DRAFT

HYDROGEOLOGICAL REVIEW
MABERLY PINES SUBDIVISION
CONTRACT #2021-PD-002

Submitted to:

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

Submitted by:

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

BluMetric Project Number: 220037

November 30, 2021

HYDROGEOLOGICAL REVIEW
MABERLY PINES SUBDIVISION
CONTRACT #2021-PD-002

Submitted to:

The Corporation of Tay Valley Township
217 Harper Road
Perth, ON K7H 3C6
Attention: Amanda Mabo, Clerk
clerk@tayvalleytwp.ca

Prepared by:

The Tower – The Woolen Mill
4 Cataraqui Street
Kingston, ON K7K 1Z7

BluMetric Project Number: 220037

November 30, 2021

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1. INRODUCTION

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).

The Maberly Pines Subdivision was investigated by Water and Earth Science Associates Limited (WESA) in 1979 (report titled Maberly Pines Subdivision, Terrain, Hydrogeological and Ecological Analysis). The development was subsequently approved, and all 56 lots were sold to individual owners. Since that time, five of the lots have been developed and two have been issued building permits. 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).

Recent concerns regarding development lead TVT to consult with the Mississippi Valley Conservation Authority (MVCA) and the Rideau Valley Conservation Authority (RVCA) regarding approval based on current guidelines. It was noted that the WESA, 1979 report 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) 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 (referred to herein as "the site") 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) that includes 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.

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 the topographic survey 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 4700 m^2 (0.5 hectares). The maximum lot size is 3.2 hectares and the average lot size is 1.1 hectares.

Currently, developed lots of 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.

2. METHODOLOGY

2.1 BACKGROUND INFORMATION REVIEW

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

- 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

BluMetric contacted TVT to help identify existing well owners at the Maberly Pines Development to determine viable groundwater sampling locations and to identify recently installed wells on and within 500 m of the subdivision boundaries.

Groundwater sampling took place on November 23, 2021, and consisted of sampling one previously established location. Attempts were made to sample other locations but since they are seasonal cottages, they had already been winterized, and were vacant at the time of the site visit. In some cases, there does not appear to be an established well on the property for example, lot 47 is developed; however, there was no identification of a well in Ontario Well Records and in speaking with neighbors it was mentioned that there is no well at lot 47.

All groundwater 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 Ministry of the Environment (MOE) Regulation D-5-5. The groundwater samples were also submitted for analysis of 'RVCA recommended' Ontario Regulation 153/4 Table 8 standards for metals' including uranium, strontium, and barium, and for volatile organic compounds (VOCs).

All samples were collected unfiltered and unchlorinated 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 six hours of collection. Caduceon is fully accredited by the Canadian Association for Laboratory Accreditation (CALA).

2.3 Offsite 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 interview log sheets are included in Appendix 4.

2.4 Development of Conceptual Site 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". The Soil Survey of Lanark classifies surficial soils at the site as sandy loam coded MSL-R B5-S4. Site reconnaissance by WESA in 1979 identified surficial soils as a glacial till ground moraine covering much of the area, that ranged in thickness from 0.3 metres to greater than 1 metre. The till is 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 further described areas of poorly stratified pebbly sand up to 5 metres in thickness. Much of the site is comprised of exposed bedrock escarpments, ridges, and knobs. A terrain map was included with the WESA (1979) report and is provided in Appendix C of this report (this information is included in Figure 3, Conceptual Lot Development Plan A – Conventional Private Services).

WESA (1979) submitted one soil sample thought to be characteristic of the site to JD Paterson of Ottawa for grain size analysis. The grain size analysis is included in the WESA (1979) report. The

soil is described by WESA as 'glacial till ground moraine'. The permeability of the soil sample was determined using the Falling Head Permeameter method to be 2.42 x10^{-4} cm/sec = 68.87 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 Neo–Mesoproterozoic (0.542 Ga to 1.6 Ga) mafic to ultramafic plutonic rocks that have undergone amphibolite prograde metamorphism (Markley et al., 2018). The metamorphic protoliths within this unit include diorite, gabbro, peridotite, pyroxenite, and anorthosite. This unit is bound to the north and south by Neo–Mesoproterozoic late 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.

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.

A total of 17 MECP water well records were identified within 500 m of the subdivision, as indicated on Figure 2. 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	Well Depth (mbgs)	Overburden Depth (m)	Casing Depth (mbgs)	Depth to Groundwater (mbgs)	Static Water Level (mbgs)	1hr Test Pump Rate (L/min)	Drawdown (m)	Specific Capacity ((L/min)/m)	Date Drilled
3503579	24.38	2.4	6.7	22.50	5.48	91.0	0.0	high	10-Sep-1973
3506287	45.72	5.5	7.0	43.28	2.74	9.0	15.5	0.6	8-Jun-1981
3506755	68.58	2.7	6.7	64.00	4.88	9.0	36.6	0.2	28-Jun-1983
3506756	19.51	0.9	6.7	18.28	5.48	18.0	0.0	high	27-Jun-1983
3506757	68.58	0.6	7.0	64.00	6.70	4.5	43.3	0.1	24-Jun-1983
3507365	56.39	1.2	6.7	44.80, 55.47	9.75	18.0	37.5	0.5	9-Sep-1985
3507887	26.52	1.8	6.7	N/A	4.57	31.8	0.0	high	14-May-1987
3509525	60.96	4.6	6.7	59.44	5.49	13.6	16.5	0.8	28-Aug-1990
3510061	49.68	1.8	6.7	48.16	18.28	36.4	27.4	1.3	29-Oct-1991
3510138	48.16	1.2	6.7	38.40, 46.33	6.10	36.4	33.5	1.1	13-Nov-1991
3513257	60.96	0.5	6.7	21.34	9.45	18.2	0.0	high	1-Mar-2001
3513786	67.06	1.8	6.7	28.04, 71.63	4.88	13.6	8.8	1.5	18-Jul-2002
3514498	42.67	2.1	6.7	15.24	7.92	18.2	3.0	6.1	23-Mar-2004
7046732	67.06	1.5	6.7	64.62	10.15	30.0	8.8	3.4	28-Jun-2007
7048408	35.05	0.9	6.7	32.92	10.60	45.0	15.2	3.0	4-Jul-2007
7158460	42.70	0.6	6.1	12.00, 36.00	7.30	27.0	4.1	6.6	25-Nov-2010
7189149	121.92	1.2	6.7	N/A	6.40	13.6	36.9	0.4	24-Sep-2012

The suitability of the aquifer to supply the proposed development was assessed using the methodology provided in MECP Procedure D-5-5 (MOEE, 1996), 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 in the subdivision will be four-bedroom single family homes, so the number of persons per house will be five (5). Procedure D-5-5 indicates the minimum 'per-person water requirement' is 450 L/day, which is 2,250 L/day per house (or per well). Procedure D-5-5 indicates that 'peak demand' is assumed to occur 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 5 = 18.75 L/min.

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). Current Ontario Building Code requirements (OBC, 2012) 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.

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

- Four wells did not show any appreciable drawdown in response to pumping and are considered high yield.
- 10 wells were pumped at a rate that was at or near the 'peak demand rate' as indicated above with varying amounts of drawdown.
- 12 of the 17 wells appear to have sufficient yield to meet peak demand and average daily residential use requirements.

Due to the nature of the fractured bedrock aquifer at the site, a small percentage of future wells may not intersect fracture networks that will provide sufficient yield for normal residential use. For lots with low yielding wells additional water storage at surface may be required to meet peak demand requirements.

3.5 Water Quality

Local groundwater quality was evaluated through the collection of samples from the water supply wells located at the site, specifically from 2003 Pond Lane (see Figure 2).

The selected parameters for analysis followed the groundwater quality parameters table listed in the Appendix C of Procedure D-5-5 and 'RVCA recommended Ontario Regulation 153/04 metals, strontium, and volatile organic compounds (VOCs). The groundwater quality analytical results are summarized in Table 2 in comparison to the available standards and objectives listed in the Ontario Drinking Water Standards, Objectives, and Guidelines (ODWSOG), Ontario Regulation 169/03, as amended, Ontario Regulation 373/15, Ontario Regulation 457/16, and Ontario Regulation 153/04 Table 8 standards.

All results for VOC parameters were below the method detection limits for each parameter (i.e. all results were non detectible). A review of the analytical data summarized in Table 2 indicates that all tested water quality parameters were below the health and aesthetic related ODWSOG except for the following:

- Hardness

The operational guideline (OG) for hardness and the aesthetic objective (AO) for total dissolved solids were exceeded for the well water sample. Sodium was detected below the AO of 200 mg/L and above the recommended notification limit of 20 mg/L for persons on a sodium reduced diet. Each of these water quality parameters are discussed further below:

Hardness - Hardness was reported at 213 mg/L, exceeding the OG of 80-100 mg/L. Hardness is caused by dissolved calcium and magnesium, and is expressed as the equivalent quantity of calcium carbonate. On heating, hard water tends to form scale deposits and can form excessive scum with regular soaps. However, certain detergents are largely unaffected by hardness. Hardness levels below 500 mg/L in drinking water are considered generally acceptable for most domestic purposes and can be treated using a conventional water softener system. Softening using a domestic water softener increases the sodium level in drinking water. Sodium concentrations are reported at 28.7 whereby a concentration exceeding 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.

Overall, it is BluMetric's professional opinion based on the water sampling completed that a water supply of adequate water quality is available from the local bedrock aquifer.

Regional groundwater quality was also assessed for supply wells sampled as part of the Ontario Geological Survey study, 'Ambient Groundwater Geochemistry Data for Southern Ontario, 2007–2014; Ontario Geological Survey, Miscellaneous Release—Data 283–Revised.' One well location was identified in this study within 10 km from the subject properties. 13-AG-002 is located 5.2 km east of the site. The water quality results for these locations are summarized in Table 3 in comparison to the ODWSOG. No parameters reported for the Ambient Groundwater Quality Summary samples included in Table 3 were reported in exceedance of the ODWSOG objectives.

The results from the regional well water quality assessment indicate that a well water supply of acceptable water quality is available. No concern regarding regional groundwater quality within the area of the proposed severance properties were identified.

3.6 HYDROGEOLOGICAL SENSITIVITY

The terrain analysis plan (Appendix C) shows that surficial soil thickness varies significantly across the site and includes areas of exposed bedrock. Low permeability rates of surficial soils were determined by WESA in 1979 with T-times of 68.87 min/cm, a result that comes from one amalgamated sample thought to be characteristic of the till at the site. A low percolation rate reduces the likelihood of filtration but rather promotes the transport of contaminants along surficial water flow pathways into surface water bodies.

The site is considered potentially hydrogeologically sensitive due to the generally thin layer of soil cover over bedrock in some areas. Discontinuous thin soil coverage reduces the potential for filtration of contaminants. Measures for well construction and septic system design are provided herein to mitigate potential well water quality impacts.

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.

Some degree of isolation can be inferred, based on water well record information. The aquifer at the site, which can be said to occur as a 'hydro-stratigraphic fracture zone' within the Precambrian bedrock unit, is encountered at depths of greater than 10 m below ground surface (i.e. water bearing fractures within the bedrock unit were identified during drilling and occur at depth >10 m. This suggests that the upper bedrock zone provides a measure of protection of the deeper water bearing fracture zones, and potentially impedes the infiltration of potentially contaminated water from the surface and in the overburden unit.

3.7 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 3 and Figure 4, water supply wells must be constructed up gradient of the septic system location(s). A minimum of 50 m separation distance between water supply wells and septic systems is prescribed as best practice by RVCA, though a 30 m separation may be acceptable to address potential hydrogeologically sensitive conditions. Furthermore, the water supply well should be located with a minimum 30 m separation distance from all water courses, as indicated as best practice by the RVCA.

Based on the review of the MECP water well records, it is apparent that well yields of 18.75 L/min or greater are available from the granite bedrock aquifer (sufficient for a 4-bedroom home) situated at depths between 40 and 100 m. As a measure to address potentially sensitive hydrogeological conditions due to shallow bedrock it is recommended that the steel water well casing be installed and grouted into place to a depth of 4 m (12 feet) into competent bedrock or to a minimum depth of 12 m, whichever depth is greatest.

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. A 25.4 cm (10 in.) diameter hole should be drilled through the overburden and at least 4m (12 ft.) into competent (i.e. un-weathered) bedrock or to a minimum depth of 12 m, whichever depth is greatest.

b. New steel casing, 15.3 cm (6 in.) in diameter, should be installed in the drilled hole. Steel casing must extend 4 m (12 feet) into competent bedrock or to a minimum depth of 12 m, whichever depth is greatest.
c. Ontario Reg. 903 well placement requirements and grouting procedures should be followed to ensure that surface derived contaminants cannot enter the well.
d. When the grout has set (24 hours for quick set cement, 72 hours for a regular cement), drilling can continue until a suitable water supply is obtained. The cement must be dry before drilling is continued. Disturbance of partially set grout can either cause fractures to form in the grout, or separation between the grout and the bounding materials. This could create a pathway for contamination between the overburden and the bedrock aquifer.
e. The well must be completed with a vented and vermin proof well cap and 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 6 hours after construction to ensure adequate well development and to reduce groundwater turbidity to acceptable levels before connection to the residences plumbing system.

Chlorine should be introduced at the completion of well development in sufficient quantity to 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.

The well should be completed with a submersible pump, pitless adaptor and vermin proof well cap. All such mechanical work connected to the well is to be completed by a licensed well contractor possessing a valid Class 4 pump installer's license. After completion of the mechanical work in the well, the well should be disinfected as described above.

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

3.8 Surface Storage for Low Yield Wells

The daily water usage according to Procedure D-5-5 is 2,250 L/day. The peak demand water usage is (18.75 L x 120 mins) 2,250 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. However, the pumping rate in the well may be relatively low (to ensure the water level does not draw down past the pump), so the water stored in the well will not be delivered at a fast enough rate for use during peak demand periods. For example, if the maximum sustainable flow rate from a well is 3 L/min, it can only deliver 360 L during the 120 minute long peak demand period, so an additional 1,890 L of surface storage would be required. In cases where surface storage is deemed to be necessary, the amount of surface storage should be determined based on the actual sustainable yield of the well (as determined by a suitable pumping test).

As discussed in the WESA (1979) report, development planning should preclude any high volume water usages.

3.9 Potable 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.

3.10 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 nitrate impact assessment has been provided.

3.11 Predictive Nitrate Impact Assessment

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 was used (Environment Canada, 2021). 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 calculation is provided in Appendix 4.

The cumulative nitrate impact for this subdivision has been calculated to be 4.98 mg/L with parameters detailed in Table 4a. Nitrate concentrations in onsite and offsite wells is assumed to be typically non-detectible (see onsite groundwater analytical results in 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.

3.12 Sewage System Design

Assuming a four bedroom residence, the septic system would have to be sized to accommodate a daily sewage flow rate (Q) of 1600 L/d (OBC Table 8.2.1.3.A). Given that the lots have soils with a percolation time (T-time) >50 min/cm or bedrock, whereby the OBC specified loading rate would be 4 L/m²/d (Table 8.7.4.1.A) the mantle loading area can thereby be calculated. The OBC further specifies that 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 (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.

An assessment of the suitability for development of each lot was conducted. Two development scenarios have been considered: lot servicing using conventional septic systems (see Figure 3, Conceptual Lot Development Plan A – Conventional Private Services), and lot servicing incorporating alternative septic systems (see Figure 4, Conceptual Lot Development Plan A – Restricted Private Services). Table 5 (below) provides a summary of our analysis and a breakdown of the lots in terms of development status, lot size, suitability for conventional septic system, and constraints (water bodies, steep slopes). Table 5 also provides a list of concerns where conventional systems are not deemed suitable, along with suggested solutions/recommendations for the lots that will require alternatives to conventional systems. Figure 4 reflects the following tabulated breakdown of sites according to the rationale described above.

Table 5: Lot Serviceability Summary

Lot #	Area (m^2)	Status	Conventional / Restricted	Restrictions / Considerations	Solutions / Recommendations
1	8737	Vacant	Conventional	Observatory	Raised Bed
2	13952	Vacant	Conventional	N/A	Raised Bed
3	8693	Vacant	Conventional	Gradient	Max. 4:1 slope for septic / Raised Bed
4	6824	Vacant	Conventional	N/A	Raised Bed
5	8066	Vacant	Conventional	N/A	Raised Bed
6	7712	Developed	-	-	-
7	14003	Vacant	Conventional	N/A	Raised Bed
8	12012	Vacant	Conventional	Surface water body	OBC clearances 15 metres / WESA 1979 = 30 m / Raised Bed
9	17486	Vacant	Conventional	N/A	Raised Bed
10	11369	Vacant	Conventional	N/A	Raised Bed
11	11596	Vacant	Conventional	N/A	Raised Bed
12	9687	Vacant	Conventional	N/A	Raised Bed
13	8030	Vacant	Conventional	N/A	Raised Bed
14	8075	Vacant	Conventional	Gradient	Max. 4:1 slope for septic // Raised Bed
15	9771	Vacant	Conventional	Gradient	Max. 4:1 slope for septic / Raised Bed
16	9118	Vacant	Conventional	Gradient, Exposed Bedrock	Max. 4:1 slope for septic, Raised Bed
17	10604	Vacant	Conventional	Gradient, Exposed Bedrock	Max. 4:1 slope for septic, Raised Bed
18	9068	Vacant	Restricted	Gradient, Exposed Bedrock, Well proximity to neighboring wells	Max. 4:1 slope for septic, Alternative Sewage Treatment System
19	7966	Vacant	Restricted	Gradient, Exposed Bedrock, Well proximity to neighboring wells	Max. 4:1 slope for septic, Alternative Sewage Treatment System
20	12424	Developed	-	-	-
21	8488	Vacant	Conventional	N/A	Raised Bed
22	7789	Vacant	Conventional	N/A	Raised Bed
23	11079	Permitted	-	-	-
24	10840	Developed	-	-	-
25	12592	Vacant	Restricted	Gradient, Exposed Bedrock	Max. 4:1 slope for septic, Raised bed
26	11831	Vacant	Conventional	N/A	Raised Bed
27	4700	Vacant	Restricted	Lot size	Alternative Sewage Treatment System
28	6974	Vacant	Conventional	Gradient	Max 4:1 slope for septic / Raised Bed
29	10770	Vacant	Conventional	N/A	Raised Bed
30	6233	Vacant	Conventional	N/A	Raised Bed
31	32459	Vacant	Conventional	N/A	Raised Bed
32	20926	Vacant	Conventional	N/A	Raised Bed
33	15389	Vacant	Conventional	Exposed Bedrock	Raised Bed
34	9840	Vacant	Conventional	Gradient	Max 4:1 slope for septic / Raised Bed
35	6145	Permitted	-	-	-
36	7609	Vacant	Conventional	Surface Water Body	OBC clearances 15 metres from surface waters / WESA 1979 = 30 m / Raised Bed
37	6791	Vacant	Restricted	Lot size, Surface Water Body, well proximity to septic treatment system, well proximity to neighboring wells	OBC clearances 15 metres from surface waters / WESA 1979 = 30 m / Recommended >30 metres between well and septic / Alternative Sewage Treatment System
38	6442	Vacant	Restricted	Lot size, Surface Water Body, well proximity to septic treatment system, well proximity to neighboring wells	OBC clearances 15 metres from surface waters / WESA 1979 = 30 m / Recommended >30 metres between well and septic / Alternative Sewage Treatment System
39	8473	Vacant	Conventional	Gradient, Surface Water Body	Max. 4:1 slope for septic, OBC clearances 15 metres
40	8287	Vacant	Conventional	N/A	Raised Bed
41	13254	Vacant	Conventional	Gradient	Max. 4:1 slope for septic
42	6413	Vacant	Conventional	N/A	Raised Bed
43	6901	Vacant	Conventional	N/A	Raised Bed
44	6522	Vacant	Restricted	Lot size, Surface Water Body	Max. 4:1 slope for septic, OBC clearances 15 metres / WESA 1979 = 30m not possible
45	9520	Vacant	Restricted	Lot size, Surface Water Body	Max. 4:1 slope for septic, OBC clearances 15 metres / WESA 1979 = 30m not possible
46	10298	Vacant	Conventional	N/A	Raised Bed
47	7389	Developed	-	-	-
48	7120	Vacant	Conventional	N/A	Raised Bed
49	12097	Vacant	Conventional	N/A	Raised Bed
50	11534	Vacant	Conventional	Exposed Bedrock	Raised Bed
51	12634	Vacant	Conventional	Exposed Bedrock	Raised Bed
52	10099	Vacant	Conventional	Gradient, Exposed Bedrock	Max. 4:1 slope for septic, Raised Bed
53	15447	Vacant	Conventional	N/A	Raised Bed
54	16997	Vacant	Conventional	Surface Water Body	OBC clearances 15 metres from surface waters / WESA 1979 = 30m / Raised Bed
55	23678	Developed	-	-	-
56	18025	Vacant	Conventional	N/A	Raised Bed

For lots that meet clearances and requirements in accordance with sections 8.2.1.6, 8.7.4.2, 8.7.5.3 of the OBC, it is suggested that traditional Class 4 sewage systems consisting of a septic tank and leaching bed be implemented (see Figure 4). For lots that exceed clearances and requirements outlined in sections 8.2.1.6, 8.7.4.2, and 8.7.5.3 of the OBC it is suggested that alternative sewage treatment systems be implemented (see Figure 4).

Section 8.7.4.2 and 8.7.5.3 of the OBC requirements state that there must be a minimum 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, or high groundwater table. All lots at the site consist of either bedrock or a varying thickness of surficial soil with a T-time of >50 min/cm thereby requiring, at a minimum, fully raised Class 4 filter beds and/or absorption trench style leaching beds for all vacant lots. For lots that have sloping topography, a 4:1 gradient (25% slope) is the maximum allowable for septic bed application.

The conventional Lot Development Plan (Figures 1) shows the size of the leaching beds required for a 4-bedroom household. The leaching beds have been located as close as possible to be in accordance with section 8.2.1.6 of the OBC. The sewage system layouts on Figure 2 are fully raised leaching beds with an imported sand mantle that covers an area of 500 sq. metres. This area was determined using an equation to determine the loading rate area required (LRAR) and is as follows:

$$LRAR = Q / T$$

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

In accordance with OBC, a minimum separation of 18 m for fully raised systems is required between a well and a Class 4 sewage system, however, it has been recommended that this distance be increased to ≥30 metres. Clearance distances also apply to wells and sewage systems located on neighbouring lots.

In all instances, careful, site-specific analysis of the soil morphology in the area of each proposed leaching bed is required during the design stages of the leaching bed in order to determine if sufficient soil exists to facilitate the use of native soil for subgrade preparation.

It is not the intent of Figure 2 (Lot Development Plan) 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, the separation criteria for the immediate and neighbouring lots should be followed.

Alternative Sewage System Design Considerations

Alternative sewage treatment systems can be implemented on lots that are steeply sloping, have less than 0.5 hectares of useable land, or have surface water bodies that cover more than 30% of the lot. This practice would reduce the likelihood of excess nitrates entering surface water/groundwaters. The highly variable sloping terrain and bedrock escarpments at the site bring about an added level of complexity in septic system placement on some of the lots. Surface water runoff will need to be controlled upgradient of these systems to avoid untimely erosion of septic systems and reduce the potential of an unnecessary influx of partially treated wastewater into the surrounding environment.

Oakley et al., 2010 distinguished that conventional onsite wastewater treatment systems comprised of sand filters and denitrifying bioreactors (septic tanks) are the most robust and reliable wastewater treatment methods however, their implementation is constricted to larger lot size.

As a substitute to the use of a traditional septic tank and filter beds or absorption trench style leaching beds, alternative treatment of sewage may be utilized in accordance with OBC. As depicted in Figure 3, the area required for alternative sewage treatment units greatly reduces the sewage treatment footprint allowing for lots with tight clearances to be developed. These alternative sewage treatment systems vary in 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.

Alternative sewage treatment systems that are suggested for the site include but are not limited to:

- 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.

4. CONCLUSIONS

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

- Existing water well records within 500 m of the subdivision show that well yields are acceptable in most cases. Some wells have relatively low yields. This may be due to the nature of the fractured bedrock aquifer at the site. A small percentage of future wells may not intersect fracture networks that will provide 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. In these cases, the amount of surface storage should be determined based on the actual sustainable yield of the well, as determined by a six-hour pumping test.
- Analytical results from a water quality sample obtained from the well at 2003 Pond Lane (within the subdivision) are all below the limits specified in the ODWSOG, except for the result for hardness. Hardness levels below 500 mg/L in drinking water are considered generally acceptable for most domestic purposes and can be treated using a conventional water softener system.
- The concentration of sodium (28.7 mg/L) in the sample from the well at 2003 Pond Lane exceeds 20 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L.
- The site is potentially hydrogeologically sensitive. Discontinuous thin soil coverage reduces the potential for filtration of contaminants. Measures for well construction and septic system design are provided herein to mitigate potential water quality impacts. The results of a site wide predictive nitrate impact assessment show that additional nitrate loading from individual septic systems should be well below the provincially mandated limit of 10 mg/L so the subdivision should have an acceptable impact.
- 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 systems. Any potential impacts to neighbouring well users are expected to be minimal.

5. RECOMMENDATIONS

5.1 WATER SUPPLY

- All future water wells in the subdivisions should be constructed so that the steel water well casing is installed and grouted into place to a depth of 4 m (12 feet) into competent bedrock or to a minimum depth of 12 m, whichever depth is greatest. This will reduce the potential of contamination. 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.
- At the time of new well installation, the drilling of the casing hole, installation of casing, and grouting of the annular space should be inspected by a licensed Professional Engineer

or Professional Geoscientist of Ontario. All well construction must be carried out by a licensed well technician.

- Wells should be developed to a sand free state in order to ensure that the residual turbidity created by the well drilling activities is completely purged from the well. Additional well development, prior to placing the well into use, is strongly recommended in order to provide adequate development of the formation and remove extraneous rock debris from the aquifer pathways.
- All future water wells should be constructed so that the top of well casing is a minimum of 400 mm above the finished grade within a 3 m radius of the wellhead. The grade should slope away from the wellhead in all directions for a distance of at least 3 m.
- Well owners should ensure that the wellhead and surrounding area are maintained in accordance with the requirements of O.Reg. 903. Future well owners should refer to the MECP Water Supply Wells Requirements and Best Management Practices, (Revised April 2015) website at: https://dr6j45jk9xcmk.cloudfront.net/documents/4410/a-wwbmp-title-master-table-of-contents-chapter-1.pdf
- The raw water found in the water supply aquifer system is considered to be hard. Residential grade water softeners are recommended where water hardness is deemed unsuitable. A warning clause addressed to people on low sodium diets should be registered on title regarding the elevated concentration of sodium (> 20 mg/L) associated with water softeners.

5.2 Wastewater Treatment

- For lots that meet clearances and requirements in accordance with the OBC, it is suggested that fully raised Class 4 sewage systems consisting of a septic tank and leaching beds be implemented (i.e. conventional systems with raised beds). Imported fill should be used to raise septic beds no less than 900 mm above native ground surface. These lots are listed in Table 5 and indicated on Figure 4.
- Special attention should be taken with the placement of fully raised Class 4 sewage systems on steeply sloping lots that meet clearances and requirements in accordance with the OBC, including as indicated in Table 5 and on Figure 4 (i.e. conventional systems with raised beds on sloping lots).
- For lots that exceed clearances and requirements outlined in the OBC it is suggested that alternative sewage treatment systems be implemented. These lots are identified in Table 5 and on Figure 4 and include Lots 18, 19, 27, 37, and 38.
- 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 as recommended by WESA (1979). 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 in Table 5.

- 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.
- Proposed well, septic, and building locations are noted on Figure 4 (Conceptual Lot Development Plan B – Restricted Private Services).
- Future owners of individual onsite wastewater treatment systems should familiarize themselves with basic safety and maintenance information which is available at: http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm

The conclusions presented in this report represent our professional opinion and are based on the conditions observed on the dates set out in the report for the specific locations where samples were collected, the information available at the time this report was prepared, the scope of work, and any limiting conditions noted herein. BluMetric provides no assurances regarding changes to conditions after the time of the assessment. BluMetric makes no warranty as to the accuracy or completeness of the information provided by others or of the conclusions and recommendations predicated on the accuracy of that information.

This report has been prepared for Tay Valley Township. Any use a third party makes of this report, any reliance on the report, or decisions based upon the report, are the responsibility of those third parties unless authorization is received from BluMetric in writing. BluMetric accepts no responsibility for any loss or damages suffered by any unauthorized third party as a result of decisions made or actions taken based on this report.

This report was written by Matthew DeGeer and Russell Chown of BluMetric and reviewed by Robert Hillier of BluMetric. 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.

DRAFT

Matthew DeGeer M.Sc.
Geoscientist in Training
mdegeer@blumetric.ca

DRAFT

Russell Chown P.Geo
Senior Hydrogeologist
rchown@blumetric.ca

6. REFERENCES

Environment Canada, 2015. Canadian Climate Normals and Averages website: http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?stnID=4337&lang=e&StationName=ottawa&SearchType=Contains&stnNameSubmit=go&dCode=1

Markley, M., Dunn, S., Jercinovic, M., Peck, W., Williams, M. (2018). Monazite U-Th-Pb geochronology of the Central Metasedimentary Belt Boundary Zone (CMBbz), Grenville Province, Ontario Canada. In*: Canadian Journal of Earth Sciences*. 55, pp. 1063-1078.

Oakley, S., Gold, A., Oczkowski, A. (2010). Nitrogen control through decentralized wastewater treatment: Process performance and alternative management strategies. In: *Ecological Engineering*. 36, pp. 1520-1531.

Rayne, T,. Broadbury, k., Krause, J. (2019). Impacts of Rural Subdivision on Groundwater Quality: Results of Long-Term Monitoring. In*: Groundwater*. 57, 2, pp. 279-291.

Ontario Geological Survey (OGS) Earth, 2021. Ontario Ministry of Northern Development, Mines and Forestry, - Ontario Geological Survey, OGS Earth website: (http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth).

Ontario Ministry of Environment and Climate Change (MECP), 2015. Water Supply Wells Requirements and Best Management Practices, (Revised April 2015) website at: https://dr6j45jk9xcmk.cloudfront.net/documents/4410/a-wwbmp-title-master-table-of-contents-chapter-1.pdf

Ontario Ministry of Environment (MOE), 2003. Ontario Drinking Water Standards, Objectives and Guidelines (ODWS) (June 2003).

Ontario Ministry of Environment and Energy (MOEE), 1995. Hydrogeological Technical Information Requirements for Land Development Applications (April, 1995).

Ontario Ministry of Environment and Energy (MOEE), 1996. Guideline D-5: Planning for Sewage and Water Services (August 1996).

Ontario Ministry of Environment and Energy (MOEE), 1996. Procedure D-5-4: Technical Guideline for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment (August 1996).

Ontario Ministry of Environment and Energy (MOEE), 1996. Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment (August 1996).

Ontario Water Resources Act, 1990. Revised Statute of Ontario (R.S.O.), Ontario Regulation 903 (O.Reg. 903), 1990, Wells.

Ontario Building Code (O. Reg. 332/12: BUILDING CODE, under Building Code Act, 1992, S.O. 1992, c. 23)

TABLES

Table 2: Well Water Quality Summary
Tay Valley Township - Maberly Pines Subdivision - 56 lot development

Parameter	Units	MDL	Regulation				Sample ID: 2003-01
			ODWSOG[1, 2]		LG&LDHU[3]	O. Reg. 153/04[6]	
Sample Date			Objective	Type of Objective		Table 8	23-11-2021
Field Measurements							
Conductivity	uS/cm	1	-	-	-	-	488.5
pH	pH units	0.01	-	-	-	-	6.99
Hydrogen Sulphide	-	-	-	-	-	-	No odour
Temperature	°C	0.1	-	-	-	-	8.9
Visual Clarity	-	-	-	-	-	-	Clear & Colourless
Microbiological Parameters							
E. Coli	CFU/100 mL	1	0 CFU/100 mL	MAC	0 CFU/100 mL	-	0
Fecal Coliforms	CFU/100 mL	1	-	-	-	-	0
Total Coliforms	CFU/100 mL	1	0 CFU/100 mL	MAC	5 CFU/100 mL	-	0
General Inorganics							
Alkalinity, total	mg/L	5	500 mg/L	OG	-	-	234
Ammonia as N	mg/L	0.01	-	-	-	-	0.02
Dissolved Organic Carbon	mg/L	0.5	5 mg/L	AO	-	-	Hold for results
Colour	TCU	2	5 TCU	AO	-	-	<2
Conductivity	uS/cm	5	-	-	-	-	476
Hardness	mg/L	1	80-100	OG	-	-	213
pH	pH Units	0.1	-	-	-	-	8.12
Phenolics	mg/L	0.001	-	-	-	-	
Total Dissolved Solids	mg/L	1	500 mg/L	AO	-	-	246
Sulphide	mg/L	0.01	0.05 mg/L	AO	-	-	
Tannin & Lignin	mg/L	0.1	-	-	-	-	
Total Kjeldahl Nitrogen	mg/L	0.1	-	-	-	-	
Turbidity	NTU	0.1	5 NTU	AO	-	-	0.2
Anions							
Chloride	mg/L	1	250 mg/L	AO	-	-	7.2
Fluoride	mg/L	0.1	1.5 mg/L	MAC	-	-	0.2
Nitrate as N	mg/L	0.1	10 mg/L	MAC	-	-	<0.10
Nitrite as N	mg/L	0.1	1 mg/L	MAC	-	-	<0.10
Sulphate	mg/L	1	500 mg/L	AO	-	-	18
Metals							
Antimony (Sb)	mg/L	0.0005	0.006 mg/L	IMAC	-	0.006	<0.0001
Arsenic (As)	mg/L	0.001	0.01 mg/L	IMAC	-	0.025	<0.0001
Barium (Ba)	mg/L	0.001	1 mg/L	MAC	-	1	0.086
Beryllium (Be)	mg/L	0.0005	-	-	-	0.004	<0.0001
Boron (B)	mg/L	0.01	5 mg/L	IMAC	-	5	0.153
Cadmium (Cd)	mg/L	0.0001	0.005 mg/L	MAC	-	0.0021	<0.000015
Calcium (Ca)	mg/L	0.1	-	-	-	-	55.8
Chromium (Cr)	mg/L	0.001	0.05 mg/L	MAC	-	0.05	<0.002
Cobalt (Co)	mg/L	0.0002	-	-	-	0.0038	0.0001
Copper (Cu)	mg/L	0.001	1 mg/L	AO	-	0.069	0.019
Iron (Fe)	mg/L	0.1	0.3 mg/L	AO	-	-	<0.005
Lead (Pb)	mg/L	0.0001	0.01 mg/L	MAC	-	0.01	0.00018
Magnesium (Mg)	mg/L	0.2	-	-	-	-	18
Manganese (Mn)	mg/L	0.005	0.05 mg/L	AO	-	-	0.018
Molybdenum (Mo)	mg/L	0.005	-	-	-	-	0.0008
Nickel (Ni)	mg/L	0.005	-	-	-	0.1	<0.0002
Potassium (K)	mg/L	0.1	-	-	-	-	2.8
Selenium (Se)	mg/L	0.001	0.05 mg/L	-	-	0.01	<0.001
Silver (Ag)	mg/L	0.0001	-	-	-	0.0012	<0.0001
Sodium (Na)	mg/L	0.2	200 mg/L[4]	-	-	-	28.7
Strontium (Sr)	mg/L	0.001	7.0[5]	MAC	-	-	0.557
Thallium (Tl)	mg/L	0.0001	-	-	-	0.002	<0.00005
Uranium (U)	mg/L	0.0001	0.02 mg/L	-	-	0.02	0.00198
Vanadium (V)	mg/L	0.001	-	-	-	0.0062	0.0002
Zinc (Zn)	mg/L	0.01	5 mg/L	-	-	0.89	0.006
Volatile Organic Compounds	µg/L						
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

Table 2: Well Water Quality Summary
Tay Valley Township - Maberly Pines Subdivision - 56 lot development

Parameter	Units	MDL	Regulation				Sample ID: 2003-01
			ODWSOG[1, 2]		LG&LDHU[3]	O. Reg. 153/04[6]	
Sample Date			Objective	Type of Objective		Table 8	23-11-2021
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- (Ethylene Dibromide)	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 (Methylene Chloride)	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

Notes:
1 - Denotes Ontario Drinking-Water Standards Objectives and Guidelines, June 2006 (O. Reg. 169/03, as amended)
2 Denotes Ontario Drinking-Water Standards Objectives and Guidelines, June 2006 (O. Reg. 373/15, s. 1; O. Reg. 457/16, s. 1.)
3 - Denotes Leeds, Grenville, and Lanark District Health Unit Safe Drinking Water Interpretation
4 - Potential elevated sodium intake should should be communicated to your physician when concentration exceeds 20 mg/L.
5 - Health Canada Proposed Standard
6 - O. Reg. 153/04 - Table 8: Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Groundwater Condition
MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline (for water treatment)
- Denotes exceeds ODWSOG
- Denotes exceeds O. Reg. 153/04
- - No standard value or parameter not tested

Table 3: Well Water Quality (Ambient Groundwater Study)
Ontario Geological Survey Ambient Groundwater Quality Summary
Tay Valley Township - Maberly Pines Subdivision - 56 lot development

Parameter	Units	Regulation		13-AG-002
		Proximity to subject property		5.02 km east
		Well Depth (m)		50.29
Sample Date		ODWSOG[1]		25-May-13
		Objective	Type of Objective	
General Inorganics				
Alkalinity, total	mg/L	500 mg/L	OG	-
Ammonia as N	mg/L	-	-	-
Colour	TCU	5 TCU	AO	-
Conductivity	uS/cm	-	-	582
DOC	mg/L	5	AO	2.2
pH	pH Units	6.5 - 8.5	-	6.27
TDS	mg/L	500	AO	387.4
Organic Nitrogen	mg/L	-	-	0.07
TKN	mg/L	-	-	0.07
Anions				
Chloride	mg/L	250 mg/L	AO	54.28
Fluoride	mg/L	1.5 mg/L	MAC	0.107
Nitrate as N	mg/L	10 mg/L	MAC	1.34
Nitrite as N	mg/L	1 mg/L	MAC	<0.005
Sulphide	mg/L	0.05	AO	NA
Sulphate	mg/L	500 mg/L	AO	50.06
Metals				
Calcium	mg/L	-	-	71.31
Iron	mg/L	0.30 mg/L	AO	<0.015
Magnesium	mg/L	-	-	12.457
Manganese	mg/L	0.05 mg/L	AO	0.002
Potassium	mg/L	-	-	3.29
Sodium	mg/L	200 mg/L	AO	13.184
Antimony (Sb)	µg/L	6	IMAC	0.015
Arsenic (As)	µg/L	25	IMAC	0.088
Barium (Ba)	µg/L	1000	MAC	84.5
Boron (B)	µg/L	5000	IMAC	74
Cadmium (Cd)	µg/L	5	MAC	<0.01
Chromium (Cr)	µg/L	50	MAC	<0.02
Copper (Cu)	µg/L	1000	AO	5.91
Lead (Pb)	µg/L	10	MAC	0.1102
Mercury (Hg)	µg/L	1	MAC	<0.0015
Selenium	µg/L	10	MAC	<0.2
Zinc	µg/L	5000	AO	1.3
Uranium	µg/L	20	MAC	1.09

Notes:
1 - Denotes Ontario Drinking-Water Standards Objectives and Guidelines, June 2006 (O. Reg. 169/03, as amended)
MAC - Maximum Acceptable Concentration
IMAC - Interim Maximum Acceptable Concentration
AO - Aesthetic Objective
OG - Operational Guideline (for water treatment)
- Denotes exceeds respective Ontario Drinking Water Standard
- - No standard value or parameter not tested

Table 4 - Nitrate Attenuation from Conventional Septic Systems - Maberly Pines - All 56 Lots

Parameters		Units	Information Source/Calculation
Annual Precipitation (P) =	0.9398	m/year	Canadian Climate Normals 1981-2010 Station Data, Godfrey Station.
Runoff (Q) =	16.5	%	Silty Loam. - Table 3.1: Hydrologic Cycle Component Values, (MOE Stormwater Mangement Planning and Design Manual, March 2003)
Evapotranspiration(E) =	58.6	%	
Infiltration/groundwater recharge (R) =	24.9	%	
Concentration of Nitrate =	40	mg/L	Values as specified in Section 5.6.2 of Procedure D-5-4 Technical Guideline For Individual On-Site Sewage Sytems: Water Quality Impact Risk Assessment, Last Revision August 1996
Concentration of Nitrate =	40000	mg/m3	
Daily Flow rate of Sewage =	1000	L /day	
Number of units =	56		
Yearly Sewage Volume (S_y) =	20440	m^3/year	
Total Property Surface Area =	767579	m^2	Total Development Area
% Pervious Area =	80%		Stormwater Management Report prepared by Forefront Engineering Inc.
Infiltration Surface Area (A_d) =	614063.2	m^2	
Infiltration Flux, R	143697.05	m^3/year	R=P-Q-E
Yearly Volume of Sewage (Sy) =	20440	m^3/year	
Yearly Volume of Infiltration (R) =	143697	m^3/year	
Yearly Mass Loading of Nitrate (M_y) =	817600000	mg/year	
Nitrate Conc.at Downgradient Prop.Boundary =	4981.20	mg/m^3	My/(Sy + R)
" =	**4.98**	mg/L	
Background Nitrate Concentration =	**0.00**	mg/L	Max. concentration measured at test wells (2003-01)
Nitrate Total =	**4.98**	mg/L	

FIGURES

LEGEND

Maberly Pines Subdivision

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 4 8 Kilometers

1:150,000

CLIENT

Tay Valley Township - Maberly Pines

PROJECT

Hydrogeology Study

TITLE

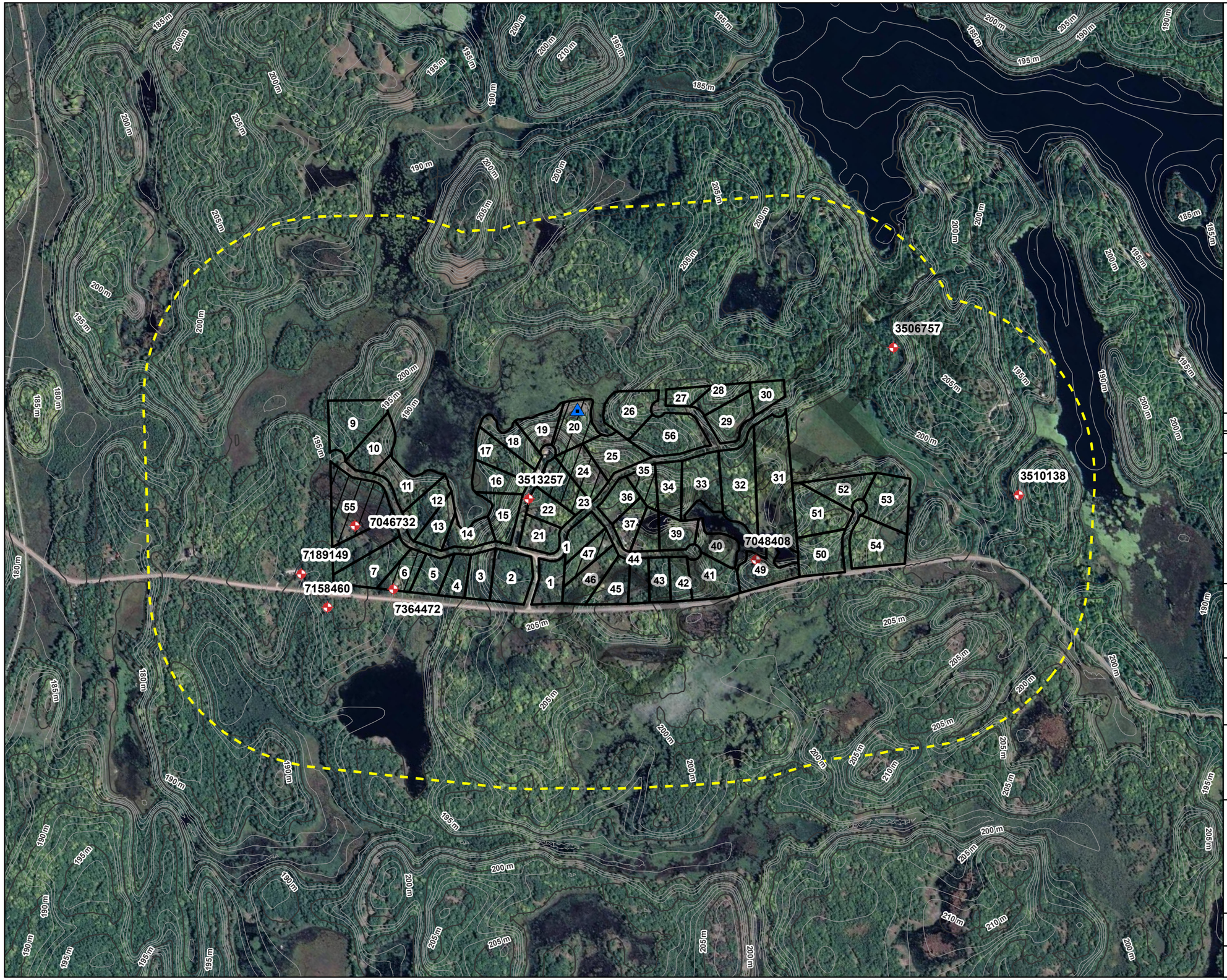
Site Location

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	**November 29, 2021**

DRAWN	CHECKED	FIG NO.	REV
GM	**RC**	**01**	**0**

D:\GIS_PROJECTS\220037 - P07047- Tay Valley Township - Mayberly Pines Hydrogeo Review\MXD\2021-11-25\220037-Fig01-SiteLocation.mxd



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.

0 200 400 Metres

1:10,000

CLIENT

Tay Valley Township - Maberly Pines

PROJECT

Hydrogeology Study

TITLE

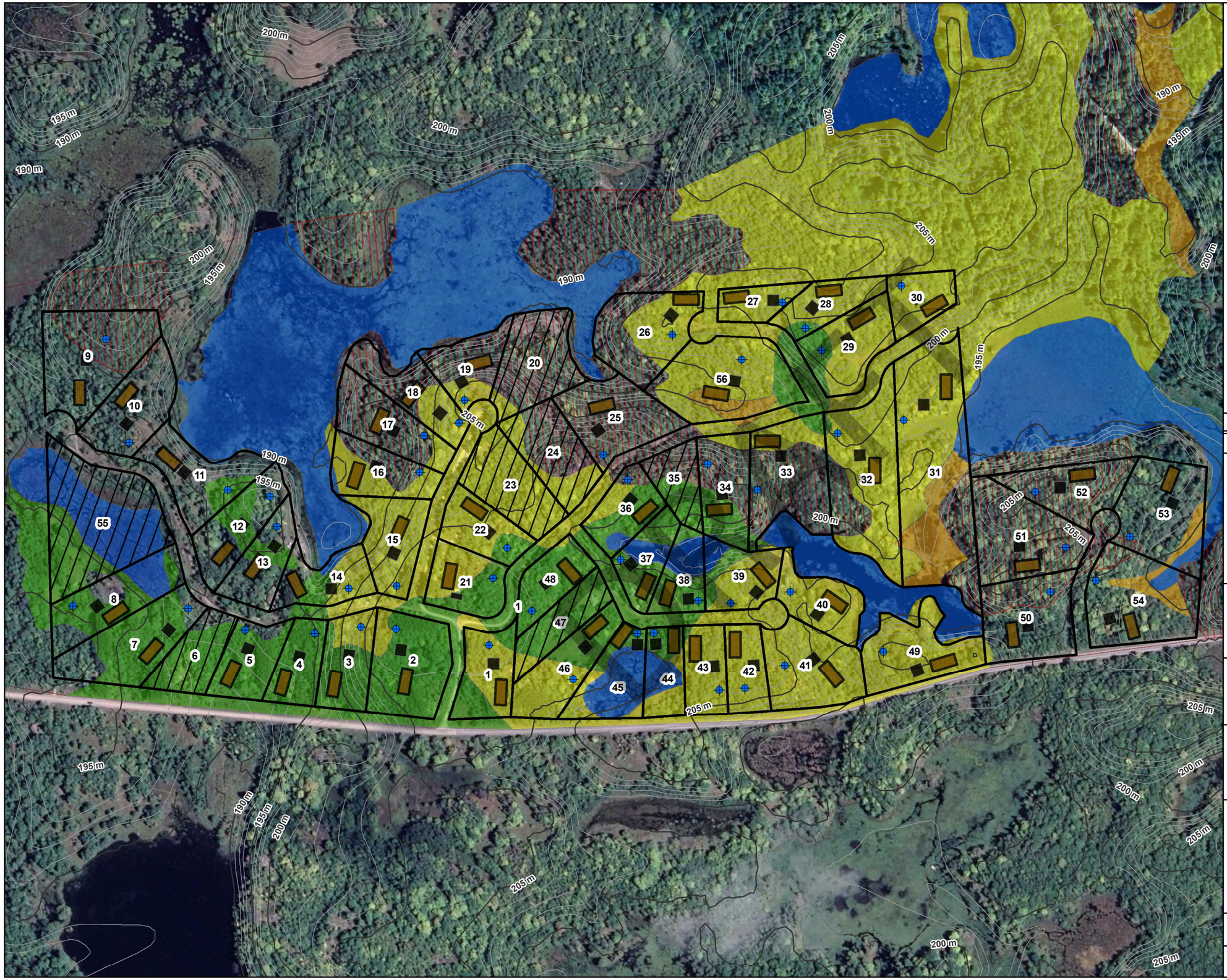
Site Layout and Well Records

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	November 29, 2021

DRAWN	CHECKED	FIG NO.	REV
GM	RC	02	0

D:\GIS_PROJECTS\220037 - P07047- Tay Valley Township - Mayberly Pines Hydrogeo Review\MXD\2021-11-29\220037-Fig02-SiteLayout.mxd



LEGEND

- Supply Well
- Dwelling
- Septic Bed
- Property Parcel
- Property Parcel - 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, Pooryl Drained
- Beaver Swamp Marsh

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

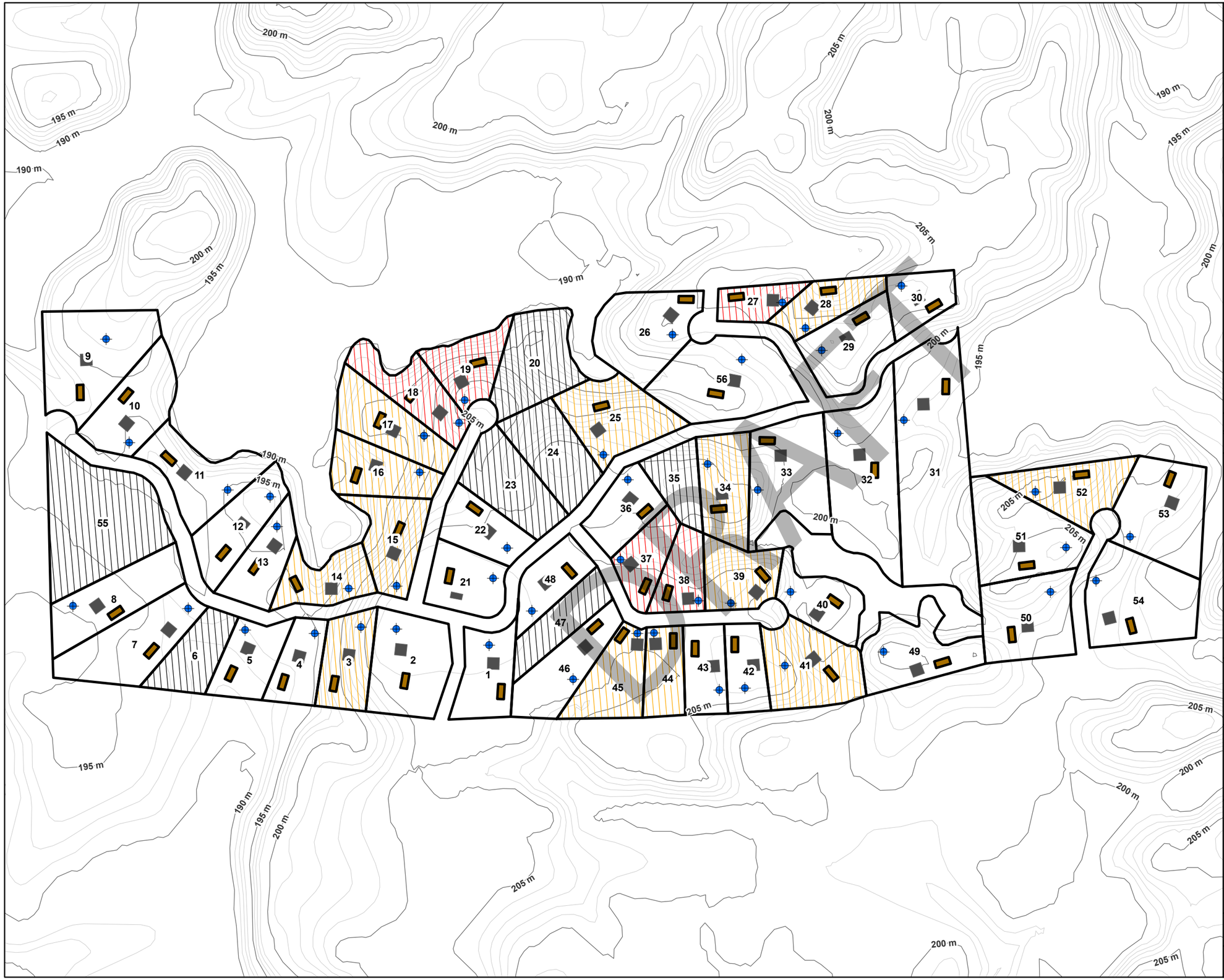
TITLE

Conceptual Lot Development Plan A (Conventional Provate Services)

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	**December 01, 2021**		
DRAWN	*CHECKED*	*FIG NO.*	*REV*
GM	**RC**	**03**	**0**

D:\GIS_PROJECTS\220037 - P07047- Tay Valley Township - Mayberly Pines Hydrogeo Review\MXD\2021-11-30\220037-Fig03-ConventionalLotLayout.mxd



LEGEND

- Supply Well
- Dwelling
- Septic Bed
- Conventional Parcel
- Developed Parcel
- Likely Exceed Maximum Allowable Gradient Listed in OBC for Septic Systems
- Alternative System Recommended
- Elevation Contour - 1 m (MNR)
- Elevation Contour - 5 m (MNR)

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

1:5,000

CLIENT

Tay Valley Township - Maberly Pines

PROJECT

Hydrogeology Study

TITLE

Conceptual Lot Development Plan B (Restricted Private Services)

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	December 01, 2021

DRAWN	CHECKED	FIG NO.	REV
GM	RC	04	0

D:\GIS_PROJECTS\220037 - P07047- Tay Valley Township - Mayberly Pines Hydrogeo Review\MXD\2021-11-30\220037-Fig04-RestrictedLotLayout.mxd

APPENDIX A

WESA, 1979 report

Reference 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.
124 O'CONNOR ST., SUITE 303, OTTAWA, ONTARIO K1P 5M9

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

Derek P. Smith M.Sc. FGAC

Water and Earth Science Associates Ltd.

Harold J. Parsons, Director

Al Macdonald B.Sc.

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.

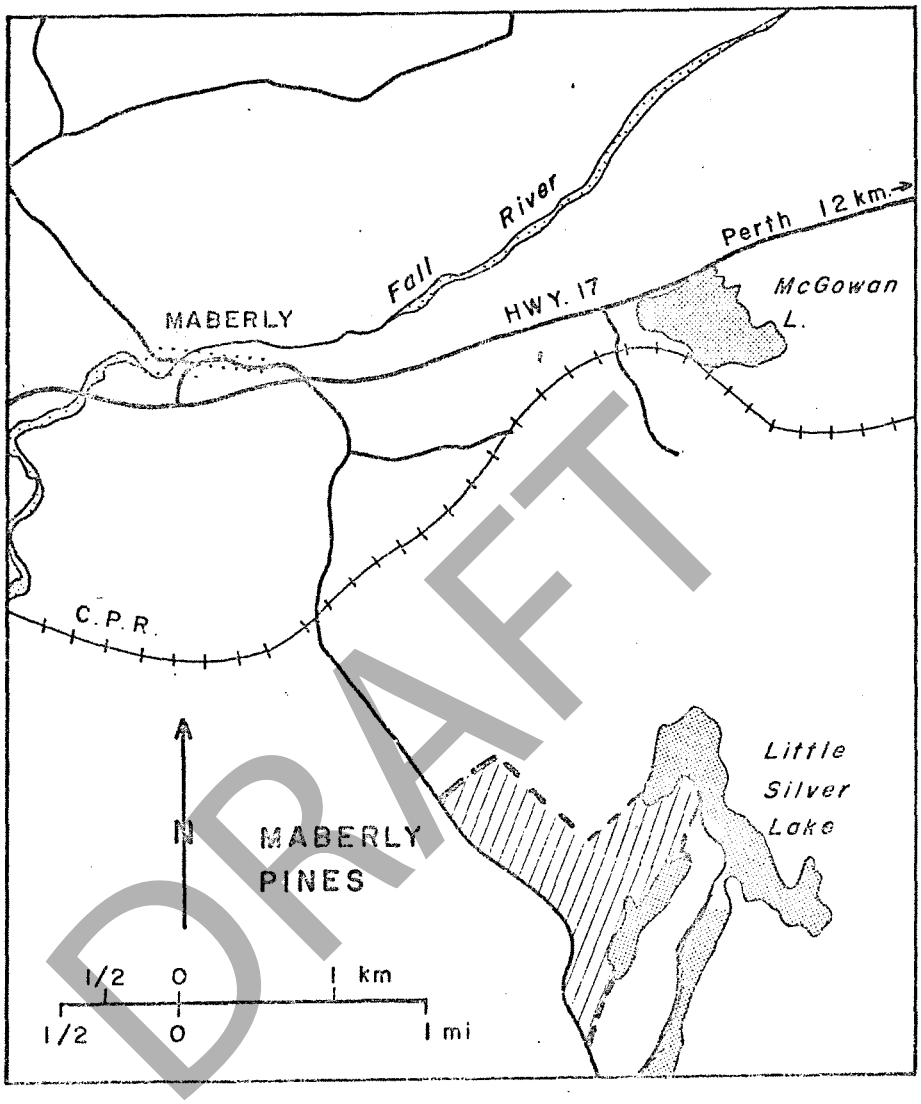


FIGURE I

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

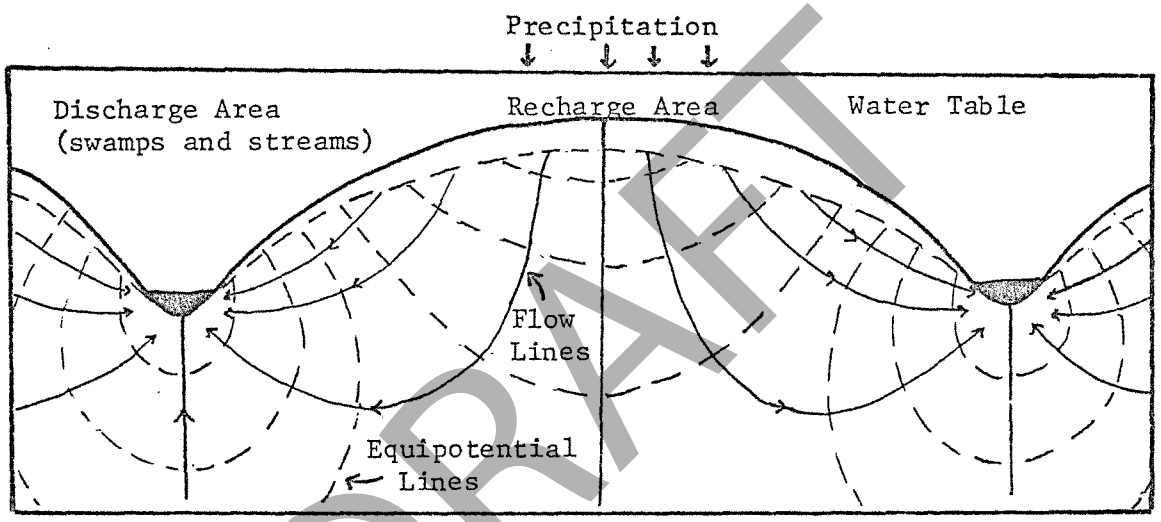


Figure 3: Idealized Model illustrating Groundwater Flow from Recharge on the Topographic Highs to Discharge in the Valleys (Hubbert, 1940)

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 175 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

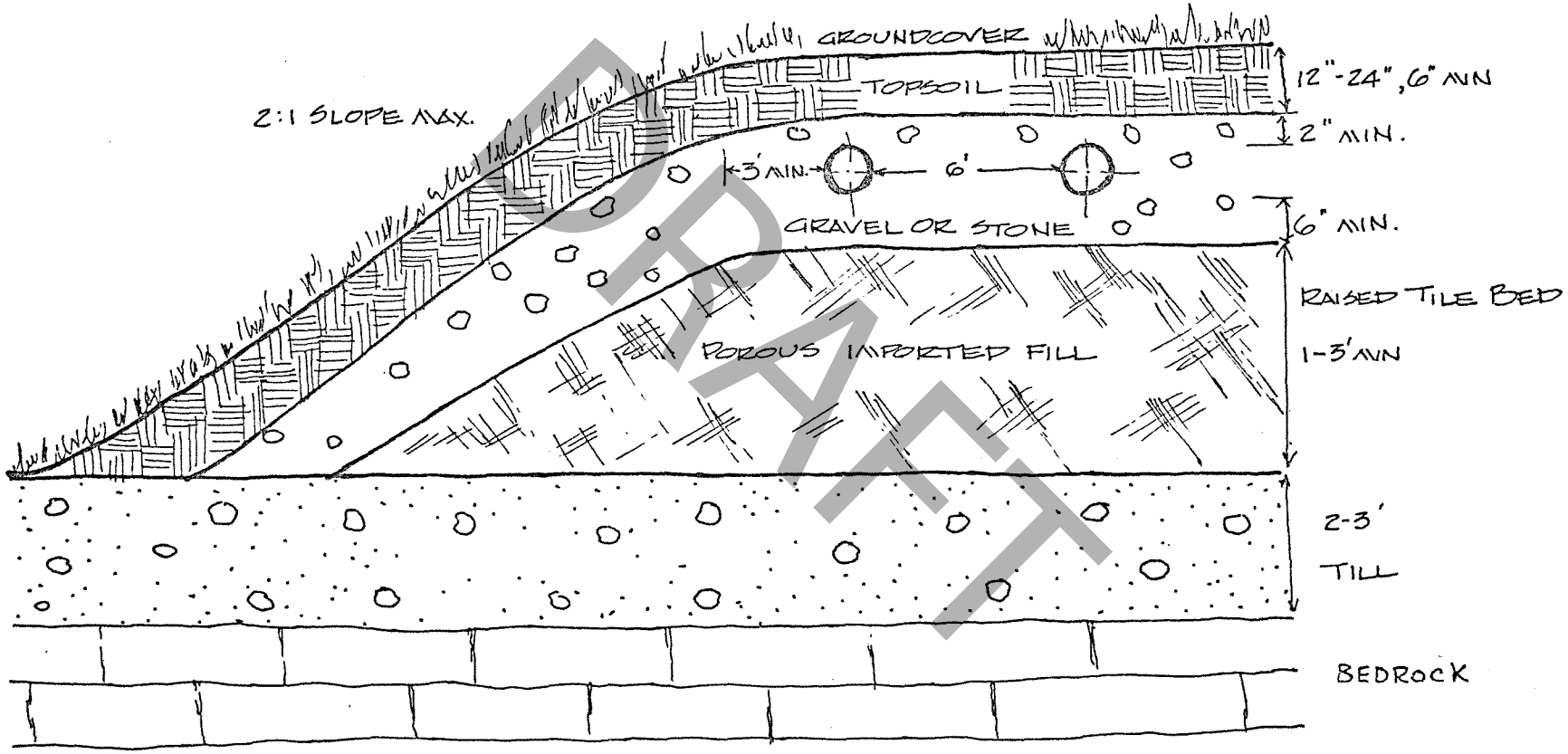
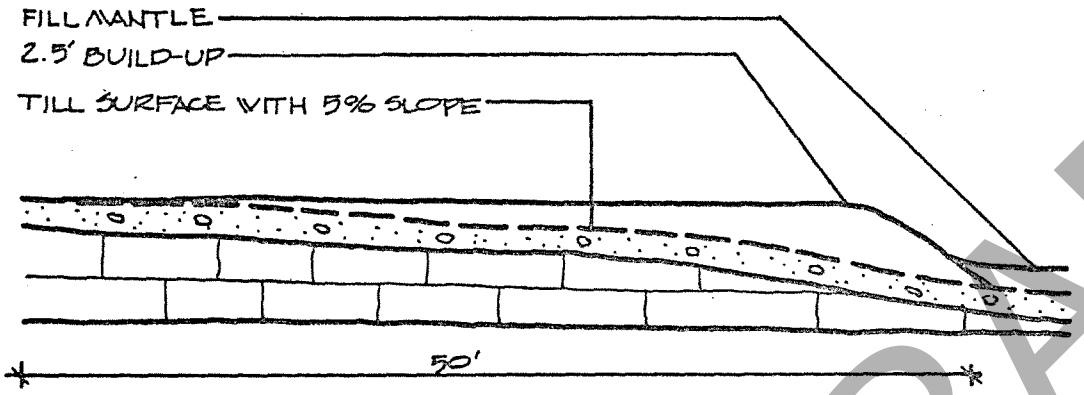
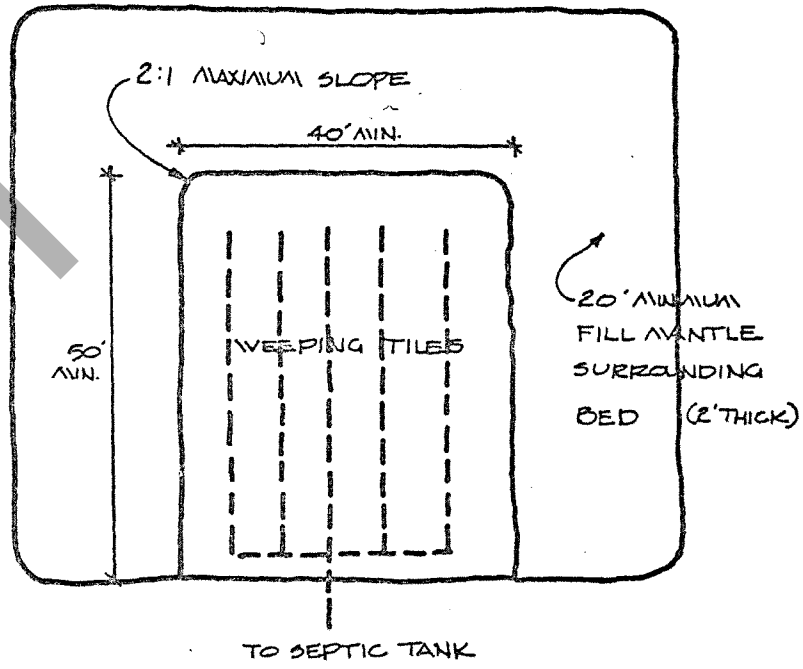


FIGURE 4 RECOMMENDED DESIGN OF LEACHING BED WHERE THIN TILL UNIT IS PRESENT

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

A. Sections 1 - 4

Baer, A.J. et al (1977). Riviere Gatineau Geological Survey of Canada Map Sheet 1334 A.

Bernhart A.P.(1972). A Rational Approach to Determining Sizes of Building Lots According to their Capabilities for On-site Wastewater Treatment, University of Toronto, Department of Civil Engineering Publication.

Central Mortgage and Housing Corporation (1977). CMHC Septic Tank Standards.

Department of Mines (1972). Before You Have a Well Drilled. Report 68-3, Halifax.

Farvolden, R.N. (1961). A Farm Water Supply From Quicksand. Research Council of Alberta, Preliminary Report 61-3, Edmonton.

Gadd, Nelson R. (1963). Surficial Geology of Ottawa Map-Area Ontario and Quebec 31 G/5. Geological Survey of Canada, Paper 62.16, Ottawa.

Gibb, John E. and John F. Jones (1975). Pollution Hazard to Groundwater in Nova Scotia. Bulletin 1. Water Planning and Management Division, Nova Scotia Department of the Environment, Halifax.

Henderson, E.P. (1972). Surficial Geology of the Kingston Area. G.S.C. Paper 72-48.

Hubbert M.K. (1940). The Theory of Groundwater Motion, Journal of Geology, Vol. 48 pp 785-944.

Ministry of the Environment, 1977. Septic Tank Sand Filter System for Treatment of Domestic Sewage (Publication W64, Na Chowdrey).

1976. Phosphate Retention Capability of Granular Soils, Precambrian Shield (by D. A. Aikens)

Ministry of the Environment (1976). Water Well Records for Ontario Regional Municipality of Ottawa-Carleton 1946-1972. Water Resource Bulletin 2-16, Toronto.

Sobanski, A.A. (1970). Groundwater Survey Regional Municipality of Ottawa-Carleton. The Ontario Water Resources Commission.

Todd, D.K. (1959). Groundwater Hydrology, Wiley and Sons, New York 336 pp.

Wilson, Alice E. (1964). Geology of the Ottawa-St. Lawrence Lowland, Ontario and Quebec. Geological Survey of Canada Memoir 241, Ottawa.

Selected References

B. Section 5

Canada Land Inventory. 1971. Land Capability for Wildlife - Waterfowl. Department of Energy, Mines and Resources, Ottawa.

Canada Land Inventory, 1970. Land Capability for Wildlife - Ungulates. Department of Energy, Mines and Resources, Ottawa.

Canada Land Inventory, 1971. Land Capability for Forestry. Department of Energy, Mines and Resources, Ottawa.

Canada Land Inventory, 1966. Soil Capability for Agriculture. Department of Energy, Mines and Resources, Ottawa.

Cook, F.R. 1970. Rare or Endangered Canadian Amphibians and Reptiles. Can. Field Nat. 84: 9-16.

Goodwin, C.E. 1977. Rare and Endangered Birds of Canada. pp. 85-87. In Canada's Threatened Species and Habitats. Edited by T. Mosquin and C. Suchal. Proceedings of the Sumposium on Canada's Threatened Species and Habitats. Ottawa, 1976. Canadian Nature Federation x + 185 pp.

Macdonald, A.L. 1978. The Biology and Conservation of the Black Rat Snake, Elaphe obsoleta obsoleta (Colubridae), in eastern Ontario. Unpublished H. B.Sc. thesis, Carleton University, Ottawa. v + 41 pp.

Ministry of Natural Resources, Dec. 1978. Little Silver Lake Study Lanark, Ontario.

Ricklefs, R.E. 1973. Ecology. Chrion Press Inc. Newton, Mass. x + 861 pp.

Smith, R.L. 1974. Ecology and Field Biology. Harper and Row Publishers New York, New York. xii + 855 pp.

APPENDIX A

Grain Size Analysis Matrix of Glacial Till Ground Moraine

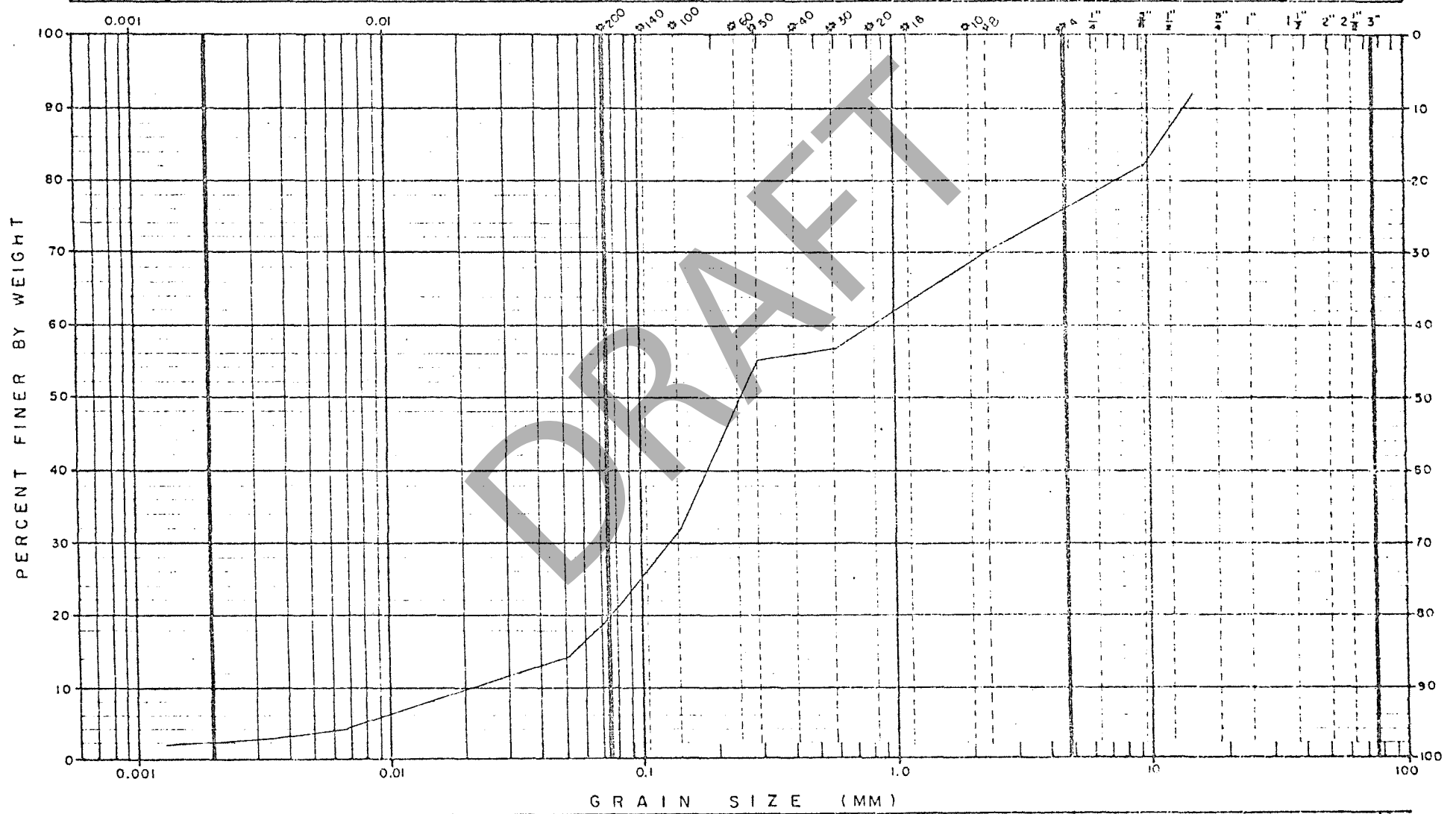
GRAIN SIZE DISTRIBUTION

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

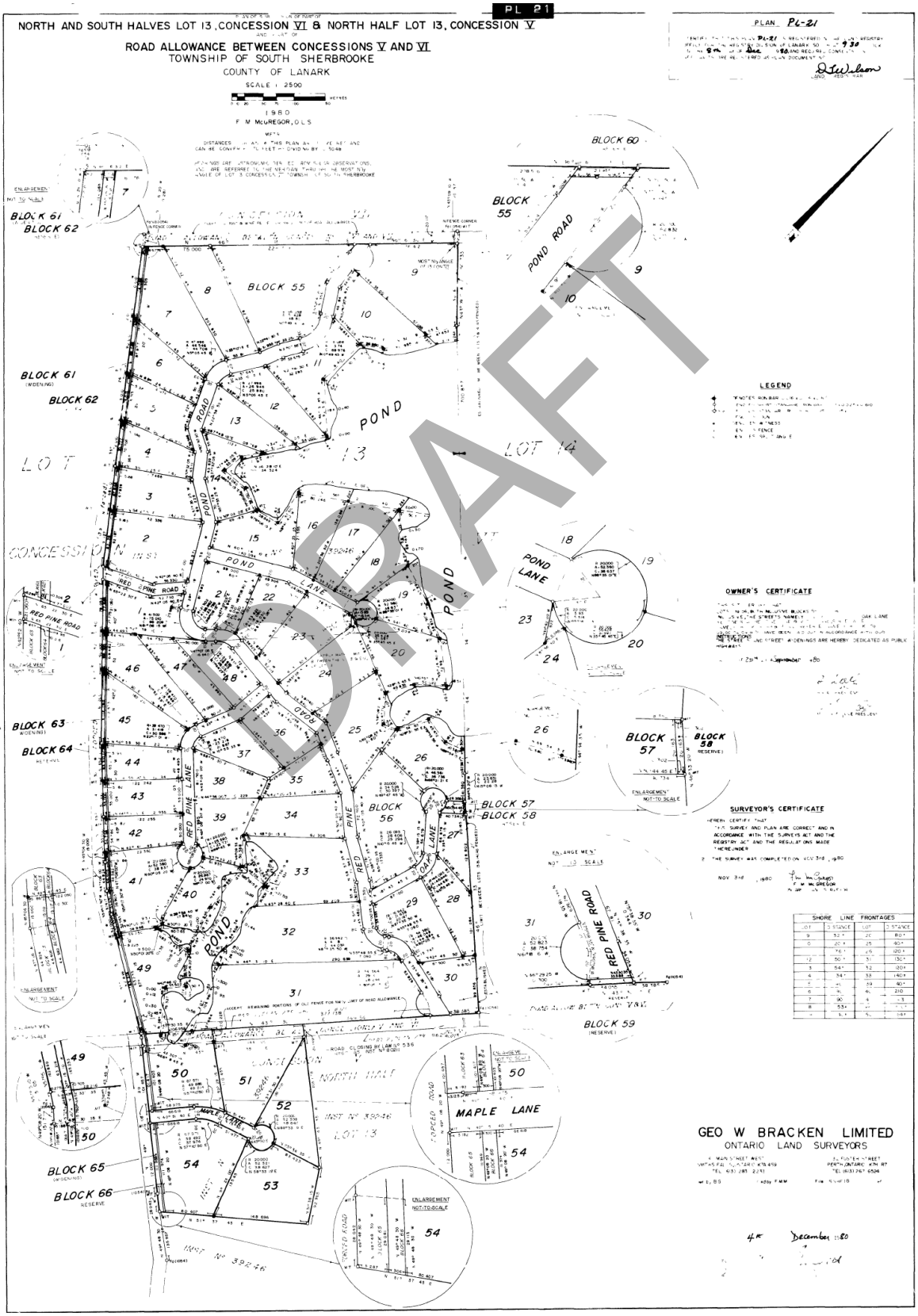
APPENDIX B

Topographic Survey (1980)

THE CORPORATION OF TAY VALLEY TOWNSHIP
HYDROGEOLOGICAL REVIEW
MABERLY PINES SUBDIVISION

CONTRACT #2021-PD-002

ADDENDUM NO. 2



APPENDIX C

Terrain Analysis Map (WESA, 1979)

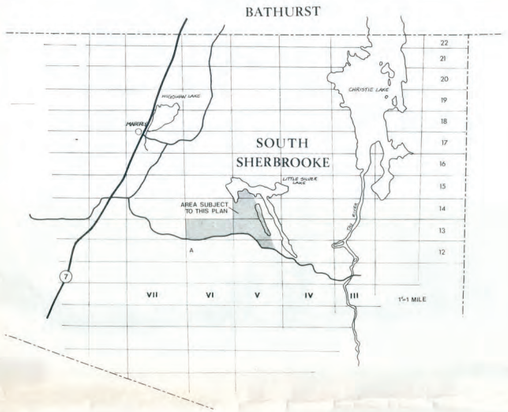


FIGURE 2.
MABERLY PINES
TERRAIN MAP

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

50 100 200 350 600 FEET

25 50 125 200 METRES

N

APPENDIX D

MECP Water Well Records

MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD

Ontario

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

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

UTM NORTHING 9 6 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 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 6¼	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.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

71 PUMPING TEST

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

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

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

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

50-53 0004 GPM./FT. SPECIFIC CAPACITY

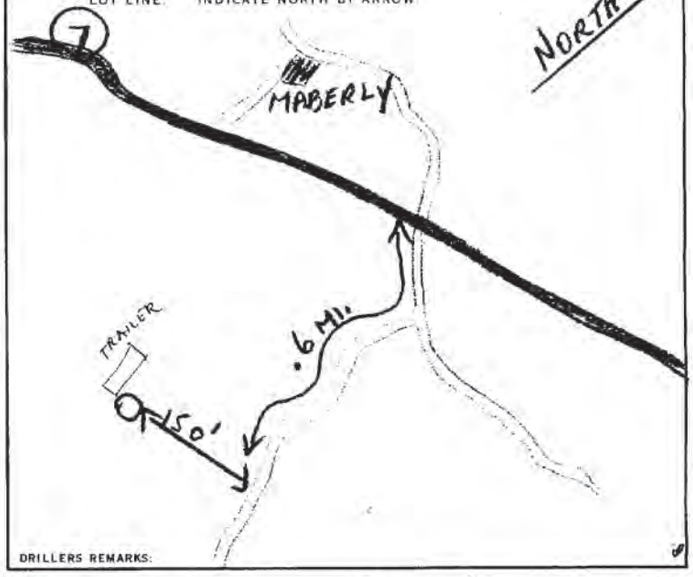
FINAL STATUS OF WELL 1
1 ☑ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

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

LOCATION OF WELL T964

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 1 | CONTRACTOR 4905 | DATE RECEIVED 120274

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

REMARKS:

P

WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 07-091

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

31 CASES

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

11 3506287 MUNICIP 35014 CON. CON 07

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

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

UTM 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 0150

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0142	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 64	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	0188	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/SLOT 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

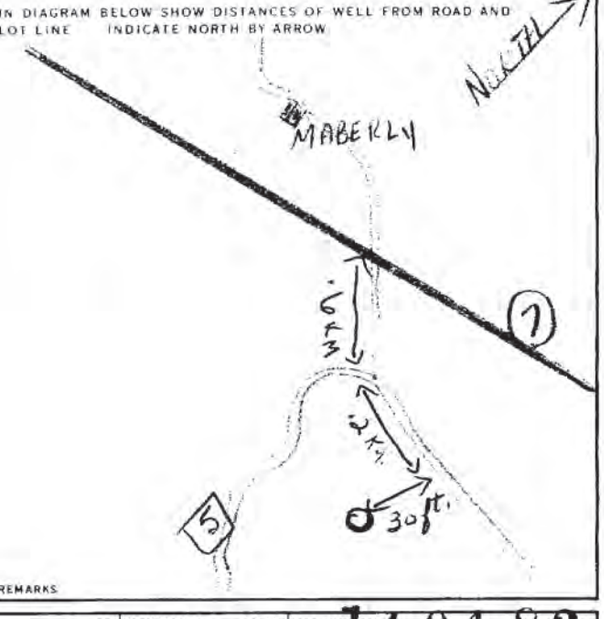
PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING HOURS	MINS
1 ☑ PUMP 2 ☐ BAILER	0002 GPM		

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	RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
GPM	145 FEET	1 ☑ CLEAR 2 ☐ CLOUDY	☐ 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

MINISTRY OF THE ENVIRONMENT COPY

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 4905 | DATE RECEIVED 140482

DATE OF INSPECTION | INSPECTOR

REMARKS: OP/LM

CSS.ES

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: Lanark
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: South Sherbrooke
CON: 5
BLOCK, TRACT, SURVEY, ETC.:
LOT: 08
[redacted] Elderfield Crt Ottawa
DATE COMPLETED: DAY 28 MO 06 YR 83
UTM: 361599 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 VF:17

31 0009728 00602/5 00806/5 02252/5
32

41 WATER RECORD

WATER FOUND AT FEET	KIND OF WATER
0210	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	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: 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: Ruf Hall Ltd — LICENCE NUMBER: 2558
ADDRESS: Mc Donalds Corners
NAME OF DRILLER OR BORER: Ruf Hall — LICENCE NUMBER: 2558
SIGNATURE OF CONTRACTOR: Ruf Hall — SUBMISSION DATE: DAY 29 MO 6 YR 83

OFFICE USE ONLY

DATA SOURCE 58: 1 — CONTRACTOR 59-62: 2558 — DATE RECEIVED 63-68: 120384 — 80
DATE OF INSPECTION — INSPECTOR
REMARKS: CSSES

MINISTRY OF THE ENVIRONMENT COPY

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 [X] CORRECT BOX WHERE APPLICABLE

(11) 3506756 MUNICIP 3501 4 CON CON 05

COUNTY OR DISTRICT: Lanark
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: South Sherbrooke
CON: 5
BLOCK, TRACT, SURVEY, ETC.:
LOT: 013
[redacted] 3rd Ave, Ottawa
DATE COMPLETED: DAY 27 MO 06 YR 83
UTM: 361599 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 & gray	sand & boulders			0'	3'
	limestone			3'	64'

MOE WELL

(31) 0003728B13 0064215

(32)

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0060	1 [X] 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 [X] 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.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

(71) PUMPING TEST

PUMPING TEST METHOD: 1 [X] PUMP 2 [ ] BAILER
PUMPING RATE: 0004 GPM
DURATION OF PUMPING: 01 HOURS 00 MINS
WATER LEVELS DURING: 1 [X] PUMPING 2 [ ] RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
018 FEET	FEET	FEET	018 FEET	018 FEET	018 FEET

IF FLOWING GIVE RATE: GPM
PUMP INTAKE SET AT: 64 FEET
WATER AT END OF TEST: 1 [X] CLEAR 2 [ ] CLOUDY
RECOMMENDED PUMP TYPE: [ ] SHALLOW [X] 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 (54): 1 [X] 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 [X] 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 [X] ROTARY (AIR); 5 [ ] AIR PERCUSSION; 6 [ ] BORING; 7 [ ] DIAMOND; 8 [ ] JETTING; 9 [ ] DRIVING

CONTRACTOR

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

OFFICE USE ONLY

DATA SOURCE (58): 1
CONTRACTOR (59-62): 2558
DATE RECEIVED: 120384
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 RL 29 CON 05

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	LOT	DATE COMPLETED
Lanark	South Sherbrooke	014	DAY 24 MO 06 YR 83

[redacted] 3-2625 Regina St Ottawa

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'
brown	limestone			30'	31'
gray	limestone			31'	100'
white	limestone			100'	125'
gray	limestone			125'	170'
white	limestone			170'	180'
gray	limestone			180'	225'

MOE WF-171

(31) 0002 728 12 | 0030 221 | 0031 615 | 0100 215 | 0125 115 | 0170 215 | 1

(32) 0180 115 | 0225 215

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0210	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	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.)

(71) PUMPING TEST

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

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

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

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

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)
1	2558	120384

DATE OF INSPECTION | INSPECTOR

REMARKS

FORM NO. 0506—4—77 FORM 7

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 — 3507365 — MUNICIP — CON.

COUNTY OR DISTRICT: LANARK — TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: S. SHERBROOKE — CON. — BLOCK, TRACT, SURVEY, ETC. — LOT: 14

[redacted] ST. REMY DR. NEPEAN ONT — DATE COMPLETED: DAY 9 MO 9 YR 85

ELEVATION — RC — BASIN CODE: K2J 1A3

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET 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	calite	Grnt, pirite, Quartz	medium Hard.	162	185

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
147	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
182	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
6 1/4	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	22
6 1/8	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		22	185
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER — PUMPING RATE: 4 GPM — DURATION OF PUMPING: 1 HOURS 0 MINS

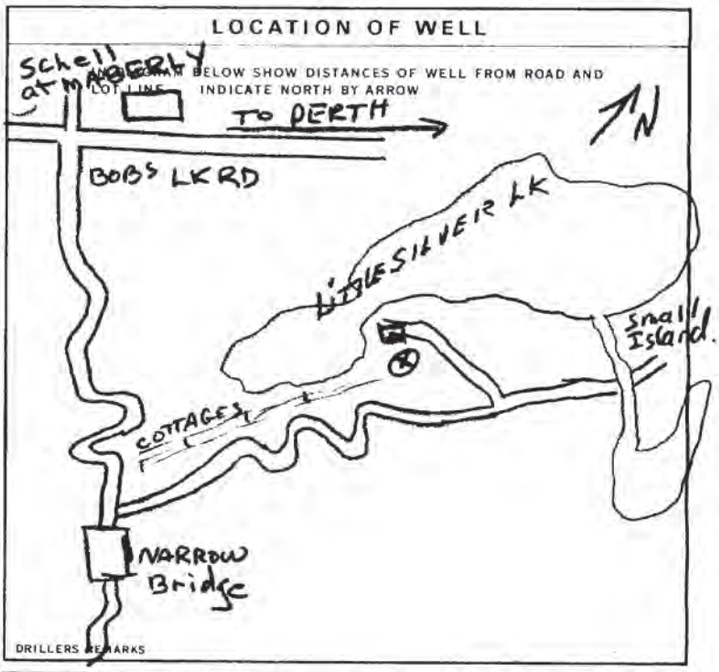
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING (1 ☒ PUMPING 2 ☐ RECOVERY)	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
32 FEET	155 FEET		32 FEET	69 FEET	88 FEET	155 FEET

IF FLOWING GIVE RATE: — GPM — PUMP INTAKE SET AT: 175 FEET — WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

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

LOCATION OF WELL

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



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

WATER USE

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

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: Giffin Well Drilling Ltd — LICENCE NUMBER: 2307

ADDRESS: RR #2 Renfrew ont.

NAME OF DRILLER OR BORER: D. Linden, D. Gauthier — LICENCE NUMBER: 2307

SIGNATURE OF CONTRACTOR: [signature] — SUBMISSION DATE: DAY ____ MO ____ YR ____

MINISTRY OF THE ENVIRONMENT COPY

OFFICE USE ONLY

DATA SOURCE — CONTRACTOR — DATE RECEIVED: 10 0286

DATE OF INSPECTION — INSPECTOR

REMARKS: CSS FS

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 R3 Maberly	7		13

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

71 PUMPING TEST

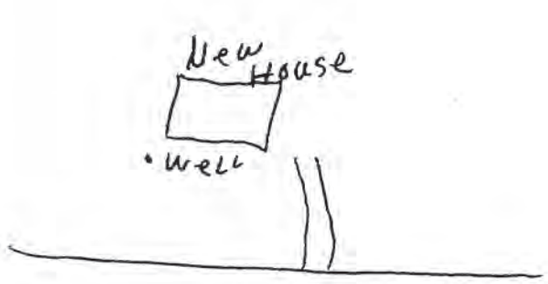
PUMPING TEST METHOD: 1 ☒ PUMP 2 ☑ BAILER
PUMPING RATE: 7 GPM
DURATION OF PUMPING: 30 HOURS MINS
WATER LEVELS DURING: 1 ☐ PUMPING 2 ☑ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
15 FEET	FEET	FEET	FEET	15 FEET	15 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: 70 FEET
RECOMMENDED PUMPING RATE: 7 GPM

LOCATION OF WELL

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



DRILLERS REMARKS: 10851

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 9 ☐ 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 2558 ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: Huf Well Ltd
WELL CONTRACTOR'S LICENCE NUMBER: 2558
ADDRESS: McDonalds Corners Ont.
NAME OF WELL TECHNICIAN: Brad 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 | CONTRACTOR | DATE RECEIVED: 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: 5
BLOCK, TRACT, SURVEY, ETC.:
LOT: 14
[redacted] Oakridge Blvd, Nepean Ont
DATE COMPLETED: DAY 28 MO 8 YR 90
UTM: KQ 6275
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 30 MINS

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: Tiff 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: Tiff 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

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 105

COUNTY OR DISTRICT: Fanark
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
MINING: RC: ELEVATION: AQ: K/R: BASIN CODE: SPR

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

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
60 FEET	150 FEET	1 ☐ PUMPING 2 ☐ RECOVERY	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.

Fan Rd 5

10 km

Rd 12

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 Mains Well Drilling
WELL CONTRACTOR'S LICENCE NUMBER: 3644
ADDRESS: Box 326 Richmond Ont
NAME OF WELL TECHNICIAN:
WELL TECHNICIAN'S LICENCE NUMBER: ~~LICENCE~~ 7-0564
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: 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 3510138 MUNICIP 35014 CON. CON OS

COUNTY OR DISTRICT: Lanark
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Sherbrooke
CON: 5
LOT: 13
DATE COMPLETED: DAY 13 MO 11 YR 91
[redacted]
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 & Trace			0	4
red/grey	granite			4	68
grey & green	"			68	158

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
176	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
6 1/4	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: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 8 GPM
DURATION OF PUMPING: HOURS MINS
STATIC LEVEL: 20 FEET
WATER LEVEL END OF PUMPING: 130 FEET
WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
135 FEET	130 FEET	130 FEET	130 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: 140 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.

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 Hasper Ont
NAME OF WELL TECHNICIAN: Shannon Purcell
WELL TECHNICIAN'S LICENCE NUMBER: 10003
SIGNATURE OF TECHNICIAN/CONTRACTOR: Shannon Purcell
SUBMISSION DATE: DAY 28 MO 11 YR 91

MINISTRY OF THE ENVIRONMENT COPY

OFFICE USE ONLY

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

FORM NO. 0506 (11/86) FORM 9

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 35014 — 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 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

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

25 Water levels during: 1 ☑ Pumping 2 ☐ Recovery

Static level	Water level end of pumping	15 minutes	30 minutes	45 minutes	60 minutes
31' feet	feet	135' feet	70' feet	42' feet	31' feet

If flowing give rate: GPM

Pump intake set at: 200' feet

Water at end of test: ☐ Clear ☑ Cloudy

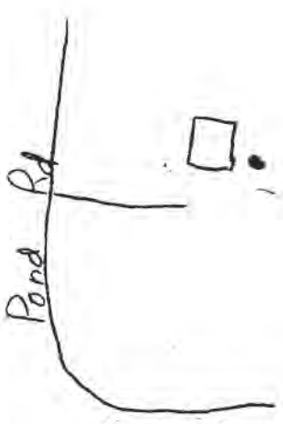
Recommended pump type: ☐ Shallow ☑ Deep

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.
Hall Well Ltd	2558
Address: RR1 McDonalds Corners Ont K0G1M0	
Name of Well Technician: Mark Hall	Well Technician's Licence No.: T2228
Signature of Technician/Contractor: Mark Hall	Submission date: 5 (day) 3 (mo) 01 (yr)

MINISTRY USE ONLY

Data source — Contractor: 2558 — Date received: APR 11 2001

Date of inspection — Inspector

Remarks

CSS.ES1

2 - MINISTRY OF THE ENVIRONMENT COPY

0506 (07/00) Front Form 9

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 — 3513786 — Municipality 35014 — Con. CON — 12

County or District	Township/Borough/City/Town/Village	Con	block	tract	survey, etc.	Lot
Lanark	South Sherbrooke	12				4

Owner's surname	First Name	Address	Date completed (day / month / year)
[redacted]		Box 1456, Kemptville Ont.	17 / 7 / 02

21 — UTM: Zone — Easting — Northing — RC — Elevation — BC — Basin Code — ii — iii — iv

KOG 1J0

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'
black / grey	granite			6'	35'
black / red	granite			35'	38'
black / grey	granite			38'	75'
black / red	granite			75'	114'
black / pink / grey	granite			114'	220'

31

32

41 WATER RECORD

Water found at - feet	Kind of water
92'	1 ☐ Fresh 3 ☐ Sulphur 14 — 2 ☐ Salty 4 ☐ Minerals 6 ☐ Gas — untested
235'	1 ☐ Fresh 3 ☐ Sulphur 19 — 2 ☐ Salty 4 ☐ Minerals 6 ☐ Gas — untested
	1 ☐ Fresh 3 ☐ Sulphur 24 — 2 ☐ Salty 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 3 ☐ Sulphur 29 — 2 ☐ Salty 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 3 ☐ Sulphur 34 — 2 ☐ Salty 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

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: 3 GPM — Duration of pumping: ____ Hours ____ Mins

Static level	Water level end of pumping	Water levels during ☑ Pumping ☐ Recovery			
16 feet	feet	15 minutes: 175 feet	30 minutes: 130 feet	45 minutes: 85 feet	60 minutes: 45 feet

If flowing give rate	Pump intake set at	Water at end of test
GPM	220 feet	☐ Clear ☑ Cloudy

Recommended pump type	Recommended pump setting	Recommended pump rate
☐ Shallow ☑ Deep	190 feet	3 GPM

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 ☐ Botary (reverse); 4 ☑ Rotary (air); 5 ☐ Air percussion; 6 ☐ Boring; 7 ☐ Diamond; 8 ☐ Jetting; 9 ☐ Driving; 10 ☐ Digging; 11 ☐ Other

LOCATION OF WELL

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

246248

Name of Well Contractor	Well Contractor's Licence No.
Huff Hall Ltd	2558

Address	
RR1 McDonalds Corners Ont K0G1M0	

Name of Well Technician	Well Technician's Licence No.
Mark Hall	T2228

Signature of Technician/Contractor	Submission date (day / mo / yr)
Huff Hall	18 / 7 / 02

MINISTRY USE ONLY

Data source	Contractor	Date received
	2558	AUG 13 2002

Date of inspection	Inspector

Remarks:

2 - MINISTRY OF THE ENVIRONMENT COPY

0506 (07/00) Front 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 83 Zone 18 Easting 381292 Northing 4962789 Unit Make/Model: Magellan Mode of Operation: WASS ☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Metres 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: 153 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				
1524	☑ 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.

	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	9.26	20	8.50
25	25	9.85	25	8.37
30	30	10.15	30	8.35
40	40	10.43	40	8.08
50	50	10.71	50	7.90
60	60	10.95	60	7.74

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: 8.90 metres
☐ Shallow ☑ Deep
Recommended pump depth: 35 metres
Recommended pump rate: 18 (litres/min)
If flowing give rate (litres/min): 0
If pumping discontinued, give reason: N/A

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

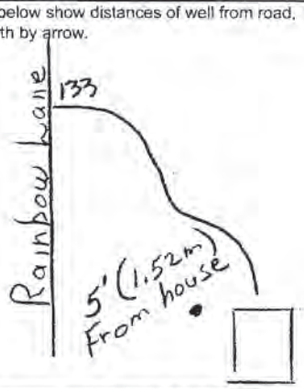
☑ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

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: 2004 / 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
Well Record Number: CSS.ES5 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 (Place sticker and/or print number below)
A051411
A 051411

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 Help Desk (Toll Free) at 1-888-396-9355.
- **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: ☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify: Waas

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

- 6.70 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	.49	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
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

Pump intake set at - (metres) 60
Pumping rate - (litres/min) 30
Duration of pumping ___ hrs + ___ min
Final water level end of pumping 51.10 metres
Recommended pump type. ☐ Shallow ☑ Deep
Recommended pump depth. 48 metres
Recommended pump rate. 25 (litres/min)
If flowing give rate - 0 (litres/min)
If pumping discontinued, give reason.

Plugging and Sealing Record

☑ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres 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

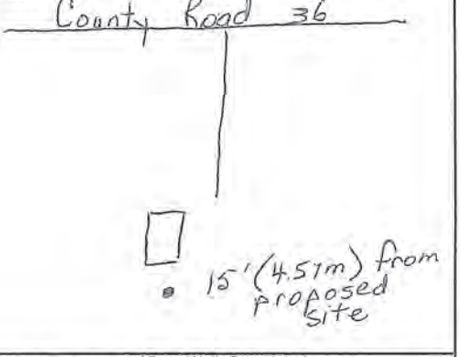
☑ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

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, McDonald's Corners Ont K0G1M0	
Name of Well Technician (last name, first name)	**Well Technician's Licence No.**
Mark Hall	T9238
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

Ontario Ministry of the Environment

Well Tag Number (Copy number below): A051413

A051413

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 Help Desk (Toll Free) at 1-888-396-9355.
- **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): # 4193 Hwy #36

Township: South Sherbrooke

Lot: 13

Concession: 6

RR#/Street Number/Name: Con 6 Lot 13

City/Town/Village:

Site/Compartment/Block/Tract etc.

GPS Reading: NAD 83 | Zone 18 | Easting 380249 | Northing 4916273.6

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)
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 (35.05m)		

Hole Diameter

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

Water Record

Water found at Metres / Kind of Water

33.53 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

Casing

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
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	Material	Slot No.		
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			

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: ___ hrs + ___ min

Final water level end of pumping: 7.43 metres

Recommended pump type: ☐ Shallow ☑ Deep

Recommended pump depth: 27 metres

Recommended pump rate: 35 (litres/min)

If flowing give rate - (litres/min):

If pumping discontinued, give reason.

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level			
1	10.60	1	21.25
2	11.75	2	19.09
3	12.70	3	17.80
4	13.23	4	16.75
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	Depth set at - Metres 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

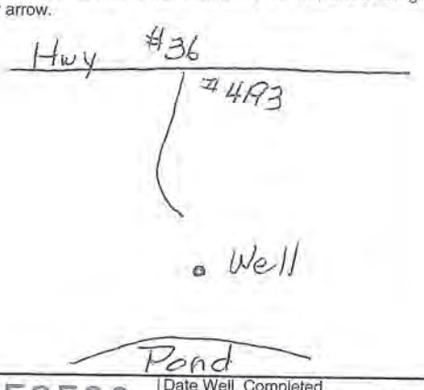
☑ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)

☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering

☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Location of Well

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



Audit No. Z 58533

Date Well Completed: YYYY 2007 MM 7 DD 4

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

Date Delivered: YYYY 2007 MM 7 DD 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 Mark Hall

Date Submitted: YYYY 2007 MM 7 DD 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

DRAFT

Ontario — Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)*: A 102498

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	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	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	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

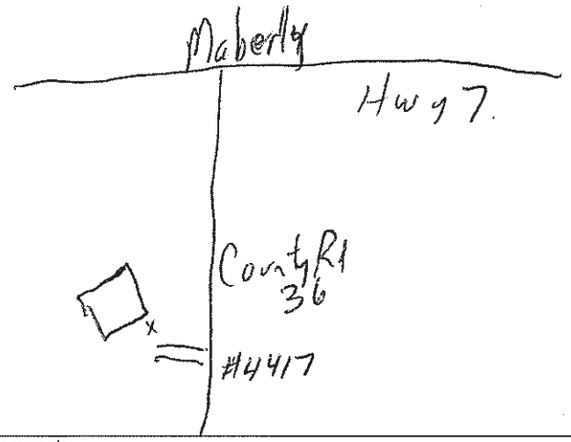
Well production (l/min / GPM): 26

Disinfected? ☑ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	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. Z 124218

Received JAN 24 2011

DRAFT

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

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 8 3 — Zone 18 — Easting 379428 — Northing 4916365	**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 (m^3/ft^3)
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)	Gas	Kind of Water	Other, specify
?	☐	☐ Fresh ☑ Untested	
	☐	☐ Fresh ☐ Untested	
	☐	☐ Fresh ☐ Untested	

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): 2gpm.

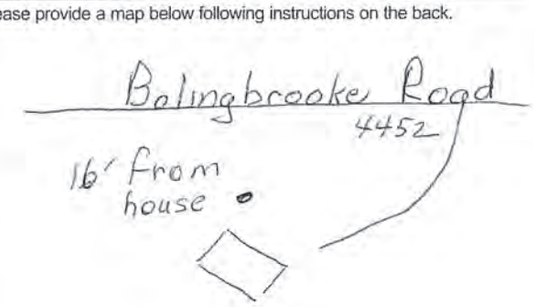
Well production (l/min / GPM): 1 1/2 gpm.

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	2 5 5 8

Business Address (Street Number/Name)	Municipality
25b Hallshore 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)
6 1 3 2 7 8 2 9 3 3	Hall Mark

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
1 2 2 2 8	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

APPENDIX E

Well Owner Interview Forms

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:** Matt 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? ✓ (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 Debree 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 F

Laboratory Report of Analyses

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

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**				
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			

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

Michelle Dubien
Lab Manager

CADUCEON™ ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Preliminary Report

C.O.C.: DW116170

REPORT No. B21-38554 (ii)

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**				
Acetone	µg/L	30	EPA 8260	26-Nov-21/R	< 30			
Benzene	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Bromodichloromethane	µg/L	2	EPA 8260	26-Nov-21/R	< 2			
Bromoform	µg/L	5	EPA 8260	26-Nov-21/R	< 5			
Bromomethane	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Carbon Tetrachloride	µg/L	0.2	EPA 8260	26-Nov-21/R	< 0.2			
Monochlorobenzene (Chlorobenzene)	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Chloroform	µg/L	1	EPA 8260	26-Nov-21/R	< 1			
Dibromochloromethane	µg/L	2	EPA 8260	26-Nov-21/R	< 2			
Dichlorobenzene,1,2-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichlorobenzene,1,3-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichlorobenzene,1,4-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichlorodifluoromethane	µg/L	2	EPA 8260	26-Nov-21/R	< 2			
Dichloroethane,1,1-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichloroethane,1,2-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichloroethylene,1,1-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichloroethene, cis-1,2-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichloroethene, trans-1,2-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichloropropane,1,2-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichloropropene, cis-1,3-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichloropropene, trans-1,3-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dichloropropene 1,3-cis+trans	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Ethylbenzene	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Dibromoethane,1,2- (Ethylene Dibromide)	µg/L	0.2	EPA 8260	26-Nov-21/R	< 0.2			
Hexane	µg/L	5	EPA 8260	26-Nov-21/R	< 5			

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

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Preliminary Report

C.O.C.: DW116170

REPORT No. B21-38554 (ii)

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**				
Methyl Ethyl Ketone	µg/L	20	EPA 8260	26-Nov-21/R	< 20			
Methyl Isobutyl Ketone	µg/L	20	EPA 8260	26-Nov-21/R	< 20			
Methyl-t-butyl Ether	µg/L	2	EPA 8260	26-Nov-21/R	< 2			
Dichloromethane (Methylene Chloride)	µg/L	5	EPA 8260	26-Nov-21/R	< 5			
Styrene	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Tetrachloroethane,1,1,1,2-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Tetrachloroethane,1,1,2,2-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Tetrachloroethylene	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Toluene	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Trichloroethane,1,1,1-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Trichloroethane,1,1,2-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Trichloroethylene	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Trichlorofluoromethane	µg/L	5	EPA 8260	26-Nov-21/R	< 5			
Vinyl Chloride	µg/L	0.2	EPA 8260	26-Nov-21/R	< 0.2			
Xylene, m,p-	µg/L	1.0	EPA 8260	26-Nov-21/R	< 1.0			
Xylene, o-	µg/L	0.5	EPA 8260	26-Nov-21/R	< 0.5			
Xylene, m,p,o-	µg/L	1.1	EPA 8260	26-Nov-21/R	< 1.1			

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

BluMetric Environmental Inc.

1682 Woodward Drive
Ottawa, Ontario
Canada K2C 3R8
Tel: 613.839.3053
Fax: 613.839.5376
ottawa@blumetric.ca

4 Cataraqui Street
The Tower, The Woolen Mill
Kingston, Ontario
Canada K7K 1Z7
Tel: 613.531.2725
Fax: 613.531.1852
kingston@blumetric.ca

209 Frederick Street
Unit 3B
Kitchener, Ontario
Canada N2H 2M7
Tel: 519.742.6685
kitchener@blumetric.ca

825 Milner Avenue
Toronto, Ontario
Canada M1B 3C3
Tel: 877.487.8436
toronto@blumetric.ca

102-957 Cambrian Heights Drive
Sudbury, Ontario
Canada P3C 5S5
Tel: 705.525.6075
Fax: 705.525.6077
sudbury@blumetric.ca

PO Box 36
Shebandowan, Ontario
Canada P0T 2T0
Tel: 807.707.1687
thunderbay@blumetric.ca

4-41 de Valcourt Street
Gatineau, Quebec
Canada J8T 8G9
Tel: 819.243.7555
Fax: 819.243.0167
gatineau@blumetric.ca

276 Saint-Jacques Street
Suite 818
Montreal, Quebec
Canada H2Y 1N3
Tel: 514.844.7199
Fax: 514.841.9111
montreal@blumetric.ca

4916 – 49th Street
Yellowknife, NT
Canada X1A 1P3
Tel: 867.873.3500
Fax: 867.873.3499
yellowknife@blumetric.ca

202b Strickland Street
Whitehorse, Yukon
Canada Y1A 2J8
Tel: 867.689.8465
whitehorse@blumetric.ca

www.blumetric.ca