



24 March 2022
Project Number: 220235

Mr. Greg Gannon
36 Overbank Court
North York, ON, M3A 1W2
Email: ggannon@me.com

**Re: Limited Hydrogeological Assessment
Proposed Single Lot Severance
37 Bellavista Road, Wellington, Prince Edward County, Ontario**

Dear Mr. Gannon

BluMetric Environmental Inc. (BluMetric™) was retained to conduct a hydrogeological assessment to support an application for a single lot severance at 37 Bellavista Road, Wellington (Prince Edward County), Ontario. The site location is indicated in Figure 1. The hydrogeological assessment is limited to a desktop analysis of available database materials and a water quality analysis from the retained lot 'lakeshore dug well'.

It is understood that the lot is to be developed using a 'lakeshore dug well' as a water source. This form of servicing is consistent with servicing at surrounding properties but is not specifically addressed under the Ontario Ministry of Environment Conservation and Parks (MECP) guideline for private (drilled) water wells. Well water quality from a 'lakeshore dug well' is assumed to be equivalent to a surface water source, and significant precautionary measures (water treatment) must be used to ensure a safe water supply.

INTRODUCTION

This study was conducted with general reference to the following regulations and guidelines:

- Ontario Ministry of the Environment, Conservation and Parks (MECP) Procedure D-5-4, Technical Guideline for Individual On-Site Sewage Systems, Water Quality Impact Risk Assessment (MOEE, 1996)
- Procedure D-5-5, Technical Guidance for Private Wells, Water Supply Assessment (MOEE, 1996b)

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- Ontario Water Resources Act, 1990. Ontario Regulation 903 (O. Reg. 903), 1990, Wells.

Figure 1: Site Location



SCOPE OF WORK

The scope of this limited assessment was revised following pre-consultation with the planning department at Prince Edward County and includes the following components:

- Desktop review of background information (water well records, geological databases, hydrology information, topography, known water uses).
- Inspect the lot for shallow groundwater/surface water conditions.
- Collect and submit one groundwater sample from the retained lot well (shoreline dug well) for laboratory analysis of 'subdivision supply' suite of parameters including bacteria.
- Tabulate water quality results and compare to Ontario Drinking Water Standards, Objectives and Guidelines.

SITE DESCRIPTION

PROPOSED LOT TO BE SEVERED

The retained lot at 37 Bellavista Drive is approximately 200 m south of Hyucks Road and is approximately 600 m west of the intersection of Hyucks Road and County Road 33. The lot to be severed is at the southwest corner of the retained lot and has an area of approximately 0.8 of a hectare. The site occurs within Prince Edward County and is within the Quinte Conservation Authority boundary. The proposed lot to be severed is indicated in Figure 2.

Figure 2: Site Layout



The proposed severed lot is grass covered with some trees. The site is flat and has an elevation of approximately 78 m asl. The elevation at the north end of the proposed lot is approximately 79.5 m asl, and the elevation at the lakeshore is approximately 76 m asl. Onsite drainage is by infiltration and overland flow towards the lake. There are no ponds on the proposed lot to be severed. Topographic contours are included in Figure 3.

It is anticipated that development of the severed lot will include a three-bedroom house serviced by a 'lakeshore dug well' and an onsite septic wastewater system.

RETAINED LOT

An existing residence is located on the retained lot. The residence is serviced by a private 'lakeshore dug well' and an onsite septic wastewater system. NOTE: For the purpose of this report the 'lakeshore dug well' on the retained lot will be referred to as DW1. Water treatment at the retained lot residence includes particulate filtration, carbon filtration, an ultraviolet reactor, and a water softener. Most of the site is grass covered with some trees. A small vineyard is located to the north of the house. Two solar panel arrays at the proposed severed lot will remain in place after the lot is severed and will be disconnected from the retained lot. The retained lot is indicated in Figure 2.

METHODOLOGY

BACKGROUND INFORMATION

A review of available background information was conducted including:

- MECP water well records
- MECP permit to take water (PTTW) database
- Topographic databases
- Quinte Conservation online GIS
- Property information from the Prince Edward County GIS
- Ontario Geological Survey (OGS) online geology mapping databases

GROUNDWATER SAMPLING

One groundwater sample was collected at the 'lakeshore dug well' (DW1) on the retained lot (37 Bellavista Drive) on March 3, 2022. The sample was collected according to BluMetric standard procedures and the MECP's 'Practices for the Collection and Handling of Drinking Water Samples

Version 2.0 April 1, 2009'. The groundwater sample was submitted for comprehensive testing of chemical and physical water quality parameters.

The sample was collected unfiltered and unchlorinated and was placed directly into clean bottles supplied by the analytical laboratory. The sample was placed immediately into a cooler with ice and was transported directly to the Caduceon Laboratory at Kingston Ontario. The sample was delivered to the laboratory within 24 hours of collection. Caduceon is accredited by the Canadian Association for Laboratory Accreditation (CALA) for testing according to the Ontario Safe Drinking Water Act (OSDWA, 2002).

INTERVIEW

An interview with the well owner was conducted at the time of sampling. A standard interview form requesting details about well water quality and quantity was used. The interview form includes questions about the onsite wastewater treatment system. A copy of the completed well interview form is included as Attachment A.

GEOLOGY

SURFICIAL GEOLOGY

Surficial geology information from the Ontario Geological Survey was obtained from the OGS Earth website (OGS, 2022).

The data from OGS shows that the site has Paleozoic bedrock at or near surface. The geology is described as “undifferentiated carbonate and clastic sedimentary rock, exposed at surface or covered by a discontinuous, thin layer of drift”. The physiography is described as “limestone plains”. A linear feature described as a beach ridge/near shore bar extends from the northeastern corner of the retained lot to the northeast.

The water well records (see below) show that the thickness of the overburden unit within 500 m the subject property varies site from 0.3 m to 4 m and is an average of 1.3 m thick. The overburden is generally comprised of clay over gravel.

BEDROCK GEOLOGY

Geological mapping information from the OGS Earth website (OGS, 2022) shows that the site is located in an area where the Middle Ordovician Lindsay Formation is the uppermost bedrock unit. The Lindsay formation is the uppermost unit in the Simcoe Group. The bedrock is described as limestone, nodular to black laminated. The site is not in an area of inferred karst.

HYDROGEOLOGY

Overburden groundwater was not investigated as part of this study. A shallow unconfined water table may exist within the overburden unit. The interpreted direction of groundwater flow in the overburden unit is expected to be to the south, towards Lake Ontario.

The bedrock aquifer consists of water bearing fracture zones (i.e., horizontal bedding plane fractures) that occur between relatively unfractured layers of massive bedrock. The primary water supply aquifer occurs within the horizontally bedded Palaeozoic carbonate sedimentary bedrock. Permeability within these strata is controlled by fractures. The primary porosity associated with horizontal bedding plane fractures. A secondary porosity is associated with subvertical fracturing. The interpreted direction of groundwater flow in bedrock at the site is probably to the south, towards Lake Ontario.

Water Well Records

A total of 26 water well records from the MECP Water Well Information System (MECP, 2022a) were reviewed (individual well records are provided in Attachment B). The well record locations are shown on Figure 3. Please note that the well records locations are based on the database coordinates and may be subject to varying degrees of error. A summary of relevant information from the water well records is provided in Table 1.

Water bearing fractures mentioned in the water well records occur at variable depths, from 2 m below ground surface (bgs) to 27 m bgs. Three of the well records indicate the well was unable to provide sufficient water. Three wells produced salty water (two of these wells were abandoned). Four well records indicate 'sulphur'. Only 14 of 26 well records indicate fresh water in drilled wells and five of these wells have indications of low yield. Two of the well records are for dug wells and it appears that at least three neighbouring properties may be serviced by dug wells for which there are no well records in the system. Taken collectively this information shows that drilled wells in the area are sometimes capable of providing a suitable water supply (31% of the wells) but there are many instances where this is not the case.

A well record corresponding to the retained lot dug well was not identified. Several of the surrounding properties appear to be serviced by ‘lakeshore dug wells. Corresponding water well records were also not identified for these wells (Please Note: although the Ontario government requires all new wells to be constructed by a licensed well technician and registered in the ‘water well information system’, the registration of dug wells has been historically inconsistent).

Table 1: Water Well Records Summary

MOECC WATER WELL RECORDS SUMMARY											
Well Record ID	Year drilled	Depth to BR (m)	Overburden material	Total depth (m)	Casing depth (m)	Depth to water bearing fractures (m)	Water Quality	Static Water Level (m)	Drawdown after Drillers Pumping Test (m)	Recommended pumping rate (IGPM)	Recommended pumping rate (L/min)
5301240	1961	2.7	clay	9.1	2.7	7.3	FRESH	3.4	3.66	-	-
5301241	1961	-	previously drilled, stones	17.4	2.7	12.2	FRESH	9.1	12.2	5.0	23
5301248	1966	1.5	clay, gravel	30.5	1.5	27.1	FRESH	9.1	30.5	0.8	4
5301249	1966	1.8	clay, gravel	22.9	-	-	DRY	-	-	-	-
5301251	1960	0.3	clay, gravel	32.3	0.3	-	DRY	-	-	-	-
5301252	1963	0.9	clay, gravel	13.7	0.9	5.5 / 12.2	FRESH	1.2	6.1	5.0	23
5301930	1968	1.5	clay, gravel	25.0	1.5	21.3	FRESH	3.7	25.0	3.0	14
5303033	1974	1.2	brown clay, gravel	16.8	3.0	14.6	FRESH	2.4	16.8	5.0	23
5303619	1977	1.2	brown clay, gravel, packed	24.4	3.0	21.3	FRESH	3.7	24.4	3.0	14
5304409	1984	0.9	brown loam, brown clay	18.3	3.4	3.7	FRESH	1.8	3.0	26.0	118
5305013	1988	0.6	brown clay, shale, packed	30.5	6.7	18.6	SULPHUR	3.4	18.0	0.5	2
5305014	1988	0.6	brown clay, packed	20.1	6.7	18.6	FRESH	3.0	20.1	5.5	25
5305015	1988	0.6	brown clay, packed	32.0	6.7	18.3	SULPHUR	2.7	18.0	1.0	5
5305243	1989	1.2	brown hardpan, loose gravel	29.0	6.7	17.7	SALTY	-	-	-	-
5305244	1989	1.8	brown hardpan, loose gravel	15.2	3.0	12.2	SALTY	-	-	-	-
5305245	1989	1.2	brown hardpan, loose gravel	19.5	6.7	17.7 / 23.2	SALTY	6.1	19.5	30.0	136
5305246	1989	0.6	brown loam, loose	19.5	3.4	4.0	FRESH	3.0	19.5	2.0	9
5305508	1990	2.4	sand, stones	10.7	-	6.4	SULPHUR	2.4	9.4	4.0	18
5305752	1991	0.6	brown clay, packed	12.8	7.9	8.2	FRESH	4.3	12.8	13.0	59
5305753	1991	0.6	brown clay, packed	18.3	7.6	12.2 / 15.8	FRESH	4.3	18.3	4.5	20
5305950	1993	1.5	brown loam, stones, soft	30.5	6.4	?	FRESH	0.0	30.2	0.5	2
5306110	1994	3.0	brown loam, packed	25.0	-	-	DRY	-	-	-	-
5306133	1994	-	previously drilled	24.7	14.3	7.6	FRESH	3.7	24.7	8.0	36
5306312	1996	1.8	black loam	15.2	3.0	3.2 / 13.4	SULPHUR	2.1	1.5	35.0	159
7048791	2007	0.6	brown loam	6.8	2.1	2 / 3 / 4	DUG WELL / FRESH	0	7	15.0	68
7336955	2019	0.3	brown loam	5.8	5.8	5.8	DUG WELL / not tested	0	5	12.0	55

A review of the MECP Permit to Take Water (PTTW) database was carried out within a 4 km radius of the site. PTTW information was obtained directly from the MECP interactive GIS system (MECP, 2022b). No permits were identified within the search area. The closest permits are for surface water takings associated with agricultural uses.

Potential Sources of Contamination

The following potential onsite sources of contamination at the site were identified:

- Groundwater at a lakeshore dug well may be under the direct influence of surface water. Surface water may be contaminated with bacteria and pathogens, potentially including protozoan oocysts such as *Cryptosporidium* sp. and *Giardia lamblia*.

The following potential offsite sources of contamination were identified:

- Application of road salt along Hyucks Point Road and Bellavista Drive is expected to have caused some limited impacts to the area immediately bordering the road and ditches. No significant onsite impact is expected as a result of road salt application activities.

Hydrogeological Sensitivity

The water well records show that the overburden thickness within 500 m of the subject property varies from 0.3 m to 4 m and is an average of 1.3 m thick. The overburden material at the site is thin and expected to be of moderate to low permeability based on the materials encountered (clay over gravel).

The site is not within an area mapped as 'inferred karst' as determined by the OGS Karst mapping layer (OGS, 2022).

Based on the summarized findings (thin overburden and upper bedrock contains water bearing fractures) the subject site is considered to be potentially hydrogeologically sensitive. Consequently, mitigative measures to address potentially hydrogeologically sensitive conditions are provided herein.

Groundwater Quality

It is anticipated that the new severed lot will be serviced by a 'lakeshore dug well', so water quality was assessed at the retained lot 'lakeshore dug well'. Laboratory analysis data from the retained lot dug well (DW1) is summarized in Table 2. Laboratory certificates of analysis are included in Attachment C. The analytical results show that untreated water quality at the retained lot is not acceptable and that there are exceedances of the applicable health related parameter limits of the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG).

Table 2: Groundwater Chemistry Results

Parameter	Units	RDL	ODWSOG	37 Bellavista Dug Well (DW1)
				3-Mar-22
Microbiological Parameters (Health)				
Escherichia Coli	ct/100 mL	0	0 ^{MAC}	3
Faecal Coliforms	ct/100 mL	0	not specified	3
Heterotrophic Plate Count	ct/100 mL	0	not specified	na
Total Coliforms	ct/100 mL	0	0 ^{MAC}	33
Chemical Parameters (Health)				
Fluoride	mg/L	0.1	1.5 ^{MAC}	<0.1
N-NH3 (Ammonia)	mg/L	0.01	not specified	<0.01
N-NO2 (Nitrite)	mg/L	0.1	1 ^{MAC}	<0.1
N-NO3 (Nitrate)	mg/L	0.1	10 ^{MAC}	1.8
Total Kjeldahl Nitrogen	mg/L	0.1	not specified	na
Turbidity (Lab)	NTU	0.1	1 ^{MAC}	0.3
Chemical Parameters with Aesthetic Objectives/ Operational Guidelines				
pH		0.01	6.5-8.5 ^{AO}	8.14
Hardness as CaCO3	mg/L	1	100 ^{OG}	266
Alkalinity (as CaCO3)	mg/L	5	500 ^{OG}	237
TDS (COND - CALC)	mg/L	1	500 ^{AO}	301
Calcium	mg/L	0.02	-	95.3
Chloride	mg/L	0.5	250 ^{AO}	29.6
Colour	TCU	2	5 ^{AO}	4
Conductivity	uS/cm	1	-	580
DOC	mg/L	0.2	5 ^{AO}	3.1
Hydrogen Sulphide	mg/L	0.01	0.05 ^{AO}	na
Phenols	mg/L	0.001	-	na
Sulphate	mg/L	1	500 ^{AO}	20
Tannin & Lignin	mg/L	0.1	-	na
Magnesium	mg/L	0.02	-	6.77
Potassium	mg/L	0.1	-	1.3
Sodium	mg/L	0.2	200 ^{AO}	26.2 *
Iron	mg/L	0.005	0.3 ^{AO}	<0.005
Manganese	mg/L	0.001	0.05 ^{AO}	<0.001
Field Parameters				
pH	no units	0.01	6.5-8.5 ^{AO}	7.2
Conductivity	uS/cm	0.1	-	600.4
Temperature (°C)	°C	0.1	-	8.3

Notes:

1. Shaded indicates results exceed criteria
2. RDL - Reported Detection Limit na = not analyzed
3. Medical officer of health advisory if sodium exceeds 20 mg/L. Sodium AO is 200 mg/L
4. Ontario Ministry of Environment (MOE), 2003/2022. Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) (June 2003). As amended.

The following exceedances of ODWSOG aesthetic objectives and operational guidelines are noted:

E. Coli

Escherichia coli (E. coli) is a gram-negative, facultative anaerobic, rod-shaped, coliform bacterium of the genus *Escherichia* that is commonly found in the lower intestine of warm-blooded organisms. The ODWSOG includes the following details regarding E. Coli:

Escherichia coli is a fecal coliform and can be detected using methods such as membrane filtration, presence/absence and MPN. Since Escherichia coli is present in fecal matter and prevalent in sewage, but is rapidly destroyed by chlorine, it is a strong indicator of recent fecal pollution. Contamination with sewage as shown by positive E-coli tests would strongly suggest presence of pathogenic bacteria and viruses, as well as more chlorine resistant pathogens such as Giardia and Cryptosporidium, which are much more difficult to detect.

Health Canada's "Escherichia coli in Drinking Water" (2019) includes the following information regarding private residential wells:

- *Regular E. coli testing combined with monitoring of critical processes, regular physical inspections and a source water assessment can be used to confirm the quality of the drinking water supply.*
- *The presence of E. coli indicates fecal contamination of the drinking water and as a result, there is an increased risk that enteric pathogens may be present.*
- *E. coli concentrations of "nondetectable" per 100 mL of water leaving the treatment plant should be achieved for all treated water supplies.*
- *Treatment of surface water sources or groundwater under the direct influence of surface waters (GUDI) should include adequate filtration (or technologies providing an equivalent log reduction credit) and disinfection.*

Total Coliforms

The ODWSOG includes the following details regarding Total Coliforms:

The coliform group of bacteria has been the most commonly used indicator of water quality. The coliform group consists of all aerobic and facultatively anaerobic, gram-negative, oxidase-negative, non-spore forming, rod-shaped bacteria. The group generally comprises the genera Escherichia, Klebsiella, Enterobacter and Citrobacter. The presence of these bacteria in drinking water is indicative of inadequate filtration/disinfection.

The recommendations detailed above for E. Coli are also applicable to the Total Coliforms Group. Water treatment and testing recommendations are included below under Development Recommendations.

Hardness

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

Sodium

The analytical result for sodium is below the ODWSOG aesthetic objective, but the result exceeds the 'medical notification limit' of 20 mg/L for persons on a sodium reduced diet. The ODWSOG (MOE, 2003) indicates that a concentration of sodium in drinking water that exceeds 20 mg/L is to be reported to the local Medical Officer of health "so that this information can be communicated to local physicians for their use with patients on sodium restricted diets".

Groundwater Quantity

It is anticipated that the new severed lot will be serviced by a 'lakeshore dug well'. The water well records show that only 9 of the 24 drilled wells within 500 m of the proposed lot to be severed appear to have adequate quality and quantity.

The site owner consulted with Chalk Drilling (local water well drilling company with extensive experience in Prince Edward County) regarding servicing of the new lot with a drilled well. Chalk Drilling recommended the site be serviced by a 'lakeshore dug well'. Chalk drilling expressed concerns about the general low yield of wells in the area.

The owner of the existing 'lakeshore dug well' at the retained lot did not identify any water quantity issues. The existing dug well has never run dry.

The suitability of the water supply well to meet typical water quantity requirements should be assessed after the new well is constructed. It is anticipated that water quantity at the new 'lakeshore dug well' will be more than adequate to meet the requirements discussed in MECP's Procedure D-5-5 (MOEE, 1996) which are assumed to be 1,800 L/day per house (per well), and a peak demand rate per 15 L/min for 2 hours based on a three-bedroom home with 4 occupants.

The Canadian Mortgage and Housing Corporation’s Household Guide to Water Efficiency (CMHC, 2000, revised 2014) indicates that the average daily residential water use per capita in Ontario is 225 L/day. 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 reduced from approximately 13 L/flush to 4.8 L/flush. Shower consumption is reduced from 18 L/min. to 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 will often be less than 1,000 L/day. A summary of daily usage estimates and associated usage rates is provided below in Table 3.

Table 3: Average Daily Use Summary

Water Use Summary						
Daily Usage Estimate Source	L/day/ person	Peak demand period (mins)	L/min/person (during peak demand period)	Persons per unit	L/min/house (during peak demand period)	Daily Household Water Demand (L/day)
Procedure D-5-5	450	120	3.75	4	15.0	1,800
CMHC	225	120	1.88	4	7.5	900
CMHC (with additional efficiency measures)	163	120	1.36	4	5.4	652

It is anticipated that the new severed lot will be serviced by a ‘lakeshore dug well’. The potential for interference with nearby drilled wells is considered to be insignificant because a ‘lakeshore dug well’ will not intersect or draw water from the bedrock aquifer.

DEVELOPMENT CONSIDERATIONS

FUTURE WELL

It is anticipated that the new severed lot will be serviced by a ‘lakeshore dug well’. It is unlikely that the dug well can be constructed in a location that is upgradient of the onsite septic bed, so a setback of at least 50 m is strongly recommended. The well must be installed by a licensed water well contractor in accordance with Ontario Regulation 903.

Immediately after installation of the new 'lakeshore dug well' a water quantity test should be conducted by the licensed well contractor responsible for installation of the well. The well should be pumped for two hours at a recommended minimum rate of 15 L/min in order to demonstrate that the well can provide a sufficient quantity of water to meet daily, and peak demand requirements as defined under Procedure D-5-5 (MOEE, 1996) for a three-bedroom house with four occupants.

The procedures provided in Health Canada's 'Escherichia coli in Drinking Water' (2019) should be reviewed and followed, including (but not limited to) shock chlorination and bacteriological testing of the new well.

Alternative Water Supply

If a 'lakeshore dug well' is deemed unsuitable (if significant concerns are identified regarding water quantity and/or quality), consideration should be given to installation of a drilled water supply well. The well must be installed by a licensed water well contractor in accordance with Ontario Regulation 903. Any new drilled well should be tested to ensure an adequate quantity and quality of water can be provided, according to the requirements of Procedure D-5-5 (MOEE, 1996). A report providing full details of well water quality and quantity with supporting information should be prepared by a suitably qualified person (Ontario licensed hydrogeologist) and submitted to Prince Edward County/Quinte Conservation for review.

Water Treatment

If the new severed lot is to be serviced by a 'lakeshore dug well' it is required to have minimum water treatment consisting of:

- Pre-filtration (25 and/or 10 micron and 5 micron) followed by absolute filtration to less than 1 micron prior to ultraviolet (UV) sterilization.
- UV sterilization with a National Sanitation Foundation (NSF) Class-A (NSF, 2019) device.
- Fail safe visual and audible indication if the system is not performing and/or a system that terminates the discharge of treated water if the system is not performing.

Since filtration and disinfection both contribute to the removal or inactivation of waterborne pathogens, both treatment processes are required. It should be anticipated by the owner that water treatment for hardness may also be required prior to UV sterilization. It is strongly recommended that the owner maintain a service contract with a qualified contractor to ensure the on-going maintenance and performance of the water treatment system.

The water within the bedrock aquifer displays elevated hardness. Installation of a commercial grade water softener would reduce the concentrations of hardness and extend the lifespan of the UV sterilization system. Conventional water softeners introduce sodium into the water supply. The concentration of sodium in the water supply already exceeds the ‘medical notification limit’ of 20 mg/L for persons on a sodium reduced diet, so a conventional water softener is not recommended. Softening using potassium chloride salt rather than sodium chloride salt can be used to eliminate additional sodium intake from softened drinking water. Sodium can also be removed from drinking water by using reverse osmosis or by distillation.

Testing of Treated Water

Treated water should be tested on a regular basis for bacteriological parameters. Free microbiological testing for water wells is available through Public Health Ontario. Details regarding sample bottle pickup and sampling procedures can be accessed at the Hastings Prince Edward Public Health website (<https://hpepublichealth.ca/well-water/>). Sampling should be conducted at a minimum of two times per year, at times when the risk of contamination of the drinking water source is the greatest, (e.g. early spring after the thaw, after an extended dry spell, and/or following heavy rains/flooding).

WASTEWATER TREATMENT AND DISPOSAL

MECP’s Procedure D-5-4 (MOEE, 1996a) provides a methodology for assessing the risks associated with individual onsite sewage systems. 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. The lot size at the proposed lot to be severed is 0.8 of a hectare. The average lot size in the vicinity of the subject site (based on the subject site and surrounding lots) is approximately 1.9 hectares. The site is potentially hydrogeologically sensitive, so a predictive nitrate impact assessment is provided.

An assessment of the potential impact of nitrate on overburden groundwater was conducted. The assessment is based on a reasonable estimate of groundwater recharge by infiltration from precipitation. The method relies on estimates of evaporation, evapotranspiration, infiltration and runoff and inputs regarding surficial soil type, vegetative ground cover and topography. A nitrate effluent concentration of 40 mg/L and a wastewater flow of 1,000 Litre/day per lot is used as specified in Procedure D-5-4.

A mean annual precipitation value (net of evaporation and evapotranspiration processes) of 948.3 mm/year was used (Environment Canada, Climate Normals 2022 – Mountainview Station). 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). The calculations are provided in Attachment D. The assessment shows that the nitrate impact for the proposed subdivision will be approximately 7.7 mg/L (based on post-development conditions). The additional loading will be below the provincially mandated limit of 10 mg/L. This assessment shows that nitrate in effluent from proposed development will have an acceptable impact on overburden water quality.

Sewage System Design

Based on the assessed terrain conditions (thin overburden), a raised tile bed is anticipated for the proposed severed lot. Any proposed septic system design should be supported by a lot-specific assessment meeting local septic approval requirements.

Sewage systems are designed according to Part 8 of the Ontario Building Code (OBC, 2012). The OBC sets out minimum design and construction standards for all approved classes of sewage systems. It is proposed that this site be serviced with traditional Class 4 sewage systems consisting of a septic tank and separate leaching bed.

Wherever possible, leaching beds should be located down gradient from any nearby wells or surface water bodies. The Ontario Building Code stipulates minimum clearance distances for in-ground and raised tile beds. Table 4 gives clearances for the various types of beds. In order to provide a safety margin, it is BluMetric’s recommendation that an offset of 50 m be observed between an onsite wastewater treatment system and a ‘lakeshore dug well’. Clearance distances in Table 4 also apply to wells and sewage systems located on neighbouring lots.

Table 4: Tile Bed Clearances

Surface Feature	Minimum Clearance (m)		
	In-ground	Partially Raised	Fully Raised
Water supply well with a watertight casing to a depth of 6 m	15	16.5	18
Any other water supply well (including dug wells)	30	31.5	33
Surface water body*	15	16.5	18
Structures	5	7.5	8
Lot boundaries	3	4.5	6

Source: Table 8.2.1.6.B of O.Reg. 332/12, as amended (Ontario Building Code) and increased for a 1.5 m fully raised leaching bed as required by Sentence 8.7.4.2.(11).

The homeowner is advised to have the on-site wastewater system inspected regularly and to follow a wastewater system management program to minimize the risk of failure and impact to the groundwater. Best management practices are recommended such as regular pumping of the septic

system, cursory inspection of break-out, consideration as to what materials are being discharged to the septic. It is recommended that homeowners take all reasonable measures to conserve water and promote infiltration of water into the subsurface within each of their lots. The homeowner shall consult the following guides available at: <https://www.oowa.org/homeowner-resources/>

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

A raised leaching bed with an imported sand mantle is indicated. The end of each mantle will be unobstructed and free draining. 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. Detailed soil morphology should only be determined by a qualified geotechnical specialist.

As an alternative to the use of a traditional fill-based absorption trench style leaching bed, advanced treatment of sanitary sewage may be utilized. The sewage system envelopes associated with effluent meeting Column 3 of Table 8.6.2.2.A of the OBC can be approximately 40% smaller than conventional absorption trench leaching beds.

CONCLUSIONS / RECOMMENDATIONS

The following conclusions and recommendations are based on the investigations and analyses contained within this report:

- The existing 'lakeshore dug well' is suitable for the purpose of characterizing the water supply aquifer at the subject site.
- A new 'lakeshore dug well' will probably provide a sufficient quantity of water for the intended residential use. A new dug well should be tested for quantity to ensure it meets the water quantity requirements of Procedure D-5-5 (MOEE, 1996). A two-hour pumping test at a flow rate of no less than 18.75 L/min should be conducted by a licenced well technician.
- A 'lakeshore dug well' water quality is unlikely to satisfy the health-related bacteriological limits of the ODWSOG (E. coli. and Total Coliforms identified). In this regard the water will require treatment before it can be used for domestic consumption. Pre-filtration and absolute filtration to less than 1 micron prior to ultraviolet (UV) sterilization is mandatory.

Automatic fail-safe controls are strongly recommended. This conclusion is based on the sample obtained from the retained lot well on March 3, 2022, and subsequent analysis.

- All other parameter results from analytical testing were below the health-related limits of the ODWSOG. The result for hardness exceeded the Operational Guideline limit (a non-health related parameter). Elevated hardness can be treated with a commercial grade water softener. Water softening using potassium chloride salt rather than sodium chloride salt can potentially be used to eliminate additional sodium intake from softened drinking water.
- Treated water should be tested on a regular basis to ensure the efficacy of the water treatment system. Samples should be tested for bacteriological parameters. Sampling should be conducted at a minimum of two times per year, at times when the risk of contamination of the drinking water source is the greatest (e.g., early spring after the thaw, after an extended dry spell, and/or following heavy rains/flooding).
- The concentration of sodium (26.2 mg/L) in the sample from DW1 exceeds the 'medical notification limit' of 20 mg/L. The local Medical Officer of Health should be notified when the sodium concentration in drinking water exceeds 20 mg/L.
- Based on the assessed terrain conditions (thin overburden), a raised tile bed is anticipated for the proposed severed lot. Any proposed septic system design should be supported by a lot-specific assessment meeting local septic approval requirements.
- A minimum separation distance of 50 m between a raised Class 4 sewage system and a 'lakeshore dug well' should be used as the well will be positioned in a downgradient location (this distance is greater than the distance recommended in the OBC and is intended to be protective in light of site-specific factors and constraints).

LIMITATIONS

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

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

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

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

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

Respectfully submitted,
BluMetric Environmental Inc.



Russell Chown, P.Geo.
Senior Hydrogeologist

Encl:

Attachment A: Interview Form
Attachment B: Water Well Records
Attachment C: Laboratory Certificate of Analyses
Attachment D: Nitrate Impact Assessment

Ref: 37 Bellavista Hydrog FINAL sev rpt - 24mar22.docx

REFERENCES

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<https://wvc.ca/wp-content/uploads/2021/08/Technical-Support-Documents-for-Ontario-Drinking-Water-Standards-Objectives-and-Guidelines.pdf>
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Thornthwaite, C. W., and Mather, J.R., 1957: Instructions and tables for computing potential evapotranspiration and the water balance. Publications in climatology, Volume 10(3), Laboratory of Climatology.

FIGURE



LEGEND

- MECP Well Location
- Property Outline
- Proposed lot to be severed
- Study Area
- Elevation Contour (0.5 masl)
- Elevation Contour (2.0 masl)

REV.	DESCRIPTION	YY/MM/DD	BY	CHK
1				

REFERENCES
 PROPRIETARY INFORMATION MAY NOT BE REPRODUCED OR DIVULGED WITHOUT PRIOR WRITTEN CONSENT OF BLUMETRIC ENVIRONMENTAL INC. DO NOT SCALE DRAWING.
 THIS DRAWING MAY HAVE BEEN REDUCED. ALL SCALE NOTATIONS INDICATED ARE BASED ON 11"x17" FORMAT DRAWINGS.

1:5,000

CLIENT
RFA Planning Consultant Inc.

PROJECT
RFA Planning Hydrogeological Assessment, Prince Edward County

TITLE
Water Well Records

1682 Woodward Drive
 Ottawa, ON K2C 3R8
 TEL: (613) 839-3053
 Email: info@blumetric.ca
 Web: http://www.blumetric.ca

PROJECT # 220235		DATE March 23, 2022	
DRAWN IT	CHECKED RC	FIG NO. 03	REV 0

ATTACHMENT A

Interview Form



TM

Project _____
Designed by _____

Project No. _____
Checked by _____

Water Well / Septic System Inspection Log

BluMetric
 Address: 37 Bellavista Project Number: 220235
 Name of Property Owner: Liz Brown
 Date of Inspection: Mar 03, 2012 Owner telephone No: 613 399 5725
 BLM Rep: ML Time onsite: 2 hrs

Well Details
 Is well casing exposed above ground surface? (Y) / N Length of stickup: _____
 Does owner have a copy of the 'water well record'? Y / (N) Try to obtain a copy or get details (take a photo)
 How old is the well? 17 yr In what year was the house built? 2000-2002 build
 Depth of well? _____ Depth of well casing? _____ Diameter of casing: 4" / 6" / other?
 Who drilled the well? dug shore well check well cap for driller ID
Chris Jackson Cons.

Water Quality
 Taste? _____
 Odour? Good, no odour after system
 Colour? clear
 Hardness? _____
 History of bacteria testing? yearly testing
 Any other water quality related comments or issues? no - full system

Water treatment details: filters, softeners, carbon filter, UV
 SAMPLING DETAILS: after
 Copy of results to well owner? (get contact details / email address)
 Temp 8.3°C pH 7.20 Cond 600.4 TDS _____ ORP 156.9

Water Quantity
 Size of pump in well? _____ Type of pump? Submersible
 Pumping rate? _____ has owner ever seen it layed out on surface?
 Depth of pump in well? _____
 Any water quantity related comments or issues? slight sulphur
 Has the well ever run dry? NO

Septic System draw location on sketch
 Class 4? Tertiary treatment?
 Have there been any problems with the septic system? Y / (N) regular tank
pumping

Environmental Concerns
 Surface water? shoreline degradation - 45' restoration in front of shore well
 Septic System? no
 Land use? residential
 Neighbouring properties? residential, vineyards
 Potential sources of contamination (onsite and offsite)? none

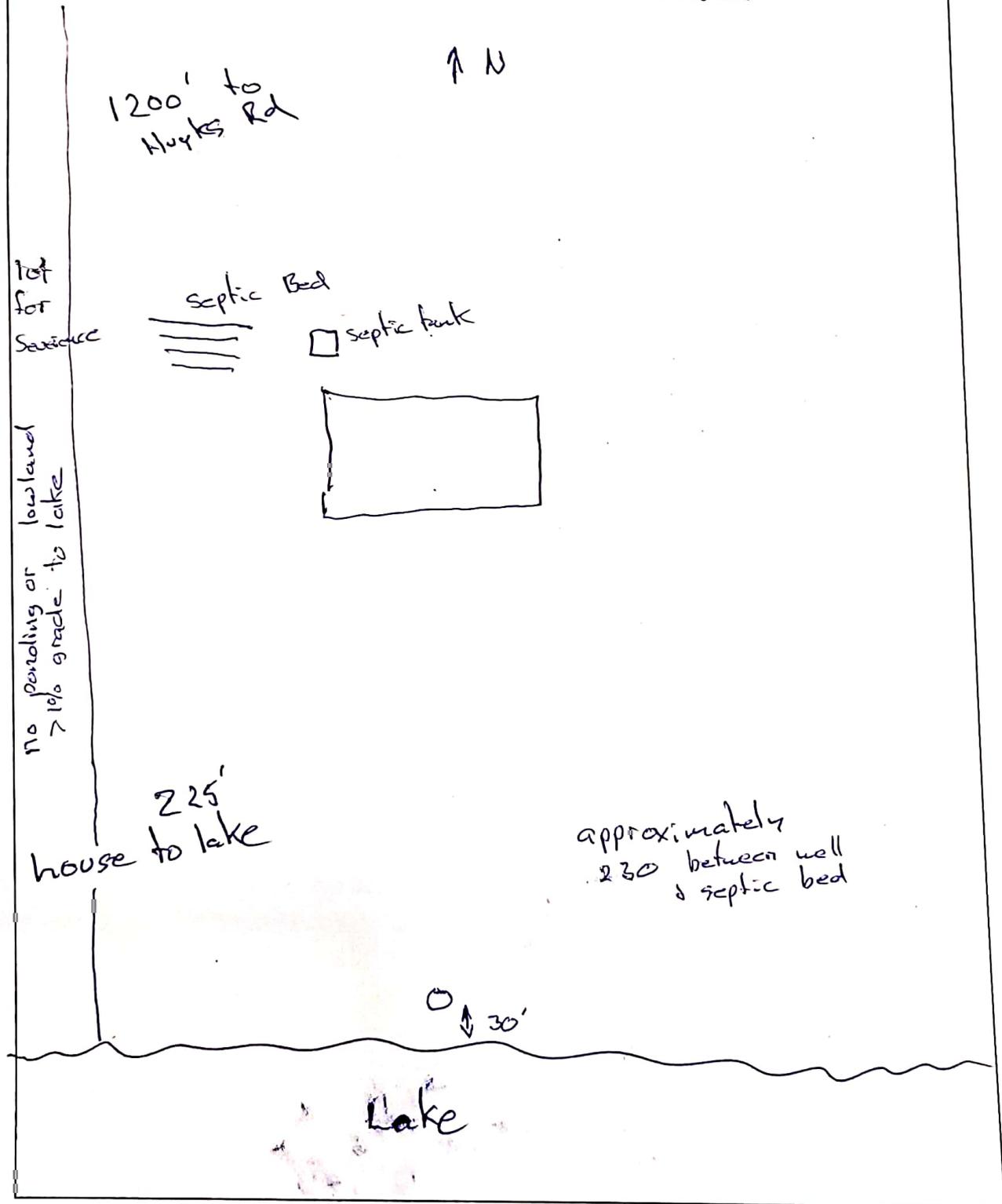
Please sketch the site layout showing well location and location of septic system - on reverse side of this sheet



BluMetric

Water Well / Septic System Inspection Log

draw site layout / show north arrow and approx scale / show well location / show septic system location / gradients



ATTACHMENT B

Water Well Records



53 No. 1249

UTM 11Uz 15R 0280

The Ontario Water Resources Commission Act

WATER WELL RECORD

Basin 24 Prince Edward Township, Village, Town or City Hillier
County of Prince Edward Date completed August 25, 1966
Con. 1 Lakeside Lot 19 (day month year)
Address Wellington, Ont.

Casing and Screen Record

Inside diameter of casing 8"
Total length of casing 6 ft.
Type of screen
Length of screen
Depth to top of screen
Diameter of finished hole 8"

Pumping Test

Static level
Test-pumping rate dry well G.P.M.
Pumping level casing pulled and well filled
Duration of test pumping
Water clear or cloudy at end of test
Recommended pumping rate G.P.M.
with pump setting of feet below ground surface

Well Log

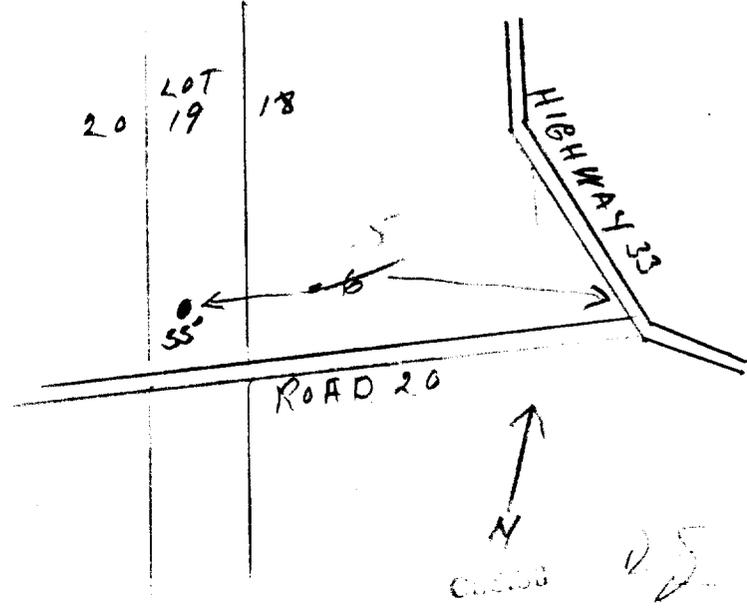
Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
<u>clay gravel</u>	<u>0</u>	<u>6</u>		
<u>hard grey limestone</u>	<u>6</u>	<u>75</u>		

For what purpose(s) is the water to be used? farm use
Is well on upland, in valley, or on hillside? level ground
Drilling or Boring Firm L.H. McClennon & Son
Address Wellington, Ont.
Licence Number 2003
Name of Driller or Borer Ken McClennon
Address Wellington, Ont.
Date August 31, 1966
L.H. McClennon
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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



18 2 305960
 5 R 1067250
 2 R 0825
 29

Cap I
 Lakeside
 Lot 17



5301930

7-11-11

B

CODED

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District Prince Edward Township, Village, Town or City Hillier
 Date completed Aug 14, 1968
 (day month year)
 Address Wellington Ont.

Casing and Screen Record

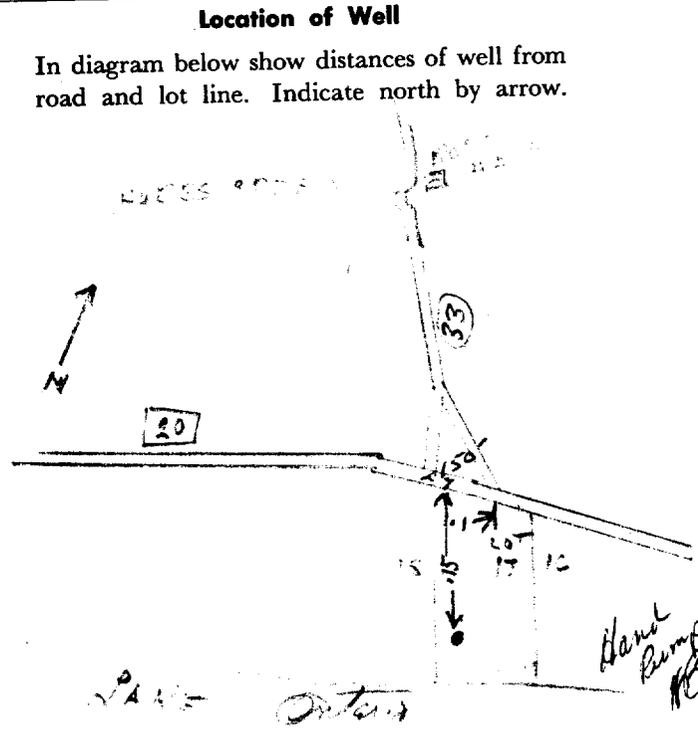
Inside diameter of casing 8"
 Total length of casing 5 ft.
 Type of screen
 Length of screen
 Depth to top of screen
 Diameter of finished hole 8"

Pumping Test

Static level 12 ft.
 Test-pumping rate 1 hr. G.P.M.
 Pumping level is empty
 Duration of test pumping 1 hr.
 Water clear or cloudy at end of test clear
 Recommended pumping rate 3 G.P.M.
 with pump setting of 79 feet below ground surface

Well Log	Water Record			
	Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found
<u>clay gravel</u>	<u>0</u>	<u>5</u>		
<u>grey limestone</u>	<u>5</u>	<u>82</u>	<u>70 ft.</u>	<u>fresh</u>

For what purpose(s) is the water to be used? household use
 Is well on upland, in valley, or on hillside? level ground
 Drilling or Boring Firm L.H. McClennon & Son
 Address Wellington, Ont.
 Licence Number 2399
 Name of Driller or Borer Howard Everall
 Address Bloomfield, Ont.
 Date August 30, 1968
L.H. McClennon
 (Signature of Licensed Drilling or Boring Contractor)





MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act
WATER WELL RECORD

302/14E

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11 5303033 53004 C.P.N. 01

COUNTY OR DISTRICT: PRINCE EDWARD TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: HILLIER CON., BLOCK, TRACT, SURVEY, ETC.: 1 Lakeside LOT: 018

ELLINGTON CNT. DATE COMPLETED: DAY 31 MO 07 YR 74

ELEVATION: 4 285 BASIN CODE: 4 24 MAR 03, 1977 263

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
Brown	clay	gravel	packed	0	f
Grey	limestone		layered	f	55

31 000460511 0055215

41 WATER RECORD

WATER FOUND AT FEET	KIND OF WATER
10-13 0048	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
15-18	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
10-11 08'	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	1.188	0	0010
17-18 08'	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input checked="" type="checkbox"/> OPEN HOLE		10	0055
24-25	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE			

SCREEN

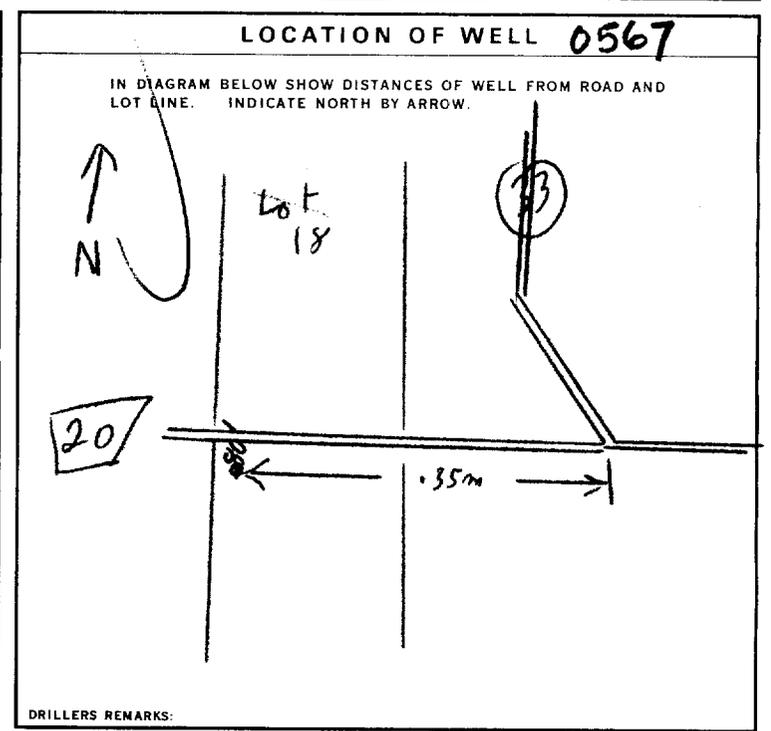
SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
31-33	34-38	39-40
MATERIAL AND TYPE		DEPTH TO TOP OF SCREEN 41-44 FEET

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD: 1 <input checked="" type="checkbox"/> PUMP AIR	PUMPING RATE: 0005 GPM	DURATION OF PUMPING: 01 HOURS 00 MINS
STATIC LEVEL: 008' FEET	WATER LEVEL END OF PUMPING: 055 FEET	WATER LEVELS DURING:
19-21	22-24	15 MINUTES: 035 FEET
26-28	29-31	30 MINUTES: 015 FEET
32-34	35-37	45 MINUTES: 009 FEET
38-41	42	60 MINUTES: 008 FEET
RECOMMENDED PUMP TYPE: <input checked="" type="checkbox"/> DEEP	RECOMMENDED PUMP SETTING: 052 FEET	RECOMMENDED PUMPING RATE: 0005 GPM



FINAL STATUS OF WELL 1 WATER SUPPLY

WATER USE 01 1 DOMESTIC

METHOD OF DRILLING 4 1 CABLE TOOL

CONTRACTOR

NAME OF WELL CONTRACTOR: M'CLENNAN DRILLING LTD LICENCE NUMBER: 3516

ADDRESS: WELKINGTON CNT.

NAME OF DRILLER OR BORER: Kenneth M'Clennan LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Kenneth M'Clennan SUBMISSION DATE: DAY MO. YR.

OFFICE USE ONLY

DATA SOURCE: 1 CONTRACTOR: 3516 DATE RECEIVED: 070375

DATE OF INSPECTION: INSPECTOR: A.M.

REMARKS:

P: WI

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5305013

WELL # 3 **53004** CON. **191**

COUNTY OR DISTRICT Prince Edward	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Hillier	CON. BLOCK, TRACT, SURVEY ETC I	LOT 25-27 18
Wellington, R.R. # 1			DATE COMPLETED DAY 25 MO 11 YR 88

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
Brown	Clay	Shale	Packed	0	2
Grey	Shale		Loose	2	3
Grey	Limestone		Hard	3	100

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13 61	1 <input type="checkbox"/> FRESH 3 <input checked="" type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
15-18	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
10-11 6 1/4"	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	0	22
17-18 6"	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input checked="" type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		22	100
24-25	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC			

61 SCREEN

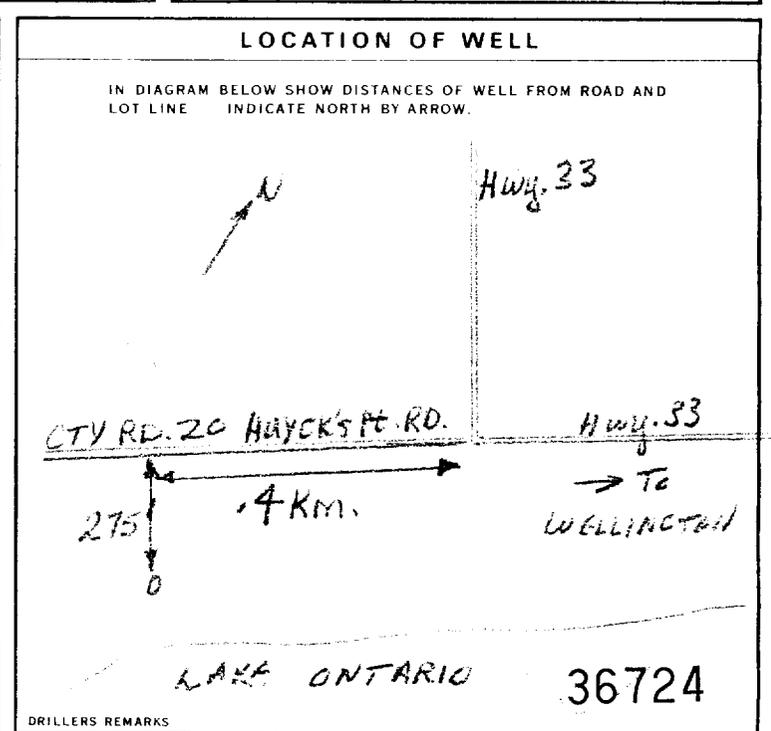
SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE		DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC)
10-13 3	14-17 20 cement
18-21	22-25
28-29	30-33

71 PUMPING TEST

PUMPING TEST METHOD 1 <input checked="" type="checkbox"/> PUMP 2 <input type="checkbox"/> BAILER	PUMPING RATE 1/2 GPM	DURATION OF PUMPING 15-16 HOURS 0 MINS
STATIC LEVEL 11 FEET	WATER LEVEL END OF PUMPING 59 FEET	WATER LEVELS DURING 15 MINUTES 54 FEET 30 MINUTES 49 FEET 45 MINUTES 45 FEET 60 MINUTES 42 FEET
IF FLOWING, GIVE RATE	PUMP INTAKE SET AT GPM	WATER AT END OF TEST FEET
RECOMMENDED PUMP TYPE <input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP	RECOMMENDED PUMP SETTING 97 FEET	RECOMMENDED PUMPING RATE 1/2 GPM



FINAL STATUS OF WELL

1 <input type="checkbox"/> WATER SUPPLY	8 <input type="checkbox"/> ABANDONED, INSUFFICIENT SUPPLY
2 <input type="checkbox"/> OBSERVATION WELL	9 <input type="checkbox"/> ABANDONED POOR QUALITY
3 <input checked="" type="checkbox"/> TEST HOLE	7 <input type="checkbox"/> UNFINISHED
4 <input type="checkbox"/> RECHARGE WELL	9 <input type="checkbox"/> DEWATERING

WATER USE

1 <input type="checkbox"/> DOMESTIC	5 <input type="checkbox"/> COMMERCIAL
2 <input type="checkbox"/> STOCK	6 <input type="checkbox"/> MUNICIPAL
3 <input type="checkbox"/> IRRIGATION	7 <input type="checkbox"/> PUBLIC SUPPLY
4 <input type="checkbox"/> INDUSTRIAL	8 <input type="checkbox"/> COOLING OR AIR CONDITIONING
<input type="checkbox"/> OTHER	9 <input checked="" type="checkbox"/> NOT USED

METHOD OF CONSTRUCTION

1 <input type="checkbox"/> CABLE TOOL	6 <input type="checkbox"/> BORING
2 <input type="checkbox"/> ROTARY (CONVENTIONAL)	7 <input type="checkbox"/> DIAMOND
3 <input type="checkbox"/> ROTARY (REVERSE)	8 <input type="checkbox"/> JETTING
4 <input checked="" type="checkbox"/> ROTARY (AIR)	9 <input type="checkbox"/> DRIVING
5 <input type="checkbox"/> AIR PERCUSSION	<input type="checkbox"/> DIGGING <input type="checkbox"/> OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR CHALK WELL DRILLING LTD.	WELL CONTRACTOR'S LICENCE NUMBER 1507
ADDRESS R.R. # 6, Napanee	
NAME OF WELL TECHNICIAN George R. Chalk	WELL TECHNICIAN'S LICENCE NUMBER T-0024
SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE DAY 25 MO 11 YR 88

OFFICE USE ONLY

DATA SOURCE	CONTRACTOR 1507	DATE RECEIVED FEB 22 1989
DATE OF INSPECTION	INSPECTOR	
REMARKS	WDE	

CSS.ES

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5305014

MUNICIPALITY 53004

CONTRACTOR CON

COUNTY OR DISTRICT: Prince Edward
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Hillier
CON. BLOCK, TRACT, SURVEY ETC: I
LOT: 19
DATE COMPLETED: DAY 25 MO 11 YR 88
R.R. #1, Wellington

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
Brown	Clay		Packed	0	2
Grey	Shale		Loose	2	3
Grey	Limestone		Hard	3	66

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
10-13 61	1 <input checked="" type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
15-18	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
20-23	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
25-28	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
30-33	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 1/4"	1 <input checked="" type="checkbox"/> STEEL 2 <input checked="" type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	0	22
6"	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input checked="" type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		22	66

SCREEN

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
10-13 15-18 20-23 25-28 30-33 5	20 cement

71 PUMPING TEST

PUMPING TEST METHOD: 1 PUMP 2 WATER

PUMPING RATE: 5 1/2 GPM

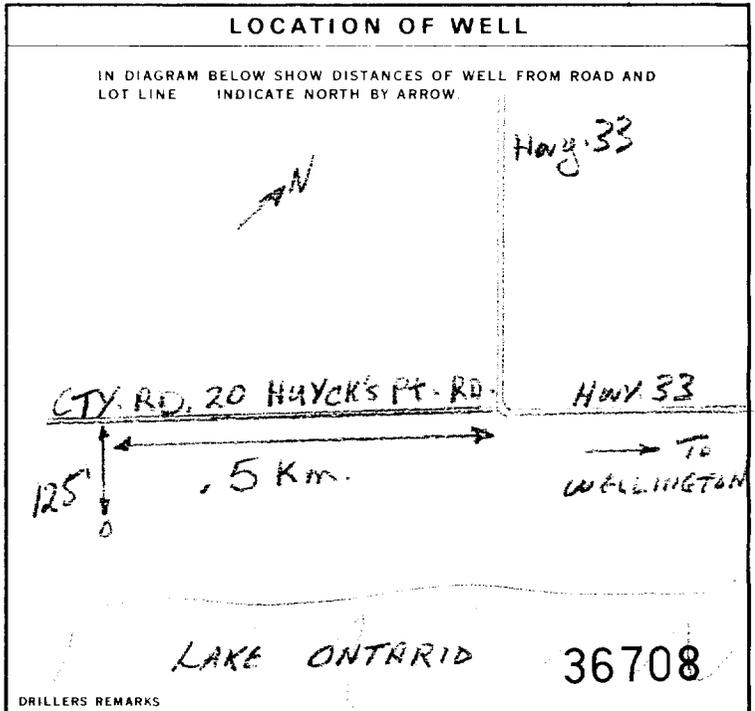
DURATION OF PUMPING: 1 HOURS 0 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING					
10 FEET	66 FEET	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES		
		38 FEET	20 FEET	13 FEET	11 FEET		

RECOMMENDED PUMP TYPE: SHALLOW DEEP

RECOMMENDED PUMP SETTING: 63 FEET

RECOMMENDED PUMPING RATE: 5 1/2 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 UNFINISHED
9 DEWATERING

WATER USE

1 DOMESTIC
2 STOCK
3 IRRIGATION
4 INDUSTRIAL

5 COMMERCIAL
6 MUNICIPAL
7 PUBLIC SUPPLY
8 COOLING OR AIR CONDITIONING
9 NOT USED

METHOD OF 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

CONTRACTOR

NAME OF WELL CONTRACTOR: CHALK WELL DRILLING LTD.
WELL CONTRACTOR'S LICENCE NUMBER: 1507

ADDRESS: R.R. #6, Napanee

NAME OF WELL TECHNICIAN: George R. Chalk
WELL TECHNICIAN'S LICENCE NUMBER: T-0024

SIGNATURE OF TECHNICIAN/CONTRACTOR: CHALK WELL DRILLING LTD.
SUBMISSION DATE: DAY 25 MO 11 YR 88

OFFICE USE ONLY

DATE RECEIVED: 1507 FEB 22 1989

DATE OF INSPECTION: INSPECTOR:

REMARKS: WDE CSS.ES

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5305508

MUNICIPALITY 53004

CON. CON

1991

COUNTY OR DISTRICT: **PRINCE EDWARD** TOWNSHIP, BOROUGH CITY, TOWN VILLAGE: **HULLER** CON. BLOCK TRACT SURVEY ETC: **CONC. 1** LOT: **18**
 ADDRESS: **WINNINGS ST. TORONTO M6T 3B9** DATE COMPLETED: DAY **28** MO **12** YR **90**

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
BROWN	SAND	STONES	FROZEN	0	1
BROWN	SAND	STONES	SOFT	1	8
GREY	LIMESTONE		HARD	8	35

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
21	1 <input type="checkbox"/> FRESH 2 <input type="checkbox"/> SALTY 3 <input checked="" type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 5 <input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD

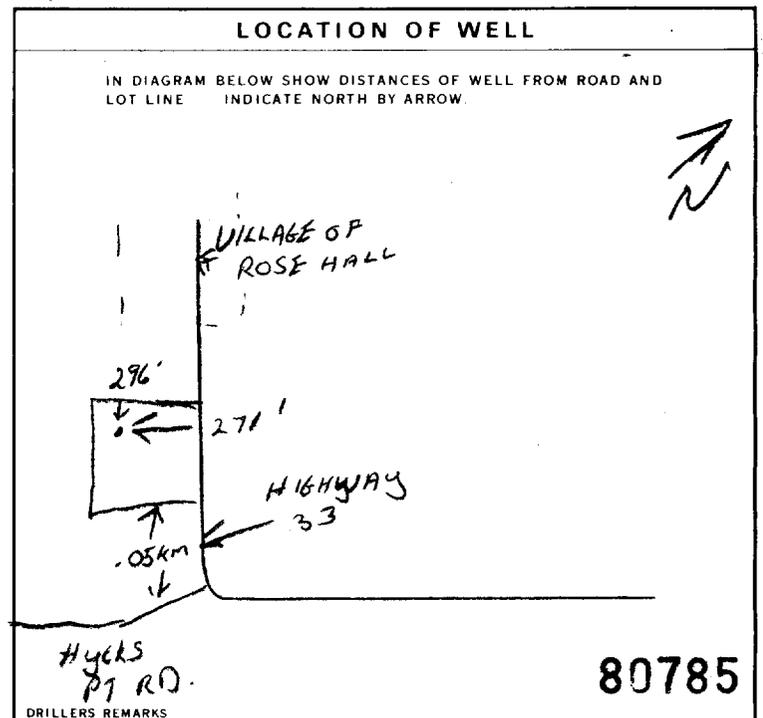
INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET
8	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		0 20
6 1/4	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	1.188	0 20
6 1/8	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		20 35

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET	MATERIAL AND TYPE
20	CEMENT GROUT
16	OVERBURDEN CUTTINGS

71 PUMPING TEST

PUMPING TEST METHOD: 1 <input type="checkbox"/> PUMP 2 <input checked="" type="checkbox"/> BAILER	PUMPING RATE: 4 GPM	DURATION OF PUMPING: 15-16 HOURS 20 MINS
STATIC LEVEL: 8 FEET	WATER LEVEL END OF PUMPING: 31 FEET	WATER LEVELS DURING PUMPING:
		15 MINUTES: 25 FEET 30 MINUTES: 31 FEET 45 MINUTES: 31 FEET 60 MINUTES: 31 FEET
RECOMMENDED PUMP TYPE: <input checked="" type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP	RECOMMENDED PUMP SETTING: 30 FEET	RECOMMENDED PUMPING RATE: 4 GPM



FINAL STATUS OF WELL

1 WATER SUPPLY 5 ABANDONED, INSUFFICIENT SUPPLY
 2 OBSERVATION WELL 6 ABANDONED POOR QUALITY
 3 TEST HOLE 7 UNFINISHED
 4 RECHARGE WELL 8 DEWATERING

WATER USE

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

METHOD OF CONSTRUCTION

1 CABLE TOOL 5 BORING
 2 ROTARY (CONVENTIONAL) 6 DIAMOND
 3 ROTARY (REVERSE) 7 JETTING
 4 ROTARY (AIR) 8 DRIVING
 9 AIR PERCUSSION 10 DIGGING 11 OTHER

CONTRACTOR NAME OF WELL CONTRACTOR: **PRINCE EDWARD**
 Name: **Stenson McKee** WELL DRILLERS LICENCE NUMBER: **6005**
 ADDRESS: **BOX 3 MILFORD ONT. K0K2P0**
 NAME OF WELL TECHNICIAN: **Rose Branson** WELL TECHNICIAN'S LICENCE NUMBER: **621**
 SIGNATURE OF TECHNICIAN/CONTRACTOR: **Rose Branson** SUBMISSION DATE: DAY **29** MO **12** YR **90**

OFFICE USE ONLY

DATA SOURCE: **6005** CONTRACTOR: **6005** DATE RECEIVED: **FEB 01 1991**
 DATE OF INSPECTION: _____ INSPECTOR: _____
 REMARKS: _____

5305753

MUNICIPALITY: 53004 CON. NO.: 01

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COUNTY OR DISTRICT: **Prince Edward** TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: **Hillier** CON. BLOCK, TRACT, SURVEY ETC: **I L.S.** LOT: **20**

R. R. # 1, Wellington, Ontario

DATE COMPLETED: DAY **24** MO **10** YR **91**

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
Brown	Clay		Packed	0	2
Brown	Shale		Loose	2	23
Grey	Limestone		Hard	23	60

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
40 (10-13)	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
52 (15-18)	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
20-23	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
25-28	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS
30-33	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 1/2"	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	0	25
6 1/2"	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input checked="" type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		25	60
	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC			

SCREEN

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)
23 (10-13) TO 16 (14-17)	Cement
16 (18-21) TO 0 (22-25)	Cuttings

71 PUMPING TEST

PUMPING TEST METHOD: AIR BRACER

PUMPING RATE: **4 1/2** GPM

DURATION OF PUMPING: **1** HOUR **0** MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING					
14 FEET	60 FEET	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES		
		26-28	29-31	32-34	35-37		
		40 FEET	20 FEET	14 FEET	14 FEET		

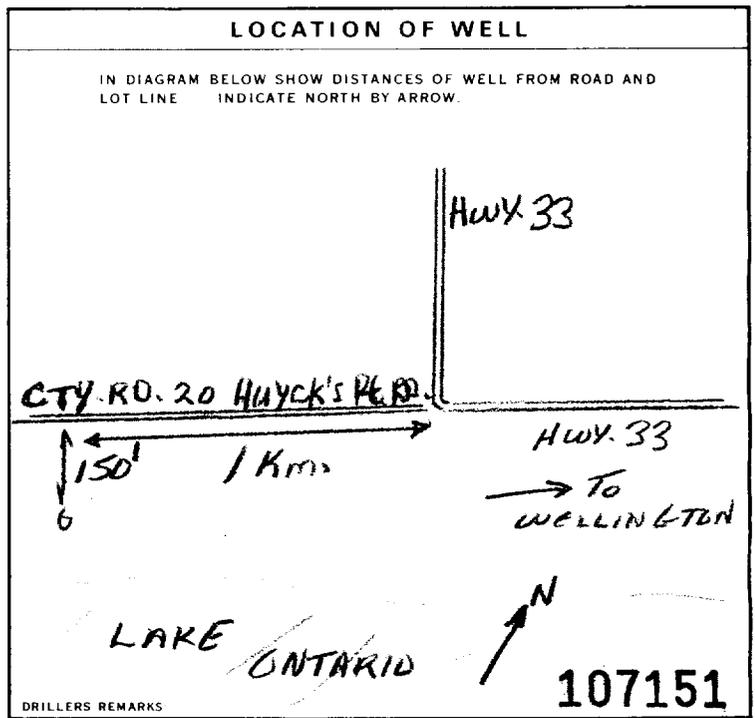
IF FLOWING, GIVE RATE: _____ GPM

PUMP INTAKE SET AT: _____ FEET

RECOMMENDED PUMP TYPE: SHALLOW DEEP

RECOMMENDED PUMP SETTING: **57** FEET

RECOMMENDED PUMPING RATE: **4 1/2** GPM



FINAL STATUS OF WELL

1 WATER SUPPLY 5 ABANDONED, INSUFFICIENT SUPPLY
2 OBSERVATION WELL 6 ABANDONED POOR QUALITY
3 TEST HOLE 7 UNFINISHED
4 RECHARGE WELL 8 DEWATERING

WATER USE

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

METHOD OF CONSTRUCTION

1 CABLE TOOL 6 BORING
2 ROTARY (CONVENTIONAL) 7 DIAMOND
3 ROTARY (REVERSE) 8 JETTING
4 ROTARY (AIR) 9 DRIVING
5 AIR PERCUSSION 10 DIGGING 11 OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: **CHALK WELL DRILLING LTD.** WELL CONTRACTOR'S LICENCE NUMBER: **1507**

ADDRESS: **R.R. # 6, Napanee, Ontario**

NAME OF WELL TECHNICIAN: **Tim Davey** WELL TECHNICIAN'S LICENCE NUMBER: **T-1495**

SIGNATURE OF TECHNICIAN/CONTRACTOR: _____ SUBMISSION DATE: DAY **24** MO **10** YR **91**

OFFICE USE ONLY

DATA SOURCE: **1507** CONTRACTOR: **1507** DATE RECEIVED: **APR 08 1992**

DATE OF INSPECTION: _____ INSPECTOR: _____

REMARKS: _____

CSS.ES



Ministry
of the
Environment
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

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5305950

MUNICIPALITY
53004

CON. NO. 101

COUNTY OR DISTRICT: PRINCE EDWARD TOWNSHIP, BOROUGH CITY TOWN, VILLAGE: HILLIER CON. BLOCK TRACT, SURVEY ETC.: CONC. I PART 19
DATE COMPLETED: DAY 29 MO 07 YR 93
WELL IDENTIFICATION: 1 WELLINGTON KOK320

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
BROWN GREY	TOP SOIL	STONES	SOFT	0	5
	LIMESTONE		HARD ROCK	5	100

WATER RECORD

DATE	KIND OF WATER	TEST METHOD
13-14	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	10
18-19	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	19
23-24	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	24
28-29	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	29
33-34	1 <input type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS	34

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
8	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		0	21
6 1/4	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	188	0	21
6 1/8	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		21	100

SCREEN

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET	MATERIAL AND TYPE
FROM TO	(CEMENT GROUT LEAD PACKER, ETC.)
21 10-13 0 14-17	CEMENT GROUT
18-21 22-25	
26-29 30-33 80	

TEST METHOD

1 PUMP 2 BAILER

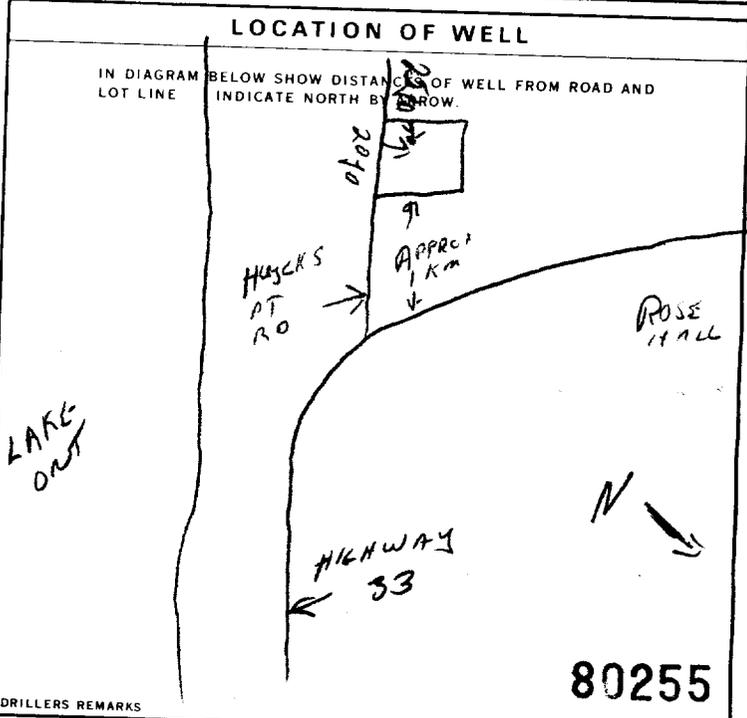
PUMPING RATE: 1/2 GPM DURATION OF PUMPING: 20 HOURS

WATER LEVEL END OF PUMPING	WATER LEVELS DURING					
FEET	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES	1 HOUR	2 HOUR
99	99	99	99	99	99	99

PUMP INTAKE SET AT: 95 FEET WATER AT END OF TEST: 42 FEET

ENDED PUMP TYPE: SHALLOW DEEP

RECOMMENDED PUMP SETTING: 95 FEET RECOMMENDED PUMPING RATE: 1/2 GPM



54 CLASSIFICATION OF WELL

1 WATER SUPPLY 5 ABANDONED, INSUFFICIENT SUPPLY
2 OBSERVATION WELL 6 ABANDONED POOR QUALITY
3 TEST HOLE 7 UNFINISHED
4 RECHARGE WELL 8 DEWATERING

55-56 USE OF WELL

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

57 METHOD OF CONSTRUCTION

1 CABLE TOOL 6 BORING
2 ROTARY (CONVENTIONAL) 7 DIAMOND
3 ROTARY (REVERSE) 8 JETTING
4 ROTARY (AIR) 9 DRIVING
5 AIR PERCUSSION 10 DIGGING 11 OTHER

DRILLER'S REMARKS

OFFICE USE ONLY

DATA SOURCE: 58 CONTRACTOR: 59-62 DATE RECEIVED: 63-68 80

6005 AUG 09 1993

DATE OF INSPECTION: INSPECTOR:

REMARKS:

CSS.ES

WELL CONTRACTOR

PRINCE EDWARD WELL DRILLERS
3 Millford Ont. KOK210

WELL CONTRACTOR'S LICENCE NUMBER
6005

WELL TECHNICIAN

2 Bronson
WELL TECHNICIAN'S LICENCE NUMBER: 621

SUBMISSION DATE
DAY 29 MO 07 YR 93

5306133

MUNICIPALITY: 53004 CON. CODE: COK

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COUNTY OR DISTRICT: **Prince Edward** TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: **Hillier** CON. BLOCK, TRACT, SURVEY ETC: **I L.S.** LOT: **20**

R. R. # 1, Wellington, Ontario DATE COMPLETED: DAY **16** MO **08** YR **94**

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET	
				FROM	TO
	Well previously drilled			0	71
Grey	Limestone		Hard	71	81

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
25	1 <input checked="" type="checkbox"/> FRESH 3 <input type="checkbox"/> SULPHUR 2 <input type="checkbox"/> SALTY 4 <input type="checkbox"/> MINERALS 6 <input type="checkbox"/> GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 1/4"	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC	.188	0	47
10"	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		47	71
6"	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE 5 <input type="checkbox"/> PLASTIC		71	81

SCREEN

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

61 PLUGGING & SEALING RECORD

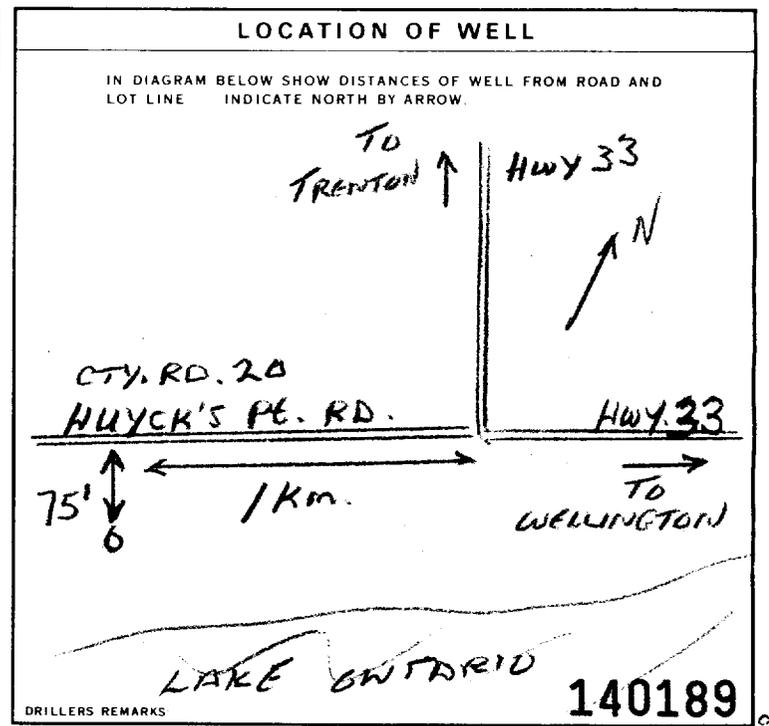
DEPTH SET AT - FEET	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)
10-13	14-17
18-21	22-25
26-29	30-33

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 <input type="checkbox"/> PUMP 2 <input checked="" type="checkbox"/> BAILER	8 GPM	3 HOURS 0 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING			
12 FEET	81 FEET	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
		26-28	29-31	32-34	35-37

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
<input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP	78 FEET	8 GPM



FINAL STATUS OF WELL

1 <input checked="" type="checkbox"/> WATER SUPPLY	5 <input type="checkbox"/> ABANDONED, INSUFFICIENT SUPPLY
2 <input type="checkbox"/> OBSERVATION WELL	6 <input type="checkbox"/> ABANDONED, POOR QUALITY
3 <input type="checkbox"/> TEST HOLE	7 <input type="checkbox"/> UNFINISHED
4 <input type="checkbox"/> RECHARGE WELL	<input type="checkbox"/> DEWATERING

WATER USE

1 <input checked="" type="checkbox"/> DOMESTIC	5 <input type="checkbox"/> COMMERCIAL
2 <input type="checkbox"/> STOCK	6 <input type="checkbox"/> MUNICIPAL
3 <input type="checkbox"/> IRRIGATION	7 <input type="checkbox"/> PUBLIC SUPPLY
4 <input type="checkbox"/> INDUSTRIAL	8 <input type="checkbox"/> COOLING OR AIR CONDITIONING
<input type="checkbox"/> OTHER	9 <input type="checkbox"/> NOT USED

METHOD OF CONSTRUCTION

1 <input checked="" type="checkbox"/> CABLE TOOL	6 <input type="checkbox"/> BORING
2 <input type="checkbox"/> ROTARY (CONVENTIONAL)	7 <input type="checkbox"/> DIAMOND
3 <input type="checkbox"/> ROTARY (REVERSE)	8 <input type="checkbox"/> JETTING
4 <input type="checkbox"/> ROTARY (AIR)	9 <input type="checkbox"/> DRIVING
5 <input type="checkbox"/> AIR PERCUSSION	<input type="checkbox"/> DIGGING <input type="checkbox"/> OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: **CHALK WELL DRILLING LTD.** WELL CONTRACTOR'S LICENCE NUMBER: **1507**

ADDRESS: **R. R. # 6, Napanee, Ontario**

NAME OF WELL TECHNICIAN: **R. Ian Chalk** WELL TECHNICIAN'S LICENCE NUMBER: **T-0047**

SIGNATURE OF TECHNICIAN/CONTRACTOR: **CHALK WELL DRILLING LTD.** SUBMISSION DATE: DAY **16** MO **08** YR **94**

DRILLERS REMARKS

REMARKS: **COULD NOT LOCATE ORIGINAL W.W. RECORD, FEB. 13/95. AE.**

DATE RECEIVED: **FEB 10 1995**

CSS.ES

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Mark correct box with a checkmark, where applicable.

5306312

Municipality 53004 Con. CON 01

County or District: [Redacted] Township/Borough/City/Town/Village: Hillier
 Con block tract survey, etc.: 1 Lot: 18
 Address: 44 Farrow Cr. Ajax, Ontario Date completed: 03 day 10 month 96 year

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)					
General colour	Most common material	Other materials	General description	Depth - feet	
				From	To
Black	Topsoil			0	1'
Brown	Clay SANDY STONES			1'	6'
Brown	SHALE			6'	7'
GREY	LIMESTONE			7'	50'
- WELL WATER IS NOT Sediment FREE - TRACE of sulfur & Gas - SALT SALT					

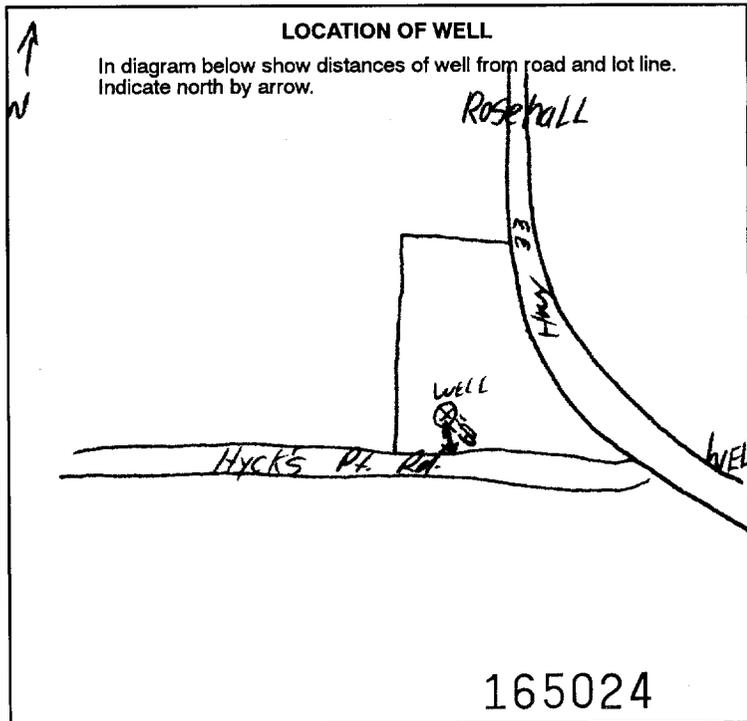
WATER RECORD	
Water found at - feet	Kind of water
10'6"	Unsalted Sulphur Minerals Gas
44'	Unsalted Sulphur Minerals Gas
	<input type="checkbox"/> Fresh Sulphur Minerals Gas <input type="checkbox"/> Salty Sulphur Minerals Gas
	<input type="checkbox"/> Fresh Sulphur Minerals Gas <input type="checkbox"/> Salty Sulphur Minerals Gas
	<input type="checkbox"/> Fresh Sulphur Minerals Gas <input type="checkbox"/> Salty Sulphur Minerals Gas

CASING & OPEN HOLE RECORD				
Inside diam inches	Material	Wall thickness inches	Depth - feet	
			From	To
6 1/4"	Steel	.188	18'	10'
6"	Galvanized		10'	50'
	Concrete			
	Open hole			
	Plastic			

SCREEN	Sizes of opening (Slot No.)	Diameter inches	Length feet
	Material and type		Depth at top of screen feet

PLUGGING & SEALING RECORD		
<input checked="" type="checkbox"/> Annular space		<input type="checkbox"/> Abandonment
Depth set at - feet		Material and type (Cement grout, bentonite, etc.)
From	To	
0'	10'	CONCRETE
18-21'	22-23'	
26-29'	30-33'	

PUMPING TEST	Pumping test method	Pumping rate	Duration of pumping
	<input type="checkbox"/> Pump <input checked="" type="checkbox"/> Bailer	2 GPM	17-18 Hours 30 Mins
	Static level	Water level end of pumping	Water levels during
	7.1' feet	46.8' feet	15 minutes: 14.6' feet, 30 minutes: 8.3' feet, 45 minutes: 8' feet, 60 minutes: 7.9' feet
	If flowing give rate	Pump intake set at	Water at end of test
		48' feet	<input type="checkbox"/> Clear <input checked="" type="checkbox"/> Cloudy
	Recommended pump type	Recommended pump setting	Recommended pump rate
	<input type="checkbox"/> Shallow <input checked="" type="checkbox"/> Deep		Est. 65 GPM



FINAL STATUS OF WELL

Water supply Abandoned, insufficient supply Unfinished
 Observation well Abandoned, poor quality Replacement well
 Test hole Abandoned (Other)
 Recharge well Dewatering

WATER USE

Domestic Commercial Not used
 Stock Municipal Other
 Irrigation Public supply
 Industrial Cooling & air conditioning

METHOD OF CONSTRUCTION

Cable tool Air percussion Driving
 Rotary (conventional) Boring Digging
 Rotary (reverse) Diamond Other
 Rotary (air) Jetting

Name of Well Contractor: ALEXANDER WELL DRILLING Well Contractor's Licence No.: 6663
 Address: RR#2 Carrying Place
 Name of Well Technician: LARRY ALEXANDER Well Technician's Licence No.: T-2533
 Signature of Technician/Contractor: Larry Alexander Submission date: day 17 mo 10 yr 96

MINISTRY USE ONLY

Data source: 6663 Date received: DEC 04 1996
 Date of inspection: Inspector:
 Remarks: CSS. S

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

5306336

Municipality 53004 Con. CON 01
10 14 15 22 23 24

11
1 2

County or District Prince Edward	Township/Borough/City/Town/Village Hillier	Con block tract survey, etc. I	Lot 18
Owner's surname K. G. Conley & Sons Ltd.	First name	Address R. R. # 1, Wellington, Ont.	
Date completed 23 10 96 day month year			

Zone Easting Northing RC Elevation RC Basin Code ii iii iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)					
General colour	Most common material	Other materials	General description	Depth - feet	
				From	To
				40	64
	Plug existing drilled well				
	Plugged by pumping 30% bent nite grout from 64 feet to 40 feet				

31
32

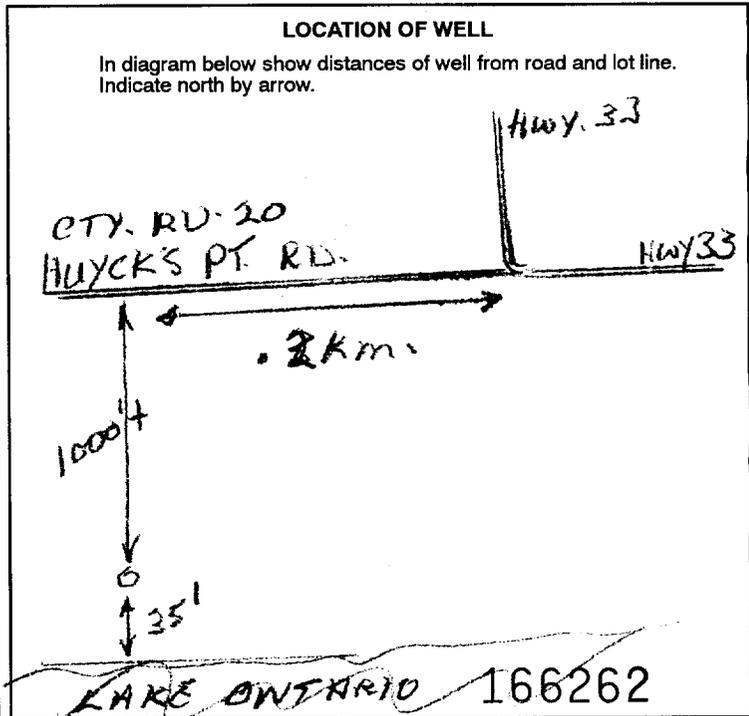
WATER RECORD			
Water found at - feet	Kind of water		
17-18	1 <input type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty	3 <input type="checkbox"/> Sulphur 4 <input type="checkbox"/> Minerals 5 <input type="checkbox"/> Gas	14
18-18	1 <input type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty	3 <input type="checkbox"/> Sulphur 4 <input type="checkbox"/> Minerals 5 <input type="checkbox"/> Gas	19
20-22	1 <input type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty	3 <input type="checkbox"/> Sulphur 4 <input type="checkbox"/> Minerals 5 <input type="checkbox"/> Gas	24
25-28	1 <input type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty	3 <input type="checkbox"/> Sulphur 4 <input type="checkbox"/> Minerals 5 <input type="checkbox"/> Gas	29
30-33	1 <input type="checkbox"/> Fresh 2 <input type="checkbox"/> Salty	3 <input type="checkbox"/> Sulphur 4 <input type="checkbox"/> Minerals 5 <input type="checkbox"/> Gas	34

CASING & OPEN HOLE RECORD				
Inside diam inches	Material	Wall thickness inches	Depth - feet	
			From	To
19-18	1 <input type="checkbox"/> Steel 2 <input type="checkbox"/> Galvanized 3 <input type="checkbox"/> Concrete 4 <input type="checkbox"/> Open hole 5 <input type="checkbox"/> Plastic			13-13
17-18	1 <input type="checkbox"/> Steel 2 <input type="checkbox"/> Galvanized 3 <input type="checkbox"/> Concrete 4 <input type="checkbox"/> Open hole 5 <input type="checkbox"/> Plastic			20-23
24-25	1 <input type="checkbox"/> Steel 2 <input type="checkbox"/> Galvanized 3 <input type="checkbox"/> Concrete 4 <input type="checkbox"/> Open hole 5 <input type="checkbox"/> Plastic			27-30

SCREEN	Sizes of opening (Slot No.)	Diameter inches	Length feet
	Material and type	Depth at top of screen feet	

PLUGGING & SEALING RECORD			
<input type="checkbox"/> Annular space		<input checked="" type="checkbox"/> Abandonment	
Depth set at - feet		Material and type (Cement grout, bentonite, etc.)	
From	To		
64	40	30% Solids Bentonite	
18-21	22-25		
26-29	30-33	80	

PUMPING TEST	Pumping test method		Pumping rate	Duration of pumping		
	1 <input type="checkbox"/> Pump 2 <input type="checkbox"/> Bailor		GPM	Hours	Mins	
	Static level	Water level end of pumping	Water levels during			
	19-21	22-24	15 minutes	30 minutes	45 minutes	60 minutes
If flowing give rate		Pump intake set at	Water at end of test			
GPM		feet	<input type="checkbox"/> Clear <input type="checkbox"/> Cloudy			
Recommended pump type		Recommended pump setting	Recommended pump rate			
<input type="checkbox"/> Shallow <input type="checkbox"/> Deep		feet	GPM			



FINAL STATUS OF WELL			
1 <input checked="" type="checkbox"/> Water supply	5 <input type="checkbox"/> Abandoned, insufficient supply	9 <input type="checkbox"/> Unfinished	
2 <input type="checkbox"/> Observation well	6 <input type="checkbox"/> Abandoned, poor quality	10 <input type="checkbox"/> Replacement well	
3 <input type="checkbox"/> Test hole	7 <input type="checkbox"/> Abandoned (Other)		
4 <input type="checkbox"/> Recharge well	8 <input type="checkbox"/> Dewatering		

WATER USE			
1 <input checked="" type="checkbox"/> Domestic	5 <input type="checkbox"/> Commercial	9 <input type="checkbox"/> Not used	
2 <input type="checkbox"/> Stock	6 <input type="checkbox"/> Municipal	10 <input type="checkbox"/> Other	
3 <input type="checkbox"/> Irrigation	7 <input type="checkbox"/> Public supply		
4 <input type="checkbox"/> Industrial	8 <input type="checkbox"/> Cooling & air conditioning		

METHOD OF CONSTRUCTION			
1 <input type="checkbox"/> Cable tool	5 <input type="checkbox"/> Air percussion	9 <input type="checkbox"/> Driving	
2 <input type="checkbox"/> Rotary (conventional)	6 <input type="checkbox"/> Boring	10 <input type="checkbox"/> Digging	
3 <input type="checkbox"/> Rotary (reverse)	7 <input type="checkbox"/> Diamond	11 <input type="checkbox"/> Other	
4 <input type="checkbox"/> Rotary (air)	8 <input type="checkbox"/> Jetting		

Name of Well Contractor CHALK WELL DRILLING LTD.	Well Contractor's Licence No. 1507
Address R. R. # 6, Napanee, Ontario	
Name of Well Technician Kevin Chalk	Well Technician's Licence No. T-0627
Signature of Technician/Contractor CHALK WELL DRILLING LTD.	Submission date 23 10 96 day mo yr

MINISTRY USE ONLY	Data source 1507	Contractor 1507	Date received FEB 19 1997
	Date of inspection	Inspector	
	Remarks <i>[Signature]</i>		

CSS. S

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

Address of Well Location (County/District/Municipality) PRINCE EDWARD		Township HILLIER	Lot P18	Concession 1
RR#/Street Number/Name 81 CTY RD 20		City/Town/Village	Site/Compartment/Block/Tract etc.	
GPS Reading	NAD 83	Zone 18	Easting 305927	Northing 4867389
Unit Make/Model COTMIN		Mode of Operation: <input checked="" type="checkbox"/> Undifferentiated <input type="checkbox"/> Averaged <input type="checkbox"/> Differentiated, specify		

Log of Overburden and Bedrock Materials (see instructions)

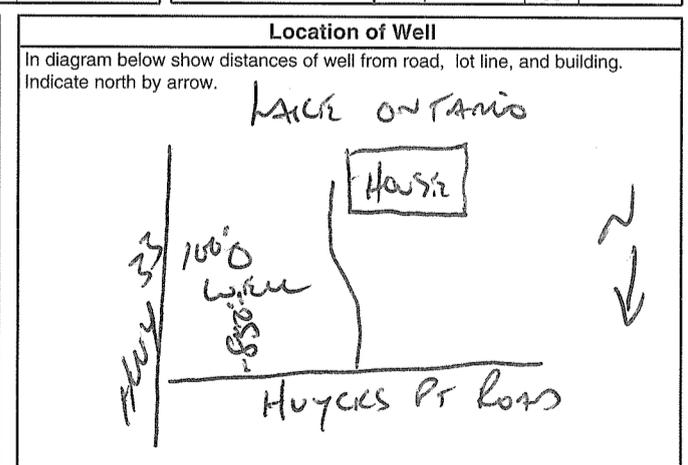
General Colour	Most common material	Other Materials	General Description	Depth Metres	
				From	To
Brown	TOPSOIL			0	0.6
	LIMESTONE			0.6	6.8

Hole Diameter		
Depth From	Metres To	Diameter Centimetres
0	6.8	200
Water Record		
Water found at	Kind of Water	
2 m	<input checked="" type="checkbox"/> Fresh <input type="checkbox"/> Sulphur	
3 m	<input type="checkbox"/> Gas <input type="checkbox"/> Salty <input type="checkbox"/> Minerals	
4 m	<input checked="" type="checkbox"/> Fresh <input type="checkbox"/> Sulphur	
	<input type="checkbox"/> Gas <input type="checkbox"/> Salty <input type="checkbox"/> Minerals	
After test of well yield, water was <input checked="" type="checkbox"/> Clear and sediment free		
<input type="checkbox"/> Other, specify		
Chlorinated <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		

Construction Record				
Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Metres To
90	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input checked="" type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	10	0	6.8
Casing				
Outside diam	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	Slot No.		
			No Casing or Screen	
<input type="checkbox"/> Open hole				

Test of Well Yield				
Pumping test method	Draw Down		Recovery	
	Time min	Water Level Metres	Time min	Water Level Metres
Pump intake set at (metres)	6.8	Static Level		
Pumping rate - (litres/min)	225	1	THIS IS A DUB WITEL A	
Duration of pumping	2 hrs + min	2	WELL CALLED	
Final water level end of pumping	6.5 metres	3	6.500	
Recommended pump type	<input checked="" type="checkbox"/> Shallow <input type="checkbox"/> Deep	4	RESERVE	
Recommended pump depth	6.8 metres	5	AND A FEW	
Recommended pump rate (litres/min)	6.8	10	RATE OF	
If flowing give rate - (litres/min)		15	FIFTEEN GALLONS	
If pumping discontinued, give reason.		20	PHR	
		25	PHR	
		30	PHR	
		40	PHR	
		50	PHR	
		60	PHR	

Plugging and Sealing Record		
Depth set at - Metres	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0 to 3	NON TOXIC CAULKING	



Method of Construction			
<input type="checkbox"/> Cable Tool	<input type="checkbox"/> Rotary (air)	<input type="checkbox"/> Diamond	<input checked="" type="checkbox"/> Digging
<input type="checkbox"/> Rotary (conventional)	<input type="checkbox"/> Air percussion	<input type="checkbox"/> Jetting	<input type="checkbox"/> Other
<input type="checkbox"/> Rotary (reverse)	<input type="checkbox"/> Boring	<input type="checkbox"/> Driving	
Water Use			
<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Industrial	<input type="checkbox"/> Public Supply	<input type="checkbox"/> Other
<input type="checkbox"/> Stock	<input type="checkbox"/> Commercial	<input type="checkbox"/> Not used	
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Municipal	<input type="checkbox"/> Cooling & air conditioning	
Final Status of Well			
<input checked="" type="checkbox"/> Water Supply	<input type="checkbox"/> Recharge well	<input type="checkbox"/> Unfinished	<input type="checkbox"/> Abandoned, (Other)
<input type="checkbox"/> Observation well	<input type="checkbox"/> Abandoned, insufficient supply	<input type="checkbox"/> Dewatering	
<input type="checkbox"/> Test Hole	<input type="checkbox"/> Abandoned, poor quality	<input type="checkbox"/> Replacement well	

Audit No. Z 64285	Date Well Completed 07 06 28
Was the well owner's information package delivered? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Date Delivered 07 09 05

Well Contractor/Technician Information	
Name of Well Contractor FRANKS Drilling & Sealing	Well Contractor's Licence No. 6881
Business Address (street name, number, city etc.) 5000 NEWBURTON RD K2K 2S0	
Name of Well Technician (last name, first name) PAUL TORLO	Well Technician's Licence No. 207 0705
Signature of Technician/Contractor	Date Submitted 2007 07 05

Ministry Use Only	
Data Source	Contractor 6881
Date Received SEP 04 2007	Date of Inspection
Remarks	Well Record Number

ATTACHMENT C

Laboratory Certificate of Analysis

C.O.C.: G104683

REPORT No. B22-05952

Report To:

Blumetric Environmental
 1682 Woodward Drive,
 Ottawa ON K2C 3R8 Canada
Attention: M Lloyd

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

DATE RECEIVED: 03-Mar-22
 DATE REPORTED: 09-Mar-22
 SAMPLE MATRIX: Groundwater

JOB/PROJECT NO.:
 P.O. NUMBER: 220235
 WATERWORKS NO.

Client I.D.	37 Bellavista		
Sample I.D.	B22-05952-1		
Date Collected	03-Mar-22		

Parameter	Units	R.L.	Reference Method	Date/Site Analyzed			
Total Coliform	cfu/100mL	1	SM9222B	03-Mar-22/K	33		
E coli	cfu/100mL	1	SM9222B	03-Mar-22/K	3		
Background	cfu/100mL	1	SM9222B	03-Mar-22/K	40		
Fecal Coliform	cfu/100mL	1	SM9222D	03-Mar-22/K	3		
Alkalinity(CaCO3) to pH4.5	mg/L	5	SM 2320B	04-Mar-22/O	237		
pH @25°C	pH Units		SM 4500H	04-Mar-22/O	8.14		
Conductivity @25°C	µmho/cm	1	SM 2510B	04-Mar-22/O	580		
Colour	TCU	2	SM 2120C	08-Mar-22/O	4		
Turbidity	NTU	0.1	SM 2130	08-Mar-22/O	0.3		
Fluoride	mg/L	0.1	SM4110C	07-Mar-22/O	< 0.1		
Chloride	mg/L	0.5	SM4110C	07-Mar-22/O	29.6		
Nitrite (N)	mg/L	0.1	SM4110C	07-Mar-22/O	< 0.1		
Nitrate (N)	mg/L	0.1	SM4110C	07-Mar-22/O	1.8		
Sulphate	mg/L	1	SM4110C	07-Mar-22/O	20		
Ammonia (N)-Total	mg/L	0.01	SM4500-NH3-H	08-Mar-22/K	< 0.01		
TDS (Calc. from Cond.)	mg/L	1	Calc.	08-Mar-22	301		
Dissolved Organic Carbon	mg/L	0.2	EPA 415.2	07-Mar-22/O	3.1		
Hardness (as CaCO3)	mg/L	1	SM 3120	04-Mar-22/O	266		
Calcium	mg/L	0.02	SM 3120	04-Mar-22/O	95.3		
Iron	mg/L	0.005	SM 3120	04-Mar-22/O	< 0.005		
Magnesium	mg/L	0.02	SM 3120	04-Mar-22/O	6.77		
Manganese	mg/L	0.001	SM 3120	04-Mar-22/O	< 0.001		
Potassium	mg/L	0.1	SM 3120	04-Mar-22/O	1.3		
Sodium	mg/L	0.2	SM 3120	04-Mar-22/O	26.2		



Richard Lecompte
 Laboratory Supervisor

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

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from

ATTACHMENT D

Thornthwaite Calculation

Thornthwaite Calculation	
Thornthwaite Method (1957)	Potential Evapotranspiration
<i>'Hydrology and Hydraulic Systems' 4th edition by Ram S. Gupta, 2017</i>	
Et month = $1.62 (10^{*Tm}/I)^a$	
where:	
a = $675*10^{-9}*I^3 - 771*10^{-7}*I^2 + 179*10^{-4}*I + 492*10^{-3}$	
I _i = $\sum (Tm/5)^{1.514}$	

Canada Climate Normals					
Environment Canada Climate Normals: MOUNTAINVIEW STATION Ontario					
Month	Temp C	I _i	Et (cm) unadjusted	Daylight Factor	Et (mm) adjusted
January	-6	frozen			
Feb	-5.3	frozen			
March	-0.3	frozen			
April	6.7	1.5575	2.9171	1.13	0.0330
May	13.1	4.2984	6.1946	1.28	0.0793
June	18.5	7.2487	9.1279	1.29	0.1178
July	21.4	9.0366	10.7498	1.31	0.1408
Aug	20.6	8.5301	10.2995	1.21	0.1246
Sept	16.1	5.8735	7.8090	1.04	0.0812
Oct	9.3	2.5588	4.2160	0.94	0.0396
Nov	3.5	0.5827	1.4068	0.79	0.0111
Dec	-2.6	frozen			
I		39.686	52.721		0.627
a =		1.1231			metres

Note: Daylight Factor is an adjustment factor for possible hours of sunshine based on latitude.
Monthly temperature from Environment Canada Climate Normals website at:
https://climate.weather.gc.ca/climate_normals/index_e.html

1981 to 2010 Canadian Climate Normals station data

Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Daily Average (°C)	-6.0	-5.3	-0.3	6.7	13.1	18.5	21.4	20.6	16.1	9.3	3.5	-2.6	7.9	⊔

1981 to 2010 Canadian Climate Normals station data

Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
Rainfall (mm)	37.1	26.3	42.6	71.4	78.0	76.3	77.9	73.7	95.3	87.0	90.7	47.4	803.5	⊔
Snowfall (cm)	42.8	30.0	20.7	5.0	0.0	0.0	0.0	0.0	0.0	0.5	11.8	34.0	144.8	⊔
Precipitation (mm)	79.8	56.3	63.2	76.5	78.0	76.3	77.9	73.7	95.3	87.5	102.5	81.5	948.3	⊔

Environment Canada Climate Normals: MOUNTAINVIEW STATION Ontario	948.3 mm
Potential Evapotranspiration (PE)	627 mm
Surplus Water (Precipitation - PE)	321 mm

Infiltration Factors	
Topography	0.3
Soil	0.2
Cover	0.1
Total	0.6
Factored Water Surplus (water surplus * infiltration factor)	193 mm/yr
Area of site	8,000 m ²
Total volume of Infiltration	1,540 m ³ /year
Infiltration flow entering the system (Q _i) :	4 m ³ /day

Infiltration Factors are from 'Storm Water Management. Planning and Design Manual' (MOE, 2003)

Infiltration Factors are also listed in 'Hydrogeological Technical Information Requirements for Land Development Applications (MOEE, 1995)

Septic Effluent	
Concentration of Effluent (Cs) =	40 mg/L
Number Of lots	1
Daily Sewage Flow (Qs) based on 1000 L/d:	1 m ³ /day
Mass Balance Model (MOEE, 1995)	
$C_T = (Q_b C_b + Q_e C_e + Q_i C_i) / (Q_b + Q_e + Q_i) = \text{Cumulative Nitrate Concentration}$	
Q _b = flow entering the system across the	0 m ³ /day
C _b = background nitrate concentration	0 mg/L
Q _e = flow entering the system from the se	1 m ³ /day
C _e = concentration of nitrates in the septi	40 mg/L
Q _i = flow entering the system from infiltr.	4 m ³ /day
C _i = Concentration of nitrates in the inflit	0 mg/L
C _T =	7.7 mg/L

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