well construction and septic system design will be needed to mitigate the potential for impacts to well water quality. Protective measures include the installation of a minimum of 12 m of steel casing into bedrock for all new drilled wells, and a minimum setback distance of 30 m between new drilled wells and septic beds (on the lots where they are indicated).
- Based on the assessed terrain conditions (thin discontinuous overburden), conventional raised septic beds are indicated for 16 undeveloped and two partially developed lots. Special attention should be taken with the placement of septic beds on sites with water bodies. Ideally a minimum distance of 30 m should be maintained between the water body high water line and septic bed. A lot-specific investigation should be carried out for the detailed sewage system design and site grading plan at each lot as part of the building permit application process.
- Tertiary treatment septic systems are indicated for six undeveloped lots. Tay Valley Township should create and maintain a database of locations where tertiary treatment systems are indicated. The database should be used to ensure that the owners of tertiary treatment systems take all necessary steps to ensure the ongoing maintenance and efficiency of the system according to manufacturer requirements. A system should be developed to ensure new owners of sites with tertiary treatment systems are informed of their obligations to adequately maintain their systems according to manufacturer requirements.
- Composting toilet systems are indicated for 29 undeveloped lots. Any proposed septic system design should be supported by a lot-specific assessment meeting local septic approval requirements. It is recommended that a database of lots with composting systems be maintained by Tay Valley Township and that the township takes steps to ensure that such systems are properly maintained, and that composted material is appropriately handled and deposited.
- A minimum separation distance of 30 m between a septic beds and new drilled wells at the undeveloped and partially developed lots should be used. Septic beds should be positioned in a downgradient position relative to new drilled wells.
- The subject property is suitable for development as a residential subdivision at the proposed density, if future development incorporates appropriate alternatives for wastewater treatment at lots that are not suitable for conventional raised bed systems.

6. LIMITATIONS

The conclusions presented in the above captioned report represent our professional opinion, in light of the terms of reference, scope of work, and the limiting conditions noted herein.

The findings presented in this report are based on conditions observed at the specified dates and locations, the analysis of samples for the specified parameters, and information obtained for this project. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, locations that were not investigated directly, or types of analysis not performed.

BluMetric makes no warranty as to the accuracy or completeness of the information provided by others, or of conclusions and recommendations predicated on the accuracy of that information. Nothing in this report is intended to constitute or provide a legal opinion.

This report describes the site conditions and observations made by the BluMetric team at the time of the site investigation and have been prepared solely for the use of the client. No other party may use or rely upon the above-captioned report or portion thereof without the express written consent of BluMetric. BluMetric will consent to any reasonable request to approve the use of this report by other parties as "Approved Users".

In summary, it is BluMetric's professional opinion that this site is suitable for the proposed additional development. We trust that this assessment satisfies local requirements. If you have any questions, please do not hesitate to contact the undersigned.

Respectfully submitted,
BluMetric Environmental Inc.

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Geoscientist in Training

Russell Chown, P.Geo
Senior Hydrogeologist

Robert Hillier, P.Geo
Senior Hydrogeologist

7. REFERENCES

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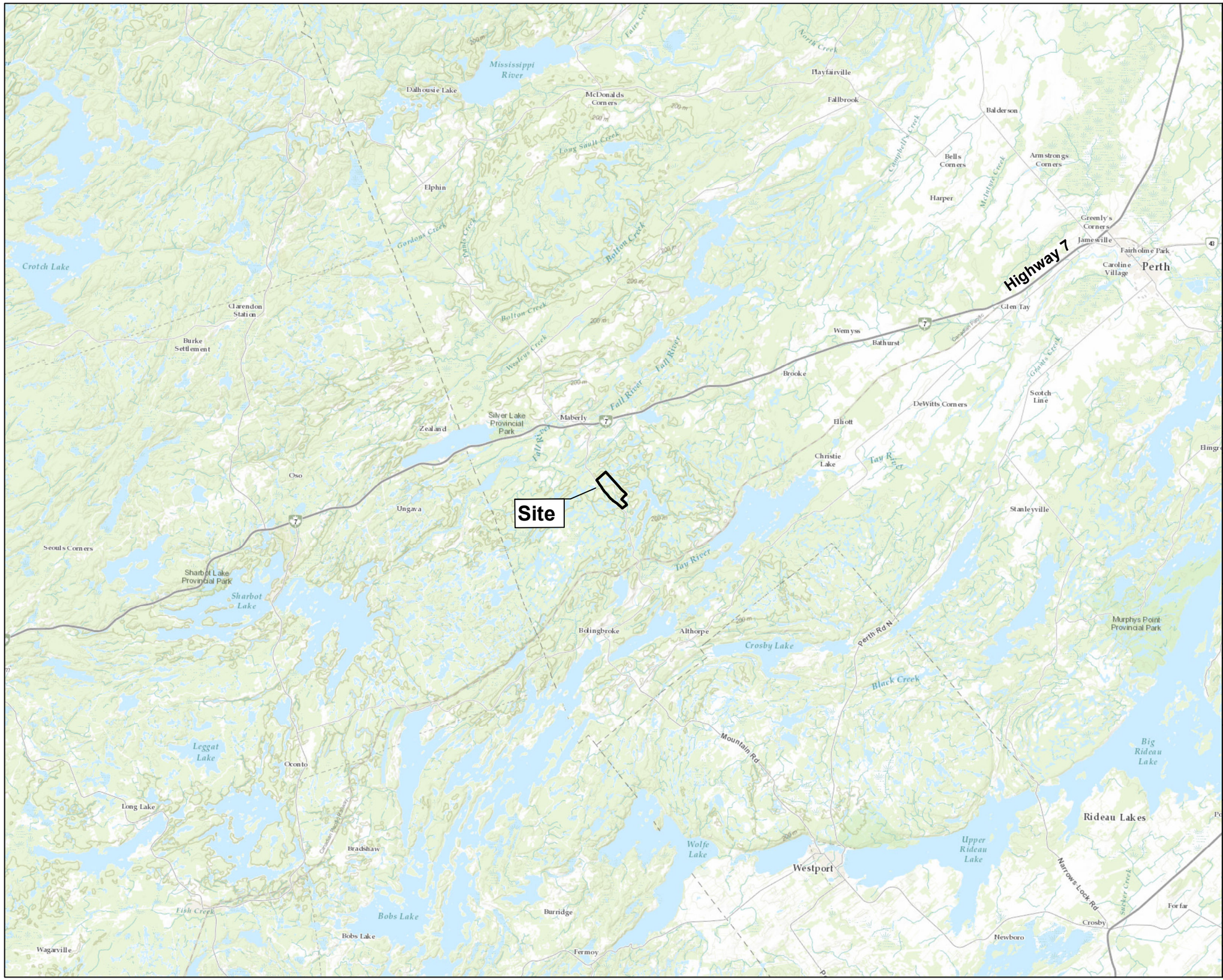
FIGURES



LEGEND

Msberly Pines Subdivision

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REFERENCES

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N W E S

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CLIENT

Tay Valley Township - Maberly Pines

PROJECT

Hydrogeology Study

TITLE

Site Location

BluMetric Environmental

The Tower - The Woolen Mill,
4 Cataraqui St.,
Kingston, Ontario K7K 1Z7
TEL: (613) 531-2725
FAX: (613) 531-1852
Email: info@blumetric.ca
Web: http://www.blumetric.ca

PROJECT #	DATE
220037	**October 05, 2022**

DRAWN	CHECKED	FIG NO.	REV
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LEGEND

- Well Location
- Inferred Direction of Water Flow
- Site Boundary
- Elevation Contour - 1 m (MNR)
- Elevation Contour - 5 m (MNR)
- Watercourse

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

N W E S

0 100 200 Metres

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CLIENT

Tay Valley Township - Maberly Pines

PROJECT

Hydrogeology Study

TITLE

Topography & Hydrology

The Tower - The Woolen Mill,
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PROJECT #	DATE
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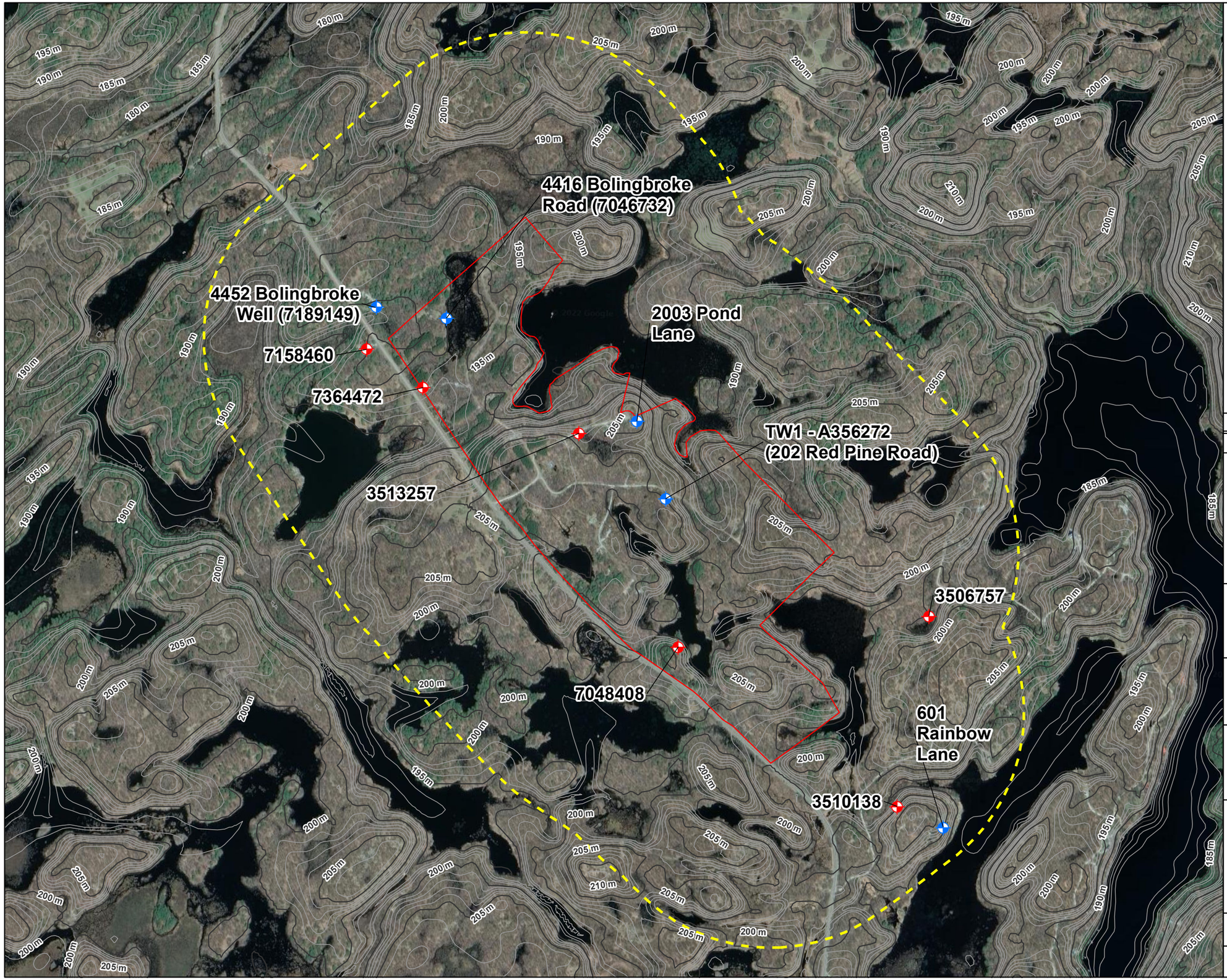

LEGEND

- Water Well Record (MECP)
- Well identified during this study
- Elevation Contour - 1 m (MNR)
- Elevation Contour - 5 m (MNR)
- Site Boundary
- 500m Buffer of Site Boundary

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

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CLIENT

Tay Valley Township - Maberly Pines

PROJECT

Hydrogeology Study

TITLE

Well Records

The Tower - The Woolen Mill,
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PROJECT #	DATE
220037	October 14, 2022

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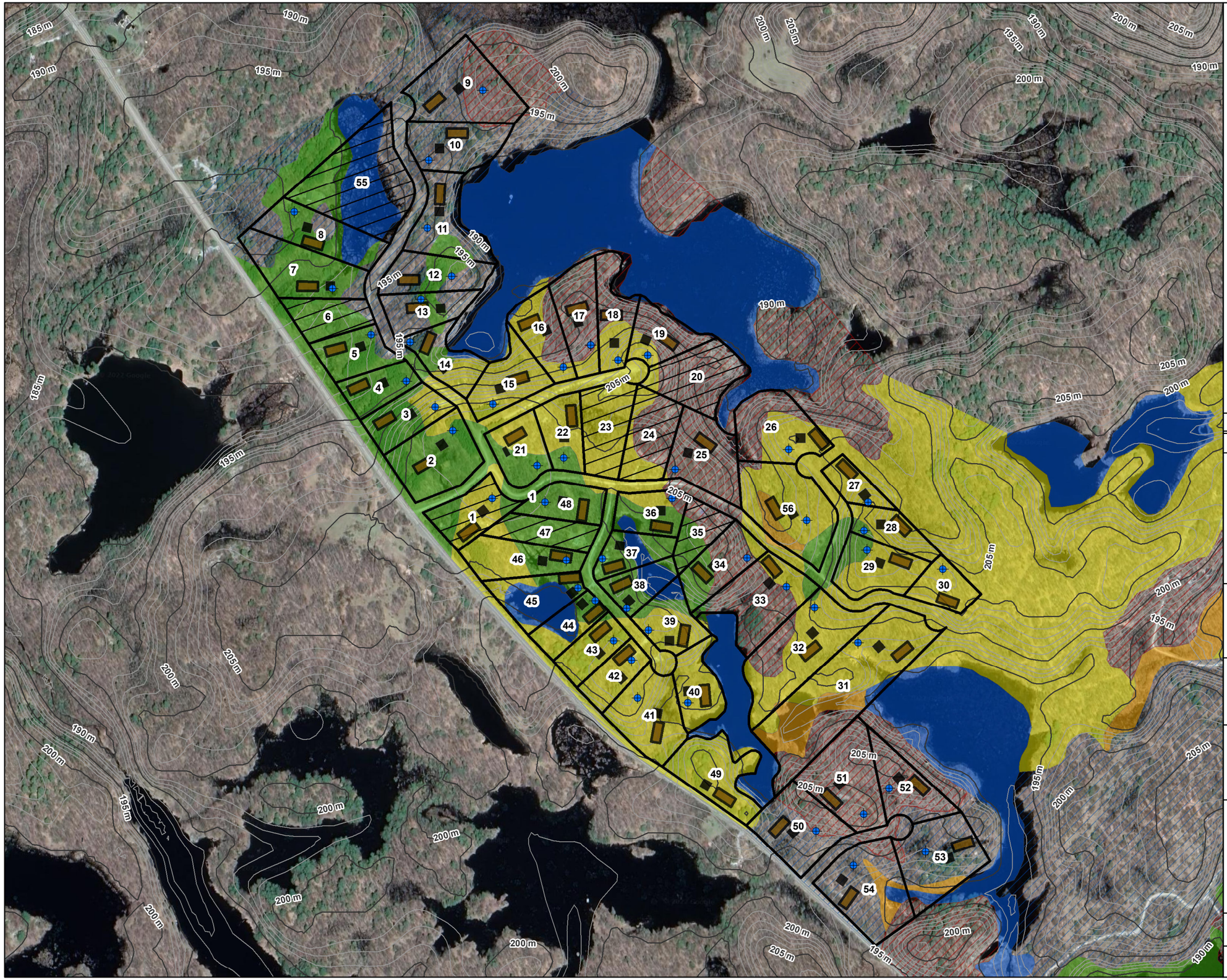

LEGEND

- Proposed Supply Well
- Conceptual Dwelling
- Conceptual Septic Bed
- Property Parcel
- Property Parcel - Developed/Partially Developed
- Elevation Contour - 1 m (MNR)
- Elevation Contour - 5 m (MNR)
- Bedrock, Flat
- Bedrock, Sloping
- Thin Till Over Bedrock
- Thick Till and Sand Over Bedrock
- Thick Till, Poorly Drained
- Surface Water Body

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

DO NOT SCALE DRAWING.
THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

N W E S

0 100 200 Metres

1:6,000

CLIENT

Tay Valley Township - Maberly Pines

PROJECT

Hydrogeology Study

TITLE

Conceptual Lot Development Plan A (Conventional Private Services)

The Tower - The Woolen Mill,
4 Cataraqui St.,
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PROJECT #	DATE
220037	October 26, 2022

DRAWN	CHECKED	FIG NO.	REV
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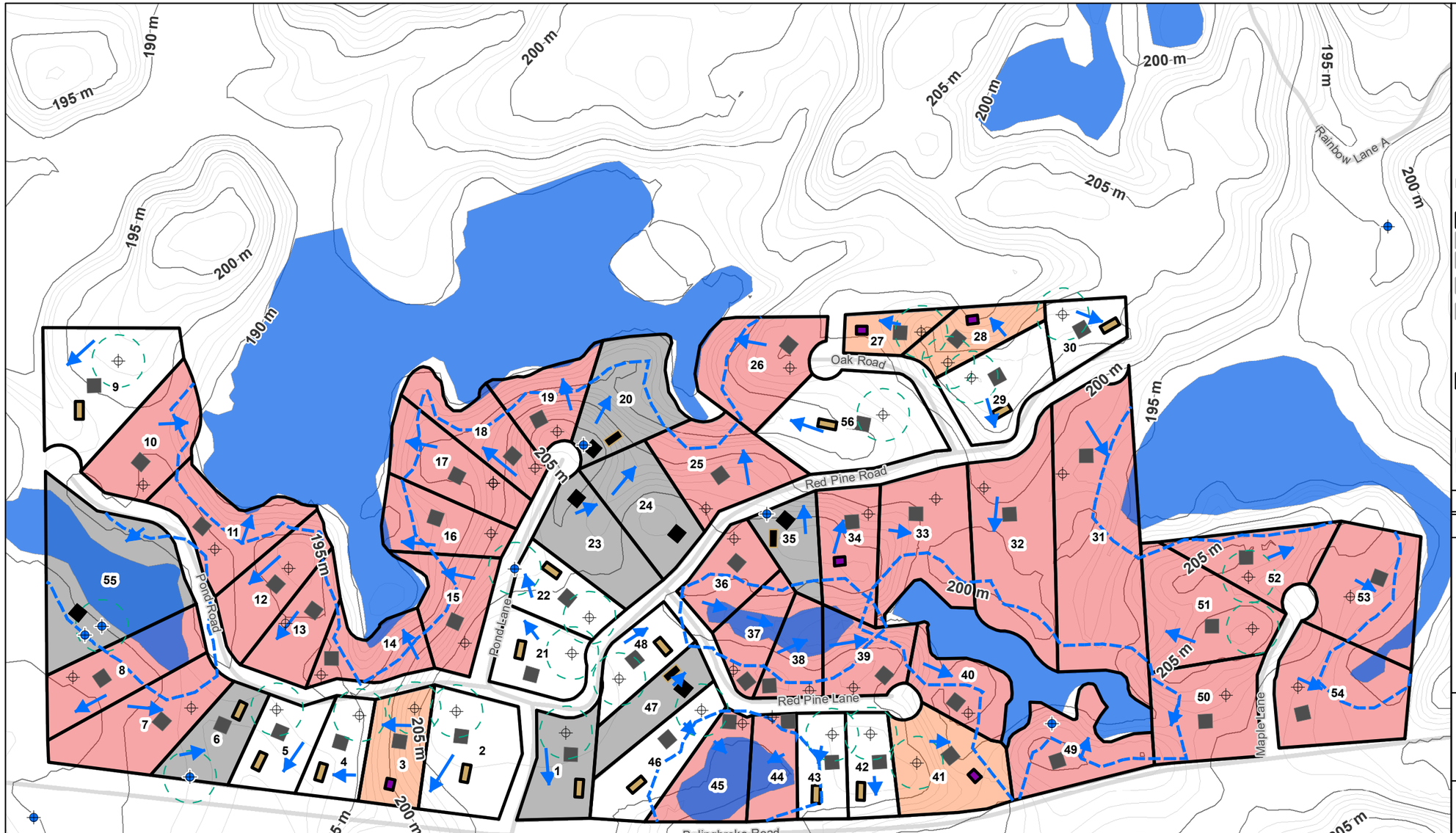

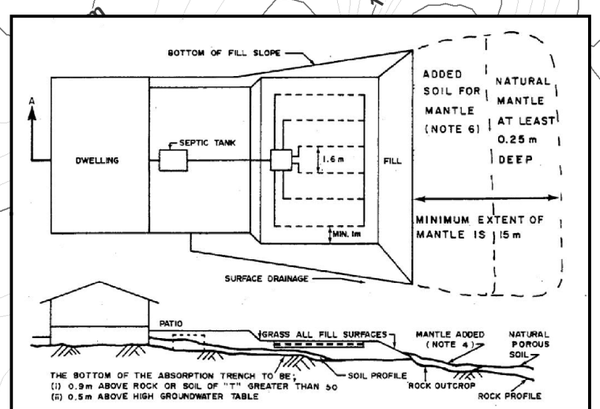

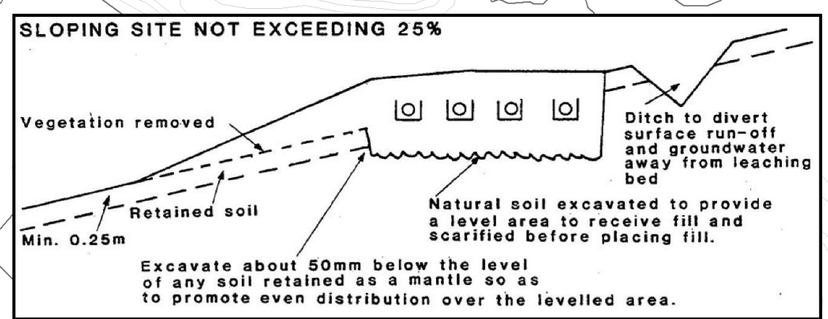

From: Manual of Policy, Procedures and Guidelines for Onsite Sewage Systems, Ministry of Environment, 1982, ISBN 0-7743-7303-2 (Drawings 8.4.2 and 8.4.4)

LEGEND

- Conceptual Supply Well
- Existing Well
- Elevation Contour - 1 m (MNR)
- Elevation Contour - 5 m (MNR)
- Downslope Direction
- Lot Boundary
- 30m Boundary around Surface Water Body
- 30m Boundary around Well
- Conceptual House Location
- Conventional Raised Septic Bed
- Conventional Lot (no shading)
- Developed Lot / Partially Developed Lot
- Lot Likely Exceeds Maximum Allowable Gradient Listed in OBC for Septic Systems
- Composting Toilet System
- Surface Water Body
- Tertiary treatment system indicated. PLEASE NOTE: It is recommended that Tay Valley Township create and maintain a database of locations where tertiary treatment systems are indicated. The database should be used to ensure that the owners of tertiary treatmen

Existing Structure (Approx. Location)

- Conventional Septic Bed
- House

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES

0 100 200 Metres

1:5,000

CLIENT

Tay Valley Township - Maberly Pines

PROJECT

Hydrogeology Study

TITLE

Conceptual Lot Development Plan B
Lot layout & servicing using a combination of conventional, tertiary treatment septic systems & composting toilets

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PROJECT #	DATE
220037	October 26, 2022

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APPENDIX A

WESA, 1979 Report

APPENDIX A

WESA, 1979 report

Scteduce to
By-Law 535
Subdivision
Maberly Pines

MABERLY PINES DEVELOPMENT

Terrain, Hydrogeological and Ecological Analysis

Concession V Parts of Lots 12, 13, 14, 15,

Concession VI Part of Lot 13

South Sherbrooke Township

WATER AND EARTH SCIENCE ASSOCIATES LTD.

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MABERLY PINES DEVELOPMENT

Terrain, Hydrogeological and Ecological Analysis

Concession V Parts of Lots 12, 13, 14, 15

Concession VI Part of Lot 13

South Sherbrooke Township

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Bufo Inc.

1.0 Introduction

Water and Earth Science Associates were commissioned by Mr. Jacques Noel, President of Lakeside Living Limited to conduct an analysis of the hydrogeological, terrain and ecological conditions of a proposed seasonal residental subdivision located on Concession V (parts of Lots 12, 13, 14, 15) and Concession VI (part of Lot 13), Township of South Sherbrooke. (Figure 1)

In order to establish the suitability of the property for development on wells and septic tank systems and provide planning and environmental guidelines as dictated by terrain conditions, the following site factors were studied:

1. the distribution and lithology of bedrock and surficial materials
2. topography and drainage
3. the hydrogeological characteristics of the bedrock aquifer
4. the characteristics of terrain units and their potential to disperse and attenuate septic tank effluent, and
5. the most suitable design of well and septic tank systems.

The results of our investigations are presented in the following report.

1.1 Study Methods

First, a site reconnaissance of the property was made and pertinent published literature about the physiography, geology, ecology and hydrogeology of the Little Silver Lake area was reviewed.

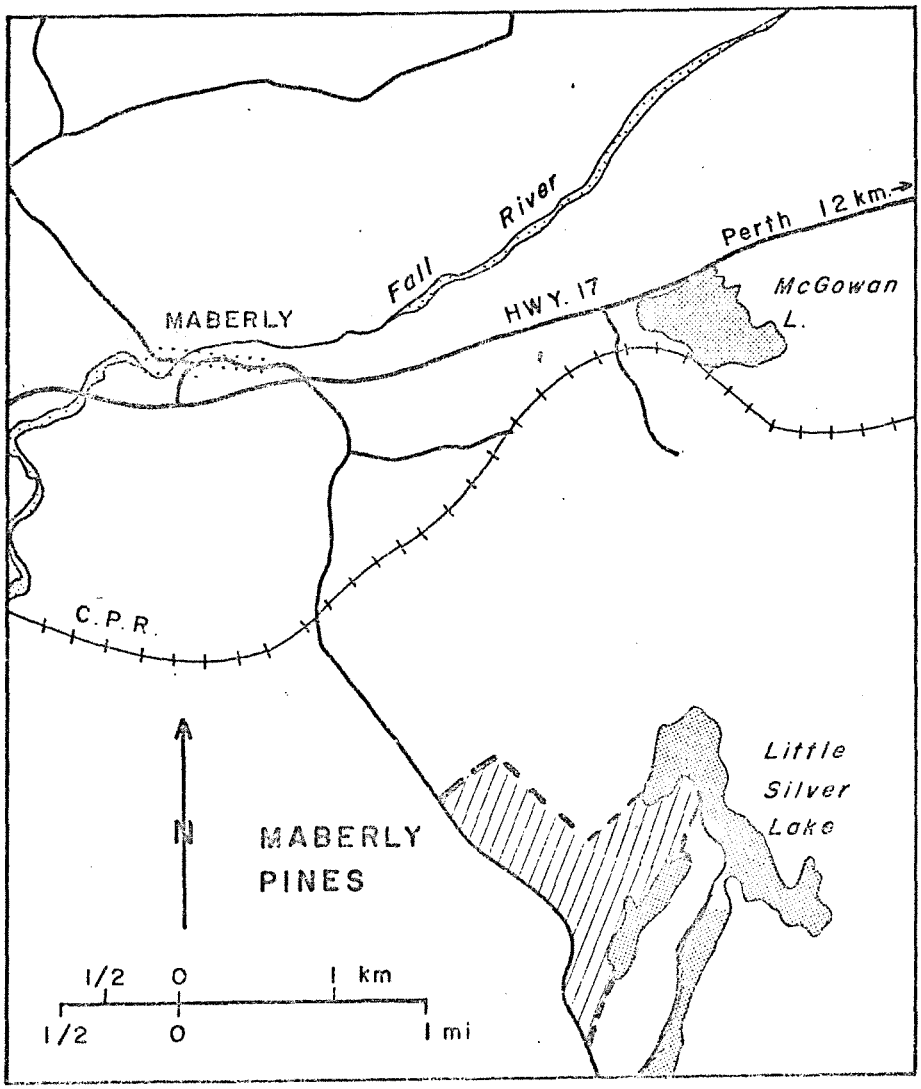


FIGURE I

MABERLY PINES

LOCATION MAP

Then five days of field work were conducted at the site during which time the geology and ecology of the land parcel was mapped at a scale of 1:2400. Large and small scale air photographs were used during this investigation. Field mapping was conducted by geological traversing and hand digging shallow test pits into the surficial sediments.

All published well logs from Concessions 3 - 9 and Lots 11 - 16 of South Sherbrooke Township were collected and analyzed to establish the potential of aquifers within the property. The grain size distribution and hydraulic conductivity of a typical soil sample were measured in the laboratory to determine the suitability of surficial materials for the in-ground disposal of domestic sewage.

Finally, planning documents and government regulations were reviewed as a basis for the recommendations included in this report.

1.2 Physiography

Physiographically, the Maberly Pines area is made up of a series of bedrock knobs and ridges interspersed with lowland areas. The terrain has a northwest-southeast orientation which is particularly pronounced immediately south of Little Silver Lake (Figure 2). Site topography reflects the peneplanation of this region which was caused by four major glacial advances and retreats. A maximum elevation of 212 metres above sea level occurs near Little Silver Lake, although most bedrock ridges lie at 202 - 210 metres above sea level. Lowland areas occur at elevations which range from 192 to 200 metres above sea level. Some variation in the elevation of swamps occurs across the site.

For example, the large pond in the northwest corner of the site has a 192 metre water level while a small waterbody near the highway to the south of the property lies at a 200 metre elevation.

2.0 Site Geology

The Little Silver Lake area is a good example of the Precambrian Terrain which characterizes much of the Canadian Shield of Ontario and Quebec. Ancient Precambrian rocks, last deformed by the Grenville Mountain Building episode which occurred about 950 million years ago, are overlain by a thin veneer of much younger glacial and non-glacial sediments. An irregular glaciated topography with an immature drainage pattern and numerous beaver ponds in lowland areas typify this terrain type.

The geology of the Little Silver Lake site is summarized in chart form as Table 1 of this text. A brief discussion of bedrock and surficial deposits is included below. The reader is referred to the geological references cited in the bibliography of this text if more details of the geological history of the Perth-Maberly region are of interest.

2.1 Bedrock Geology

The site is underlain by a Precambrian crystalline basement complex which includes biotite gneiss, diorite, migmatite, marble, quartzite, pegmatite and related paragneissic rocks. Bedrock is foliated with a northeast - southwest trend and near vertical dips.

The upper rock surface is striated, plucked and grooved and indicates that the last movement of glacial ice across this region was

GEOLOGICAL AGE			LITHOLOGY	THICKNESS	SLOPE	GEOLOGICAL HISTORY
SURFICIAL DEPOSITS	QUATERNARY	Recent	Soils; podzols, acidic and immature. Bog deposits, muck and peat, areas of fen vegetation, marsh.	5 to 10 cm	flat	Formed by interaction of biological, climatic and geological elements. Controlled by beaver population or formed in poorly drained lowlands, produced by high organic deposition in wet areas.
		Pleistocene	Glacial till, angular pebbles and boulders with a silty sandy brown matrix; pebbly sand facies overlies till.	.3 m to greater than 1 metre	deposited as thin veneer on sloping bedrock	Direct deposit from glacial ice; glacial till ground moraine. Sandy facies restricted to poorly developed small drumlin structures.
BEDROCK	PRECAMBRIAN		Migmatite, biotite gneiss, diorite, marble, pegmatite and other granitized paragneisses	unknown	5 - 40% slopes, steep escarpment in places.	Eroded roots of the Grenville Mountains (950 million years old).

Table 1: Summary of Geological History

in a northeast to southwest direction. Bedrock outcrops at the ground surface throughout the property and forms abrupt bedrock escarpments in many places.

Small outcrops and escarpments are present throughout parts of the land parcel forming a rugged microrelief.

Some evidence of minor open pit feldspar mining activity is present on the property, although excavations are too small to comprise a constraint to site planning.

2.1 Surficial Geology

Bedrock is covered by a veneer of glacial till ground moraine over most of the property. The distribution of the till material and bedrock outcrop areas is shown on Figure 2 of this report.

The till ground moraine material is composed of angular granitic pebbles and cobbles with a fine sand and silt matrix. In several areas of the property, poorly stratified pebbly sand deposits are found associated with the till ground moraine. These deposits apparently range up to 5 metres in thickness, lie stratigraphically above the till material and are oriented parallel to the direction of the last ice movement. They are interpreted as being very poorly developed small drumlin structures based on this evidence. The major drumlin is located just south of the property boundary near Little Silver Lake (just outside area of Figure 2) and has been partially quarried for borrow material. Similar deposits were noticed in several areas of the site but were mapped as a sand facies of the till ground moraine material due to their diffuse form and thinness.

The composition of a typical sample of the till ground moraine material was analyzed in the laboratory with the following results:

Grain Size Distribution	Clay	2 %
	Silt	18%
	Fine Sand	36%
	Medium Sand	12%
	Coarse Sand	8%
	Gravel	24%

Permeability (using Falling Head Permeameter) = 2.42×10^{-4} cm/sec.

Where present, the till unit is usually only a few centimetres to half a metre in thickness on ridge tops. However, in valley areas, a till thickness of 1 metre or greater was found during field investigations.

Swamp deposits include poorly drained black organic soils, muck and peat deposits. Their distribution is restricted to lowland areas and have been greatly extended in recent years by the activities of the beaver population in the area.

In general, soils formed on the sandy till ground moraine are poorly developed, are from 10 to 20 centimetres thick and have a poor potential for agricultural crop production.

3.0 Hydrogeology

In order to provide information on potential well yields and groundwater quality within the Maberly Pines subdivision, existing

well logs recorded with the Ministry of the Environment from Concessions 7, 8, 9, Lots 11 to 16 have been assembled and analyzed.

The Precambrian bedrock is the only geological unit in the study region with the potential to provide adequate quantities of groundwater for domestic water supplies. Surficial materials are too thin and discontinuous in nature to furnish reliable water sources. Therefore, dug or driven wells are considered unsuitable for use on this property.

Knowledge of the recharge characteristics, water supply potential and groundwater quality of the Precambrian aquifer is an important factor in the planning of any development of this site. A brief discussion of these points is included in the following sections.

3.1 Recharge Characteristics

Groundwater movement in the Precambrian basement rock is controlled by variations in topography between highlands and lowland areas and the pattern and extent of the fracture system present. Figure 3 illustrates in a theoretical manner how the precipitation which falls on upland recharge areas will flow downwards into the saturated groundwater zone below the water table and hence, in a lateral direction towards lowland swamp and stream discharge zones.

Saturated hydraulic gradients in Precambrian terrain are impossible to measure without detailed drilling data. Gradients in the unsaturated near-surface fracture system, however, should reflect surface topography variations and the orientation of fracture patterns closely and are typically quite high (0.2 to 0.7). Infiltration rates

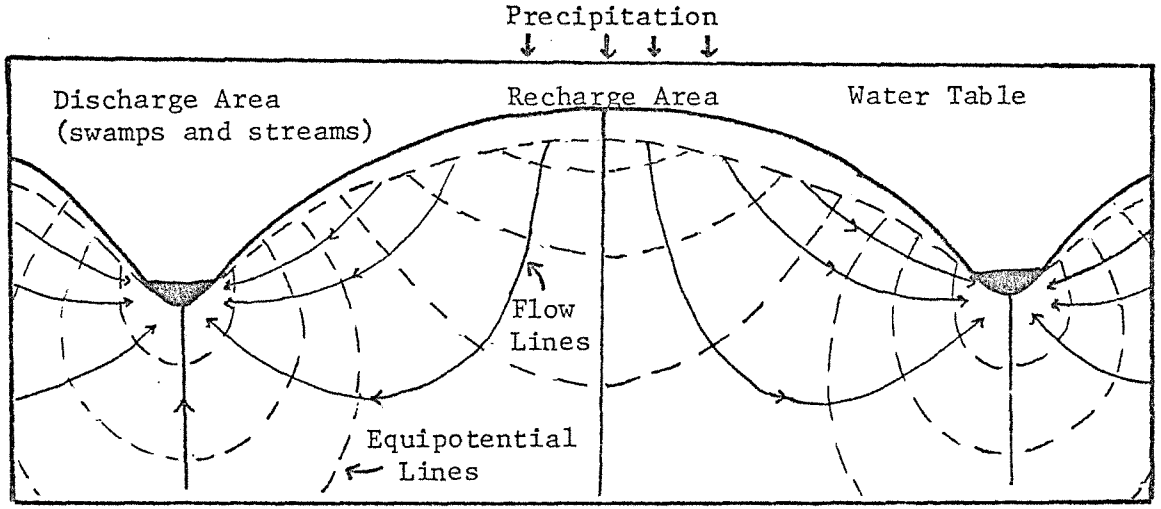


Figure 3: Idealized Model illustrating Groundwater Flow from Recharge on the Topographic Highs to Discharge in the Valleys (Hubbert, 1940)

and groundwater flow velocities should be high in this terrain but cannot be calculated because measurements of the bedrock fracture permeability have not been made. However, groundwater movement in the order of 25 - 50 metres per year is considered a reasonable estimate based on theoretical calculations.

Based on this information, wells should be located on highland areas, for two reasons:

a) septic tile weeping beds can then be located at lower elevations and will flow away from, not towards water wells

b) wells will be recharged by precipitation and will be located at a sufficient distance from lowland marsh areas to avoid drawing water from these sources. Marsh water is often of poor quality due to high organic acid concentrations, low pH or colour and odour problems.

3.2 Aquifer Potential

The water wells for all domestic wells utilizing the Precambrian bedrock aquifer in Concessions 7, 8 and 9, Lots 10 to 16 have been analyzed to provide an assessment of the groundwater supply potential in the Maberly Pines Subdivision. The 17 logs recorded with the Ministry of the Environment are included as Appendix B in this report. There is no well log information from the proposed subdivision with existing cottages along Silver Lake using lake water as a water source.

Well yields in Precambrian terrain vary as a function of the degree of fracture (i.e. fracture permeability) of the bedrock.

Well yields can vary significantly within short distances (i.e. 100 metres or less) in this rock type. It should be noted that fractures usually decrease in density with depth along the metamorphic foliation and the joint pattern in granitic rocks. Well yields are usually not significantly increased if wells are drilled beyond 50 metres as a consequence.

Water was found from 10.0 to 38.4 metres below the ground surface (mean = 21.3 metres) in these wells with a static level variation of 1.21 to 10.0 metres (mean 16.5). Well data are too sparse to permit an analysis of fracture system patterns using depth histograms. However, well depths vary from 8.2 to 35.0 metres which indicate that near surface fracture systems are supplying adequate water supplies from existing residences.

To evaluate well yields, each log was examined and classified as follows:

	Number of Wells
Poor yields (drawdowns were high, 25 - 75' after short term (1-2 hr) pump tests at 5 gpm or less)	12
Moderate yields (drawdowns were fairly low, less than 50' after short term pump tests at 5 - 10 gpm)	3
Good yields (drawdowns were low after short term pump tests at greater than 10 gpm)	2
TOTAL	17 wells

The following conclusions can be drawn from this analysis:

a) twelve of the existing wells in this area have yields close

to the minimum required to service a domestic residence (4 igpm or 18 litres per minute). Wells should be drilled and constructed as per the recommendations oulined in Section 4.1 to maximize the well yields and eliminate potential contamination problems.

b) it is unlikely that high volume wells of 200 litres per minute or greater could be drilled on this site. Development planning should preclude high volume water usages as a consequence.

3 .3 Water Quality

The water quality of groundwater from existing wells in the Little Silver Lake area is reported to be fresh, colourless and odourless. This is most likely the case on the study property.

4.0 Type of Development

It is understood that the Little Silver Lake subdivision will be a seasonal recreational development. As a consequence, septic tanks will be used primarily during summer months and water requirements will be lower than in permanent subdivisions. The recommendations proposed in this report however, are based on the assumption that some winter utilization may also occur and that coversion of dwellings to yearly use is a possibility i.e. that the development is a year-round backlot subdivision. A restriction of the subdivision to seasonal use however, should provide a large safety factor to guarantee the integrity of groundwater supplies.

4.1 Suitability for Development

Six terrain units, or land types having a unique association

of lithological, ecological and topographic characteristics have been identified on this property from our field work. These are:

1. bedrock, highly sloping
2. bedrock, flat
3. thin till over bedrock
4. thick till and sand over bedrock
5. thick till, poorly drained
6. beaver swamp

The distribution of each terrain unit is mapped on Figure 2 of this report while their characteristics are summarized as Table 2.

Terrain Unit 1 (bedrock, sloping) has little or not capability to attenuate septic tank effluent in its natural state due to the thin nature of the soil cover in these areas. High slopes, abundant outcrops and rock escarpments are major planning constraints throughout this unit. Terrain Unit 1 is not recommended for the installation of septic tank systems.

Terrain Unit 2 (bedrock, flat) has the same constraints as Unit 1 but slopes are usually less than 10% and till material is thicker in isolated pockets. Development on large lots (2 - 3 acres) is considered feasible on this unit provided tile beds are fully raised and well to septic tank spacings of 30 - 50 metres are instituted. Lot planning will require locating suitable tile bed locations first and locating dwellings second in respect to these areas.

Terrain Unit 3 and 4 are distinguised on the basis of till depth. A typical sample of the silty sand till ground moraine gave a falling

TERRAIN UNIT	LITHOLOGY OF UNIT	THICKNESS OF SURFICIAL MATERIALS	HYDRAULIC CONDUCTIVITY	WATER TABLE DEPTH	SLOPE	SUITABILITY FOR CONVENTIONAL SEPTIC TANKS	WELL TO SEPTIC TANK SPACINGS	RECOMMENDED SEPTIC SYSTEM DESIGN
1	Bedrock, sloping, very thin veneer of till	0 - .3 m	greater than 2.43 x 10^{-4} cm/sec where coarse grained and thin	below bedrock surface	5 - 40% with rock escarpments	very poor, not recommended for development	-	-
2	Bedrock, flat outcrop with pockets of till	0 - 1.0 m in pockets	as below	below bedrock surface	0 - 20% rolling, rugged microrelief	poor	30 - 50 metre wells to be "upstream" from tile beds	fully raised 1 m tile beds with soil mantles
3	Thin till over bedrock	.5 - 1.5 m blanket	tested at 2.43 x 10^{-4} cm/sec	below bedrock surface	5 - 10%	fair to good	30 m	partially raised (.5 - 1.0 m) tile beds with soil mantles
4	Thick till and sand over bedrock	1.0 m blanket	as above	well drained, below bedrock surface	5 - 10%	excellent	30 m	septic tanks as per Ministry of Environment standards
5	Thick till poorly drained	as above	as above	within .5 m of surface	0 - 40%	poor no development	-	-
6	Beaver swamp	unknown	low	at surface	0%	nil no development	-	-

Table 2: Maberly Pines
Development Potential of Terrain Units

head permeameter reading of 2.43×10^{-4} cm/second. Table 3 summarizes published literature comparing both permeability (hydraulic conductivity) and percolation test data for different types of surficial geological materials.

Permeability is expressed as both cm/second and minutes per inch in this Table. It is impossible, however, to relate percolation times and permeability measurements directly because permeameter readings are accurate saturated flow velocity measurements done in the laboratory while percolation readings are simple field tests. Percolation tests are often highly inaccurate due to problems of stratigraphic variation, compaction and partially saturated test holes. Also, percolation tests usually give higher (i.e. more permeable) results due to the presence of temporary structures in the soil horizon (rootlets, worm burrows, fissures, cracks, thin pervious soil lenses, etc.)

The Maberly Pines till sample has a permeability of 2.43×10^{-4} cm/second (or I75 minutes per inch if percolation could be calculated directly). According to Bernhart (1972) however, this permeability would yield a field percolation test near 60 minutes/inch and would be an excellent, although slightly impervious porous media for the attenuation of septic tank effluent.

In Terrain Unit 3 and 4 where till thickness is less than 1 metre, partially raised tile beds should be required. Minimum lot sizes of 1 acre are suggested for these units.

Poorly drained till areas have been mapped as Terrain Unit 5 (Figure 2). These areas would require fill and drainage work during development and should be avoided whenever possible.

Terrain Unit 6 is swampland with no potential for development. These areas are highly sensitive ecological zones and should not be filled or altered in any manner.

Maberly Pines Sample

Table: Approximate Correlation of Percolation Rates and Permeability Measurements

2.43×10^{-4} cm/sec.

Percolation Rates (x) (Bernart 1972)

t in Minutes per inch

1 - 5	5 - 30	30 - 60	60 - 120	120 - 180
Medium Sand	Fine Sand to Sand and Silt	Loam and Silt Soils	Clay and Silt Soils	Heavy Clay Soils

Correlation Based on Lithology not Calculations
(Refer to Section 4.1)

Hydraulic Conductivity (Todd 1959)

10	1	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-8}

centimetres/second

Clean Gravel	Clean Sand, Sand/Gravel Mixtures	Very fine sands, glacial till, silt and clay mixtures	Unweathered Clay

Well and septic tank design and site investigation recommendations are included in the following sections for each terrain unit.

4.1 Recommended Well Design

To minimize the risk of well water contamination and maximize well yields:

1. All wells should be drilled with a cable tool rig or an air rotary rig. Wells should be drilled slowly to minimize blockage and sealing of the fine joints and fractures in the bedrock which are the source of water in the Precambrian bedrock. In addition, wells should be surged every 5 metres during construction. Rotary drilling using "down-the-hole Hammer" technique (i.e. air percussion) seals fractures and result in low yields, over-deepened wells and high well construction costs.

2. All wells should be properly cement-grouted one casing length(about 7.5 metres) into bedrock to seal off near surface fractures close to the well which have a high potential to permit contaminated surface water from recharging the well.

3. Wells should be drilled at least 50 metres from swamps and marshes to avoid the possibility of recharging wells with poor quality water. Swamp water is often enriched in organic acids and may have an objectionable colour and odour.

4.2 Tile Field Design Recommendations

1. It is recommended that the capacity of septic tanks and the lengths of weeping tile used by increased be increased by a

factor of 1.5 over Ministry of Environment guidelines. It is felt that most septic tank systems are underdesigned for the capacity loadings placed on them by modern household appliances (e.g. dish-washers).

2. It is recommended that tile bed or well spacings within individual lots be increased to between 30 and 50 metres as a safety factor in order to minimize any risk of contamination of potable well water. Tile beds should be located blow wells to permit effluent to flow away from and not towards water supplies.

3. Septic tanks on Terrain Units 2 and 3 will require raised tile bed installations. A diagram of this design is included as Figure 4 of this report.

4. Where slopes are high (5 - 10%), tile bed construction will require:

that a 40 x 50' minimum area be infilled with semi-permeable material to reduce the slope to less than 1%

and

that a mantle of fill (20' minimum width by 2' depth) be constructed around the tile bed.

A generalized sketch of these conditions is included as Figure 5.

Tile bed construction on slopes of 10 - 25% is difficult and might require extensive remedial work with heavy construction machinery. These cases should be designed and approved on an individual basis.

5. Precambrian terrain (especially Terrain Units 1, 2 and 3) which are to be developed for seasonal and recreational uses, have a

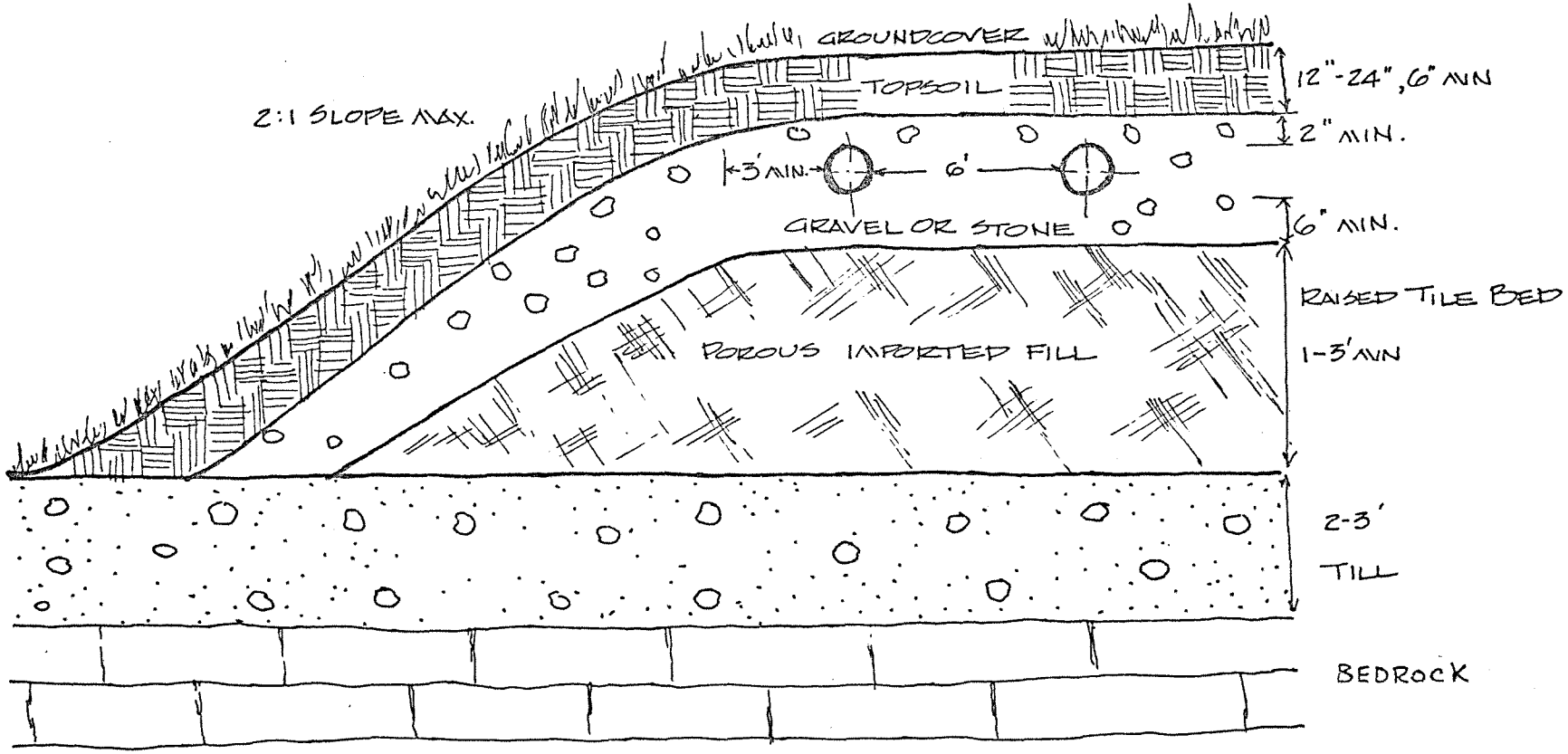
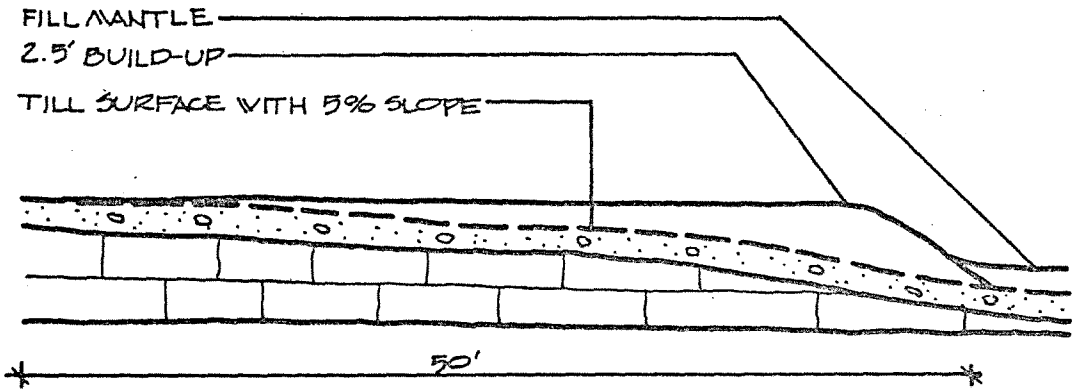
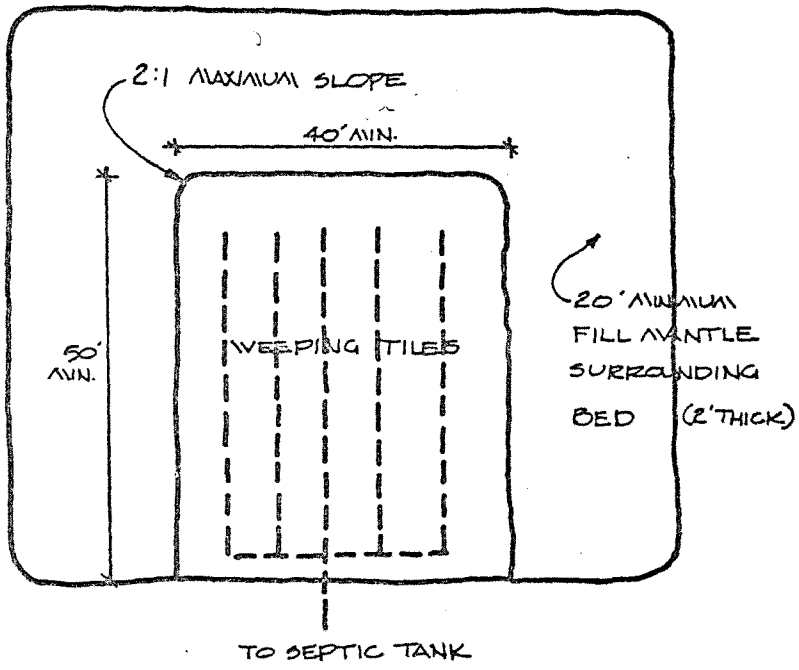


FIGURE 4 RECOMMENDED DESIGN OF LEACHING BED WHERE THIN TILL UNIT IS PRESENT

FIGURE 5: RECOMMENDED SEPTIC TANK TILE BED DESIGN ON SLOPING TERRAIN (10% MAX. SLOPE)



CROSS SECTION SCALE: 1"=10'



PLAN VIEW SCALE 1"=20'

high potential to be serviced with Humus toilets (or some other alternative sewage system brand which does not utilize in-ground disposal methods). These toilets are functional, economical and eliminate all risk of groundwater pollution.

4.3 Site Inspections

It is recommended that a lot by lot field survey of potential tile field locations be made upon completion of the concept plan with officials of the Public Health Unit, Perth Ontario.

Any possible problems with tile bed sitings due to localized drainage channels, minor escarpments or soil thickness variations, would be identified at this time. In addition, any inaccuracies in the base map or contours which might effect site layouts would be verified at this time.

Please note that this is not a lengthy procedure but has recently become a general requirement of the Ministry of the Environment for this type of terrain.

5.0 Vegetation and Wildlife

Methodology and Fromat of Ecosystem Analysis

To assess the vegetation and wildlife components for ecological constraints to development, the site was divided into natural ecosystems. An ecosystem can be defined as the interaction and interdependence of all physical and biological components of any area. The physical and vegetation parameters of an individual ecosystem constitute a biotope. For this discussion, the study site has been categorized into upland biotope, lowland biotope, open field biotope

marsh and swamp biotope and lake and shoreline biotope. Each biotope is described under the following headings:

- description and distribution
- threatened species or unique associations
- species of economic importance
- constraints to development

The vegetation component of each biotope is described with regards to species composition and distribution. The discussion of unique associations at particular sites includes consideration of abundance of species and significance of the association of plants and animals to the biotope. Decisions concerning the presence of rare and endangered species are based upon each species' range, the occurrence of suitable habitat, and records in the scientific literature. Species of economic importance include game species of birds and animals, sport fishes, fur-bearers and commercial forest tree speices. Canada Land Inventory capability maps for ungulate, waterfowl and forestry production are referred to where applicable. Constraints to development were derived after evaluating sensitivities of the ecosystems to the types of disturbance generated by an estate lot housing project. Areas of high and moderate sensitivity have been mapped on Figure 2 of this report as a guideline for subdivision planning.

5.1 Upland Biotope (Terrain Units 1 and 2)

A. Description and Distribution

The upland biotope is composed of high, well-drained areas that may be forested or shrub covered and partially bare. The forested portions of upland sites are covered by stands of red oak

but varied micro-relief promotes some growth of sugar maple and white birch in more moist situations. Thin soils on high ground are dominated by juniper shrubs that may be associated with small oaks. Small bare rocky sites are scattered intermittently throughout the juniper shrub areas.

B. Unique Associations

No rare or endangered species or unique associations were observed in the upland biotope on the Little Silver Lake property.

C. Species of Economic Importance

During the site reconnaissance on November 16, 1978, three ruffed grouse were flushed from juniper shrubs in the upland areas. These birds are an important upland game species that are hunted during the autumn months. Another game species, snowshoe hare, inhabit areas of scrub vegetation and secondary growth as well. Although the property has moderately severe limitations to the production of ungulates (Canada Land Inventory 1970), a deer was observed on the site in November. Deer may inhabit or wander through the property where there is suitable browse and cover.

The land has severe limitations to the growth of commercial forests of red pine and red oak because of either soil moisture excesses or thin soil layers (Canada Land Inventory 1971).

D. Constraints to Development

Upland clearings have a low degree of ecolocial sensitivity and are suitable for development.

5.2 Lowland Biotope (corresponds to parts of Terrain Unit 3, 4, 5)

A. Description and Distribution

The lowland biotope includes the low-lying, well-drained areas where there are deeper soil deposits and also areas associated with the swamps. The forest stand is composed largely of poplars and sugar maples with white birch and some eastern white cedar. The understory consists of red osier dogwood, willows and ash shrubs. There is a stand of white pine along ridges and low-lying areas between the north end of the small lake and Little Silver Lake. The stand composition changes to a predominance of oak on the ridge hillsides as the soil moisture conditions become drier. Oak stands are not mature but consist of scattered mature individuals among younger trees.

B. Unique Associations

No rare or endangered species or unique associations were observed in the lowland biotope.

C. Species of Economic Importance

The low-lying areas of the Little Silver Lake property have severe limitations to the growth of hard maple commercial forests because of moisture excesses and shallow soil conditions. Ruffed grouse and snowshoe hare are found in virtually all areas of the acreage including the lowland biotope.

D. Constraints to Development

The tree growth in the low areas prevents surficial erosion and is an important input of organic matter (via leaf litter) into the soil. Existing vegetation on the hillsides helps to stabilize the thin soil that has been deposited on these slopes. Tree cutting

should be minimized therefore, during construction activities in this terrain unit.

5.3 Open Field Biotope (corresponds to parts of Terrain Units 3 & 4)

A. Description and Distribution

The rugged and shallow and stony soils place severe limitations on agricultural practices in these terrain units. While some open field areas were once cleared for agriculture, they are currently either being used for grazing purposes while other clearings have been left fallow for several years. Unused fields have early successional growths of golden rod, milkweed, staghorn sumac, hawthorn and some poplar saplings. Areas with scrub vegetation provide habitat for ruffed grouse, eastern cottontails, snowshoe hare, raccoon and fox.

B. Unique Associations

No rare or endangered species or unique associations are present in the open field biotope.

C. Species of Economic Importance

Upland game associated with fields, clearings and the vegetation on the edge of these openings include ruffed grouse and snowshoe hare. As previously stated, deer may wander through the property where there is suitable browse and cover.

D. Constraints to Development

The fields and clearings are the most suitable areas for development. These sites, some originally chosen for use as pastures, are the best drained and deepest soiled areas on the property.

They do not have a high degree of ecological sensitivity as they have been disturbed by human activity in the recent past.

5.4 Marsh and Swamp Biotope (corresponds to Terrain Unit 6)

A. Description and Distribution

At the south end of the small lake, along the shallow margins and extending to the Westport-Maberly Road, marsh vegetation consisting of cattails, bulrushes and grasses grow in submerged and water-logged soils. Ash, dogwood and willow shrubs are proliferant in the poorly drained conditions that exist around the perimeter of the lake.

Throughout the rest of the property, there are extensive permanently flooded low-lying areas. These swamps, created by beavers disturbing the natural drainage, are filled with dead and rotting trees, notably poplar. Shrubs, including willow and ash, grow on wet sites at the swamp edges.

B. Unique Associations

The presence of wetlands in a relatively undisturbed tract of land is conducive to a diverse group of wildlife. There is evidence of beaver activity at all the swamp sites and muskrats are almost always associated with them. Although this land is classed as having severe limitations to the production of waterfowl according to Land Capability for Wildlife - Waterfowl, Canada Land Inventory 1971, the extensive swampy sites and the marsh area of the small lake serve as important resting and feeding locations for migrants. They may also support a small resident breeding population for some species of ducks.

Marshes and swamps are also excellent habitats and important production centres for aquatic invertebrates, amphibians and reptiles.

C. Species of Economic Importance

Waterfowl such as mallards, black ducks and blue-winged teal are important game species despite the severe limitations to waterfowl production classification by the Canada Land Inventory 1971. Beaver and muskrat are fur-bearers that inhabit most of the existing wetland areas but their economic potential is unknown.

D. Constraints to Development

Marshes and swamps are vulnerable to pollution by increased inputs of natural and unnatural substances from development. Road and building constructionnear marshes and swamps may cause some siltation, particularly in the shallow waters. Inputs of nutrients from sewage effluents change the chemical conditions of the water. Eutrophication destroys the floating and emergent vegetation and is extremely detrimental to populations of waterfowl and other wetland wildlife. No development activities such as dredging or infilling should be permitted in this terrain unit.

5.5 Lake and Shoreline Biotope (Mapped on Figure 2)

A. Description and Distribution

Included in the property is approximately 4.0 km of Little Silver Lake shoreline and 1.5 km of shoreline of the small lake. There is little emergent aquatic vegetation on Little Silver Lake as shore is rocky, steep-sloped and in most locations forested. The depth of water increases rapidly from the lake edge. This lake is a

warm water fishery with such species as smallmouth bass and yellow perch. The small, shallow lake has a rocky shoreline except at the south end where emergent aquatic vegetation is proliferant. Yellow perch and introduced rainbow trout inhabit the lake at the present time. Beaver activity was observed and the lake probably serves as an important resting and feeding site for some migrants and may support a small resident duck population.

B. Unique Associations

No rare or endangered species or unique associations were observed in the lake and shoreline biotope.

C. Species of Economic Importance

Surface-feeding ducks such as mall rds, blacks and blue-winged teal as well as diving ducks like ring-necked ducks, scaup, goldeneye and bufflehead are common game species of waterfowl. Sport fishes from a warm water fishery like Little Silver Lake include large and/or smallmouth bass, yellow perch, walleye and northern pike. Approximately 2,000 rainbow trout have been planted in the small lake. Successful over wintering of the trout will not be known until the spring of 1979, and breeding is unlikely.

D. Constraints to Development

As settling basins, the lakes are sensitive to inputs of sewage and silt. Little Silver Lake and the adjacent small lake are relatively small and not tolerant to inputs of effluents from residential developments. In comparison, other much larger lakes are not eutrophied because of unnatural nutrient enrichment from cottage disposal systems.

The fisheries may be affected as a result of damage to spawning areas. The trout in the small lake will tend to move upstream (in this case into Little Silver Lake) if the conditions become too severe.

Accordingly, we endorse the development recommendations made for these lakes by the Ministry of Natural Resources (Little Silver Lake Study Report, M.N.R., Lanark District, December 1978);

1. All development, including septic tanks and tile fields should be set back at least 100 feet from the highwater mark. If the physical limitations of a particular lot indicate a greater setback is required, the Ministry will recommend this when reviewing the specific proposal.

2. The disturbance of the natural vegetation within 100 feet of the highwater mark should be discouraged. This will help to stabilize soils, hold back nutrients, and protect the scenic quality of the shoreline.

3. No development, including dredging and/or filling should be permitted within the wetland areas shown on the accompanying map.

4. Future development should be compatible with existing uses on the lake, and should be consistent with the lake's ability to support the proposed area.

Respectfully submitted

Derek P Smith

Derek P. Smith M.Sc. FGAC

6.0 Selected References

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B. Section 5

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APPENDIX A

Grain Size Analysis

Matrix of

Glacial Till Ground Moraine

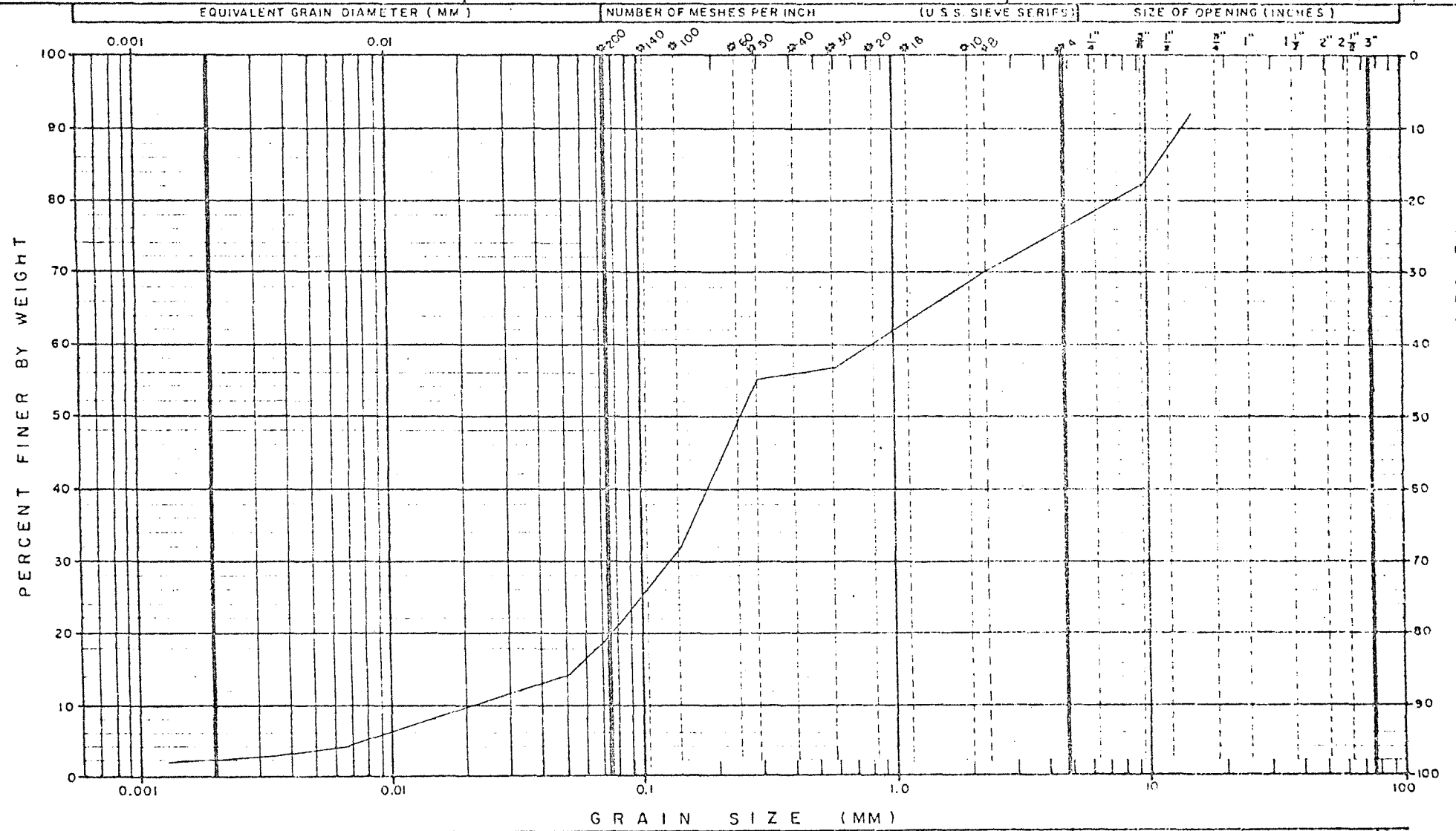
GRAIN SIZE DISTRIBUTION

JOHN D. PATERSON & ASSOCIATES LTD.
Consulting Engineers and Geologists
1479 LAPERRIERE AVE. OTTAWA, CANADA K1Z 7S8

SOIL SAMPLE DESCRIPTION:

Sand - Gravel.

LOCATION: .....
PROJECT: Water & Earth Science Associates
BORE HOLE NO. ..... SAMPLE NO 4
LAB. NO. .....
TESTED BY: S.W. DATE: .....
CHECKED BY: S.W. DATE: Jan, 15/79



CLAY SIZE	SILT SIZE	SAND SIZES			GRAVEL SIZES		COBBLE SIZE
		FINE	MEDIUM	COARSE	FINE	COARSE	

REMARKS:

EFFECTIVE GRAIN SIZE, D_{10}= ..... (CM) D_{60}= ..... (CM) UNIFORMITY COEFFICIENT, C_u = ...

APPENDIX B

Water Well Logs

Concessions 7, 8, 9

Lots 10 - 16

South Sherbrooke Township

CON	LOT	UTM EASTING NORTHING	ELEV FEET	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG
7	10	377220 4963650	600	6	FR	58	11	76	5	1/00	DO	VILLENEUVE F Tpsl Msnd 0005 Shle 0015 Grey Grnt 0076
7	15	379350 4965130	575	2	FR	78	10	50	1	2/00	DO	SMITH L Msnd 0014 Red Grnt 0115
7	16	380160 4965295	585	6	FR	40	16	48	4	2/00	DO	CONROY J Brwn Tpsl 0001 Whit Lmsn 0036 Blck Grnt 0048
8	11	377220 4964780	610	6	FR	52	10	25	2	1/00	DO	MUNRO S Tpsl 0001 Fill Bldr 0012 Red Grnt 0062
8	13	378040 4965430	609	6	FR	32 64	8	65	2	1/00	ST DO	BRIGGS A Msnd 0007 Blck Grnt 0065
8	14	378100 4965640	600	6	FR	40	10	45	5	3/30	DO	FLEMING Cecil Brwn Msnd 0007 Blck Grnt 0050
8	14	378140 4965800	575	6	FR	35 55	20	63	1	3/00	DO	FLEMING V Brwn Tpsl 0004 Rock 0018 Blck Grnt 0063
8	14	378300 4965870	565	6	FR	40	25	45	5	/30	DO	MARSHALL H Fill 0012 Shle 0016 Grnt 0054
8	14	378500 4965620	625	6	FR	27	11	15	45	/30	DO	MCFARLAND CONSTRUCT Msnd 0004 Red Grnt 0033

CON	LOT	UTM EASTING NORTHING	ELEV FEET	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG
9	11	376550 4965345	585	6	FR	50	15	63	1	1/00	DO	GRAY A Msnd 0004 Blck Grnt 0063
9	13	377400 4965620	590	6	FR	68	4	70	1	3/15	DO	MACDONNEL B Tpsl Msnd 0008 Grey Grnt 0068 Grn Grnt Shle 0069 Blck Grnt 0070
9	13	377450 4966277	650	6	FR	115	22	126	5	1/00	ST DO	CONBOY R Shle 0003 Blck Grnt 0126
9	14	377615 4966220	650	6	FR	40	12	16	30	1/00	PS	MABERLY SCHOOL Msnd 0001 Grey Grnt 0048
9	14	377670 4966690	550	6	FR	80	18	100	7	1/30	DO	VANALSTINE K Brwn Tpsl 0001 Grey Grnt 0018 Red Grnt 0040 Grey Grnt 0100
9	14	378020 4965820	595	6	FR	35 80	10	75	2	1/00	DO	ORSER W Clay 0001 Bldr 0011 Grnt 0085
9	16	378400 4967791	607	6	FR	65	33	72	4	1/30	ST	VANALSTINE D Whit Lmsn 0072
9	16	378740 4967676	620	7	FR	30	18	56	5	1/30	DO	VANALSTINE D Brwn Tpsl 0015 Grvl 0018 Whit Lmsn 0056

APPENDIX B

Topographic Survey (1980)

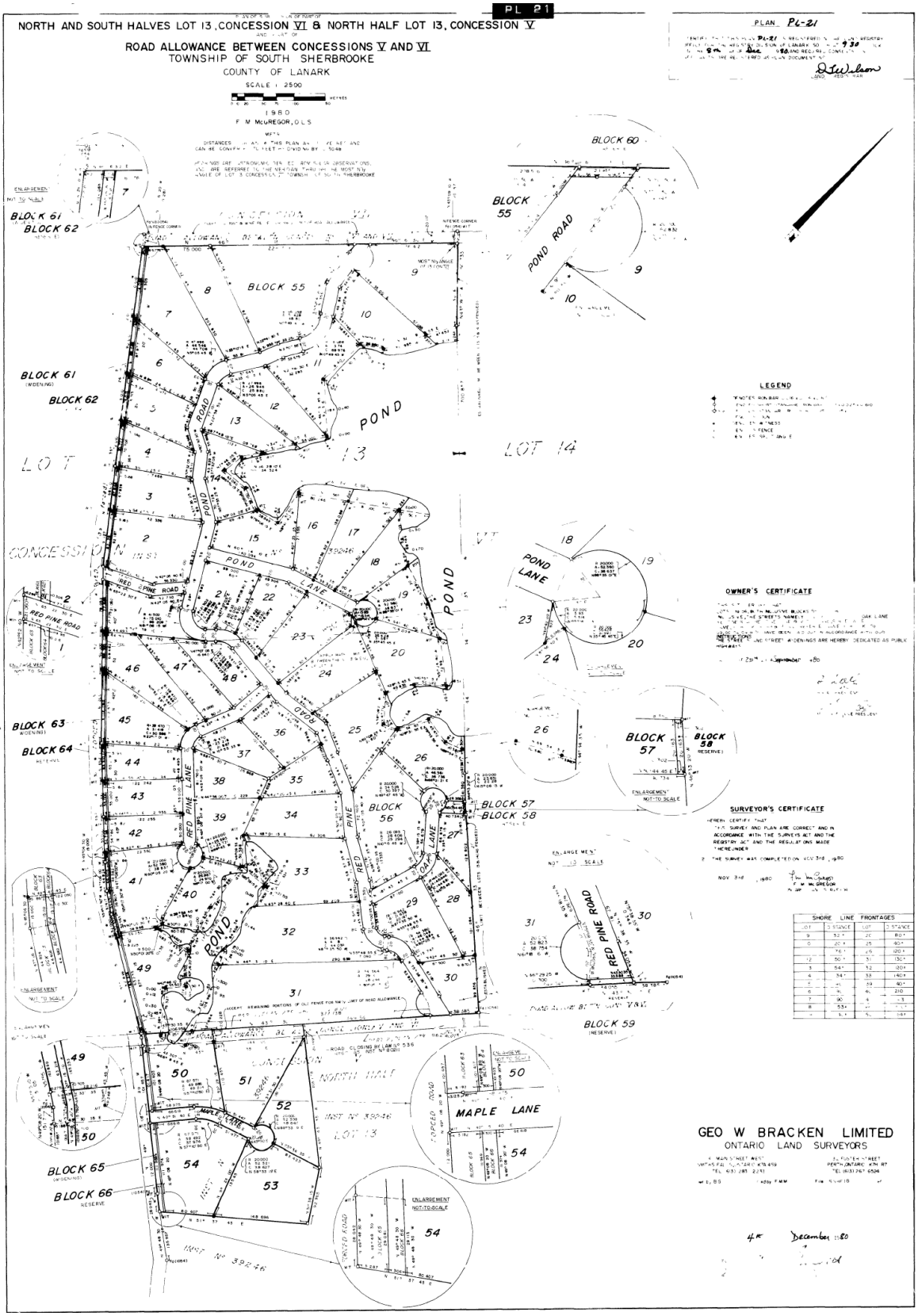
APPENDIX B

Topographic Survey (1980)

THE CORPORATION OF TAY VALLEY TOWNSHIP
HYDROGEOLOGICAL REVIEW
MABERLY PINES SUBDIVISION

CONTRACT #2021-PD-002

ADDENDUM NO. 2



APPENDIX C

Well Owner interview Forms

WELL INSPECTION SURVEY FORM

WELL ID (SAMPLE ID): A134690 Sample Date/Time: 04/06/22 14:40
Blind Duplicate ID: _____

OWNER/ADDRESS OF WELL: Sample Location: Faucet
Sampler Initials: MD

Name: Matthew DeBeer Person Interviewed: Kevin Tulett

Address: 4452 Bothwell 613

Telephone (Home): 268 2541 (Business): _____

How Long as Owner: 10 yrs Heating: Oil Gas (Electric) Other (circle one)

Sampling Results Requested? (Yes) or No E-mail Address: Kevintulett@bell.net

Field Readings: Turbidity_____ Temp°C_____ pH_____ TDS_____ EC_____

TENANT (if different from owner):

Name: _____ Person Interviewed: _____

Telephone (Home): _____ (Business): _____

How Long as Tenant: _____

PART I: PREVIOUS WELL ISSUES

Type of Water Quality Issue: Sediment content

Type of Water Quantity Issue: none

Outcome(s): Plugged screens on faucets

Available Documentation: no

Available Sampling Results?: no

PART II: WELL CONSTRUCTION DETAILS

No. of Wells/Type (dug/drilled): (1) Drilled

Does well draw water from overburden or (bedrock)? (circle correct one)

Location of Well in Relation to Residence/Buildings: Southwest corner

Well 1 GPS coordinates: (N) _____ (E) _____

Well 2 GPS coordinates: (N) _____ (E) _____

Water Well Record Available?: Y (Y/N; attach copy) Construction Date: 24/09/2012

Well Type (dug, drilled): Drilled

Well Depth (m): 400 ft Diameter (cm): _____

Casing Length (m): 22' Diameter (cm): _____

Screen Installed? _____ (Y/(N)) Water Quality: _____

Test Pumping Rate: 3 gpm Test Max. Drawdown/Time: _____

Depth to Bedrock (m/ft): 4 Bedrock Decript: Granite

Depth Water found (m/ft): ~200 Recommended Pumping Rate: 2 gpm

PART III: PUMP INSTALLATION DETAILS

Pump Type / HP (submersible, centifugal, jet, etc): Submersible

Date of Installation: 2012 mid october

Pump Intake Depth (m): 250 ?

Storage Tank Type (bladder, contact, etc.): NO

Tank capacity (specify units):

Have you had any problems with your pump? (If so, what?) NO

PART IV: WATER TREATMENT SYSTEM(S)

Do you have a water treatment system(s)? Yes / (No) (circle one)

Type(s): (pls circle) Water softener / Reverse Osmosis / Distillation / Filtration / UV

Date of Installation:

Services: Entire system / Kitchen Faucet (circle one or write other)

Water Softener: Salt Type: (pls circle) NaCl / KCl

Discharge location:

Reverse Osmosis:

Discharge location:

Filtration: (pls circle) Cartridge / Greensand / Other (specify):

Cartridge size (um):

How often is cartridge replaced?

Disinfection: Make/model:

Location:

PART V: WATER USAGE

What is well water used for (specify for each well)?

(eg., domestic supply, agricultural, commercial/industrial usage - see below; give specifics)

Domestic supply watering gardens

If domestic usage, specify number of persons using well: (2)

Lawn watering? (Y)(N)

Type & number of Livestock watered from well:

Other uses for water not specified above:

Owner Permission to Take Well Water Level _____

print name signature

Well Water Level (m TOC): _____ Date/Time: _____

PART VI: SEPTIC SYSTEM

Location: Back of house Age: 2012

Any problem with system? none

When was tank last pumped? 2021

Interviewed By: Matthew Deboer Date: 04/06/2022

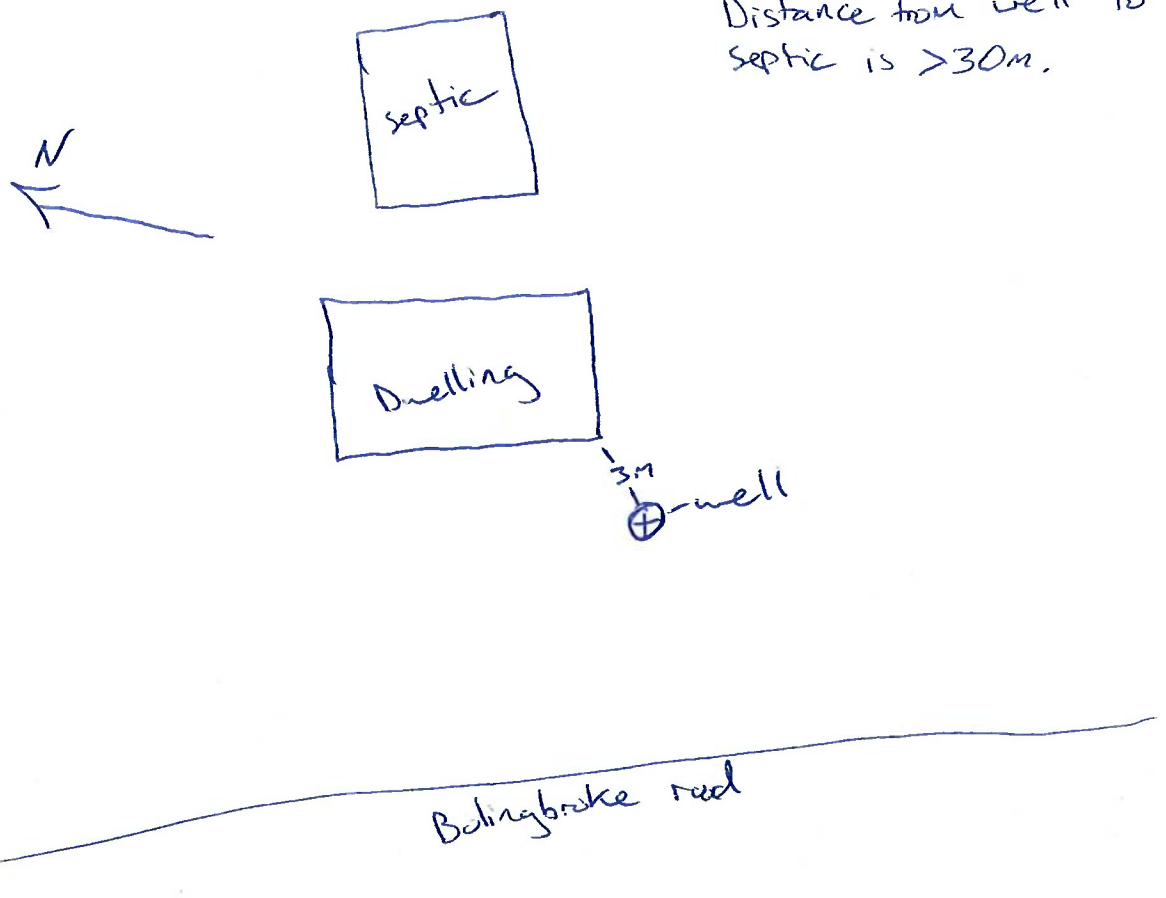
Ref: BluMetric Well Inspection Survey Form-V2.xls

Site Plan /Well Insp.- indicate well vs Septic location, site drainage, adjacent land use, N arrow, scale

Is surface drainage away from well? (Yes) / No Well Casing Height (m) _____

Any Contaminant sources near well? (downspouts, animal waste, storage tanks, fill pipes, leaking equip.)

Well location photo taken? Yes / No



3506756

WELL INSPECTION SURVEY FORM

WELL ID (SAMPLE ID): 3506756 Sample Date/Time: 04/06/22 12:38
Blind Duplicate ID: _____

OWNER/ADDRESS OF WELL: Sample Location: Faucet interior
Sampler Initials: MD

Name: Matthew DeBree Person Interviewed: Don Cameron

Address: 601 Rainbow lane

Telephone (Home): (613) 402-3758 (Business): _____

How Long as Owner: 1987 Heating: Oil Gas Electric Other (circle one)

Sampling Results Requested? (Yes) or No E-mail Address: DCameron3009@hotmail.com
Field Readings: Turbidity_____ Temp°C_____ pH_____ TDS_____ EC_____

TENANT (if different from owner):

Name: _____ Person Interviewed: _____

Telephone (Home): _____ (Business): _____

How Long as Tenant: _____

PART I: PREVIOUS WELL ISSUES

Type of Water Quality Issue: Hardness, Bacteria - no treatment currently.

Type of Water Quantity Issue: _____

Outcome(s): TBD

Available Documentation: yes

Available Sampling Results?: yes

PART II: WELL CONSTRUCTION DETAILS

No. of Wells/Type (dug/drilled): (1) Drilled

Does well draw water from overburden or (bedrock)? (circle correct one)

Location of Well in Relation to Residence/Buildings: 3-4 m upgradient

Well 1 GPS coordinates: (N) _____ (E) _____

Well 2 GPS coordinates: (N) _____ (E) _____

Water Well Record Available?: Y (Y/N; attach copy) Construction Date: 27/06/83

Well Type (dug, drilled): Drilled

Well Depth (m): 19.5 Diameter (cm): 15.2

Casing Length (m): 6.7 Diameter (cm): 15.2

Screen Installed? N (Y/N) Water Quality: Fresh

Test Pumping Rate: 4 gpm Test Max. Drawdown/Time: static

Depth to Bedrock (m/ft): 0.9 Bedrock Decript: grey Limestone

Depth Water found (m/ft): 18.28 Recommended Pumping Rate: 4 gpm

PART III: PUMP INSTALLATION DETAILS

Pump Type / HP (submersible, centifugal, jet, etc): Submersible

Date of Installation: 2013 possibly

Pump Intake Depth (m): 16.4

Storage Tank Type (bladder, contact, etc.):

Tank capacity (specify units):

Have you had any problems with your pump? (If so, what?) No

PART IV: WATER TREATMENT SYSTEM(S)

Do you have a water treatment system(s)? Yes / (No) (circle one)

Type(s): (pls circle) Water softener / Reverse Osmosis / Distillation / Filtration / UV

Date of Installation:

Services: Entire system / Kitchen Faucet (circle one or write other)

Water Softener: Salt Type: (pls circle) NaCl / KCl

Discharge location:

Reverse Osmosis:

Discharge location:

Filtration: (pls circle) Cartridge / Greensand / Other (specify):

Cartridge size (um):

How often is cartridge replaced?

Disinfection: Make/model:

Location:

PART V: WATER USAGE

What is well water used for (specify for each well)?

(eg., domestic supply, agricultural, commercial/industrial usage - see below; give specifics)

Domestic supply, watering gardens

If domestic usage, specify number of persons using well: 6

Lawn watering? (Y/N)

Type & number of Livestock watered from well:

Other uses for water not specified above:

Owner Permission to Take Well Water Level _____

print name signature

Well Water Level (m TOC): _____ Date/Time: _____

PART VI: SEPTIC SYSTEM

Location: up gradient to well ~30 m . Age: 1995 ?

Any problem with system? No - Inspected in last 5 yrs all good.
some vegetation on top of septic bed. - will clear -

When was tank last pumped? 2021

Interviewed By: Matthew DeBoer Date: 04 June 2022

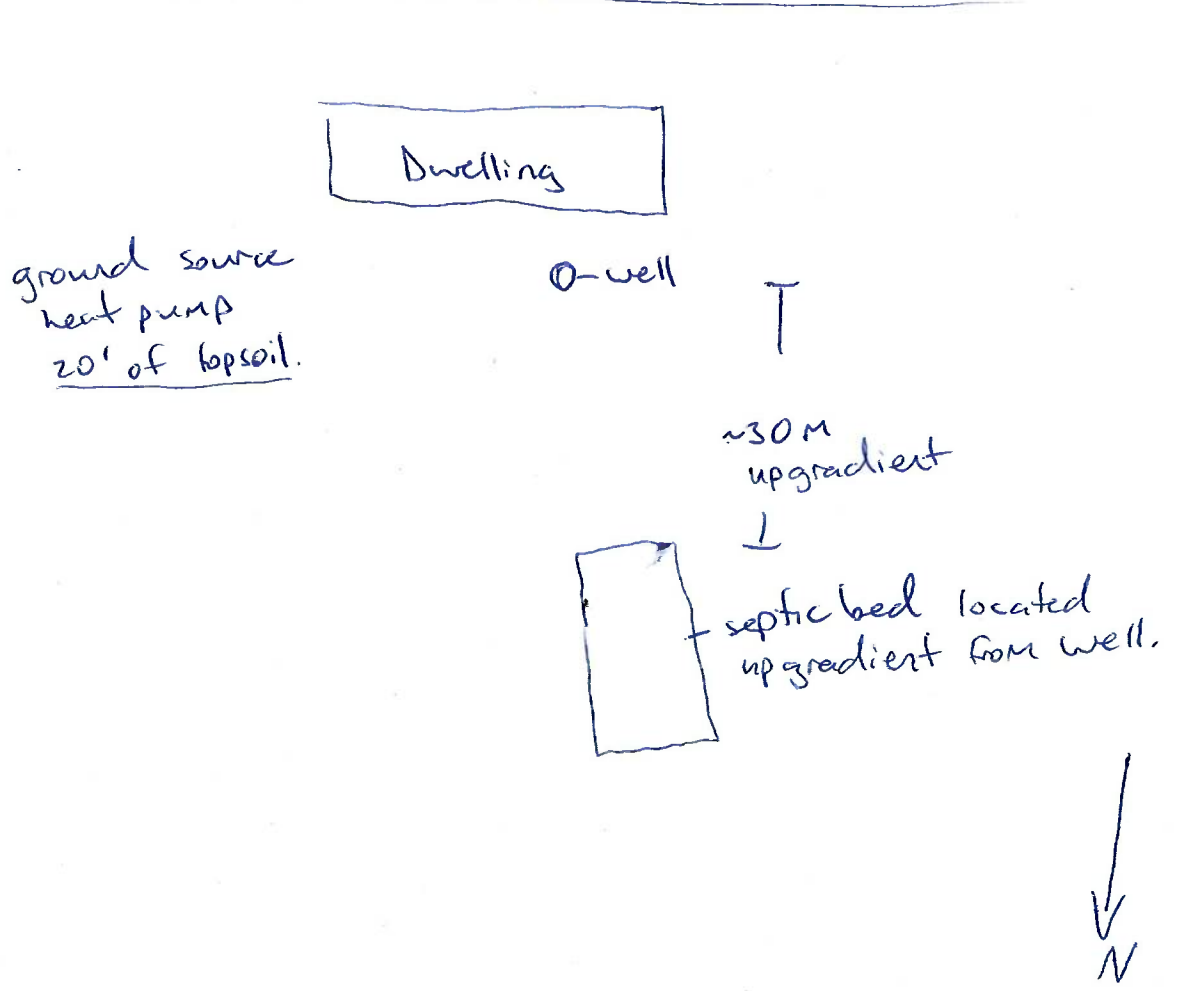
Ref: BluMetric Well Inspection Survey Form-V2.xls

Site Plan /Well Insp.- indicate well vs Septic location, site drainage, adjacent land use, N arrow, scale

Is surface drainage away from well? (Yes) / No Well Casing Height (m) _____

Any Contaminant sources near well? (downspouts, animal waste, storage tanks, fill pipes, leaking equip.)

Well location photo taken? Yes / No



BluMetric Environmental

WELL INSPECTION SURVEY FORM

WELL ID (~~SAMPLE ID~~): 7046732 Sample Date/Time: —
Blind Duplicate ID: —

OWNER/ADDRESS OF WELL: Sample Location: —
Sampler Initials: —

Name: Karen Prytula Person Interviewed: Mark Debeer

Address: County Rd 36, Con 6, lot 13

Telephone (Home): _____ (Business): _____

How Long as Owner: _____ Heating: Oil Gas Electric Other (circle one)

Sampling Results Requested? Yes or No E-mail Address: _____

Field Readings: Turbidity_____ Temp°C_____ pH_____ TDS_____ EC_____

TENANT (if different from owner):

Name: _____ Person Interviewed: _____

Telephone (Home): _____ (Business): _____

How Long as Tenant: _____

PART I: PREVIOUS WELL ISSUES

Type of Water Quality Issue: _____

Type of Water Quantity Issue: _____

Outcome(s): _____

Available Documentation: _____

Available Sampling Results?: _____

PART II: WELL CONSTRUCTION DETAILS

No. of Wells/Type (dug/drilled): Drilled

Does well draw water from overburden or bedrock? (circle correct one)

Location of Well in Relation to Residence/Buildings: 1

Well 1 GPS coordinates: (N) 4963628 (E) 379621

Well 2 GPS coordinates: (N) _____ (E) _____

Water Well Record Available?: Y (Y/N; attach copy) Construction Date: 2007/06/28

Well Type (dug, drilled): Drilled

Well Depth (m): 67.07 Diameter (cm): 25.4

Casing Length (m): 6.70 Diameter (cm): 15.24

Screen Installed? N (Y/N) Water Quality: "Best water in the world"

Test Pumping Rate: 13.64 L/min Test Max. Drawdown/Time: _____

Depth to Bedrock (m/ft): 1.52 Bedrock Decript: Black/grey granite

Depth Water found (m/ft): 64.62 Recommended Pumping Rate: 25 L/min

PART III: PUMP INSTALLATION DETAILS

Pump Type / HP (submersible, centifugal, jet, etc): submersible

Date of Installation: ✓

Pump Intake Depth (m): ✓

Storage Tank Type (bladder, contact, etc.): ✓

Tank capacity (specify units): ✓

Have you had any problems with your pump? (If so, what?) ✓

PART IV: WATER TREATMENT SYSTEM(S)

Do you have a water treatment system(s)? Yes / (No) (circle one)

Type(s): (pls circle) Water softener / Reverse Osmosis / Distillation / Filtration / UV

Date of Installation:

Services: Entire system / Kitchen Faucet (circle one or write other)

Water Softener: Salt Type: (pls circle) NaCl / KCl

Discharge location:

Reverse Osmosis:

Discharge location:

Filtration: (pls circle) Cartridge / Greensand / Other (specify):

Cartridge size (um):

How often is cartridge replaced?

Disinfection: Make/model:

Location:

PART V: WATER USAGE

What is well water used for (specify for each well)?

(eg., domestic supply, agricultural, commercial/industrial usage - see below; give specifics)

Domestic supply

If domestic usage, specify number of persons using well: 1-2

Lawn watering? N (Y/N)

Type & number of Livestock watered from well:

Other uses for water not specified above: Bottling for personal use at permanent residence.

Owner Permission to Take Well Water Level _____

print name signature

Well Water Level (m TOC): _____ Date/Time: _____

PART VI: SEPTIC SYSTEM

Location: _____ Age: _____

Any problem with system? _____

_____

When was tank last pumped? _____

Interviewed By: Matt Debeer Date: Nov 3 2021

Ref: BluMetric Well Inspection Survey Form-V2.xls

Site Plan /Well Insp.- indicate well vs Septic location, site drainage, adjacent land use, N arrow, scale

Is surface drainage away from well? Yes / No Well Casing Height (m) _____

Any Contaminant sources near well? (downspouts, animal waste, storage tanks, fill pipes, leaking equip.)

Well location photo taken? Yes / No

Please see well Record

APPENDIX D

Terrain Analysis Map (WESA, 1979)

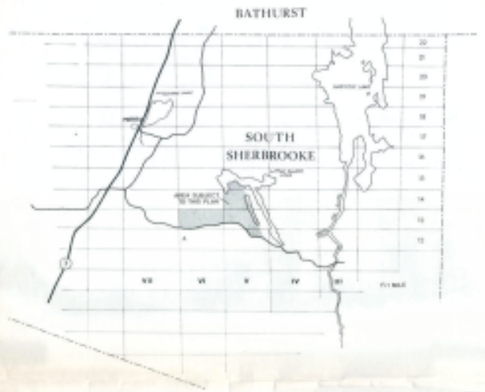


FIGURE 2.
MABERLY PINES
TERRAIN MAP

LEGEND

- ROCK ESCARPMENT
- GEOLOGICAL CONTACT, APPROXIMATE
- DRAINAGE CHANNEL
- CONTOUR INTERVAL 2 m.
- VEGETATION
- MARSH
- AREA OF MODERATE ECOLOGICAL SENSITIVITY
- AREA OF HIGH ECOLOGICAL SENSITIVITY

TERRAIN UNIT	LITHOLOGY
1	BEDROCK, SLOPING
2	BEDROCK, FLAT
3	THIN TILL OVER BEDROCK
4	THICK TILL AND SAND OVER BEDROCK
5	THICK TILL, POORLY DRAINED
6	BEAVER SWAMP, MARSH

FEET
METRES
N

APPENDIX E

MECP Water Well Records

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

TW1 at 202 Red Pine Road

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 356272

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name
Champagne	Michael Charles & Paula
Organization	**Email Address**
	paulachampagne@rogers.com

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
	85	John Street	Ottawa

Country	Province	Postal Code	Telephone Number
Canada	ON	K1M 1N3	613-296-0854

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	202	Red Pine Road	South Sherbrooke

Lot	Concession	County/District/Municipality
13	6	LANARK

City/Town	Province	Postal Code
Maberly	Ontario	K0H 2B0

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	18	380217	4963136	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 305 (ft)

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

				(ft)	(ft)
Grey	Granite			0	200
Red	Granite			200	220
Grey	Granite			220	299
Red	Granite			299	305

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	10	Bentonite (Quick Grout)	1.24
10	20	Cement	1.24

5. Method of Construction *

☐ Cable Tool ☑ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☐ Direct Push
☐ Other (specify)

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☑ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☐ Monitoring
☐ Irrigation ☐ Test Hole ☐ Dewatering
☐ Other (specify)

7. Status of Well *

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

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
6.25	Steel	0.188	-2	20

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)

10. Water Details

Water found at Depth 55 (ft)	☐ Gas	Kind of water	☐ Fresh	☑ Untested	☐ Other		
Water found at Depth 198	☐ Gas	Kind of water	☐ Fresh	☑ Untested	☐ Other		

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	20	10
20	305	6

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	42.1	47.7	50.3	52.8	55	57.2	67.8	78.2	89	98.9	108.4	125.7	141.5	154.2

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	151.8	149.6	147.6	145.5	143.6	133.7	124.4	115.5	107.2	99.3	85	71.4	58.6

After test of well yield, water was

☑ Clear and sand free ☐ Other (specify)

Pump intake set at	Pumping rate	Duration of pumping	Final water level end of pumping	Disinfected? *
250 (ft)	4 (GPM)	1 hrs + 0 min	154.2 (ft)	☑ Yes ☐ No

Recommended pump depth	Recommended pump rate	Well production
250 (ft)	(GPM)	4.5 (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☑ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☑ Yes ☐ No	2022/09/21	2022/09/16

Comments
Drilling Detail:
Grey Red White Granite 0-90'
Grey White Red Granite 90-115'
Grey Red White Granite 115-200
Red Grey Granite 200-220'
Grey Red White Granite 220-299'
Red Granite 299-305'

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
Wilf Hall & Sons Well Drilling	2558

Business Address

Unit Number	Street Number	Street Name *
	256	Hall Shore Road

City/Town/Village *	Province	Postal Code *
McDonalds Corners	ON	K0G 1M0

Business Telephone Number	Business Email Address
613-278-0580	info@wilfhallandsons.com

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Hall	Scott	2760

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
Hall	Scott	info@wilfhallandsons.com
Signature		Date Submitted (yyyy/mm/dd)

17. Ministry Use Only

Audit Number

Incomplete Record

2003 Pond Lane (well record not in MECP database)

Ministry of the Environment

Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1 PRINT ONLY IN SPACES PROVIDED
2 CHECK [✓] CIRCLE WHERE APPLICABLE

Plan 21

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON	BLOCK	TRACT	SURVEY	ETC	LOT
Lanark	South Sherbrooke		6				20

OWNER (SURNAME FIRST) — ADDRESS — DATE COMPLETED

Brulé Ernie A — 422-25 Woodridge Cres. Nepean, Ont K2B 7T4 — DAY 30 MO. 9 YR. 88

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FEET FROM	DEPTH FEET TO
red	sand			0'	3'
gray	limestone			3'	50'
orange	limestone			50'	56'
gray	limestone			56'	153'
orange	limestone			153'	162'
black	limestone			162'	168'
orange	limestone			168'	201'
gray					
orange	limestone			201'	285'

WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
280'	☑ FRESH ☐ SALTY — ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY — ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY — ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY — ☐ SULPHUR ☐ MINERALS ☐ GAS
	☐ FRESH ☐ SALTY — ☐ SULPHUR ☐ MINERALS ☐ GAS

CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH FEET FROM	DEPTH FEET TO
6"	☑ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE ☐ PLASTIC	188	0'	22'
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE ☐ PLASTIC			
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE ☐ PLASTIC			

SCREEN

DIAMETER INCHES	LENGTH FEET	SLOT NO. OF OPENING	MATERIAL AND TYPE	DEPTH SET AT FEET

PLUGGING & SEALING RECORD

DEPTH SET AT FEET FROM	TO	MATERIAL AND TYPE
0'	22'	Cement

PUMPING TEST

PUMPING TEST METHOD: ☑ PUMP ☐ BAILER — PUMPING RATE 10 GPM — DURATION OF PUMPING 1 HOURS ___ MINS

STATIC LEVEL FEET	WATER LEVEL END OF PUMPING FEET	WATER LEVEL DURING PUMPING: 15 MINUTES FEET	30 MINUTES FEET	45 MINUTES FEET	60 MINUTES FEET
					120

☐ PUMPING ☐ RECOVERY

IF FLOWING GIVE RATE ___ GPM

PUMP INTAKE SET AT 285 FEET

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP

RECOMMENDED PUMP SETTING 250 FEET

WATER AT END OF TEST: ☑ CLEAR ☐ CLOUDY

RECOMMENDED PUMPING RATE 8 GPM

FINAL STATUS OF WELL

☑ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED INSUFFICIENT SUPPLY ☐ ABANDONED POOR QUALITY ☐ UNFINISHED ☐ DEWATERING

WATER USE

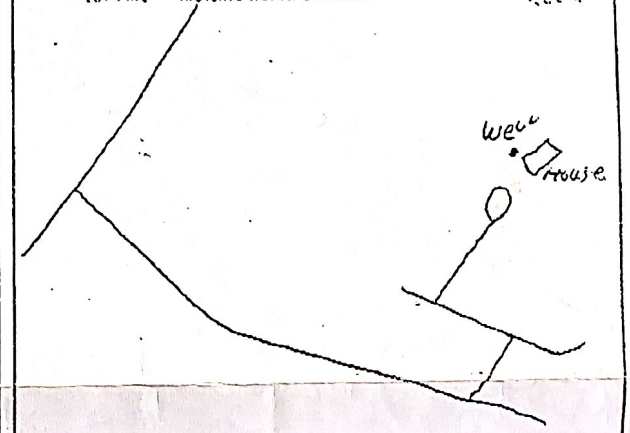
☑ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ OTHER ☐ NOT USED

METHOD OF CONSTRUCTION

☐ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☑ ROTARY (AIR) ☐ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING ☐ DIGGING ☐ OTHER

LOCATION OF WELL

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



41145

DRILLERS REMARKS

CONTRACTOR

NAME OF WELL CONTRACTOR: Wilf Wall Ltd. — WELL CONTRACTOR'S LICENCE NUMBER: 2558

ADDRESS: McDonalds Corners, Ont.

NAME OF WELL TECHNICIAN: Carl Hemmill — WELL TECHNICIAN'S LICENCE NUMBER: T0050

SIGNATURE OF TECHNICIAN/CONTRACTOR: Wilf Wall — SUBMISSION DATE: DAY 4 MO. 10 YR. 88

CONTRACTOR'S COPY

OFFICE USE ONLY

FORM NO 0506 (11/80) FORM 9

4452 Bolingbroke Road (well record # 7189149)

Ontario Ministry of the Environment

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No. (Place Sticker and/or Print Below) A134690 **Tag#: A134690**

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

[redacted]

Address of Well Location (Street Number/Name)	Township	Lot	Concession
4452 Bolingbrooke Road	South Sherbrooke	13	7
County/District/Municipality	**City/Town/Village**	**Province**	**Postal Code**
Lanark	Maberly	Ontario	K0H2B0
UTM Coordinates NAD 83 Zone 18 Easting 379428 Northing 4963656	**Municipal Plan and Sublot Number**	**Other**	

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Red	Sand/stones			0'	4'
black/grey/red	granite			4'	32'
black/grey	granite			32'	198'
grey	granite			198'	205'
black	granite			205'	280'
Red	granite			280'	284'
Black/grey	granite			284'	310'
Black/grey/pink	granite			310'	400'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0'	22'	2 Bags cement	0.044
		2 Bags quick grout	0.044

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6"	Steel	.49cm	0'	22'

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	
?	☐ Gas	☐ Fresh ☑ Untested ☐ Other, specify
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify
	☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0'	22'	25.4cm

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 250'

Pumping rate (l/min / GPM): 3 gpm

Duration of pumping: 1 hrs + ____ min

Final water level end of pumping (m/ft): 24.10'

If flowing give rate (l/min / GPM): 0

Recommended pump depth (m/ft): 350'

Recommended pump rate (l/min / GPM): 2 gpm

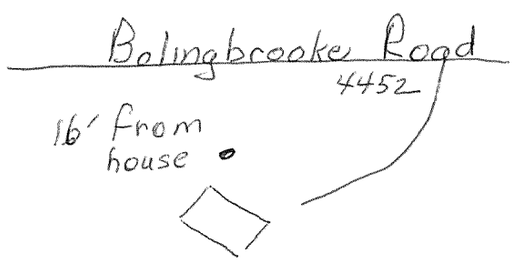
Well production (l/min / GPM): 1 1/2 gpm

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level			
1	21.0'	1	141.2'
2	23.4'	2	139.8'
3	26.0'	3	137.10'
4	28.8'	4	136.3'
5	31.3'	5	135.4'
10	43.25'	10	129.35'
15	55.0'	15	124.0'
20	65.85'	20	119.75'
25	76.2'	25	116.2'
30	86.2'	30	112.95'
40	104.65'	40	106.75'
50	124.6'	50	100.115'
60	142.5'	60	95.8'

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Wilf Hall & Sons Well Drilling	2558
Business Address (Street Number/Name)	**Municipality**
956 Hall Shore Rd RR1	McDonald's Corners
Province	**Postal Code**	**Business E-mail Address**
ON	K0G1M0	wilfhallltd@bellnet.ca
Bus. Telephone No. (inc. area code)	**Name of Well Technician (Last Name, First Name)**
6132787293 3	Hall Mark
Well Technician's Licence No.	**Signature of Technician and/or Contractor**	**Date Submitted**
12128	Mark Hall	2012/09/21

Well owner's information package delivered ☑ Yes ☐ No

Date Package Delivered: 2012/09/24

Date Work Completed: 2012/09/24

Ministry Use Only

Audit No. Z153980

Received OCT 05 2012

Ministry's Copy

Ontario Ministry of the Environment

Well Tag Number (Plate number below)
A051411
A 051411

Well Record
Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

- For
- All
- Qu
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

4416 Bollingbroke Road (Well record #7046732)

document is a permanent **legal** document. Please retain for future reference.
delays in processing. Further instructions and explanations are available on the back of this form.
on can be directed to the Water Well Help Desk (Toll Free) at 1-888-396-9355.

Ministry Use Only

[redacted]

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
County Road 36	South Sherbrooke	13	6
RR#/Street Number/Name	**City/Town/Village**	**Site/Compartment/Block/Tract etc.**	
Con 6 Lot 13			

GPS Reading: NAD 83 | Zone 18 | Easting 371962 | Northing 4963628 | Unit Make/Model: Magellan | Mode of Operation: Waas | ☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To (Metres)
	gravel / boulders			0.	1.52
black / grey	granite			1.52	67.06
		3 gpm (13.64 litres)	220' Deep (67.06 m)		

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0.	6.70	25.4

Water Record

Water found at Metres	Kind of Water
64.62 m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☑ Other: not tested
m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was: ☐ Clear and sediment free ☑ Other, specify cloudy

Chlorinated ☑ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
Casing				
15.24	☑ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	0.61	6.70
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☑ Open hole		6.70	67.06

Test of Well Yield

Pumping test method: Pump

	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at - (metres) 60	Static Level			
Pumping rate - (litres/min) 30	1	10.15	1	15.44
Duration of pumping 1 hrs + ____ min	2	10.20	2	14.22
Final water level end of pumping 8.76 metres	3	10.30	3	13.25
Recommended pump type. ☐ Shallow ☑ Deep	4	10.57	4	12.45
Recommended pump depth. 48 metres	5	10.80	5	11.78
Recommended pump rate. 25 (litres/min)	10	11.43	10	10.08
	15	12.95	15	9.69
If flowing give rate - (litres/min) 0	20	13.82	20	9.57
	25	15.02	25	9.50
If pumping discontinued, give reason.	30	15.82	30	9.45
	40	16.82	40	9.36
	50	17.39	50	9.29
	60	18.99	60	9.23

Plugging and Sealing Record

☑ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
6.70	0.	2 Bags cement	0.044
		2 Bags quick grout	0.044

Method of Construction

☐ Cable Tool ☑ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☑ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

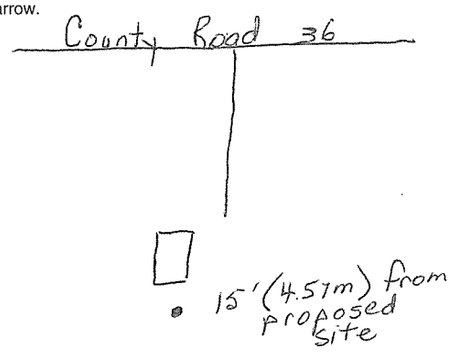
☑ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor	Well Contractor's Licence No.
Wilf Hall & Sons Well Drilling RR1	2558
Business Address (street name, number, city etc.)	
260 Hall Shore Rd, McDonalds Corners Ont K0G1M0	
Name of Well Technician (last name, first name)	**Well Technician's Licence No.**
Mark Hall	T9228
Signature of Technician/Contractor	**Date Submitted** YYYY MM DD
X Mark Hall	2007 6 28

Location of Well

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



Audit No. Z 58529

Date Well Completed: YYYY 2007 MM 6 DD 28

Was the well owner's information package delivered? ☑ Yes ☐ No

Date Delivered: YYYY 2007 MM 6 DD 28

Ministry Use Only

Data Source | Contractor 2558

Date Received: YYYY MM DD JUL 17 2007 | Date of Inspection: YYYY MM DD

Remarks | Well Record Number

0506E (08/2006) Ministry's Copy *Cette formule est disponible en français*

Well record #3513257 (probably corresponds to well on Lot 23)

Ontario — Ministry of the Environment

The Ontario Water Resources Act
WATER WELL RECORD

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

11 — 3513257 — Municipality 3501A — Con. CON — 06

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
Lanark	South Sherbrooke	6	13

Address: 596 North Russell Rd., Russell

Date completed: 13 (day) 3 (month) 01 (year)

21 — UTM — 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	Depth - feet To
red	sand			0'	1½'
black	granite			1½'	23'
grey/orange/green	granite			23'	130'
black/grey	granite			130'	156'
grey/orange	granite			156'	190'
black	granite			190'	200'

31

32

41 WATER RECORD

Water found at - feet	Kind of water
70'	1 ☑ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6	1 ☑ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	188	0'	22'
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

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

Material and type — Depth at top of screen feet

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at - feet From	Depth set at - feet To	Material and type (Cement grout, bentonite, etc.)
0'	22'	Cement

71 PUMPING TEST

Pumping test method: 1 ☑ Pump 2 ☐ Bailer — Pumping rate: 4+ GPM — Duration of pumping: 1 Hours ... Mins

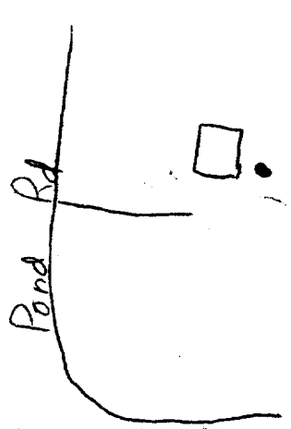
Static level	Water level end of pumping	Water levels during: 1 ☑ Pumping 2 ☐ Recovery			
31' feet	feet	15 minutes: 135' feet	30 minutes: 70' feet	45 minutes: 42' feet	60 minutes: 31' feet

If flowing give rate: GPM — Pump intake set at: 200 feet — Water at end of test: ☐ Clear ☑ Cloudy

Recommended pump type: ☐ Shallow ☑ Deep — Recommended pump setting: 175' feet — Recommended pump rate: 4 GPM

LOCATION OF WELL

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



225789

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	Well Contractor's Licence No.
Huff Well Ltd	2558
Address: RR1 McDonalds Corners Ont K0G1M0	
Name of Well Technician: Mark Huff	Well Technician's Licence No.: T2228
Signature of Technician/Contractor: Mark Huff	Submission date: 13 (day) 3 (mo) 01 (yr)

MINISTRY USE ONLY

Data source 58 — Contractor 59-62: 2558 — Date received 63-68: APR 11 2001 — 80

Date of inspection — Inspector

Remarks

CSS.ES1

0506 (07/00) Front Form 9

2 - MINISTRY OF THE ENVIRONMENT COPY

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 — 3510061 — MUNICIP 35014 — CON. CON 05

COUNTY OR DISTRICT: Renfrew
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: South Sherbrooke
CON. BLOCK, TRACT, SURVEY, ETC: Con 5
LOT: NE½ 12
[redacted] 0 Fisher Ave Apt 505, Ottawa
DATE COMPLETED: DAY 29 MO 10 YR 91
RC: KLR
ELEVATION:
BASIN CODE: 5 P 7

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
grey	hardpan			0	6
black red	granite			6	163

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
158	1 ☒ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	22
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		22	163
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

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

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP (Air) 2 ☐ BAILER
PUMPING RATE: 8 GPM
DURATION OF PUMPING: 1 HOURS 0 MINS
WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
60 FEET	150 FEET	150 FEET	150 FEET	150 FEET	150 FEET

IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 150 FEET
RECOMMENDED PUMPING RATE: 8 GPM

LOCATION OF WELL

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

N.

Fine RD 5

40 km

40 m

DRILLERS REMARKS

92134

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
☐ DEWATERING

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: A Mann's Well Drilling
WELL CONTRACTOR'S LICENCE NUMBER: 3644
ADDRESS: Box 326 Richmond Ont
NAME OF WELL TECHNICIAN:
WELL TECHNICIAN'S LICENCE NUMBER: T-0064
SIGNATURE OF TECHNICIAN/CONTRACTOR:
SUBMISSION DATE: DAY 2 MO 11 YR 91

OFFICE USE ONLY

DATA SOURCE
CONTRACTOR: 3644
DATE RECEIVED: DEC 06 1991
DATE OF INSPECTION
INSPECTOR
REMARKS
CSSES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 — 3510138 — MUNICIP 35014 — CON. CON — LOT 05

COUNTY OR DISTRICT: [redacted]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Sherbrooke
CON: 5
LOT: 13
DATE COMPLETED: DAY 13 MO 11 YR 91
ADDRESS OF WELL: Ottawa Ont

RC. — ELEVATION — RC. — BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	Sandy Soil & Stones			0	4
red/grey granite				4	68
grey & green	"			68	158

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
126	1 ☒ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
152	1 ☒ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY — 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	0	22
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
4	22	cement grout

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☒ PUMP 2 ☐ BAILER	8 GPM	1 HOURS ___ MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
20 FEET	130 FEET	1 ☒ PUMPING 2 ☐ RECOVERY	135 FEET	130 FEET	130 FEET	130 FEET

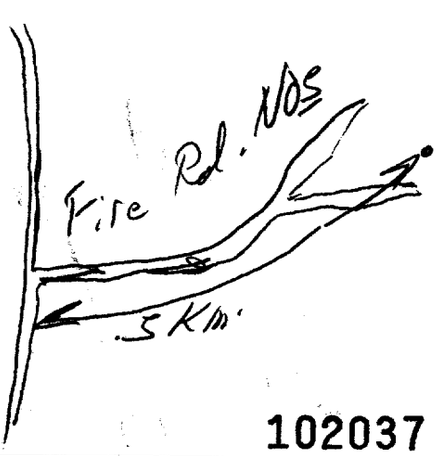
IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	FEET	1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	140 FEET	8 GPM

LOCATION OF WELL

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

Plan 29 R 1939 PT L



DRILLERS REMARKS

102037

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 — ☐ DEWATERING

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Air-Rock Drilling Ltd.
WELL CONTRACTOR'S LICENCE NUMBER: 1119
ADDRESS: RR # 2 Hastings Ont
NAME OF WELL TECHNICIAN: Stranger Purcell
WELL TECHNICIAN'S LICENCE NUMBER: 10003
SIGNATURE OF TECHNICIAN/CONTRACTOR: Stranger Purcell
SUBMISSION DATE: DAY 28 MO 11 YR 91

OFFICE USE ONLY

DATA SOURCE — CONTRACTOR: 1119 — DATE RECEIVED: DEC 06 1991
DATE OF INSPECTION — INSPECTOR
REMARKS: CSS FS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ontario Ministry of the Environment

Well Tag Number (Plate number below) A006544

A006544

Well Record

Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

- For use in the **Province of Ontario** only. This document is a permanent **legal** document. Please retain for future reference.
- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

[redacted]

Address of Well Location (County/District/Municipality): 133 Rainbow Lane, Lanark Cty,

Township: South Sherbrooke

Lot: 7 Concession: 5

RR#/Street Number/Name: South Sherbrooke Twp

City/Town/Village:

Site/Compartment/Block/Tract etc.:

GPS Reading: NAD 8.3 Zone 18 Easting 381292 Northing 4962789 Unit Make/Model Magellan Mode of Operation: WAAS ☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To
	sand/gravel/stones			0.	2.13
black/pink	granite			2.13	14.33
black/grey/green	(mica) granite			14.33	15.85
black	granite			15.85	21.95
white/grey	granite			21.95	27.43
black/pink	granite			27.43	41.15
black	granite			41.15	42.67

4 gpm @ 140 feet.

Hole Diameter

Depth From	Metres To	Diameter Centimetres
0.	6.70	25.4

Water Record

Water found at Metres: 152.4 m — Kind of Water: ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☑ Other: not tested

☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was: ☐ Clear and sediment free ☑ Other, specify Cloudy

Chlorinated ☑ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Metres To
Casing				
15.24	☑ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	0.61	6.70
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☐ Open hole			

Test of Well Yield

Pumping test method: Pump.

Pump intake set at - (metres) 24.38

Pumping rate - (litres/min) 18.18

Duration of pumping 1 hrs + ____ min

Final water level end of pumping 6.90 metres

Recommended pump type. ☐ Shallow ☑ Deep

Recommended pump depth. 35 metres

Recommended pump rate. 18 (litres/min)

If flowing give rate - (litres/min)

If pumping discontinued, give reason. N/A

	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level				
1	1.	7.92	1	10.06
2	2	8.19	2	9.75
3	3	8.32	3	9.53
4	4	8.43	4	9.37
5	5	8.52	5	9.25
10	10	8.90	10	8.88
15	15	9.08	15	8.63
20	20	9.36	20	8.50
25	25	9.85	25	8.37
30	30	10.15	30	8.25
40	40	10.43	40	8.08
50	50	10.91	50	7.90
60	60	10.95	60	7.74

Plugging and Sealing Record ☐ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
6.70	0.	Quick grout	0.22

Method of Construction

☐ Cable Tool ☑ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☑ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☑ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor: WILF HALL Ltd — Well Contractor's Licence No.: 2558

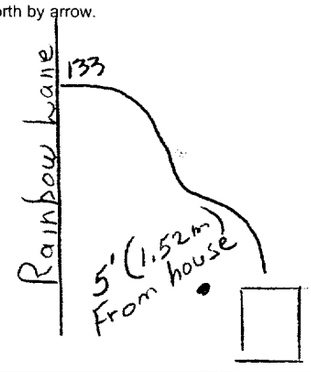
Business Address (street name, number, city etc.): RR1, 260 Hall Shore Rd McDonald's Corners Ont K0G1M0

Name of Well Technician (last name, first name): Mark Hall — Well Technician's Licence No.: 2558

Signature of Technician/Contractor: x Mark Hall — Date Submitted: 2004 03 23

Location of Well

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



Audit No. Z 06648

Date Well Completed: 2003 03 23

Was the well owner's information package delivered? ☑ Yes ☐ No

Date Delivered: 2004 03

Ministry Use Only

Data Source — Contractor: 2558

Date Received: APR 16 2004 — Date of Inspection

Remarks: CSS.ES5 — Well Record Number: 3514498

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☑ Well Owner's Copy ☐ *Cette formule est disponible en français*

Ontario Ministry of the Environment

Well Tag Number (Plate number below): A051411

A 051411

Well Record

Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

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- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

[redacted]

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
County Road 36	South Sherbrooke	13	6
RR#/Street Number/Name	**City/Town/Village**	**Site/Compartment/Block/Tract etc.**	
Con 6 Lot 13			

GPS Reading: NAD 83 | Zone 18 | Easting 379621 | Northing 4963628 | Unit Make/Model: Magellan | Mode of Operation: Waas | ☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To (Metres)
	gravel / boulders			0.	1.52
black / grey	granite			1.52	67.06
		3 gpm (13.64 litres)	220' Deep (67.06 m)		

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0.	6.70	25.4

Water Record

Water found at Metres	Kind of Water
64.62 m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☑ Other: not tested
____ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: ____
____ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: ____

After test of well yield, water was: ☐ Clear and sediment free ☑ Other, specify: cloudy

Chlorinated ☑ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
Casing				
15.24	☑ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	0.61	6.70
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☑ Open hole		6.70	67.06

Test of Well Yield

Pumping test method: Pump

Pump intake set at - (metres): 60

Pumping rate - (litres/min): 30

Duration of pumping: 1 hrs + ____ min

Final water level end of pumping: 8.76 metres

Recommended pump type: ☐ Shallow ☑ Deep

Recommended pump depth: 48 metres

Recommended pump rate: 25 (litres/min)

If flowing give rate - (litres/min): 0

If pumping discontinued, give reason.

	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level				
1	10.15		1	15.44
2	10.20		2	14.22
3	10.30		3	13.25
4	10.57		4	12.45
5	10.80		5	11.78
10	11.43		10	10.08
15	12.95		15	9.69
20	13.82		20	9.57
25	15.02		25	9.50
30	15.82		30	9.45
40	16.82		40	9.36
50	17.39		50	9.29
60	18.99		60	9.23

Plugging and Sealing Record

☑ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
6.70	0.	2 Bags cement	0.044
		2 Bags quick grout	0.044

Method of Construction

☐ Cable Tool ☑ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☐ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☑ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

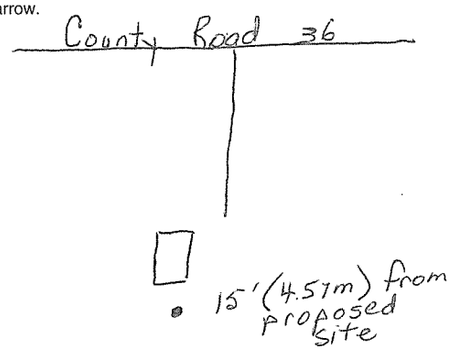
☑ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor	Well Contractor's Licence No.
Wilf Hall & Sons Well Drilling RR1	2558
Business Address (street name, number, city etc.)	
260 Hall Shore Rd, McDonalds Corners Ont K0G1M0	
Name of Well Technician (last name, first name)	**Well Technician's Licence No.**
Mark Hall	T9228
Signature of Technician/Contractor	**Date Submitted** YYYY MM DD
X Wilf Hall	2007 6 28

Location of Well

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



Audit No. Z 58529

Date Well Completed: YYYY 2007 MM 6 DD 28

Was the well owner's information package delivered? ☑ Yes ☐ No

Date Delivered: YYYY 2007 MM 6 DD 28

Ministry Use Only

Data Source

Contractor 2558

Date Received: YYYY JUL 17 2007 MM DD

Date of Inspection: YYYY MM DD

Remarks

Well Record Number

0506E (08/2006)

Ministry's Copy

Cette formule est disponible en français

Ontario | Ministry of the Environment

Well Tag Number (Place Sticker and/or Print Number below): A 051413 / A 051413

Well Record

Regulation 903 Ontario Water Resources Act

page 1 of 1

Instructions for Completing Form

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- Please print clearly in blue or black ink only.

Ministry Use Only

[redacted]

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
# 4193 Hwy #36	South Sherbrooke	13	6

RR#/Street Number/Name	City/Town/Village	Site/Compartment/Block/Tract etc.
Con 6 Lot 13		

GPS Reading	NAD	Zone	Easting	Northing	Unit Make/Model	Mode of Operation
	83	18	380249	4962736	Magellan	Waas; ☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
red	Sand			0.	0.91
black/red	granite			0.91	32.92
black/brown	granite			32.92	33.53
black	granite			33.53	35.05

10 gpm (45.46 litres) 115' Deep (35.05 m)

Hole Diameter

Depth Metres From	To	Diameter Centimetres
0.	6.70	25.4

Water Record

Water found at Metres	Kind of Water
32.92 m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☑ Other: not tested
m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was: ☐ Clear and sediment free ☑ Other, specify cloudy

Chlorinated ☑ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	To
Casing				
15.24	☑ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	0.61	35.05
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen (Outside diam)	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen	☑ Open hole		6.70	35.05

Test of Well Yield

Pumping test method: Pump

Pump intake set at - (metres): 30

Pumping rate - (litres/min): 45

Duration of pumping: 1 hrs + ___ min

Final water level end of pumping: 4.43 metres

Recommended pump type: ☐ Shallow ☑ Deep

Recommended pump depth: 27 metres

Recommended pump rate (litres/min): 35

If flowing give rate - (litres/min): 0

If pumping discontinued, give reason.

Draw Down Time min	Water Level Metres	Recovery Time min	Water Level Metres
Static Level			
1	10.60	1	21.25
2	11.75	2	19.09
3	12.70	3	17.80
4	13.28	4	16.78
5	13.90	5	15.85
10	16.37	10	13.33
15	17.94	15	11.92
20	19.30	20	11.10
25	20.09	25	10.48
30	21.90	30	10.04
40	23.91	40	9.28
50	25.08	50	8.74
60	25.75	60	8.33

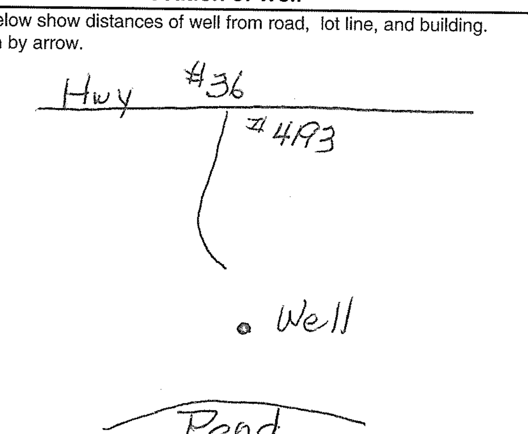
Plugging and Sealing Record

☑ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
6.70	0.	2 Bags cement	0.044
		2 Bags quick grout	0.044

Location of Well

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



Method of Construction

☐ Cable Tool ☐ Rotary (conventional) ☐ Rotary (reverse) ☑ Rotary (air) ☐ Air percussion ☐ Boring ☐ Diamond ☐ Jetting ☐ Driving ☐ Digging ☐ Other

Water Use

☑ Domestic ☐ Stock ☐ Irrigation ☐ Industrial ☐ Commercial ☐ Municipal ☐ Public Supply ☐ Not used ☐ Cooling & air conditioning ☐ Other

Final Status of Well

☑ Water Supply ☐ Observation well ☐ Test Hole ☐ Recharge well ☐ Abandoned, insufficient supply ☐ Abandoned, poor quality ☐ Unfinished ☐ Dewatering ☐ Replacement well ☐ Abandoned, (Other)

Audit No. Z 58533

Date Well Completed (YYYY MM DD): 2007 7 4

Was the well owner's information package delivered? ☑ Yes ☐ No

Date Delivered (YYYY MM DD): 2007 7 4

Well Contractor/Technician Information

Name of Well Contractor: WILF Hall & Sons Well Drilling RR1

Well Contractor's Licence No.: 2558

Business Address (street name, number, city etc.): 260 Hall Shore Rd, McDonald's Corners Ont K0G1M0

Name of Well Technician (last name, first name): Mark Hall

Well Technician's Licence No.: T2228

Signature of Technician/Contractor: X [signature]

Date Submitted (YYYY MM DD): 2007 7 4

Ministry Use Only

Data Source	Contractor 2558
Date Received (YYYY MM DD) AUG 17 2007	Date of Inspection (YYYY MM DD)
Remarks	Well Record Number

0506E (08/2006)

Ministry's Copy

Cette formule est disponible en français

Ontario Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)* A102498

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☑ Metric ☐ Imperial

Page of

[redacted]

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
4417 County Rd 36	South Sherbrooke	13	7

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

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	379404	4963543		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
black	earth			0	.6
red+black	granite			.6	19.8
green	granite			19.8	42.7

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	6.1	Cement	120kg

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.85	steel	.188	0	6.1

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth	Kind of Water	
12 (m/ft) ☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify*
36 (m/ft) ☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify*
(m/ft) ☐ Gas	☐ Fresh ☐ Untested	☐ Other, *specify*

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
6.1	42.7	15.24

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 40

Pumping rate (l/min / GPM): 27

Duration of pumping: 1 hrs + ____ min

Final water level end of pumping (m/ft): 11.4

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 39

Recommended pump rate (l/min / GPM): 25

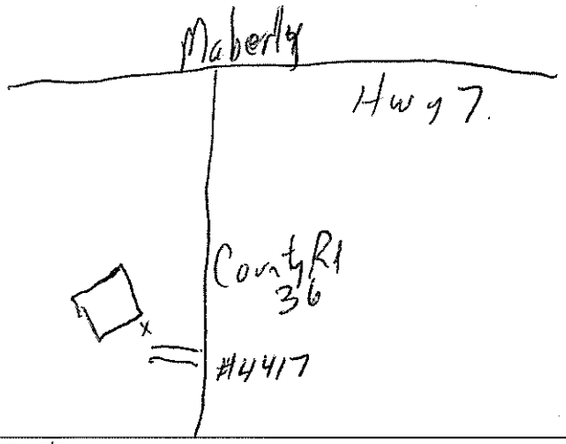
Well production (l/min / GPM): 26

Disinfected? ☑ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		7.3		
1	8.5		1	10.2
2	8.7		2	9.4
3	9.0		3	9.2
4	9.2		4	9.0
5	9.4		5	8.8
10	9.8		10	8.3
15	10.2		15	7.9
20	10.6		20	7.6
25	10.8		25	7.3
30	11.0		30	7.3
40	11.2		40	7.3
50	11.3		50	7.3
60	11.4		60	7.3

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
J R Thompson	4905

Business Address (Street Number/Name)	Municipality
2076 Old Brooke Rd	Maberly

Province	Postal Code	Business E-mail Address
ON	K0H 2B0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6132674800	Darrell Stevenson

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2919	Brian Brady	2010/11/25

Well owner's information package delivered ☑ Yes ☐ No

Date Package Delivered: 2010/11/25

Date Work Completed: 2010/11/25

Ministry Use Only

Audit No. Z124218

Received JAN 24 2011

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Ontario

Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☑ Imperial

Well Tag No Tag#:A299688

A299688

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

[redacted]

Address of Well Location (Street Number/Name)	Township	Lot	Concession
415 POND ROAD	SOUTH SHERBROOKE	15	6

County/District/Municipality	City/Town/Village	Province	Postal Code
LANARK	MABERLY	Ontario	K0H2B0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	379557	4963439		

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
SAND	& STONES			0'	4'
GREY	RED WHITE GRANITE			4'	240'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
0'	22'	2 BAGS CEMENT	0.044
		2 BAGS QUICK GROUT	0.044
		HENRY SHOE	

Method of Construction

☐ Cable Tool ☑ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Other, *specify* _____

☐ Diamond ☐ Jetting ☐ Driving ☐ Digging

Well Use

☐ Public ☑ Domestic ☐ Livestock ☐ Irrigation ☐ Industrial ☐ Other, *specify* _____

☐ Commercial ☐ Municipal ☐ Test Hole ☐ Cooling & Air Conditioning

☐ Not used ☐ Dewatering ☐ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
6"	STEEL	.48CM	0'	22'

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth	Kind of Water	
225' (m/ft) ☐ Gas	☐ Fresh ☑ Untested ☐ Other, *specify*	
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*	
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, *specify*	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0'	22'	25.4cm

Results of Well Yield Testing

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

If pumping discontinued, give reason: —

Pump intake set at (m/ft) 220'

Pumping rate (l/min / GPM) 4 GPM

Duration of pumping 1 hrs + _____ min

Final water level end of pumping (m/ft) 128.35'

If flowing give rate (l/min / GPM) —

Recommended pump depth (m/ft) 220'

Recommended pump rate (l/min / GPM) 3GPM

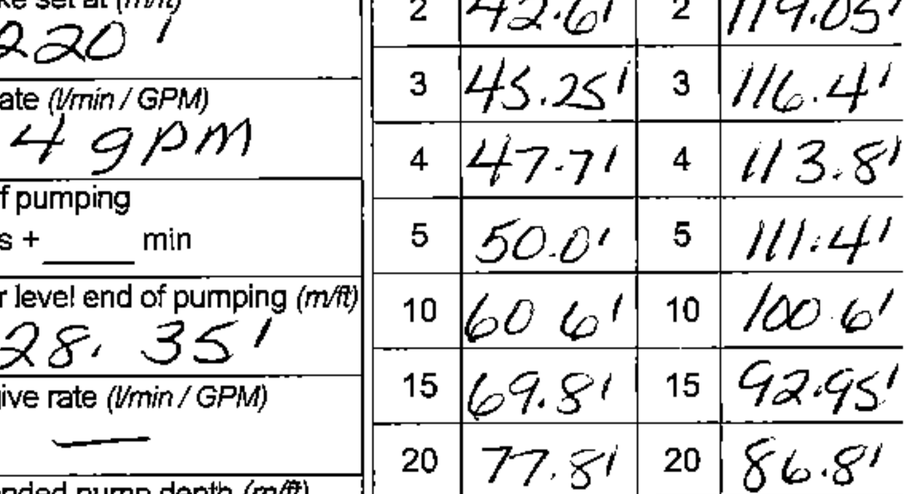
Well production (l/min / GPM) 3GPM

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	36.45'		
1	39.7'	1	121.7'
2	42.6'	2	119.05'
3	45.25'	3	116.4'
4	47.7'	4	113.8'
5	50.0'	5	111.4'
10	60.6'	10	100.6'
15	69.8'	15	92.95'
20	77.8'	20	86.8'
25	85.5'	25	82.0'
30	94.3'	30	78.25'
40	109.4'	40	72.45'
50	120.1'	50	67.95'
60	128.35'	60	64.15'

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
WILF HALL & SONS WELL DRILLING	2558

Business Address (Street Number/Name)	Municipality
256 HALL STORE RD.	MCDONALDS CORNERS

Province	Postal Code	Business E-mail Address
ON	K0G1M0	WILFHALLLTD@BELLNET.CA

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
613 278 0588	HALL, SCOTT

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T2760		AUG 20 2020

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☑ Yes ☐ No	AUG 20 2020	AUG 20 2020

Ministry Use Only

Audit No. Z340813

AUG 12 2020

Received

0506E (2018/12)

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MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

Ontario

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11 | 3503579 | MUNICIP. 3501 4 | CON. CON | 07

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
LANARK	SOUTH SHERBROOKE	7	013

[redacted]
MABERLY, R.R.# 3,

DATE COMPLETED: DAY 10 MO 09 YR 73

HING 9 6 4 4 5 8 | RC. 4 | ELEVATION 0 4 3 2 | RC. 5 | BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
BLACK	EARTH			0	8
BLACK	GRANITE		HARD	8	50
RED	GRANITE		HARD	50	80

31 | 0008801 | 0050821 | 0080721

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0074	1 ☑ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06 64	1 ☑ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE	.188	0	0022
06	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☑ OPEN HOLE		22	0080
	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE			

SCREEN

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

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☑ PUMP 2 ☐ BAILER | PUMPING RATE: 0020 GPM | DURATION OF PUMPING: 01 HOURS 45 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☑ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
018 FEET	075 FEET	018 FEET	018 FEET	018 FEET	018 FEET

IF FLOWING, GIVE RATE: GPM | PUMP INTAKE SET AT: 70 FEET | WATER AT END OF TEST: 1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☑ DEEP | RECOMMENDED PUMP SETTING: 070 FEET | RECOMMENDED PUMPING RATE: 0015 GPM

50-53: 000.4 GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL 54: 1

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

WATER USE 55-56: 01

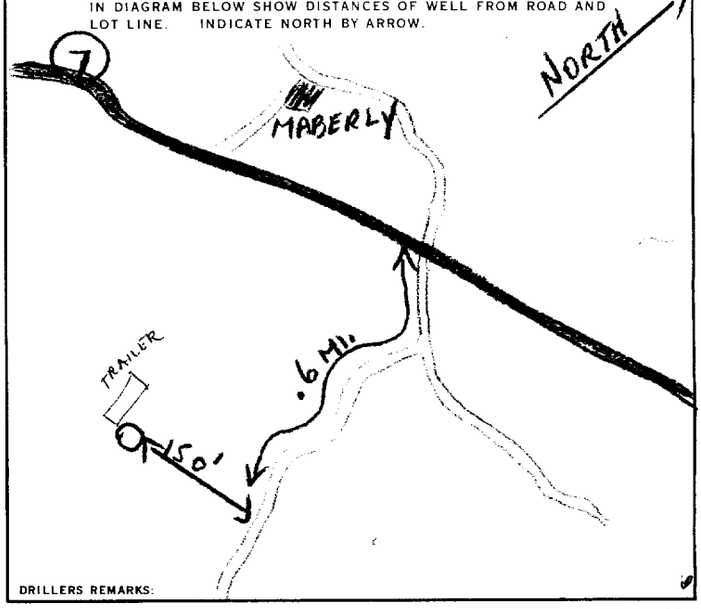
1 ☑ DOMESTIC; 2 ☐ STOCK; 3 ☐ IRRIGATION; 4 ☐ INDUSTRIAL; 5 ☐ COMMERCIAL; 6 ☐ MUNICIPAL; 7 ☐ PUBLIC SUPPLY; 8 ☐ COOLING OR AIR CONDITIONING; ☐ OTHER; 9 ☐ NOT USED

METHOD OF DRILLING 57: 5

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

LOCATION OF WELL 7964

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



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: J.R. THOMPSON | LICENCE NUMBER: 4905

ADDRESS: R.R.# 1, WESTPORT, ONTARIO

NAME OF DRILLER OR BORER: DONALD SMITH | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: J R Thompson | SUBMISSION DATE: DAY 30 MO. 1 YR. 74

OFFICE USE ONLY

DATA SOURCE 58: 1 | CONTRACTOR 59-62: 4905 | DATE RECEIVED 63-68: 120274

DATE OF INSPECTION: 19 Jun 75 | INSPECTOR: K. P/R. Doug

REMARKS:

P

WI

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FORM 7 07-091

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

31 C 15 E

1. PRINT ONLY IN SPACES PROVIDED
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11 — 3506287 — MUNICIP 35014 — CON. CON 07

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	SOUTH SHERBROOKE	7		014

[redacted] R#1 MABERLY ONT. K0H 2B0 — DATE COMPLETED: DAY 08 MO 06 YR 81

UTM ZONE — EASTING 964299 — RC 5 — ELEVATION 0650 — RC 6 — BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FEET FROM	DEPTH FEET TO
	SAND			0	18
	GRANITE			18	150

31 — 0018 28 — 0150 21

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0142	1 ☑ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH FEET FROM	DEPTH FEET TO
06	1 ☑ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE	.188	0	0023
06	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☑ OPEN HOLE		23	0150
	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE			

SCREEN

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

MATERIAL AND TYPE — DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE	CEMENT GROUT / LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☑ PUMP 2 ☐ BAILER — PUMPING RATE: 0002 GPM — DURATION OF PUMPING: HOURS MINS

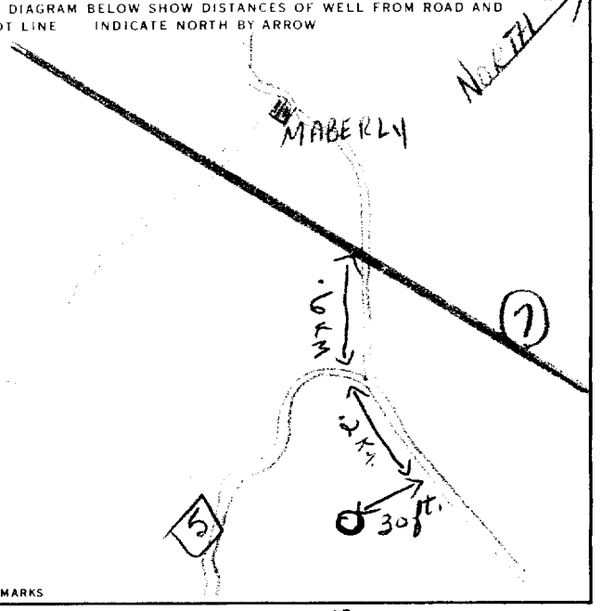
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☑ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
009 FEET	149 FEET		123 FEET	097 FEET	078 FEET	060 FEET

IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	145 FEET	1 ☑ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☑ DEEP	145 FEET	0002 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

FINAL STATUS OF WELL 1 — 1 ☑ WATER SUPPLY; 2 ☐ OBSERVATION WELL; 3 ☐ TEST HOLE; 4 ☐ RECHARGE WELL; 5 ☐ ABANDONED, INSUFFICIENT SUPPLY; 6 ☐ ABANDONED, POOR QUALITY; 7 ☐ UNFINISHED

WATER USE 01 — 1 ☑ DOMESTIC; 2 ☐ STOCK; 3 ☐ IRRIGATION; 4 ☐ INDUSTRIAL; ☐ OTHER; 5 ☐ COMMERCIAL; 6 ☐ MUNICIPAL; 7 ☐ PUBLIC SUPPLY; 8 ☐ COOLING OR AIR CONDITIONING; 9 ☐ NOT USED

METHOD OF DRILLING 5 — 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: J.R THOMPSON — LICENCE NUMBER: 4905

ADDRESS: RR#1 WESTPORT

NAME OF DRILLER OR BORER: DONALD SMITH — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: J.R. Thompson — SUBMISSION DATE: DAY 15 MO. 7 YR. 81

OFFICE USE ONLY

DATA SOURCE: 1 — CONTRACTOR: 4905 — DATE RECEIVED: 14082

DATE OF INSPECTION — INSPECTOR: OP/LM

REMARKS: CSS.ES

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FORM NO. 0506—4—77 FORM 7

31C15E

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 3506755 MUNICIP 35014 CON CON 05

COUNTY OR DISTRICT: Sandb[illegible]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: South Sherbrooke
CON: 5
BLOCK, TRACT, SURVEY, ETC:
LOT: 0B
DATE COMPLETED: DAY 28 MO 06 YR 83
[redacted] Elderfield Crt Ottawa
UTM: 161599 RC 5 ELEVATION 0650 RC 6 BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Red	sand			0	9
Gray	Limestone			9	60
Brown & Gray	Limestone			60	80
Gray	Limestone			80	225

MOE WELL

31 0009728 0060215 0080615 0225215

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0210	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	0022
17-18	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			20-23
24-25	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			27-30

SCREEN

SIZE(S) OF OPENING (SLOT NO.) 31-33	DIAMETER 34-38 INCHES	LENGTH 39-40 FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN 41-44 FEET	80

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

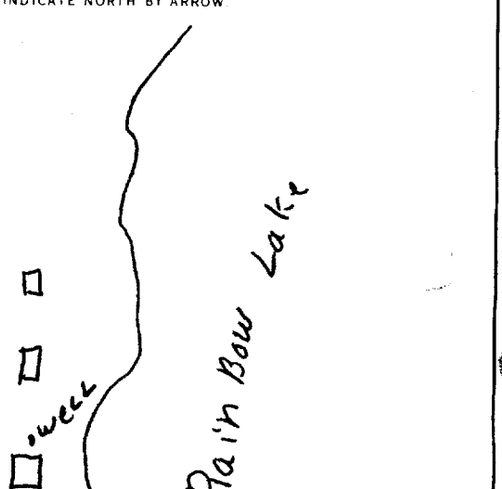
PUMPING TEST METHOD 10: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE 14: 0002 GPM
DURATION OF PUMPING: 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY			
016 FEET	225 FEET	15 MINUTES FEET	30 MINUTES FEET	45 MINUTES FEET	60 MINUTES 136 FEET

IF FLOWING GIVE RATE: GPM
PUMP INTAKE SET AT: 225 FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 200 FEET
RECOMMENDED PUMPING RATE: 0002 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

FINAL STATUS OF WELL 54: 1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED — 1

WATER USE 55-56: 1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED — 01

METHOD OF DRILLING 57: 1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☒ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING — 4

CONTRACTOR

NAME OF WELL CONTRACTOR: Guy Hall Ltd — LICENCE NUMBER: 2558
ADDRESS: Mc Donalds Corners
NAME OF DRILLER OR BORER: Guy Hall — LICENCE NUMBER: 2558
SIGNATURE OF CONTRACTOR: Guy Hall — SUBMISSION DATE: DAY 29 MO 7 YR 83

MINISTRY OF THE ENVIRONMENT COPY

OFFICE USE ONLY

DATA SOURCE 58: 1
CONTRACTOR 59-62: 2558
DATE RECEIVED 63-68: 120384
DATE OF INSPECTION
INSPECTOR
REMARKS: CSSES

FORM NO. 0506-4-77 FORM 7

31C15E

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 3506756 MUNICIP 35014 CON CON 05

COUNTY OR DISTRICT: Lanark
TOWNSHIP BOROUGH CITY TOWN VILLAGE: South Sherbrooke
CON BLOCK TRACT SURVEY ETC: 5
LOT: 013
[redacted] 3rd Ave, Ottawa
DATE COMPLETED: DAY 27 MO 06 YR 83
UTM 461599 RC 5 ELEVATION 0650 RC 6 BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
red + gray	sand + boulders limestone			0'	3'
				3'	64'

MOE 11-FEB-83

31 0003728131 0064215

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0060	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0'	0022'
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 0004 GPM
DURATION OF PUMPING: 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING
018 FEET	FEET

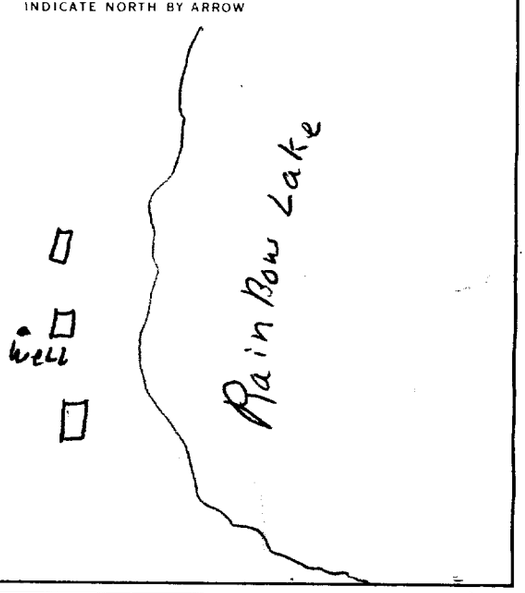
WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
FEET	018 FEET	018 FEET	018 FEET

IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: 64 FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 054 FEET
RECOMMENDED PUMPING RATE: 0004 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

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

WATER USE 01
1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF DRILLING 4
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: Hall Ltd — LICENCE NUMBER: 2558
ADDRESS: McDonalds Corners Ont
NAME OF DRILLER OR BORER: Hall — LICENCE NUMBER: 2558
SIGNATURE OF CONTRACTOR: Hall — SUBMISSION DATE: DAY 29 MO 30 YR 83

OFFICE USE ONLY

DATA SOURCE: 1 — CONTRACTOR: 2558 — DATE RECEIVED: 12 03 84
DATE OF INSPECTION — INSPECTOR
REMARKS

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506-77 FORM 7

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 3506757

Plan Lot 9 in CON 05

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON	BLOCK/TRACT/SURVEY, ETC	LOT
Lanark	South Sherbrooke	5		014

[redacted] 3-2625 Regina St Ottawa — DATE COMPLETED: DAY 24 MO 06 YR 83

UTM: 362599 | RC: 5 | ELEVATION: 0650 | RC: 6 | BASIN CODE: 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
red	sand + stone			0'	2'
gray	granite			2'	30'
broken	limestone			30'	31'
gray	limestone			31'	100'
white	limestone			100'	125'
gray	limestone			125'	170'
white	limestone			170'	180'
gray	limestone			180'	225'

NOV 17 '83

31 0002 7281 2 | 0030 221 | 0031 615 | 0100 215 | 0125 115 | 0170 215

32 0180 115 | 0225 215

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0210	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	0020
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

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

PUMPING TEST

71

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☒ PUMP 2 ☐ BAILER	0001 GPM	02 HOURS 00 MINS

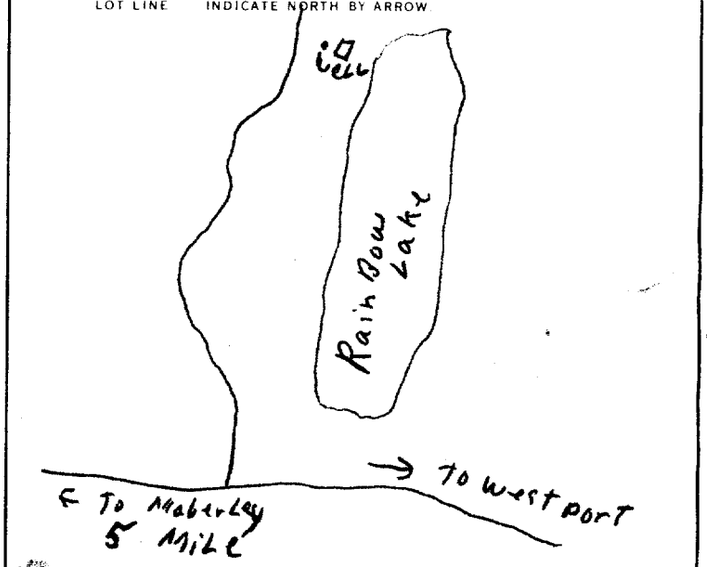
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
022 FEET	FEET	FEET	FEET	FEET	164 FEET

IF FLOWING GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	225' FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	215 FEET	0002 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

FINAL STATUS OF WELL 54	1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED
WATER USE 55-56 01	1 ☐ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED
METHOD OF DRILLING 57 4	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: Guy Hall Ltd. — LICENCE NUMBER: 2558

ADDRESS: McDonalds Corners

NAME OF DRILLER OR BORER: Guy Hall — LICENCE NUMBER: 2558

SIGNATURE OF CONTRACTOR: Guy Hall — SUBMISSION DATE: DAY 29 MO 6 YR 83

OFFICE USE ONLY

DATA SOURCE 58	CONTRACTOR 59-62	DATE RECEIVED 63-68	80
1	2558	120384	

DATE OF INSPECTION | INSPECTOR

REMARKS

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Ministry of the Environment

Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 | 3507365 | MUNICIP | CON.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Lanark	S. SHERBROOKE	V 5?	14

[redacted] ST. REMY DR. NEPEAN ONT K2J 1A3

DATE COMPLETED: DAY 9 MO 9 YR 85

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	SAND	Stones	Loose	0	4
BLK	Granite	Rd Grn, Qurtz, Calite	medium Hard.	4	47
Red	Grnt.	BLK. Grnt, phelbr, Qurtz	medium Hard.	47	96
Grey	Grnt	Grapht, phelbr, calite,	medium Hard.	96	139
BLK	Grnt	Redgrnt, Qurtz, phelds,	Layers of Iron Pirite	139	162
white	calcite	Grnt, pirite, Quartz	medium Hard.	162	185

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
147	☒ FRESH
182	☒ FRESH
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERAL
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERAL
	☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
6 1/4	☒ STEEL	.188	0	22
6 1/8	☒ OPEN HOLE		22	185
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			

SCREEN

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

MATERIAL AND TYPE: ~~Cement~~ | DEPTH TO TOP OF SCREEN: FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
0	22	Cement Grout

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
☒ PUMP ☐ BAILER	4 GPM	1 HOURS 0 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
32 FEET	155 FEET	32 FEET	69 FEET	88 FEET	155 FEET

WATER LEVELS DURING: ☒ PUMPING ☐ RECOVERY

IF FLOWING, GIVE RATE: GPM | PUMP INTAKE SET AT: 175 FEET | WATER AT END OF TEST: ☒ CLEAR ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP | RECOMMENDED PUMP SETTING: 175 FEET | RECOMMENDED PUMPING RATE: 4 GPM

FINAL STATUS OF WELL

☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED

WATER USE

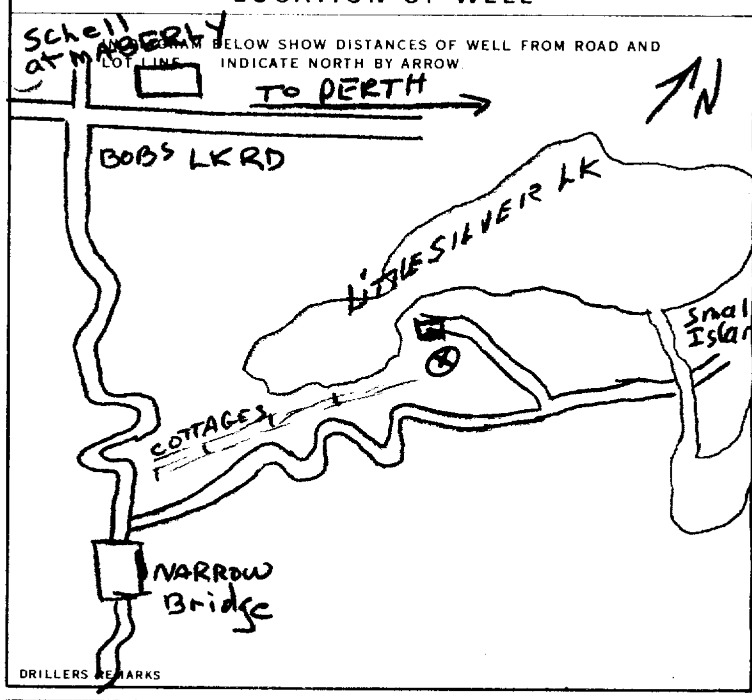
☒ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED

METHOD OF DRILLING

☐ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☒ ROTARY (AIR) ☒ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING

LOCATION OF WELL

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



DRILLERS REMARKS

CONTRACTOR

NAME OF WELL CONTRACTOR: Giffin Well Drilling Ltd | LICENCE NUMBER: 2307

ADDRESS: RR#2 Renfrew ont.

NAME OF DRILLER OR BORER: D. Linnen. D. Gauthier | LICENCE NUMBER: 2307

SIGNATURE OF CONTRACTOR: [signature] | SUBMISSION DATE: DAY ___ MO ___ YR ___

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR | DATE RECEIVED: 10 0286

DATE OF INSPECTION | INSPECTOR

REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506—4—77 FORM 7

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

3507887

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

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	South Sherbrooke		7	13
	R3 Waverly			

DATE COMPLETED: DAY 14 MO 5 YR 87

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	sand & stones			0'	6'
gray	limestone			6'	25'
black	granite			25'	87'

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
15-18	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
20-23	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
25-28	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
30-33	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6 (10-11)	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (12)	188	0'	22' (13-16)
(17-18)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (19)			(20-23)
(24-25)	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC (26)			(27-30)

SCREEN

SIZE(S) OF OPENING (SLOT NO.) (31-33)	DIAMETER (34-38) INCHES	LENGTH (39-40) FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN (41-44) FEET	(80)

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD (10)	PUMPING RATE (11-14) GPM	DURATION OF PUMPING (15-16) HOURS (17-18) MINS
1 ☒ PUMP 2 ☒ BAILER	7	30

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING (25) 1 ☐ PUMPING 2 ☒ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
15 (21) FEET	(22-24) FEET	(26-28) FEET	(29-31) FEET	15 (32-34) FEET	15 (35-37) FEET

IF FLOWING, GIVE RATE (38-41) GPM	PUMP INTAKE SET AT FEET	WATER AT END OF TEST (42) 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE ☐ SHALLOW ☒ DEEP	RECOMMENDED PUMP SETTING (43-45) 70 FEET	RECOMMENDED PUMPING RATE (46-49) 7 GPM

(50-53)

FINAL STATUS OF WELL (54)

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED 9 ☐ DEWATERING

WATER USE (55-56)

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

METHOD OF CONSTRUCTION (57)

1 ☒ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING 2558 ☐ DIGGING ☐ OTHER

LOCATION OF WELL

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

DRILLERS REMARKS: 10851

CONTRACTOR

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Huf Well Ltd	2558
ADDRESS: McDonalds Corners, Ont.	
NAME OF WELL TECHNICIAN: Brant Echlin	WELL TECHNICIAN'S LICENCE NUMBER: T0273
SIGNATURE OF TECHNICIAN/CONTRACTOR: Huf Well	SUBMISSION DATE: DAY 10 MO 6 YR 87

OFFICE USE ONLY

DATA SOURCE (58)	CONTRACTOR (59-62)	DATE RECEIVED (63-68) (80)
		JUN 18 1987
DATE OF INSPECTION	INSPECTOR	
REMARKS: CSS.ES		

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 — 3509525 — MUNICIP 35014 — CON. CON 05

COUNTY OR DISTRICT: Lanark
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: South Sherbrooke
CON. BLOCK, TRACT, SURVEY, ETC.: 5
LOT: 14
[redacted] Oakridge Blvd. Nepean Ont.
DATE COMPLETED: DAY 28 MO 8 YR 90
RECORD: KR E 2175
BASIN CODE:

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
	gravel & stones			0'	15'
black	granite			15'	194'
black &					
white	granite			194'	196'
black	granite			196'	200'

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
195	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	188	0'	22'
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

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

MATERIAL AND TYPE: | DEPTH TO TOP OF SCREEN FEET:

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
0	22	cement

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☒ PUMP 2 ☐ BAILER	3 GPM	HOURS — MINS 30

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
18 FEET	FEET		FEET	FEET	FEET	72 FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	200 FEET	1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	170 FEET	3 GPM

LOCATION OF WELL

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

90215

DRILLERS REMARKS

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 ☐ DEWATERING

WATER USE

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

METHOD OF CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Hiff Hall Ltd
WELL CONTRACTOR'S LICENCE NUMBER: 2558
ADDRESS: McDonalds Corners Ont
NAME OF WELL TECHNICIAN: Earl Gemmill
WELL TECHNICIAN'S LICENCE NUMBER: T0050
SIGNATURE OF TECHNICIAN/CONTRACTOR: Hiff Hall
SUBMISSION DATE: DAY 29 MO 8 YR 90

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 2558 | DATE RECEIVED OCT 29 1990
DATE OF INSPECTION | INSPECTOR
REMARKS

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

APPENDIX F

Laboratory Certificates of Analysis

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Preliminary Report

C.O.C.: DW116170 **REPORT No. B21-38554 (i)**

Report To:

Blumetric Environmental
1682 Woodward Drive,
Ottawa ON K2C 3R8 Canada
Attention: Matt DeGeer

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 23-Nov-21
DATE REPORTED: 29-Nov-21
SAMPLE MATRIX: Drinking Water

JOB/PROJECT NO.: 220037
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		2003-01			
			Sample I.D.		B21-38554-1			
			Date Collected		23-Nov-21			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Fluoride	mg/L	0.1	SM4110C	26-Nov-21/O	0.2			
Chloride	mg/L	0.5	SM4110C	26-Nov-21/O	7.2			
Nitrite (N)	mg/L	0.1	SM4110C	26-Nov-21/O	< 0.1			
Nitrate (N)	mg/L	0.1	SM4110C	26-Nov-21/O	< 0.1			
Nitrate + Nitrite (N)	mg/L	0.1	SM4110C	26-Nov-21/O	< 0.1			
Sulphate	mg/L	1	SM4110C	26-Nov-21/O	18			
Hardness (as CaCO3)	mg/L	1	SM 3120	29-Nov-21/O	213			
Barium	mg/L	0.001	SM 3120	29-Nov-21/O	0.086			
Boron	mg/L	0.005	SM 3120	29-Nov-21/O	0.153			
Chromium	µg/L	2	SM 3120	29-Nov-21/O	< 2			
Copper	mg/L	0.002	SM 3120	29-Nov-21/O	0.019			
Zinc	mg/L	0.005	SM 3120	29-Nov-21/O	0.006			
Sodium	mg/L	0.2	SM 3120	29-Nov-21/O	28.7			
Calcium	mg/L	0.02	SM 3120	29-Nov-21/O	55.8			
Iron	mg/L	0.005	SM 3120	29-Nov-21/O	< 0.005			
Potassium	mg/L	0.1	SM 3120	29-Nov-21/O	2.8			
Magnesium	mg/L	0.02	SM 3120	29-Nov-21/O	18.0			
Manganese	mg/L	0.001	SM 3120	29-Nov-21/O	0.018			
Strontium	mg/L	0.001	SM 3120	29-Nov-21/O	0.557			
Fecal Coliform	cfu/100mL	1	SM9222D	24-Nov-21/K	0			
Dissolved Organic Carbon	mg/L		EPA 415.2	/				
Antimony	mg/L	0.0001	EPA 200.8	26-Nov-21/O	< 0.0001			
Arsenic	mg/L	0.0001	EPA 200.8	26-Nov-21/O	< 0.0001			
Beryllium	mg/L	0.0001	EPA 200.8	26-Nov-21/O	< 0.0001			
Cadmium	mg/L	).000015	EPA 200.8	26-Nov-21/O	< 0.000015			
Cobalt	mg/L	0.0001	EPA 200.8	26-Nov-21/O	0.0001			
Lead	mg/L	0.00002	EPA 200.8	26-Nov-21/O	0.00018			

Michelle Dubien
Lab Manager

R.L. = Reporting Limit
Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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Preliminary Report

C.O.C.: DW116170

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DATE REPORTED: 29-Nov-21
SAMPLE MATRIX: Drinking Water

JOB/PROJECT NO.: 220037
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		2003-01			
			Sample I.D.		B21-38554-1			
			Date Collected		23-Nov-21			
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Molybdenum	mg/L	0.0001	EPA 200.8	26-Nov-21/O	0.0008			
Nickel	mg/L	0.0002	EPA 200.8	26-Nov-21/O	< 0.0002			
Selenium	mg/L	0.001	EPA 200.8	26-Nov-21/O	< 0.001			
Silver	mg/L	0.0001	EPA 200.8	26-Nov-21/O	< 0.0001			
Thallium	mg/L	0.00005	EPA 200.8	26-Nov-21/O	< 0.00005			
Uranium	mg/L	0.00005	EPA 200.8	26-Nov-21/O	0.00198			
Vanadium	mg/L	0.0001	EPA 200.8	26-Nov-21/O	0.0002			
Mercury	mg/L	0.00002	SM 3112 B	25-Nov-21/O	< 0.00002			
Total Coliform	cfu/100mL	1	MOE E3407	24-Nov-21/K	0			
E coli	cfu/100mL	1	MOE E3407	24-Nov-21/K	0			
Background	cfu/100mL	1	MOE E3407	24-Nov-21/K	0			
Conductivity @25°C	µmho/cm	1	SM 2510B	25-Nov-21/O	476			
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	25-Nov-21/O	234			
pH @25°C	pH Units		SM 4500H	25-Nov-21/O	8.12			
TDS (Calc. from Cond.)	mg/L	1	Calc.	26-Nov-21	246			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	25-Nov-21/K	0.02			
Colour	TCU	2	SM 2120C	26-Nov-21/O	< 2			
Turbidity	NTU	0.1	SM 2130	25-Nov-21/O	0.2			

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Test methods may be modified from specified reference method unless indicated by an *
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Michelle Dubien
Lab Manager

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G097073 **REPORT No. B22-16874**

Report To:

Blumetric Environmental
1682 Woodward Drive,
Ottawa ON K2C 3R8 Canada
Attention: Matt DeGeer

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 06-Jun-22
DATE REPORTED: 13-Jun-22
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 220037
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		3506756	A134690		
			Sample I.D.		B22-16874-1	B22-16874-2		
			Date Collected		04-Jun-22	04-Jun-22		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Total Coliform	cfu/100mL	1	MOE E3407	06-Jun-22/K	> 200	0		
E coli	cfu/100mL	1	MOE E3407	06-Jun-22/K	0	0		
Fecal Coliform	cfu/100mL	1	SM9222D	06-Jun-22/K	0	0		
Heterotrophic Plate Count	cfu/mL	10	SM9215D	06-Jun-22/K	230	< 10		
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	07-Jun-22/O	127	101		
pH @25°C	pH Units		SM 4500H	07-Jun-22/O	7.50	7.97		
Conductivity @25°C	µmho/cm	1	SM 2510B	07-Jun-22/O	283	735		
Turbidity	NTU	0.1	SM 2130	10-Jun-22/O	0.1	0.2		
Fluoride	mg/L	0.1	SM4110C	08-Jun-22/O	< 0.1	< 0.1		
Chloride	mg/L	0.5	SM4110C	08-Jun-22/O	2.5	11.5		
Nitrite (N)	mg/L	0.1	SM4110C	08-Jun-22/O	< 0.1	< 0.1		
Nitrate (N)	mg/L	0.1	SM4110C	08-Jun-22/O	0.8	< 0.1		
Sulphate	mg/L	1	SM4110C	08-Jun-22/O	15	231		
Total Kjeldahl Nitrogen	mg/L	0.1	E3516.2	07-Jun-22/K	0.1			
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	07-Jun-22/K	< 0.01	< 0.01		
o-Phosphate (P)	mg/L	0.002	PE4500-S	07-Jun-22/K	< 0.002			
Organic Nitrogen (Calculation)	mg/L	0.1	E3516.2	09-Jun-22/K	0.1			
TDS (Calc. from Cond.)	mg/L	1	Calc.	08-Jun-22	145	383		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	09-Jun-22/O	2.1	1.2		
Sulphide	mg/L	0.01	SM4500-S2	08-Jun-22/K	< 0.01	< 0.01		
Phenolics	mg/L	0.001	MOEE 3179	08-Jun-22/K	< 0.001	< 0.001		
Tannins and Lignins	mg/L	0.5	SM5500B	07-Jun-22/K	< 0.5	< 0.5		
Hardness (as CaCO3)	mg/L	1	SM 3120	09-Jun-22/O	143	62		
Antimony	µg/L	0.1	EPA 200.8	10-Jun-22/O	< 0.1	< 0.1		
Arsenic	µg/L	0.1	EPA 200.8	10-Jun-22/O	< 0.1	0.2		
Barium	µg/L	1	SM 3120	09-Jun-22/O	45	24		

R. Lecompte

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Test methods may be modified from specified reference method unless indicated by an *
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

Richard Lecompte
Laboratory Supervisor

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G097073 **REPORT No. B22-16874**

Report To:

Blumetric Environmental
1682 Woodward Drive,
Ottawa ON K2C 3R8 Canada
Attention: Matt DeGeer

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 06-Jun-22
DATE REPORTED: 13-Jun-22
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 220037
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		3506756	A134690		
			Sample I.D.		B22-16874-1	B22-16874-2		
			Date Collected		04-Jun-22	04-Jun-22		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Beryllium	µg/L	0.1	EPA 200.8	10-Jun-22/O	< 0.1	< 0.1		
Boron	µg/L	5	SM 3120	09-Jun-22/O	8	895		
Cadmium	µg/L	0.015	EPA 200.8	10-Jun-22/O	< 0.015	< 0.015		
Calcium	mg/L	0.02	SM 3120	09-Jun-22/O	36.8	19.8		
Chromium	µg/L	2	SM 3120	09-Jun-22/O	< 2	< 2		
Chromium (VI)	µg/L	10	MOE E3056	10-Jun-22/O	< 10 [1]	< 10 [1]		
Cobalt	µg/L	0.1	EPA 200.8	10-Jun-22/O	< 0.1	< 0.1		
Copper	µg/L	2	SM 3120	09-Jun-22/O	28	8		
Iron	mg/L	0.005	SM 3120	09-Jun-22/O	< 0.005	< 0.005		
Lead	µg/L	0.02	EPA 200.8	10-Jun-22/O	0.21	0.20		
Magnesium	mg/L	0.02	SM 3120	09-Jun-22/O	12.5	2.99		
Manganese	mg/L	0.001	SM 3120	09-Jun-22/O	0.001	< 0.001		
Mercury	µg/L	0.02	SM 3112 B	10-Jun-22/O	< 0.02	< 0.02		
Molybdenum	µg/L	0.1	EPA 200.8	10-Jun-22/O	0.4	3.0		
Nickel	µg/L	0.2	EPA 200.8	10-Jun-22/O	0.4	0.3		
Potassium	mg/L	0.1	SM 3120	09-Jun-22/O	5.2	1.3		
Selenium	µg/L	1	EPA 200.8	10-Jun-22/O	< 1	< 1		
Silver	µg/L	0.1	EPA 200.8	10-Jun-22/O	< 0.1	< 0.1		
Sodium	µg/L	200	SM 3120	09-Jun-22/O	2100	141000		
Thallium	µg/L	0.05	EPA 200.8	10-Jun-22/O	< 0.05	< 0.05		
Uranium	µg/L	0.05	EPA 200.8	10-Jun-22/O	0.10	1.69		
Vanadium	µg/L	0.1	EPA 200.8	10-Jun-22/O	0.3	0.4		
Zinc	µg/L	5	SM 3120	09-Jun-22/O	< 5	8		

1. Chromium (VI) result is based on total Chromium

R. Lecompte

Richard Lecompte
Laboratory Supervisor

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Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G109500 **REPORT No. B22-30658**

Report To:

Blumetric Environmental
1682 Woodward Drive,
Ottawa ON K2C 3R8 Canada
Attention: Russell Chown

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 28-Sep-22
DATE REPORTED: 04-Oct-22
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 220037-Maberly Pines
P.O. NUMBER: 220037-00
WATERWORKS NO.

			Client I.D.		A356272 4hr	A356272 10hr		
			Sample I.D.		B22-30658-1	B22-30658-2		
			Date Collected		27-Sep-22	27-Sep-22		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Total Coliform	cfu/100mL	1	SM9222B	28-Sep-22/K	0	0		
E coli	cfu/100mL	1	SM9222B	28-Sep-22/K	0	0		
Fecal Coliform	cfu/100mL	1	SM9222D	28-Sep-22/K	0	0		
Heterotrophic Plate Count	cfu/mL	10	SM9215D	28-Sep-22/K	< 10	< 10		
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	29-Sep-22/O	221	237		
pH @25°C	pH Units		SM 4500H	29-Sep-22/O	8.10	8.05		
Conductivity @25°C	µmho/cm	1	SM 2510B	29-Sep-22/O	450	479		
Colour	TCU	2	SM 2120C	03-Oct-22/O	< 2	< 2		
Turbidity	NTU	0.1	SM 2130	03-Oct-22/O	0.8	0.7		
Fluoride	mg/L	0.1	SM4110C	29-Sep-22/O	0.2	0.2		
Chloride	mg/L	0.5	SM4110C	29-Sep-22/O	3.0	3.0		
Nitrite (N)	mg/L	0.1	SM4110C	29-Sep-22/O	< 0.1	< 0.1		
Nitrate (N)	mg/L	0.1	SM4110C	29-Sep-22/O	< 0.1	< 0.1		
Sulphate	mg/L	1	SM4110C	29-Sep-22/O	26	24		
Phosphorus-Total	mg/L	0.01	E3516.2	30-Sep-22/K		0.03		
Total Kjeldahl Nitrogen	mg/L	0.1	E3516.2	30-Sep-22/K	< 0.1	0.3		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	29-Sep-22/K	< 0.01	< 0.01		
Organic Nitrogen (Calculation)	mg/L	0.1	E3516.2	04-Oct-22/K		0.3		
TDS (Calc. from Cond.)	mg/L	1	Calc.	30-Sep-22	232	248		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	29-Sep-22/O	3.3	3.0		
Sulphide	mg/L	0.01	SM4500-S2	29-Sep-22/K	< 0.01	< 0.01		
Phenolics	mg/L	0.001	MOEE 3179	29-Sep-22/K	< 0.001	< 0.001		
Tannins and Lignins	mg/L	0.5	SM5500B	03-Oct-22/K	< 0.5	< 0.5		
Hardness (as CaCO3)	mg/L	1	SM 3120	30-Sep-22/O	201	206		
Antimony	µg/L	0.1	EPA 200.8	03-Oct-22/O	0.2	0.3		

R. Lecompte

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Richard Lecompte
Laboratory Supervisor

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Final Report

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Ottawa ON K2C 3R8 Canada
Attention: Russell Chown

Caduceon Environmental Laboratories
285 Dalton Ave
Kingston Ontario K7K 6Z1
Tel: 613-544-2001
Fax: 613-544-2770

DATE RECEIVED: 28-Sep-22
DATE REPORTED: 04-Oct-22
SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.: 220037-Maberly Pines
P.O. NUMBER: 220037-00
WATERWORKS NO.

			Client I.D.		A356272 4hr	A356272 10hr		
			Sample I.D.		B22-30658-1	B22-30658-2		
			Date Collected		27-Sep-22	27-Sep-22		
Parameter	**Units**	**R.L.**	**Reference Method**	**Date/Site Analyzed**				
Arsenic	µg/L	0.1	EPA 200.8	03-Oct-22/O	0.2	0.2		
Barium	µg/L	1	SM 3120	30-Sep-22/O	86	103		
Beryllium	µg/L	0.1	EPA 200.8	03-Oct-22/O	< 0.1	< 0.1		
Boron	µg/L	5	SM 3120	30-Sep-22/O	46	73		
Cadmium	µg/L	0.015	EPA 200.8	03-Oct-22/O	< 0.015	< 0.015		
Calcium	mg/L	0.02	SM 3120	30-Sep-22/O	51.4	52.7		
Chromium	µg/L	2	SM 3120	30-Sep-22/O	< 2	< 2		
Chromium (VI)	µg/L	10	MOE E3056	03-Oct-22/O	< 10 [1]	< 10 [1]		
Cobalt	µg/L	0.1	EPA 200.8	03-Oct-22/O	0.2	0.1		
Copper	µg/L	2	SM 3120	30-Sep-22/O	< 2	< 2		
Iron	mg/L	0.005	SM 3120	30-Sep-22/O	0.039	0.027		
Lead	µg/L	0.02	EPA 200.8	03-Oct-22/O	0.03	< 0.02		
Magnesium	mg/L	0.02	SM 3120	30-Sep-22/O	17.6	18.2		
Manganese	mg/L	0.001	SM 3120	30-Sep-22/O	0.042	0.050		
Mercury	µg/L	0.02	SM 3112 B	04-Oct-22/O	< 0.02	< 0.02		
Molybdenum	µg/L	0.1	EPA 200.8	03-Oct-22/O	1.4	1.2		
Nickel	µg/L	0.2	EPA 200.8	03-Oct-22/O	0.7	0.2		
Potassium	mg/L	0.1	SM 3120	30-Sep-22/O	3.0	3.1		
Selenium	µg/L	1	EPA 200.8	03-Oct-22/O	< 1	< 1		
Sodium	µg/L	200	SM 3120	30-Sep-22/O	13100	17900		
Silver	µg/L	0.1	EPA 200.8	03-Oct-22/O	< 0.1	< 0.1		
Strontium	mg/L	0.001	SM 3120	30-Sep-22/O	0.385	0.458		
Thallium	µg/L	0.05	EPA 200.8	03-Oct-22/O	< 0.05	< 0.05		
Uranium	µg/L	0.05	EPA 200.8	03-Oct-22/O	3.33	3.68		
Vanadium	µg/L	0.1	EPA 200.8	03-Oct-22/O	0.4	0.3		
Zinc	µg/L	5	SM 3120	30-Sep-22/O	< 5	< 5		

1. Chromium (VI) result is based on total chromium

R. Lecompte

Richard Lecompte
Laboratory Supervisor

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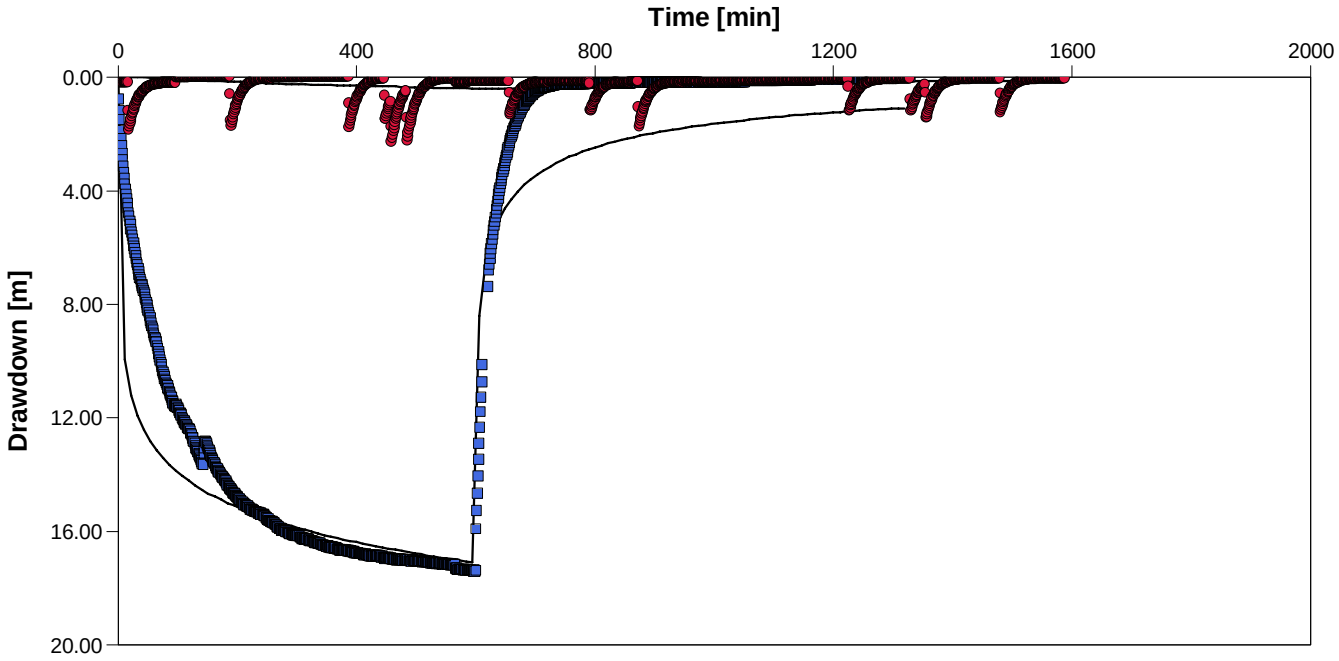
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill,B-Barrie

APPENDIX G

Aquifer Analysis

	Pumping Test Analysis Report
	Project: TVT Maberley
	Number: 220037
	Client: TVT

Location: 202 Red Pine Rd	Pumping Test: Pumping Test 1	Pumping Well: TW1
Test Conducted by: BM		Test Date: 9/27/2022
Analysis Performed by: rlc	Theis	Analysis Date: 8/25/2022
Aquifer Thickness: 100.00 m	Discharge: variable, average rate 3.05 [U.S. gal/min]	

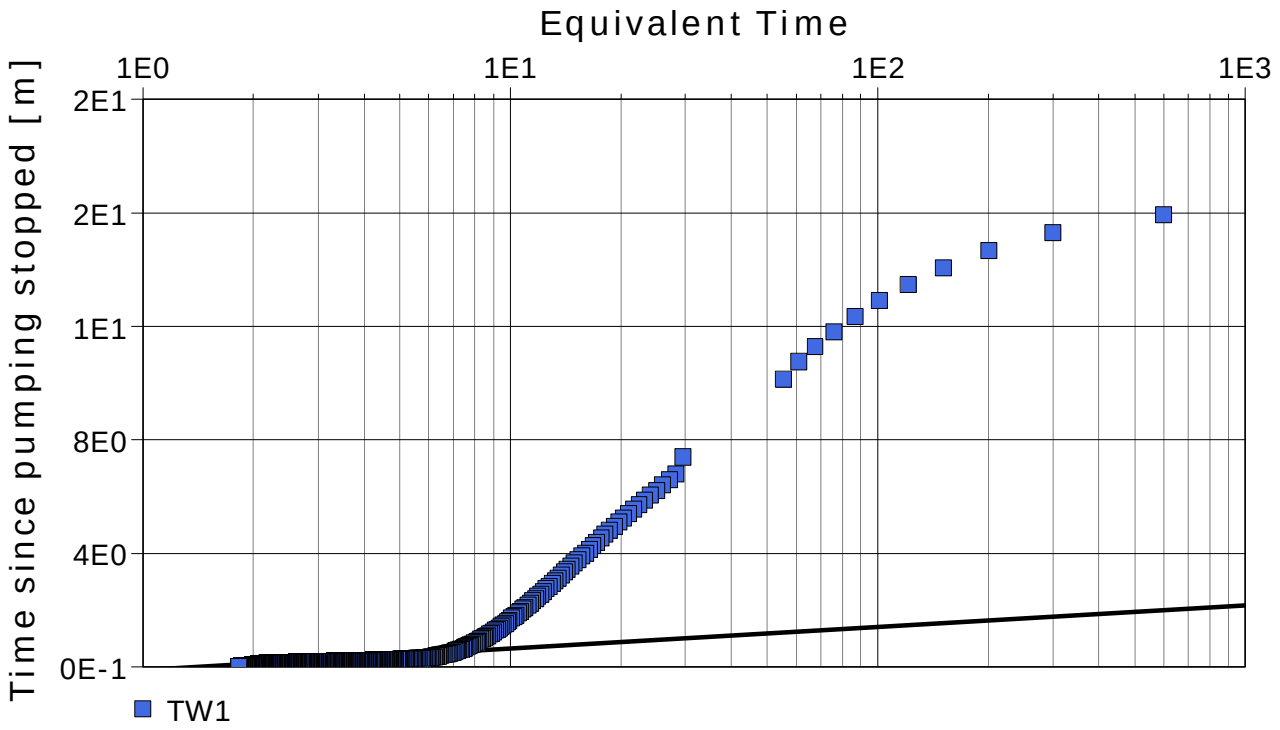


Calculation using Theis

Observation Well	Transmissivity [m²/s]	Hydraulic Conductivity [m/s]	Storage coefficient	Radial Distance to PW [m]	
TW1	8.60×10^{-6}	8.60×10^{-8}	8.31×10^{-3}	0.08	
2003 Pond	5.65×10^{-5}	5.65×10^{-7}	2.37×10^{-5}	230.0	
Average	3.25×10^{-5}	3.25×10^{-7}	4.17×10^{-3}		

	Pumping Test Analysis Report
	Project: TVT Maberley
	Number: 220037
	Client: TVT

Location: 202 Red Pine Rd	Pumping Test: Pumping Test 1	Pumping Well: TW1
Test Conducted by: BM		Test Date: 9/27/2022
Analysis Performed by: rlc	Thies Recovery	Analysis Date: 8/25/2022
Aquifer Thickness: 100.00 m	Discharge: variable, average rate 3.05 [U.S. gal/min]	



Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/s]	Hydraulic Conductivity [m/s]	Radial Distance to PW [m]	
TW1	4.69×10^{-5}	4.69×10^{-7}	0.08	

Pumping Test Analysis Report

Project: TVT Maberley

Number: 220037

Client: TVT

Location: 202 Red Pine Rd	Pumping Test: Pumping Test 1	Pumping Well: TW1
Test Conducted by: BM		Test Date: 9/27/2022
Aquifer Thickness: 100.00 m	Discharge: variable, average rate 3.05 [U.S. gal/min]	

	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well	T [m²/s]	K [m/s]	S
1	Theis	rlc	8/25/2022	Theis	TW1	8.60×10^{-6}	8.60×10^{-8}	8.31×10^{-3}
2	Theis	rlc	8/25/2022	Theis	2003 Pond	5.65×10^{-5}	5.65×10^{-7}	2.37×10^{-5}
3	Thies Recovery	rlc	8/25/2022	Theis Recovery	TW1	4.69×10^{-5}	4.69×10^{-7}	

APPENDIX H

Thornthwaite and PNIA Calculations

Thornthwaite Calculation

Thornthwaite Method (1957) **Potential Evapotranspiration**

'Hydrology and Hydraulic Systems' 4th edition by Ram S. Gupta, 2017

Et month = 1.62 (10*Tm)/I) ^ a

where:

a = 675*10 ^ -9*I ^ 3 - 771 *10 ^ -7*I ^ 2 +179*10 ^ -4 * I + 492*10 ^ -3

I_i = sum (Tm/5) ^ 1.514

Canada Climate Normals Environment Canada Climate Normals: GODFREY STATION Ontario **Month**	Temp C	I_i	Et (cm) unadjusted	Daylight Factor	Et (mm) adjusted
January	-8.4	frozen			
Feb	-7.8	frozen			
March	-1.8	frozen			
April	6.1	1.3513	2.8686	1.13	0.0324
May	13	4.2488	6.4086	1.28	0.0820
June	17.8	6.8375	8.9485	1.29	0.1154
July	20.3	8.3427	10.2892	1.31	0.1348
Aug	19.1	7.6075	9.6443	1.21	0.1167
Sept	14.3	4.9084	7.0915	1.04	0.0738
Oct	8.2	2.1148	3.9279	0.94	0.0369
Nov	1.8	0.2129	0.7844	0.79	0.0062
Dec	-4.9	frozen			
		35.624	49.963		0.598
	a =	1.0623			metres

Note: Daylight Factor is an adjustment factor for possible hours of sunshine based on latitude.
Monthly temperature from Environment Canada Climate Normals website at:
https://climate.weather.gc.ca/climate_normals/index_e.html

▼ Temperature

1981 to 2010 Canadian Climate Normals station data

Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	-8.4	-7.8	-1.8	6.1	13.0	17.8	20.3	19.1	14.3	8.2	1.8	-4.9	6.5	D

<- UPDATE

▼ Precipitation

1981 to 2010 Canadian Climate Normals station data

Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Rainfall (mm)	35.6	24.4	38.0	61.2	85.6	77.5	65.1	85.3	98.6	79.8	75.5	39.5	766.1	C
Snowfall (cm)	46.1	34.4	32.4	7.8	0.1	0.0	0.0	0.0	0.0	1.8	15.3	35.8	173.7	C
Precipitation (mm)	81.7	58.9	70.4	68.9	85.7	77.5	65.1	85.3	98.6	81.7	90.8	75.3	939.8	C

<- UPDATE

Environment Canada Climate Normals: GODFREY STATION Ontario	939.8	mm
Potential Evapotranspiration (PE)	598	mm
Surplus Water (Precipitation - PE)	342	mm

Predictive Nitrate Impact Assessment

PRE DEVELOPMENT CONDITIONS

Infiltration Factors

Topography	0.1	hilly
Soil	0.2	till/ clay / gravel / sand
Cover	0.2	woodland
Total	**0.5**	

Site Characteristics

Area of Site :	767,579	m^2
	76.76	hectares
Infiltration Area =	767,579	m^2

Septic Effluent

Concentration of Effluent (Cs) =	40	mg/L
Daily Sewage Flow (Qs)=	0	m^3

Infiltration Calculation

Nitrate concentration in precipitation (C_i) =	0.8	mg/L
Environment Canada Climate Normals: GODFREY STATION Ontario	939.8	mm/yr
Surplus Water (Thornthwaite calc attached)	342	mm/yr
Factored Surplus Water =	171	mm/yr
Total volume of Infiltration	131,089	m^3
Infiltration flow entering the system (Q_i) =	359	m^3/day

Mass Balance Model (MOEE, 1995)

$C_T = (Q_bC_b+Q_eC_e+Q_iC_i)/(Q_b+Q_e+Q_i)$ = Cumulative Nitrate Concentration

Q_b = flow entering the system across the upgradient area	0	m^3/day
C_b = background nitrate concentration	0	mg/L
Q_e = flow entering the system from the septic drainfield	0	m^3/day
C_e = concentration of nitrates in the septic effluent	40	mg/L
Q_i = flow entering the system from infiltration	359	m^3/day
C_i = Concentration of nitrates in the infiltrate	0.8	mg/L
C_T =	**0.8**	**mg/L**
Estimate Number of Lots	**1**	**lots**

POST DEVELOPMENT CONDITIONS

Infiltration Factors

Topography	0.1	hilly
Soil	0.2	till/ clay / gravel / sand
Cover	0.15	mixed
Total	**0.45**	

Site Characteristics

Area of Site :	767,579	m^2
	76.76	hectares
Area of each roof:	400	m^2
Total of roof areas:	22,400	m^2
Length of roadways:	0	m
Width of roadways:	0	m
Total area of roadways:	-	m^2
Impervious Area	22,400	m^2
Percent Impervious Area =	2.92	%
Infiltration Area =	745,179	m^2

Septic Effluent

Concentration of Effluent (Cs) =	40	mg/L
Daily Sewage Flow (Qs)=	56	m^3

Infiltration Calculation

Nitrate concentration in precipitation (C_i) =	0.8	mg/L
Environment Canada Climate Normals: GODFREY STATION Ontario	939.8	mm/yr
Surplus Water (Thornthwaite calc attached)	342	mm/yr
Factored Surplus Water =	154	mm/yr
Total volume of Infiltration	114,537	m^3
		mm/yr
Infiltration Flow Entering the System (Q_i) =	314	m^3/day

Mass Balance Model (MOEE, 1995)

$C_T = (Q_bC_b+Q_eC_e+Q_iC_i)/(Q_b+Q_e+Q_i)$ = Cumulative Nitrate Concentration

Q_b = flow entering the system across the upgradient area	0	m^3/day
C_b = background nitrate concentration	0	mg/L
Q_e = flow entering the system from the septic drainfield	56	m^3/day
C_e = concentration of nitrates in the septic effluent	40	mg/L
Q_i = flow entering the system from infiltration	314	m^3/day
C_i = Concentration of nitrates in the infiltrate	0.8	mg/L
C_T =	**6.7**	**mg/L**
Estimate Number of Lots	**56**	**lots**

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