



March 01, 2018

Our File Ref.: 170254

Mr. Bob Cousins
2930 French Hill Road
Ottawa, Ontario K4C 1K7

Attention: Bob Cousins

Subject: Hydrogeological Assessment & Terrain Analysis – Proposed Land Development
8015 Russell Road, Ottawa (Vars), Ontario

Dear Mr. Cousins,

1 INTRODUCTION

LRL Associates Ltd. (LRL) was retained by Mr. Bob Cousins to complete a hydrogeological assessment & terrain analysis at 8015 Russell Road in Ottawa (Vars), Ontario in support of a proposed commercial development. The assessment was carried out to determine if the current lot can adequately and safely be supplied with potable water in accordance with the Ontario Drinking Water Standards (ODWS) and that the property has soil conditions that are suitable for on-site sewage disposal without impairing the use of groundwater resources on the site and adjacent lands.

The assessment was conducted per the MOECC *“Hydrogeological Technical Information Requirements for Land Development Applications”* (April 1995), which include the following guidelines and procedures:

- Guideline D-5 Planning for Sewage and Water Services (August 1996); and
- Procedure D-5-4 Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment (August 1996)

The assessment involved a desktop review of available information on the geology and hydrogeology of the site and adjacent lands, as well as fieldwork consisting of digging test pits for soil sampling and installation of piezometers (with groundwater sampling), as well as installation of a test well for conducting a 24-hr pump test with further groundwater sampling of the quality of the aquifer in the area.

2 SITE AND AREA DESCRIPTION

The site is located at 8015 Russell Road in a Rural Industrial (RH) zoned area of Ottawa (Vars), Ontario. The location of the subject site is presented in **Figure 1**. The site is irregular in shape, being approximately 640 m wide (east-west) by between 110 and 153 m deep (north-south) with a total site area of approximately 89 954 m². The property is currently undeveloped with fields/cleared land and mature treed areas, see **Figure 2**. It is understood that the property will

be developed with a commercial building approximately 1859 m², supplied with a private well and septic, see **Figure 3** for proposed locations. Historical photos of the site indicated earth-moving activities in the central portion of the property since 2005¹, although it is LRL's understanding that no development took place. Land development in the surrounding area consists of mostly agricultural, low density residential and industrial land use, such as:

- Residential and vacant land to the north;
- Russell Road, followed by residential and agricultural land use to the south;
- Industrial (Tomlinson Ready Mix Concrete Supplier) to the east; and
- Frank Kenny Road, followed by residential and agricultural land use to the west.

The topography of the land is generally flat with an approximate elevation around 72 m above mean sea level. The nearest bodies of water are Shaws Creek located 72 m west from the south-west corner of the property line, and a tributary of Shaws Creek located 177 m north from the north-east corner of the property.

3 PROPOSED WATER SUPPLY

It is understood that the proposed development on the site will be serviced by a private water well.

A newly constructed "Test Well" (Well Tag No. A236235) was installed on the site by Bourgeois Well Drilling in January 2018 in order to assess the potential quality and quantity of the bedrock aquifer. The approximate location of the test well (TW1) is presented in **Figure 2**. A copy of the Water Well Record (WWR) is included in **Appendix A**.

It was described on the WWR for the Test Well that the underlying subsurface material encountered was brown clay with silt from grade to 3.1 m bgs, transitioning to grey clay with silt from 3.1 to 4.8 m bgs, over grey shale to a depth of 36.6 m bgs where the well was terminated. The recommended pumping rate was indicated as 100 L/min.

4 GEOLOGY & HYDROGEOLOGY

4.1 Geological Mapping

Surficial soil deposit maps² indicate that overburden material consists of a till, plain/ hummocky to rolling with local relief less than 5 m (to the north and southern portions of site) and/or between 5 – 25 m in the central portion of the site. The bedrock maps³ indicate similar bedrock that is described as limestone, dolostone, shale, arkose and sandstone.

Based on review of geological maps and available Ministry of the Environment and Climate Change (MOECC) WWR (presented in the table below), it is anticipated that the supply aquifer on the property would be that of the shale and/or limestone bedrock formation and is consistent to the test well and data provided for the nearby wells.

4.2 Water Well Record Review

A search of the Ontario Ministry of the Environment and Climate Change (MOECC) WWR database was conducted to locate available WWRs within 500 m of the site based on reported

¹ City of Ottawa; geoOttawa Interactive Mapping Software; Retrieved from <https://ottawa.ca/en/city-hall/get-know-your-city/maps-ottawa#geoottawa>; 2018.

² St-Onge, D.A., Surficial Geology, Lower Ottawa Valley, Ontario, Map 2140A, Geological Survey of Canada, 2009.

³ Ontario Geological Survey 1991. Bedrock geology of Ontario, southern sheet; Ontario Geological Survey, Map 2544, scale 1:1 000 000.

UTM coordinates thirteen (13) WWRs were available. Copies of available WWRs are included in **Appendix A** and their approximate locations are presented in **Figure 4**.

4.2.1 Subsurface Stratigraphy

The general subsurface conditions described in the thirteen (13) well records from within 500 m radius of the site are as follows:

MOE Well Number	Distance and Direction from Site (m)	Depth (m)	Subsurface Stratigraphy				Groundwater Encountered (m)	Static Water Level (m)	Type of water
			Clay (m)	Sand (m)	Gravel/hard-pan (m)	Weathered Bedrock/Bedrock (m)			
7179701	47 SW	18.4	3.1 - 6	0 – 3.1	6 – 7.1	7.1 – 18.4 (Limestone)	15	1.62	Untested
7229010	68 SW	18.1	0 – 7.27	--	7.27 – 9.09	9.09 – 18.1 (Limestone)	9.09	2.82	Fresh
7229011	53 SW	18.8	0 – 9.09	--	9.09 – 10.9	10.9 – 18.8 (Limestone)	10.9	2.77	Fresh
7229012	51 SW	12.7	0 – 7.27	--	7.27 – 9.09	9.09 – 12.7 (Limestone)	9.09	2.8	Fresh
1535359	46 SW	18.2	0.6 – 3.0	0 – 0.6	3.0 – 6.0	6.0 – 18.2	15.8; 13.7	2.65	Fresh
7207127	25 W	18.5	0 – 4.5	--	--	4.5 – 18.5 (Limestone)	17	3.21	Untested
5606153	32 SW	23.8	0 – 6.09	--	--	6.09 – 23.8 (Shale)	22	4.15	Fresh
1511791	38 SW	33.8	0 – 7.3	--	--	7.3 – 33.8 (Shale/Limestone)	21.3; 33.5	1.5	Fresh
1519681	55 NE	12.8	--	--	0 – 4.8	4.8 – 12.8 (Shale)	8.8	5.4	Fresh
1521089	55 NE	10.1	--	--	0 – 4.8	4.8 – 10.1 (Shale)	9.4	1.8	Fresh
1522272	42 SE	36.5	--	--	0 – 2.7	2.7 – 36.5 (Limestone)	21.3; 35.1	10.6	Fresh
1533155	55 NE	36.6	0 – 3.96	--	--	3.96 – 36.5 (Shale)	7.6; 30.4	3.0	Fresh
1533156	56 NE	57.9	0 – 4.5	--	--	4.5 – 57.9 (Limestone/Shale)	7.6	3.0	Fresh

*Distances are based on NAD83 UTM coordinates provided on the WWRs.

The well records show that the geological conditions within 500 m are generally similar and described to consist of till material including sand, clay, hardpan and/or gravel material (from surface to 10.9 m below ground surface (bgs)), over limestone and/or shale bedrock (from 2.7 to 10.9 m bgs. Of the thirteen (13) well records found, all were drilled wells into bedrock. The well depths ranged from 10.1 to 57.9 m bgs.

4.3 Water Supply Assessment

Based on review of geological maps and well records in the area it is anticipated that the proposed supply aquifer would be that of the upper bedrock consisting of shale, which is consistent with the test well that was used as part of this assessment. The proposed water supply for the development is the bedrock aquifer. Future wells for the development should be installed into the bedrock up to the depth of the test well (36.6 m).

5 FIELDWORK

5.1 Test Pits and Piezometer Installation

On January 18, 2018, four (4) test pits were completed across the proposed retained lot to determine the general upper soil and groundwater conditions, as well as to establish the depth of overburden in the area. The test pits were advanced using a hydraulic shovel operated by the client. LRL was present to supervise and document the advancement of the test pits. The locations of the test pits are presented in **Figure 2** with the Test Pit Logs included in **Appendix D**.

The general subsurface soil encountered in the test pits consisted of a layer of sand and gravel fill with concrete and brick debris (up to approximately 1.9 m bgs), over silty grey clay (with the exception of sand in TP2), up to at least 2.8 m deep. Bedrock was not encountered in the test pits. Water was found at approximately 1.2 to 2.1 m bgs.

A 25 mm open tube PVC piezometer was installed in test pits TP1, TP2, TP3 and TP4 to allow for groundwater elevation measurement and sampling of the perched water found in the overburden, herein referred to as groundwater. Groundwater samples were collected from piezometers TP1, TP2, TP3 and TP4 on January 18, 2018 and were submitted for laboratory analyses for select nitrate species parameters. The laboratory Certificate of Analysis is included in **Appendix C**. Select soil samples from TP1, TP2 and TP3 were submitted to LRL Materials Testing Laboratories for grain size/sieve and hydrometer analysis. Laboratory results reported that the subsurface native soil in the submitted soil samples consist of silty clay with trace to some fine to medium sand, with the exception of TP2 that indicated native fine to medium grained sand with some silt and clay and trace fine gravel. The laboratory certificates of analysis are included in **Appendix E**.

5.1.1 Pumping test

LRL conducted a pumping test on the new test well on January 24, 2018 in order to assess the quality and quantity of the aquifer. The test well was pumped for a total of 1860 minutes (approximately 31 hours) at 44 L/min for the first 8 hours, and then at 26 L/min for the duration of the test.

The drawdown was measured during the pumping and recovery periods using an electronic water level tape. Following the pump's cessation, the pumping well's recovery was monitored until a minimum of 95% recovery was achieved.

5.2 Groundwater Quality

5.2.1 Field measurements

Throughout the pumping test the following field parameters were measured and recorded:

- Turbidity, chlorine and colour using a Lamotte TC-3000 Trimeter; and
- Conductivity, total dissolved solids (TDS) and pH using a portable meter (Hanna Instruments HI 98129).

The summary of the field measurements are provided in the table included in **Appendix B**.

5.2.2 Groundwater Samples

Groundwater samples were collected for laboratory analysis during the pumping test to assess the quality of the proposed supply aquifer. The water samples were collected after three (3), eight (8), and thirty-one (31) hours of pumping. The water samples were collected directly into laboratory prepared bottles and were submitted to the laboratory for analysis of a "subdivision"

package. The laboratory Certificates of Analysis from Paracel Laboratories Ltd. (Ottawa, Ontario) are included in **Appendix C**. The groundwater analytical results are discussed in Section 6.1.2.

5.3 Groundwater Quantity

5.3.1 Pump Test

The test well was pumped at approximately 44 L/min for 8 hours, then at 26 L/min for the duration of the test. The field data of the pumping tests, which include flow rates, water levels and measurement intervals, are presented in **Appendix B**. The maximum drawdown throughout the test was approximately 3.37 m or 10% of the available water column in the well.

6 RESULTS

6.1 Water Quality

6.1.1 Groundwater Results from Test Pits

Table 3 summarizes the water quality analysis from the test pit piezometers for nitrates, nitrites, ammonia and total kjeldahl nitrogen (TKN). The Laboratory Certificate of Analysis are included in **Appendix C**.

Levels of nitrate and nitrite were non-detect (<0.1 and <0.05 mg/L, respectively) with the exception of nitrate in TP2 which was 0.3 mg/L; and nitrite in TP2 which was 0.97 mg/L and <0.25 mg/L in TP3. All results remained below the MAC of 10 mg/L for nitrate and 1 mg/L for nitrite.

6.1.2 Groundwater Results from Test Well (A236235)

Table 1 summarizes the water analysis and also includes the relative (ODWS) (O. Reg. 169/03) for the parameters tested. The analytical results for the untreated water samples collected meet the ODWS for the parameters tested except for the following:

- Fecal coliforms were reported at 1 CFU/100 mL in the thirty-one (31) hour sample, above the ODWS of 0 CFU/100 mL. The presence of fecal coliforms may indicate that other harmful bacteria could be present. Fecal coliforms and other bacteria can be disinfected/deactivated through filtration and disinfection, such as chlorination or UV disinfection. However, the efficiency of the treatment can be affected by the high turbidity.
- Turbidity was reported at a level of 55.7 NTU in the three (3) hour sample, 40.5 NTU in the eight (8) hour sample, and 8.3 NTU in the thirty-one (31) hour sample. All results were above the MAC of 1 NTU if a treatment system is required to provide filtration and above the AO of 5 NTU. The level is also above the D-5-5 level considered reasonably treatable of 5 NTU. Turbidity decreased with additional pumping, however, the level after thirty-one (31) hours was still above the AO and D-5-5 limit of 5 NTU; and the MAC of 1 NTU if treatment is required to provide filtration.
- Colour was reported to be 18 and 9 TCU after three (3) and eight (8) hours of pumping, respectively, above the ODWS AO of 5 TCU, and above the MOECC D-5-5 limit of 7 TCU in both the samples. With continued pumping colour levels decreased and results for the thirty-one (31) hour sample were 3 TCU, below ODWS AO and the MOECC D-5-5 limits. High levels of colour may indicate that dissolved organic material is present in the water which may cause an increase in disinfectant by-products. Colour can be reduced through carbon filtration.
- pH was reported to be 8.7, 8.7, and 8.6 for the three (3), eight (8), and thirty-one (31) hours of pumping, respectively, above the ODWS OG limits (6.5 – 8.5 pH).

- Sulphide was reported to be 1.42 mg/L; 1.56 mg/L; and 1.38 mg/L after three (3), eight (8), and thirty-one (31) hours of pumping, respectively, above the AO of 0.05 mg/L. Sulphide can cause an unpleasant taste and odour which can be reduced by, but not limited to, a manganese greensand filtration system or aeration.
- Iron was reported to be 400 ug/L and 800 ug/L after three (3) and eight (8) hours, being above the ODWS AO 300 ug/L. With continued pumping levels dropped below the ODWS AO limits, being <100 ug/L for the thirty-one (31) hour sample.
- Sodium was reported to be 100 mg/L; 101 mg/L; and 97.4 mg/L after three (3), eight (8) and thirty-one (31) hours of pumping, respectively, which is below the ODWS AO and the level considered reasonably treatable in Procedure D-5-5 of 200 mg/L. However, the concentrations are above the 20 mg/L warning level notification limit for those on a sodium restricted diet. The local Medical Officer of Health should be notified of these levels so that this information may be communicated to local physicians with regards to homeowners who follow a sodium-restricted diet. Sodium can be reduced through the use of a point-of-use reverse osmosis system, if required.
- Hardness was reported to be 6.3; 7.9 and 8.6 mg/L after the three (3), eight (8) and thirty-one (31) hours of pumping, which are below the Operational Guideline (OG) of 80 mg/L.
 - The Langelier Saturation Index (LSI) is used to determine the calcium carbonate stability of water and the pH at which water is saturated with calcium carbonate (pHs). The Ryznar Stability Index (RI) is used to determine the aggressiveness of water which can indicate the scale and corrosion potential. The calculations for RI and LSI for the thirty-one (31) hour sample are shown in **Table 2**. Using a water temperature of 10°C, the LSI was calculated to be -0.3 at thirty-one (31) hours which indicates the water is slightly corrosive but not scale forming. The RI was calculated to be 9.3 at thirty-one (31) hours which indicate intolerable corrosion.

6.2 Water Quantity

6.2.1 Water Quantity of wells within 500 m radius

A summary of the quantity of water reported for the thirteen (13) wells within a 500 m radius of the site are in the following table. The well records are included in **Appendix A** and their approximate locations are presented in **Figure 4**.

MOE Well Number	Distance and Direction from Site	Depth (m)	Pump Test Details					
			Pump Rate (L/min)	Duration (min)	Drawdown (m)	Specific Capacity (L/Sec/m)	Recovery (%)	Recommended Pump Rate (L/min)
7179701	47 SW	18.4	6.45	60	4.8	--	100	6.45
7229010	68 SW	18.1	63	60	0.7	--	100	90
7229011	53 SW	18.8	63	60	0.53	--	100	63
7229012	51 SW	12.7	58.5	60	6.25	--	100	67.5
1535359	46 SW	18.2	60	60	1.8	--	98	22.7
7207127	25 W	18.5	20	60	2.16	--	99	20
5606153	32 SW	23.8	20	60	2.67	--	86	30
1511791	38 SW	33.8	--	60	9.1	--	--	45.4

1519681	55 NE	12.8	26.5	60	2.5	--	--	18.9
1521089	55 NE	10.1	94.7	60	1.5	--	--	37.9
1522272	42 SE	36.5	30.3	90	25.9	--	--	22.7
1533155	55 NE	36.5	94.7	60	9.0	--	--	56.8
1533156	56 NE	57.9	11.3	120	54.9	--	72	11.3

As shown, all WWR tap into the bedrock aquifer. Based on the details provided in the well records obtained, the recommended pumping rates were reported to be between 11.3 L/min and 94.7 L/min.

6.2.2 Quantity of Test Well (A236235)

The initial static water level was measured as 1.48 m below top of casing (BTOC). The drawdown at eight (8) hours of pumping at 44 L/min was 3.37 m bgs. This represents approximately 10% of the available drawdown in the well. At eight (8) hours the pumping rate was adjusted to 26 L/min, with a drawdown of 2.52 m bgs, representing 7% of the available drawdown.

The specific capacity of the well at eight (8) hours of pumping at a rate of approximately 44 L/min is calculated to be 0.218 L/s/m, see **Table 5** for specific capacity calculations.

The well achieved approximately 97.9% recovery within 76 minutes of the end of pumping. Based on the observed drawdown and recovery, it is concluded that the long-term yield of the test well is in excess of the tested pumping rate of 44 L/min.

6.2.2.1 Quantity for Proposed Development Use

The proposed development involves construction of a multiuse 1895 m² building on the center portion of the property; therefore, the required aquifer yield has been derived from the City of Ottawa's Water Distribution Guidelines, July 2010 and the MOECC's Design Guidelines for Drinking-Water Systems, 2008.

The anticipated average daily flow demands have been evaluated based on the septic design prepared by Dimensional Analysis. See **Appendix F** for attached septic design and sewage system details.

Based on the septic design, the anticipated daily flow demand is 2 850 L/day. The average daily flow demand was estimated based on the anticipated daily flow demand of 2 850 L/day over an 8 hour period as 5.9 L/min. The maximum daily flow is estimated as 4 275 L/day or 8.9 L/min (1.5 times the average daily flow) and the peak hourly flow is estimated as 16.0 L/min (1.8 times the maximum daily flow).

7 TERRAIN ANALYSIS

The terrain analysis was conducted to demonstrate that the unconsolidated material on the site is appropriate for the construction of an on-site subsurface sewage disposal system.

The subsurface conditions indicated for the site are considered suitable for a Class IV septic sewage disposal system with a fully raised leaching bed depending on the lot specific soil and groundwater conditions at the actual location of the proposed septic system leaching bed. The leaching bed should be constructed to conform to the specifications set out in the Ontario Building Code (OBC).

As part of this assessment, an analysis was carried out to ensure that sufficient space exists on the property for the construction of a septic system in accordance with the OBC. Based off septic designs and sewage system details an area of approximately 882 m² is required for the septic bed assuming 8 pipes each having a length of 18.2 m and a spacing of 1.6 m between the pipes,

with mantle of 15 m in length along the down gradient portion of the bed. See **Appendix F** for details.

It is proposed that a lot size of 89,954 m², with 85,137 m² of area available for infiltration is considered sufficient area for the installation of a septic system in accordance with the OBC to service a commercial property with a design sewage flow of up to 2 850 L/day, see **Table 4** for nitrate attenuation calculations.

7.1 Groundwater Impact Assessment

The groundwater impact assessment addresses the ability of the land to attenuate the sewage effluent created by the development. Three methods for conducting the assessment are outlined in MOE's *Procedure D-5-4 Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment* (1996):

- *Lot Size Consideration* for lot greater than 10 000 m²;
- *System Isolation Consideration* for areas where the septic system is hydrogeologically isolated from the potable water source; and
- *Contaminate Attenuation Consideration* for sites that do not meet the above two points.

Based on the review of the available information and site visit, the site is not hydrogeologically sensitive (i.e. areas of karst formations, bedrock outcrops, or thin soil over highly permeable soils).

In this hydrogeological assessment the "**Contaminant Attenuation**" case was considered.

7.1.1 Contaminant Attenuation Method (Predictive Assessment)

The Contaminant Attenuation Method (Predictive Assessment) was used to determine the impact of the individual on-site septic systems at the boundary of the proposed developed lot. This procedure assesses the risk that the individual on-site systems will cause the concentration of the nitrate-nitrogen at the boundary to exceed 10 mg/L at the property boundaries. Dilution is the attenuation mechanism considered for nitrates, with precipitation being the only source of infiltration. The following parameters and assumptions were used in the nitrate attenuation calculations:

- Infiltration factors for the proposed development lot was;
 - a. Flat topography;
 - b. An assumption of clay loam;
 - c. Cultivated Land/ woodland;
 - d. Background nitrate concentration was not detected in submitted water samples thus for this calculation the background concentration is set to 0 mg/l;
 - e. Impervious areas of 1895 m² for the building and 2922 m² of impervious area; and
 - f. Moisture surplus values from the Ottawa weather station (Environment Canada, 2011). This value is considered representative of Vars, Ontario.

The detailed calculations for the proposed development is presented in the attached Nitrate Attenuation Calculations table, see **Table 4**. Based on the proposed lot size and soil conditions,

the calculated levels of nitrates at the property limits will be 2.05 mg/L respectively. This meets the procedure's guideline of 10.0 mg/L at the properties boundaries. Based on the "**Contaminant Attenuation Method**" the currently proposed severed lot size and soil conditions are suitable to attenuate the nitrate impacts generated by the septic systems on the development.

8 CONCLUSIONS

Based on our review of available information and the results of the groundwater sampling and laboratory analytical program the following conclusions are made.

1. A test well (TW1) was installed on the site and was tested for quality and quantity in accordance with MOECC Procedures D-5 & D-5-4. The test well was installed into the inferred shale bedrock to a depth of approximately 36.6 m bgs.
2. Based on the results of the investigation the long-term yield of the tested well appears to be in excess of the tested rate of 44 L/min and 26 L/min.
3. Based on LRL's desktop review of the hydrogeology and geology of the site and surrounding area, site visits and calculations for the "Contaminant Attenuation Method"; a total lot size of 89 954 m² (with 27 647 m² of the total lot size consisting of cultivated land), produces a calculated nitrate level at the limits of the proposed severed lot as 2.9 mg/L, below the procedure's guideline of 10 mg/L. Therefore, the soil conditions are suitable to attenuate the nitrates.
4. The results of the final samples submitted from the test well generally met the Procedure D-5-5 and ODWS limits for the tested parameters with the following exceptions:
 - Fecal coliforms were reported at 1 CFU/100 mL in the thirty-one (31) hour sample, above the ODWS of 0 CFU/100 mL. The presence of fecal coliforms may indicate that other harmful bacteria could be present. Fecal coliforms and other bacteria can be disinfected/deactivated through filtration and disinfection, such as chlorination or UV disinfection. However, the efficiency of the treatment can be affected by the high turbidity.
 - Turbidity was reported at a level of 55.7 NTU in the three (3) hour sample, 40.5 NTU in the eight (8) hour sample, and 8.3 NTU in the thirty-one (31) hour sample. All results were above the MAC of 1 NTU if a treatment system is required to provide filtration and above the AO of 5 NTU. The level is also above the D-5-5 level considered reasonably treatable of 5 NTU. Turbidity decreased with additional pumping, however, the level after thirty-one (31) hours was still above the AO and D-5-5 limit of 5 NTU; and the MAC of 1 NTU if treatment is required to provide filtration.
 - Colour was reported to be 18 and 9 TCU after three (3) and eight (8) hours of pumping, respectively, above the ODWS AO of 5 TCU, and above the MOECC D-5-5 limit of 7 TCU in both the samples. With continued pumping colour levels decreased and results for the thirty-one (31) hour sample were 3 TCU, below ODWS AO and the MOECC D-5-5 limits.
 - pH was reported to be 8.7, 8.7, and 8.6 for the three (3), eight (8), and thirty-one (31) hours of pumping, respectively, above the ODWS OG limits (6.5 – 8.5 pH).
 - Sulphide was reported to be 1.42 mg/L; 1.56 mg/L; and 1.38 mg/L after three (3), eight (8) and thirty-one (31) hours of pumping, respectively, above the AO of 0.05 mg/L.

- Iron was reported to be 400 ug/L and 800 ug/L after three (3) and eight (8) hours, being above the ODWS AO 300 ug/L. With continued pumping levels dropped below the ODWS AO limits, being <100 ug/L for the thirty-one (31) hour sample.
- Sodium was reported to be 100 mg/L; 101 mg/L; and 97.4 mg/L after three (3), eight (8) and thirty-one (31) hours of pumping, respectively, which is below the ODWS AO and the level considered reasonably treatable in Procedure D-5-5 of 200 mg/L. However, the concentrations are above the 20 mg/L warning level notification limit for those on a sodium restricted diet. The local Medical Officer of Health should be notified of these levels so that this information may be communicated to local physicians with regards to homeowners who follow a sodium-restricted diet. Sodium can be reduced through the use of a point-of-use reverse osmosis system, if required.
- Hardness was reported to be 6.3 mg/L; 7.9 mg/L and 8.6 mg/L after the three (3), eight (8) and thirty-one (31) hours of pumping, which are below the Operational Guideline (OG) of 80 mg/L.

9 RECOMMENDATIONS

1. It is recommended that the well be pumped further in an attempt to reduce the turbidity to acceptable levels. Following additional pumping if turbidity is acceptable (<5 NTU) additional samples should be collected for microbiological parameters.
2. Treatment options should be considered on an individual basis. Conventional treatment options exist for the parameters exceeding the ODWS and D-5-5 guidelines, which include the following (based off the 31-hr sample results):
 - Turbidity above 5 NTU is not considered reasonably treatable above 5 NTU;
 - Fecal Coliforms and other microbiological bacteria can be reduced through filtration and a disinfection treatment system such as chlorination or UV disinfection;
 - Sodium can be reduced by a point-of-use reverse osmosis system; and
 - Sulphide can be reduced through aeration.
3. Water should be tested on an individual basis and a water treatment specialist be consulted prior to the final design and installation of any water treatment system.
4. The owner is advised to have their water regularly analysed for bacteria and septic indicator parameters, such as chloride, ammonia, nitrates, nitrites, Total Kjeldahl Nitrogen, E. coli and total coliforms.
5. The owner should maintain their well as outlined in the Ontario Ministry of Agricultural and Rural Affairs Best Management Series – Water Wells and O. Reg. 903/90.
6. All future wells shall be drilled by a licensed well contractor in accordance with Ontario Regulation 903/90, as amended and the MOECCs Water Supply Wells - Requirements and Best Management Practices (December 2009). The construction, casing and sealing must comply with the applicable regulation and practices. The well casing should be installed into sound bedrock to a minimum depth of 6.1 m below the final surface grade.

Future wells should not be installed deeper than the test well (i.e. 36.6 m) due to the uncertainty of the water quality in the deeper aquifer. However, in the event that a deeper well is required, the well water should be tested prior to consumption. The well water sample should be collected following pumping of the well for a minimum of six

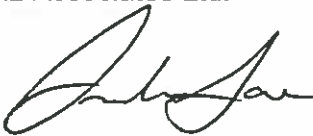
- (6) hours and tested at an accredited laboratory for at least the parameters tested in this assessment.
7. Should the test well not be used or required to supply future intended use it must be decommissioned in accordance with Ontario Regulation 903/90.

10 LIMITATIONS

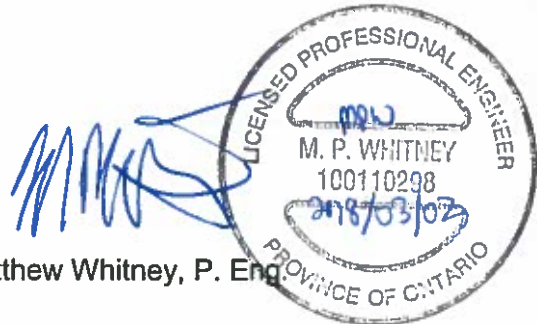
The findings contained in this report are based on data and information collected during the Hydrogeological Assessment & Terrain Analysis of the subject property conducted by LRL Associates Ltd. The conclusions and recommendations are based solely on the site conditions encountered at the time of our fieldwork on January 10; 24 & 25, 2018, supplemented by desktop information and data obtained as described in this report. The information presented in this report represents the soil and groundwater conditions at the locations sampled. Due to natural variations in geological conditions, no inference is made to the soil or groundwater conditions between sampling points. No assurance is made regarding changes in conditions subsequent to the time of this investigation. If additional information is discovered or obtained, LRL Associates Ltd. should be requested to re-evaluate the conclusions presented in this report and to provide amendments as required.

In evaluating the subject property, LRL Associates Ltd. has relied in good faith on information provided by individuals as noted in this report. We assume that the information provided is factual and accurate. We accept no responsibility for any deficiencies, misstatements or inaccuracies contained in this report as a result of omissions, misinterpretation or fraudulent acts of the persons contacted.

Yours truly,
LRL Associates Ltd.



Andrea Sare
Environmental Technician



Matthew Whitney, P. Eng.

Encl:

Figure 1: Site Location
Figure 2: Site Plan With Test Well & Test Pits Locations
Figure 3: Site Plan With Proposed Building & Septic Locations
Figure 4: MOECC Wells Within 500 m Radius Of The Site
Table 1: Summary of Analysis of Water Sample Collected from Supply Well
Table 2: Langelier and Ryznar Calculations- 8015 Russell Road 31hr
Table 3: Summary of Analysis of Water Samples Collected from the Test Pits
Table 4: Nitrate Attenuation Calculations
Table 5: Specific Capacity and Long term Availability
Appendix A: Well Records of Wells Within 500 m of Site
Appendix B: Pump Test Data
Appendix C: Laboratory Analysis
Appendix D: Test Pit Logs
Appendix E: Sieve/Hydrometer Analysis Results
Appendix F: Septic Design

FIGURES



LRJ

ENGINEERING | INGÉNIERIE

5430 Canotek Road | Ottawa, ON, K1J 9G2
www.lrl.ca | (613) 842-3434

PROJECT

HYDROGEOLOGICAL ASSESSMENT &
TERRAIN ANALYSIS FOR PROPOSED
COMMERCIAL DEVELOPMENT
8015 RUSSELL ROAD
OTTAWA (VARS), ONTARIO

DRAWING TITLE

SITE LOCATION
(NOT TO SCALE)
SOURCE: geoOttawa

CLIENT

BOB COUSINS

DATE

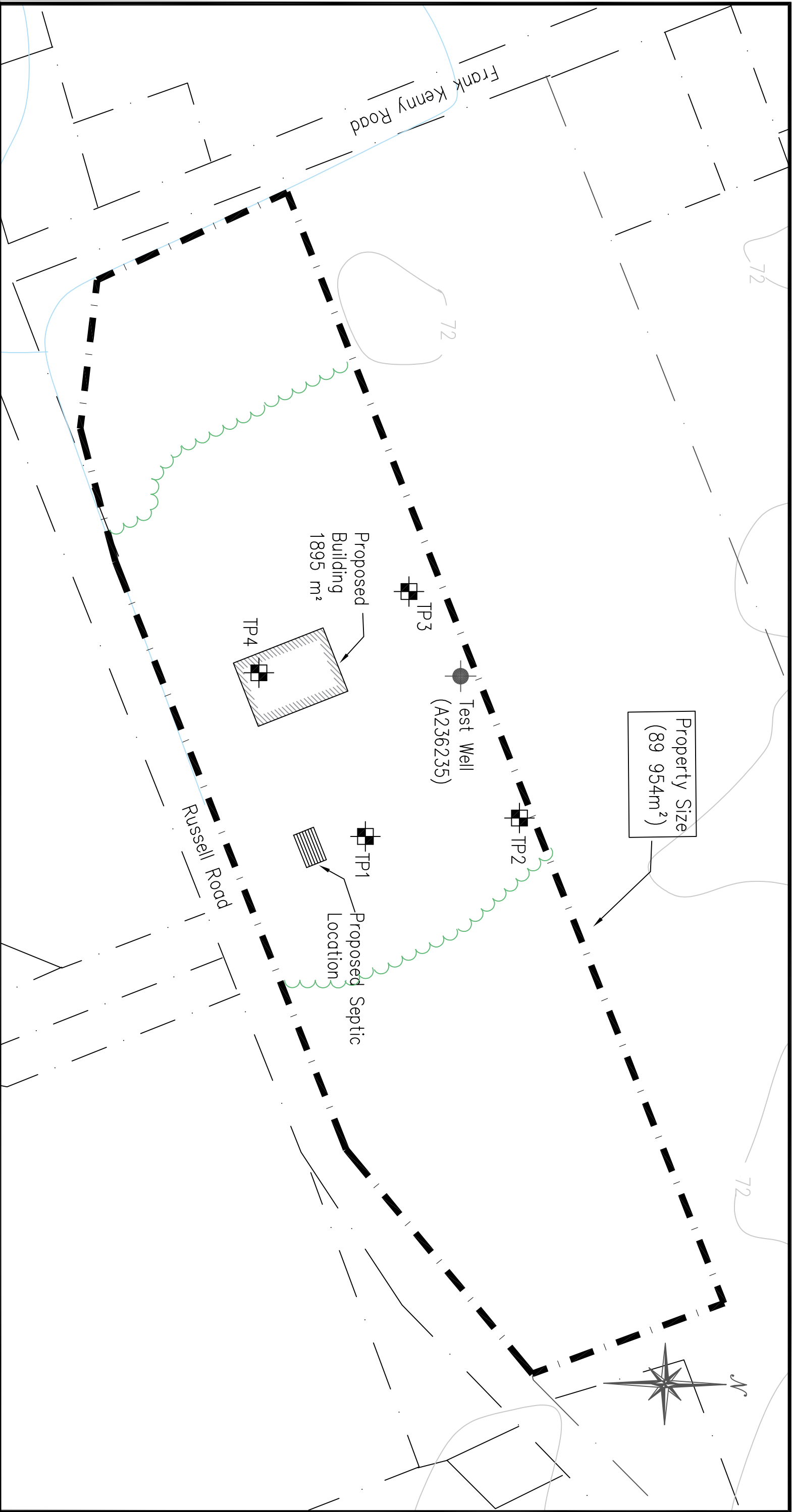
FEBRUARY 2018

PROJECT

170254

FIGURE1





Legend

- Property Line
- Surface Water (according to City of Ottawa, Interactive geotowns Mapping)
- Groundsurface Contour Line
- Division of Surface Materials
- Existing Treeline
- Test Pit
- Test Well
- Proposed Building

40m 20 0 40 80m

SCALE: 1:2000

No.	ISSUED FOR REVIEW	A.S.	09/02/2018
01	REVISIONS	BY	DATE

ENGINEERING | INGÉNIERIE
5430 Carolek Road | Ottawa, ON K1J 9G2
www.lrt.ca | (613) 842-3434

CLIENT

BOB COUSINS

DESIGNED BY:	DRAWN BY:	APPROVED BY:
A.S.	A.S.	M.W.

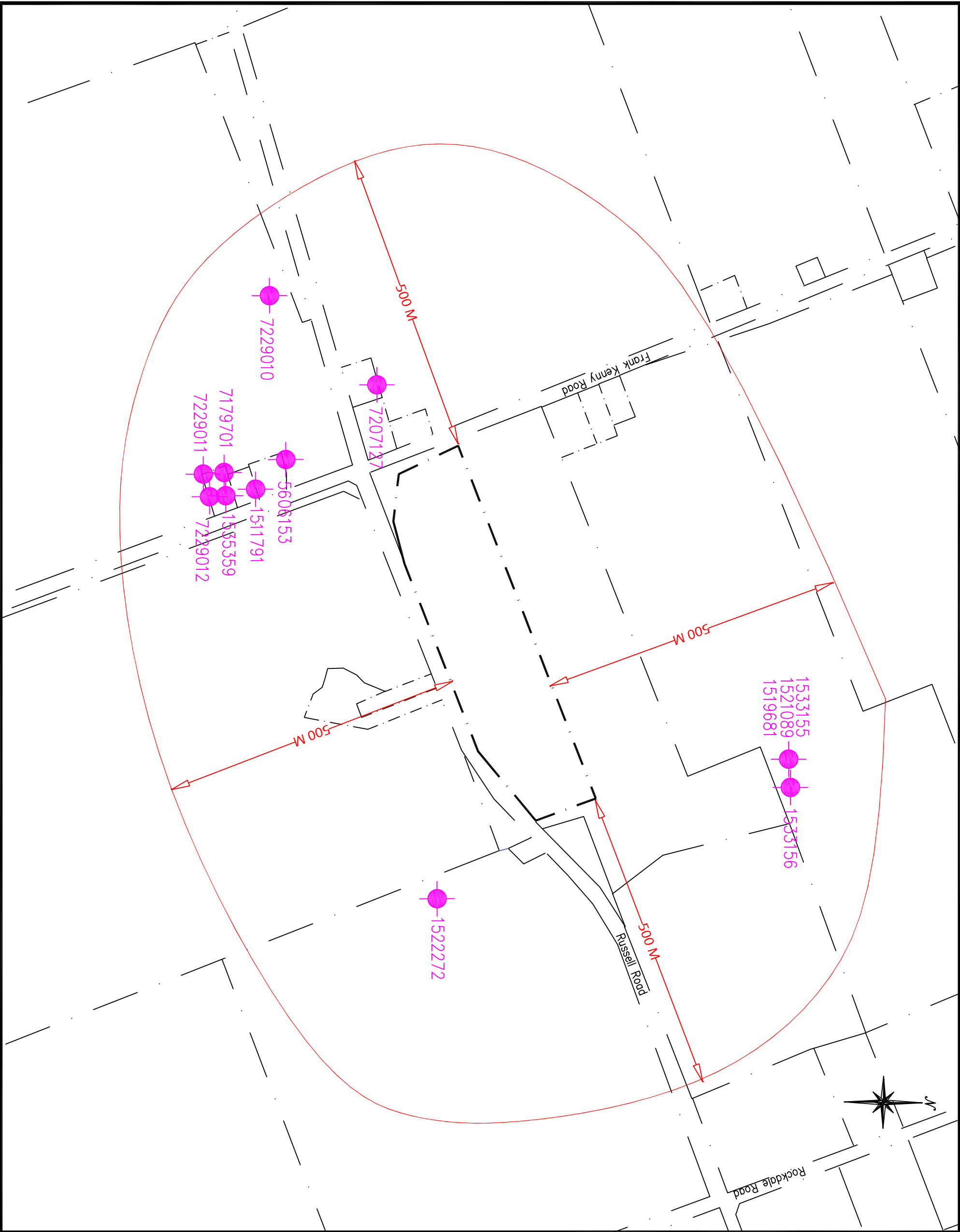
PROJECT
HYDROGEOLOGICAL ASSESSMENT & TERRAIN ANALYSIS FOR COMMERCIAL DEVELOPMENT
8015 RUSSELL ROAD
OTTAWA (VARS), ONTARIO

DRAWING TITLE


SITE PLAN WITH PROPOSED BUILDING AND SEPTIC LOCATIONS

PROJECT NO.	170254
DATE	FEBRUARY 2018


FIGURE3




Legend

 xxxxx

Well With MOECC Tag Number



Property Line

 xxx

Wells Within 500 m Radius from Property Line

01	ISSUED FOR REVIEW	A.S.	17/01/2018
No.	REVISIONS	BY	DATE



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CLIENT

BOB COUSINS

DESIGNED BY:

A.S.

DRAWN BY:

A.S.

APPROVED BY:

M.W.

PROJECT

HYDROGEOLOGICAL ASSESSMENT & TERRAIN ANALYSIS FOR PROPOSED COMMERCIAL DEVELOPMENT

8015 RUSSELL ROAD

OTTAWA (VARS), ONTARIO

DRAWING TITLE

MOECC WELLS WITHIN 500 M RADIUS OF THE SITE

PROJECT NO.

170254

DATE

FEBRUARY 2018

FIGURE4

TABLES

Table 1
Summary of Analysis of Water Sample Collected from the Supply Well
Hydrogeological Assessment and Terrain Analysis For Proposed Commercial Development
8015 Russell Road, Ottawa, Ontario
LRL File: 170254

Parameter	Units	MRL	Ontario Drinking Water Standards		Sample			
			Standard	Type	MOECC D-5-5 ⁵	8015 Russell Road-3hr	8015 Russell Road-8hr	8015 Russell Road-31hr
Sample Date (d/m/y)								
Microbiological Parameters								
E. Coli	CFU/100 mL	1	0	MAC		<1	<1	<1
Fecal Coliforms	CFU/100 mL	1	0 ¹	MAC		<1	<1	<u>1</u>
Heterotrophic Plate Count	CFU/ml	10				<1	<10	10
Total Coliforms	CFU/100 mL	1	0/5 ¹	MAC		<1	<1	<1
General Inorganics								
Alkalinity, total	mg/L	5	30 - 500	OG		229	230	235
Ammonia as N	mg/L	0.01				0.81	0.78	0.83
Dissolved Organic Carbon	mg/L	0.5	5	AO	10	1.6	0.8	2.4
Colour	TCU	2	5	AO	7	<u>18</u>	<u>9</u>	3
Conductivity	uS/cm	5				521	519	531
Hardness	mg/L	1	80 - 100	OG		<u>6.3</u>	<u>7.9</u>	<u>8.6</u>
pH	pH Units	0.05	6.5 - 8.5	OG		<u>8.7</u>	<u>8.7</u>	<u>8.6</u>
Phenolics	mg/L	0.001				<0.001	<0.001	<0.001
Total Dissolved Solids	mg/L	10	500	AO		332	324	320
Sulphide	mg/L	0.02	0.05	AO		<u>1.42</u>	<u>1.56</u>	<u>1.38</u>
Tannin & Lignin	mg/L	0.1				1.1	1.1	1.4
Total Kjeldahl Nitrogen	mg/L	0.1				0.9	0.8	0.7
Organic Nitrogen (Calculated)	mg/L		0.15	OG		0.09	0.02	-0.13
Turbidity	NTU	0.1	1/5 ²	MAC/AO	5	<u>55.4</u>	<u>40.5</u>	<u>8.3</u>
Anions								
Chloride	mg/L	1	250	AO	250	23	22	23
Fluoride	mg/L	0.1	1.5 ³ /2.4	MAC		0.5	0.4	0.4
Nitrate as N	mg/L	0.1	10	MAC		<0.1	<0.1	<0.1
Nitrite as N	mg/L	0.05	1	MAC		<0.05	<0.05	<0.25[1]
Sulphate	mg/L	1	500	AO	500	25	25	26
Metals								
Calcium	ug/L	100				1600	1700	2300
Iron	ug/L	100	300	AO	10000	<u>400</u>	<u>800</u>	<100
Magnesium	ug/L	200				600	900	700
Manganese	ug/L	50	50	AO	1000	20	20	17
Potassium	ug/L	100				3000	4100	3500
Sodium	mg/L	0.2	20 ⁴ /200	AO	200	<u>100</u>	<u>101</u>	<u>97.4</u>

NOTES

MRL Minimum Reportable Limit
MAC Maximum Acceptable Concentration
AO Aesthetic Objective
OG Operational Guideline

ODWS Ontario Drinking Water Standards (2006)
NA Not Analysed
UNDERLINE Parameter level above ODWS
Italics Notify Medical Officer of Health
BOLD Parameter level above D-5-5 maximum treatability limits

[1] Elevated reporting limit due to matrix interference.

¹ As per Table 1 of MOECC's technical guideline "D-5-5 Private Wells: Water Supply Assessment"

² 1.0 NTU OG if treatment system required to provide filtration for disinfection. 5.0 NTU AO for all points of consumption.

³ Where supplies of naturally occurring fluoride at levels above 1.5 mg/L but below 2.4 mg/L the Ministry of Health recommends notification of local board of health of levels to avoid excessive exposure from other

⁴ Health related warning level at which Local Medical Officer of Health should be notified of levels.

⁵ MOECC D-5-5 guideline, maximum concentration considered reasonably treatable.

Table 2
Langelier and Ryznar Calculations- 8015 Russell Road 31hr
Hydrogeological Assessment & Terrain Analysis For Proposed Commercial Development
8015 Russell Road, Ottawa (Vars), Ontario
LRL File: 170254

Analyzed Parameters

TDS (mg/L)	320
Hardness(mg/L)	8.6
alkalinity(mg/L)	235
pH (pH units)	8.6
Temperature °C	10

Langelier

LSI = pH - pHs

$$\text{pHs} = (9.3 + A + B) - (C + D) \quad \text{Where}$$

A = $(\text{Log10}(\text{TDS}) - 1) / 10$	=	0.150515
B = $(-13.12 * \text{Log10}(T^{\circ}\text{C} + 273) + 34.55)$	=	2.382562
C = $\text{Log10}(\text{Hardness}) - 0.4$	=	0.5344985
D = $\text{Log10}(\text{Alkalinity})$	=	2.3710679

Ryznar

RI = 2pHs - pH

pHs =	8.92751
LSI =	-0.3
RI =	9.25502

Langelier

-2.0 < -0.5	Serious Corrosion
-0.5 < 0	Slightly corrosive but non-scale forming
LSI = 0.0	Balanced but pitting corrosion possible
0.0 < 0.5	Slightly scale forming and corrosive
0.5 < 2	Scale forming but non corrosive

<http://www.lenntech.com/calculators/langelier/index/langelier.htm>

Ryznar

4.0-5.0	Heavy Scale
5.0-6.0	Light Scale
6.0-7.0	Light Scale or Corrosion
7.0-7.5	Corrosion Significant
7.5-9.0	Heavy Corrosion
9.0 +	Corrosion is Intolerable

<http://www.lenntech.com/calculators/ryznar/index/ryznar.htm>

Table 3
Summary of Analysis of Water Samples Collected from the Test Pits.
 Hydrogeological Assessment and Terrain Analysis For Proposed Commercial development
 8015 Russell Road, Ottawa (Vars), Ontario
 LRL File: 170254

Parameter	Units	MRL	Ontario Drinking Water Standards		Sample			
			Standard	Type	TP1	TP2	TP3	TP4
Sample Date (d/m/y)					18/01/2018	18/01/2018	18/01/2018	18/01/2018
Anions								
Ammonia	mg/L	0.01			1.03	10.7	1.48	0.33
Total Kjeldahl Nitrogen	mg/L	0.1			13.8	20.7	15.3	5.7
Nitrate as N	mg/L	0.1	10	MAC	<0.1	0.3	<0.1	<0.1
Nitrite as N	mg/L	0.05	1	MAC	<0.05	0.97	<0.25[1]	<0.05

NOTES

[1] Elevated reporting limit due to matrix interference

MRL Minimum Reportable Limit

MAC Maximum Acceptable Concentration

ODWS Ontario Drinking Water Standards (2006)

Table 4
Nitrate Attenuation Calculations
Hydrogeological Assessment & Terrain Analysis For Proposed Commercial Development
8015 Russell Road, Ottawa (Vars), Ontario
LRL File: 170254

1. Potential Infiltration

Weather Station Ottawa

No.	Section Area (m²)	Infiltration Factor (IF) ¹							Moisture Surplus (MS)				Potential Infiltration (PI) (IF*MS) (mm)				
		Topography		Value		Soil		Cover		Ground Cover		Soil Type		Moisture Retention ² (mm)	Moisture Surplus ³ (mm)	Section	Weighted
1	62,307	Flat	0.3	Clay Loam	0.2	Woodland	0.2	0.7	Moderately Rooted Crops	3 Clay Loam	150	336	235.2	162.9			
2	27,647	Flat	0.3	Clay Loam	0.2	Cultivated Land	0.1	0.6	Shallow Rooted Crops	4 Clay Loam	100	363	217.8	66.9			
Total		89,954											Total		229.9		

2. Area Available for Infiltration

Number of Lots	n	1
Approximate footprint of house/garage	H	1895 m ²
Approximate paved area	d ⁴	2085 m ²
Approximate Area of Stormwater Management Pond		837 m ²
Approximate Length of Road	L	0 m
Approximate Width of Road	w	0 m
Total Area of Property		89954 m ²
Impervious Area		4817.0 m ²
Roads	I x w	0 m ²
Retention Pond	I x w	837 m ²
Driveway	n x d	2085 m ²
Houses	n x H	1895 m ²
Area available Infiltration	A	85,137 m²

3. Nitrate Dilution Calculations

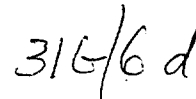
Nitrate Concentration of Infiltration	C _i	0 mg/L ⁶
Site Infiltration	Q _i = A*PI	19569 m ³
Daily Sewage Volume per Lot ⁵	Q _d	2.9 m ³
Maximum Yearly Sewage Volume (water)	Q _e = 365*n*Q _d	1059 m ³
Nitrate Concentration in Sewage ⁵	C _e	40 mg/L
Maximum Allowable Nitrate Concentration at Boundary	C _m	10.0 mg/L
Increase in Nitrate Concentration at Boundaries	C = (Q _e C _e +Q _i C _i)/(Q _e +Q _i)	2.05 mg/L

NOTES

- ¹ Table 2: Infiltration Factors, *Hydrological Technical Information Requirements for Land Development Applications*, Ministry of the Energy and Environment, April 1995.
- ² Thornthwaite and Mather's (1957) Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance.
- ³ Moisture surplus for data for Mason Anger (Environment Canada Meteorological Service of Canada, 2010).
- ⁴ Area based on proposed civil design drawings
- ⁵ As per *Technical Guideline for Individual On-Site Sewage Systems: Water Quality and Impact Risk Assessment*, Ministry of the Energy and Environment, August 1996.
- ⁶ Average of nitrate concentrations from test pits water sample collected on January 18, 2018

APPENDIX A

Well Records of Wells Within 500 m of the Site



OWRC COPY



WATER WELL RECORD

11

11514684.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Carleton	Cumberland	8	2
OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED	
	Box 4218 Station "E" Ottawa, Ont. K1S 5A7	DAY 26 MO. 5 YR. 7	
NORTHING	ELEVATION	BASIN CODE	

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

[illegible]

31. $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$ $\frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$ $\frac{1}{6} \times \frac{1}{7} = \frac{1}{42}$ $\frac{1}{8} \times \frac{1}{9} = \frac{1}{72}$ $\frac{1}{10} \times \frac{1}{11} = \frac{1}{110}$

32. $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$ $\frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$ $\frac{1}{6} \times \frac{1}{7} = \frac{1}{42}$ $\frac{1}{8} \times \frac{1}{9} = \frac{1}{72}$ $\frac{1}{10} \times \frac{1}{11} = \frac{1}{110}$

41	1 2	10	14 15	21
WATER RECORD				
WATER FOUND AT - FEET	KIND OF WATER			
62	10-13	1 <input checked="" type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	14
		2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	
101	15-18	1 <input checked="" type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	19
		2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	
20 23		1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	24
		2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	
25 28		1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	29
		2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	
30-33		1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	34
		2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL	

CASING & OPEN HOLE RECORD				
INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
6 ¹⁰⁻¹¹	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input checked="" type="checkbox"/> OPEN HOLE	12 188	0	24 ¹³⁻¹⁴
6 ¹⁵	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input checked="" type="checkbox"/> OPEN HOLE		24	103 ²⁰⁻²¹
	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE			
	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE			
	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE			

SCREEN W	SIZE(S) OF OPENING (SLOT NO.)	31-33	DIAMETER	34-38	LENGTH	39-43
	MATERIAL AND TYPE			DEPTH TO TOP OF SCREEN		

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	RO	

PUMPING TEST	PUMPING TEST METHOD		10	PUMPING RATE		11-14	DURATION OF PUMPING	
	1 <input type="checkbox"/> PUMP 2 <input checked="" type="checkbox"/> BAILER			6		GPM	1 15-16 HOURS	12-18 MINS
	STATIC LEVEL	WATER LEVEL END OF PUMPING	25	WATER LEVELS DURING			1 <input checked="" type="checkbox"/> PUMPING 2 <input type="checkbox"/> RECOVERY	
	19-21	22-24	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES		
			26-28	29-31		32-34	35-37	
	22 FEET	47 FEET	47 FEET	47 FEET	47 FEET	47 FEET		
IF FLOWING, GIVE RATE		38-41	PUMP INTAKE SET AT			WATER AT END OF TEST		
		GPM				FEET	1 <input type="checkbox"/> CLEAR 2 <input checked="" type="checkbox"/> CLOUDY	
RECOMMENDED PUMP TYPE			RECOMMENDED PUMP SETTING		43-45	RECOMMENDED PUMPING RATE		46-49
<input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP			70		FEET	5		GPM
50-53			GPM / FT. SPECIFIC CAPACITY					

<p>54</p> <p>FINAL STATUS OF WELL</p>	<p>1 <input checked="" type="checkbox"/> WATER SUPPLY</p> <p>2 <input type="checkbox"/> OBSERVATION WELL</p> <p>3 <input type="checkbox"/> TEST HOLE</p> <p>4 <input type="checkbox"/> RECHARGE WELL</p>	<p>5 <input type="checkbox"/> ABANDONED, INSUFFICIENT SUPPLY</p> <p>6 <input type="checkbox"/> ABANDONED, POOR QUALITY</p> <p>7 <input type="checkbox"/> UNFINISHED</p>
<p>55-56</p> <p>WATER USE</p>	<p>1 <input checked="" type="checkbox"/> DOMESTIC</p> <p>2 <input type="checkbox"/> STOCK</p> <p>3 <input type="checkbox"/> IRRIGATION</p> <p>4 <input type="checkbox"/> INDUSTRIAL</p> <p><input type="checkbox"/> OTHER _____</p>	<p>5 <input type="checkbox"/> COMMERCIAL</p> <p>6 <input type="checkbox"/> MUNICIPAL</p> <p>7 <input type="checkbox"/> PUBLIC SUPPLY</p> <p>8 <input type="checkbox"/> COOLING OR AIR CONDITIONING</p> <p>9 <input type="checkbox"/> NOT USED</p>
<p>57</p> <p>METHOD OF DRILLING</p>	<p>1 <input checked="" type="checkbox"/> CABLE TOOL</p> <p>2 <input type="checkbox"/> ROTARY (CONVENTIONAL)</p> <p>3 <input type="checkbox"/> ROTARY (REVERSE)</p> <p>4 <input type="checkbox"/> ROTARY (AIR)</p> <p>5 <input type="checkbox"/> AIR PERCUSSION</p>	<p>6 <input type="checkbox"/> BORING</p> <p>7 <input type="checkbox"/> DIAMOND</p> <p>8 <input type="checkbox"/> JETTING</p> <p>9 <input type="checkbox"/> DRIVING</p>

LOCATION OF WELL

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

REGIONAL RD # 26

210'

210'

+

DRILLERS REMARKS:

CONTRACTOR	NAME OF WELL CONTRACTOR		LICENCE NUMBER	
	Capital Water Supply Ltd.		1558	
	ADDRESS			
	Box 490 Stittsville, Ontario			
CONTRACTOR	NAME OF DRILLER OR BORER		LICENCE NUMBER	
	E. Maurice & M. Kavanagh			
	SIGNATURE OF CONTRACTOR		SUBMISSION DATE	
E. Maurice & M. Kavanagh		DAY 26 MO. 5 YR. 7		

OFFICE USE ONLY	DATA SOURCE	48	CONTRACTOR	59 62	DATE RECEIVED	63 JUN 06 06 25
	DATE OF INSPECTION			INSPECTOR		
	REMARKS					P
						WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07



Ontario

WATER WELL RECORD

2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11

1519681

MUNICIP
15011

CON. C N

107

COUNTY OR DISTRICT

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE

10	12
CON. BLOCK TRACT SURVEY ETC	

22	23	24
LOT	25-27	

OTTAWA Corbett

CUMBERLAND

7

20

DATE COMPLETED

DAY 13 MO. 5 YR. 85

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

[illegible]

31

32

1 2

10 14 15 21 33 43 64 84 94

41		WATER RECORD			
WATER FOUND AT - FEET		KIND OF WATER			
10-13	1 <input checked="" type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	14		
29	2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL			
	15-18	1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	19	
	2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL			
20-23	1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	24		
	2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL			
25-28	1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	29		
	2 <input type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERAL			
30-33	1 <input type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR	34		
	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	
6-14	1 <input checked="" type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	1.88	0	16 ²³⁻¹⁶	
17-18	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE	19		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	26		27-30	

SCREEN	SIZE (S) OF OPENING (SLOT NO.)		31-33	34-38	39-40	41-44	45-48	49-50
			DIAMETER		INCHES	FEET		
	MATERIAL AND TYPE				DEPTH TO TOP OF SCREEN		41-44	10
							FEET	

61			PLUGGING & SEALING RECORD		
DEPTH SET AT - FEET			MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)		
FROM	TO				
10-12	14-17				
18-21	22-25				
26-29	30-33	80			

PUMPING TEST

71

PUMPING TEST METHOD		10	PUMPING RATE		R-14	DURATION OF PUMPING	
1 <input type="checkbox"/> PUMP 2 <input checked="" type="checkbox"/> BAILER			7		GPM	15-16 HOURS 17-18 MINS	
STATIC LEVEL		WATER LEVEL END OF PUMPING		25		WATER LEVELS DURING	
1 <input type="checkbox"/> PUMPING		2 <input type="checkbox"/> RECOVERY					
19-21		22-24		15 MINUTES		30 MINUTES	
18 FEET		26 FEET		26-28		29-31	
				32-34		35-37	
				26 FEET		26 FEET	
IF FLOWING, GIVE RATE		38-41		PUMP INTAKE SET AT		WATER AT END OF TEST	
		GPM		28 FEET		1 <input type="checkbox"/> CLEAR 2 <input checked="" type="checkbox"/> CLOUDY	
RECOMMENDED PUMP TYPE		RECOMMENDED PUMP SETTING		43-45		RECOMMENDED PUMPING RATE	
1 <input checked="" type="checkbox"/> SHALLOW 2 <input checked="" type="checkbox"/> DEEP		28 FEET		5		46-49 GPM	

50-53

FINAL STATUS OF WELL	94	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	
WATER USE	55-56	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 DRILLING	57	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	

CONTRACTOR	NAME OF WELL CONTRACTOR		LICENCE NUMBER	
	YUON GENIER WELL DRILLING		2351	
	ADDRESS			
	BOX 160 CASSELMAN ONT KOA-110			
	NAME OF DRILLER OR BORER		LICENCE NUMBER	
	YUON GENIER		2351	
	SIGNATURE OF CONTRACTOR		SUBMISSION DATE	
	YUON GENIER		DAY 13 MO. 5 YR. 85	

7125 LOCATION OF WELL

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

Diagram illustrating the location of a well relative to a road and lot line. The diagram shows a vertical line representing the lot line and a horizontal line representing Russell Rd. The well is located 325 feet from the lot line and 1650 feet from Russell Rd. An arrow points North.

DRILLERS REMARKS:

OFFICE USE ONLY	DATA SOURCE	58	CONTRACTOR	59-62	DATE RECEIVED	21 06 85	63-68	80
	DATE OF INSPECTION			INSPECTOR				
REMARKS								

WATER WELL RECORD

1521089

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
DELAWARE COUNTY	CUMBERLAND	7	20
DATE COMPLETED			65-51
DAY 15 MO 11 YR 86			

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

[illegible]

31

32

10 14 15 21 32 43 54 65 75 80

41		WATER RECORD			
WATER FOUND AT - FEET		KIND OF WATER			
10-13	1	<input checked="" type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	14
	2	<input type="checkbox"/> SALTY	4	<input type="checkbox"/> MINERAL	
15-18	1	<input type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	19
	2	<input type="checkbox"/> SALTY	4	<input type="checkbox"/> MINERAL	
20-23	1	<input type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	24
	2	<input type="checkbox"/> SALTY	4	<input type="checkbox"/> MINERAL	
25-28	1	<input type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	29
	2	<input type="checkbox"/> SALTY	4	<input type="checkbox"/> MINERAL	
30-33	1	<input type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	34
	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 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	1.58	0	19	
17-18	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE			20-21	
24-25	1 <input type="checkbox"/> STEEL 2 <input type="checkbox"/> GALVANIZED 3 <input type="checkbox"/> CONCRETE 4 <input type="checkbox"/> OPEN HOLE			27-30	

SCREEN	SIZE(S) OF OPENING (SLOT NO.)	31-33	DIAMETER	34-36	LENGTH	39-40
				INCHES		FEET
	MATERIAL AND TYPE		DEPTH TO TOP OF SCREEN		41-44	10
					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	80	

71	PUMPING TEST METHOD		10	PUMPING RATE		11-14	DURATION OF PUMPING		15-16	17-18	
	1 <input type="checkbox"/> PUMP 2 <input checked="" type="checkbox"/> BAILER			25		GPM	1	HOURS	00	MIN	
	STATIC LEVEL	WATER LEVEL END OF PUMPING	25	WATER LEVELS DURING			1 <input type="checkbox"/> PUMPING 2 <input type="checkbox"/> RECOVERY				
	19-21	22-24	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES					
	6	11	26-28	29-31	32-34	35-37					
FEET		FEET	FEET	FEET	FEET	FEET	FEET	FEET	FEET	FEET	
IF FLOWING, GIVE RATE			38-41	PUMP INTAKE SET AT			WATER AT END OF TEST			42	
GPM				26			1 <input type="checkbox"/> CLEAR 2 <input checked="" type="checkbox"/> CLOUDY				
RECOMMENDED PUMP TYPE				RECOMMENDED PUMP SETTING			43-45	RECOMMENDED PUMPING RATE			46-49
<input checked="" type="checkbox"/> SHALLOW <input type="checkbox"/> DEEP				26			FEET			10	
GPM											


FINAL STATUS OF WELL	54 1 <input checked="" type="checkbox"/> WATER SUPPLY 2 <input type="checkbox"/> OBSERVATION WELL 3 <input type="checkbox"/> TEST HOLE 4 <input type="checkbox"/> RECHARGE WELL	5 <input type="checkbox"/> ABANDONED, INSUFFICIENT SUPPLY 6 <input type="checkbox"/> ABANDONED, POOR QUALITY 7 <input type="checkbox"/> UNFINISHED
	55-56 WATER USE 1 <input checked="" type="checkbox"/> DOMESTIC 2 <input type="checkbox"/> STOCK 3 <input type="checkbox"/> IRRIGATION 4 <input type="checkbox"/> INDUSTRIAL <input type="checkbox"/> OTHER _____	5 <input type="checkbox"/> COMMERCIAL 6 <input type="checkbox"/> MUNICIPAL 7 <input type="checkbox"/> PUBLIC SUPPLY 8 <input type="checkbox"/> COOLING OR AIR CONDITIONING 9 <input type="checkbox"/> NOT USED
57 METHOD OF DRILLING	1 <input checked="" type="checkbox"/> CABLE TOOL 2 <input type="checkbox"/> ROTARY (CONVENTIONAL) 3 <input type="checkbox"/> ROTARY (REVERSE) 4 <input type="checkbox"/> ROTARY (AIR) 5 <input type="checkbox"/> AIR PERCUSSION	6 <input type="checkbox"/> BORING 7 <input type="checkbox"/> DIAMOND 8 <input type="checkbox"/> JETTING 9 <input type="checkbox"/> DRIVING

LOCATION OF WELL

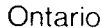
IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE
LOT LINE INDICATE NORTH BY ARROW.

VARS

DRILLERS REMARKS

CONTRACTOR	NAME OF WELL CONTRACTOR		LICENCE NUMBER
	YUON GENIER WELL DRILLING		2351
	ADDRESS		
	BOX A-7 CASSELLMAN ONT K0A-1M0		
CONTRACTOR	NAME OF DRILLER OR BORER		LICENCE NUMBER
	YUON GENIER		2351
	SIGNATURE OF CONTRACTOR		SUBMISSION DATE
			DAY _____ MO. _____ YR. _____

OFFICE USE ONLY	DATA SOURCE	58	CONTRACTOR	59-62	DATE RECEIVED	63-68	80
					130187		
	DATE OF INSPECTION			INSPECTOR			
REMARKS							
<p style="text-align: right;">SSS, R-8</p>							



The Ontario Water Resources Act

WATER WELL RECORD

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

11

1522272

MUNICIP

CON

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK TRACT, SURVEY ETC	LOT
Ottawa, Carleton	Cumberland	7 and 8	21
OWNER (SURNAME FIRST) 28-47	ADDRESS	DATE COMPLETED 48-53	
Jean Gauthier, Const.	Cumberland, Ontario	DAY 12 MO 04 YR 88	

21	ZONE	EASTING	NORTHING	RC	ELEVATION	RC	BASIN CODE	II	III	IV
	10	18	18	74	74	30	31			47

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

[illegible][illegible]

41		WATER RECORD	
WATER FOUND AT - FEET		KIND OF WATER	
70	10-13	1 <input checked="" type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR
	2 <input checked="" type="checkbox"/> SALTY	4 <input type="checkbox"/> MINERALS	6 <input type="checkbox"/> GAS
115	15-18	1 <input checked="" type="checkbox"/> FRESH	3 <input type="checkbox"/> SULPHUR
	2 <input checked="" 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

CASING & OPEN HOLE RECORD				
INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET	
			FROM	TO
10-11	<input checked="" type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE <input type="checkbox"/> PLASTIC	12		13-14
6 1/4		1.88	0	40
17-18	<input type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE <input type="checkbox"/> PLASTIC	19		20-23
6			40	120
24-25	<input type="checkbox"/> STEEL <input type="checkbox"/> GALVANIZED <input type="checkbox"/> CONCRETE <input type="checkbox"/> OPEN HOLE <input type="checkbox"/> PLASTIC	26		27-30

SCREEN	SIZE: S1 OF OPENING (SLOT NO.)	31-33	DIAMETER	34-38	LENGTH	39-40
				INCHES	FEET	
	MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN		41-44	30	
			FEET			

61		PLUGGING & SEALING RECORD	
DEPTH SET AT - FEET		MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)	
FROM	TO		
10-13	14-17		
0	40	Cement Grout	
18-21	22-25		
26-29	30-33	80	

71	PUMPING TEST METHOD		10	PUMPING RATE		11-14	DURATION OF PUMPING	
	1 <input type="checkbox"/> PUMP 2 <input checked="" type="checkbox"/> BAILER			8		GPM	1 15-16 HOURS 30 MINS	
	STATIC LEVEL		25	WATER LEVELS DURING		1 <input type="checkbox"/> PUMPING 2 <input type="checkbox"/> RECOVERY		
	WATER LEVEL END OF PUMPING							
	10-21		22-24	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES	
35		120	20-28	29-31	32-34	35-37		
FEET		FEET	FEET	FEET	FEET	FEET	FEET	
IF FLOWING GIVE RATE			38-41	PUMP INTAKE SET AT		WATER AT END OF TEST		
				100		1 <input checked="" type="checkbox"/> CLEAR 2 <input type="checkbox"/> CLOUDY		
			GPM	FEET				
RECOMMENDED PUMP TYPE			RECOMMENDED PUMP SETTING		42-45	RECOMMENDED PUMPING RATE		46-49
1 <input type="checkbox"/> SHALLOW 2 <input checked="" type="checkbox"/> DEEP			100		FEET	6		GPM
50-53								

LOCATION OF WELL

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

CH FRANK KENNY RD

200

< 1 MILE ->

LOT HAVEN

OLD HIGHWAY 17

26030

DRILLERS REMARKS

FINAL STATUS OF WELL	54	1 <input checked="" type="checkbox"/> WATER SUPPLY 2 <input type="checkbox"/> OBSERVATION WELL 3 <input type="checkbox"/> TEST HOLE 4 <input type="checkbox"/> RECHARGE WELL	5 <input type="checkbox"/> ABANDONED, INSUFFICIENT SUPPLY 6 <input type="checkbox"/> ABANDONED POOR QUALITY 7 <input type="checkbox"/> UNFINISHED 9 <input type="checkbox"/> DEWATERING
	55-56	1 <input checked="" type="checkbox"/> DOMESTIC 2 <input checked="" type="checkbox"/> STOCK 3 <input type="checkbox"/> IRRIGATION 4 <input type="checkbox"/> INDUSTRIAL <input type="checkbox"/> OTHER	5 <input type="checkbox"/> COMMERCIAL 6 <input type="checkbox"/> MUNICIPAL 7 <input type="checkbox"/> PUBLIC SUPPLY 8 <input type="checkbox"/> COOLING OR AIR CONDITIONING 9 <input type="checkbox"/> NOT USED
METHOD OF CONSTRUCTION	57	1 <input type="checkbox"/> CABLE TOOL 2 <input checked="" type="checkbox"/> ROTARY (CONVENTIONAL) 3 <input type="checkbox"/> ROTARY (REVERSE) 4 <input type="checkbox"/> ROTARY (AIR) 5 <input type="checkbox"/> AIR PERCUSSION	6 <input type="checkbox"/> BORING 7 <input type="checkbox"/> DIAMOND 8 <input type="checkbox"/> JETTING 9 <input type="checkbox"/> DRIVING <input type="checkbox"/> DIGGING <input type="checkbox"/> OTHER

CONTRACTOR	NAME OF WELL CONTRACTOR		WELL CONTRACTOR'S LICENCE NUMBER	
	Raymond Well-Drilling		4646	
	ADDRESS			
	St-Albert Ontario			
	NAME OF WELL TECHNICIAN		WELL TECHNICIAN'S LICENCE NUMBER	
	Marcel Raymond		T-0522	
	SIGNATURE OF TECHNICIAN/CONTRACTOR		SUBMISSION DATE	
	<i>Marcel Raymond</i>		DAY 14 MO 04 YR. 88	

OFFICE USE ONLY	DATA SOURCE	58 CONTRACTOR 4646	59-62 DATE RECEIVED MAY 24 1988	63-68 80
	DATE OF INSPECTION		INSPECTOR	
REMARKS				

Ministry
of the
Environment

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED

2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11

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MUNICIPAL

MUNICIP.
15011

CON.

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| C, ON

108

COUNTY OR DISTRICT

TOWNSHIP BOROUGH CITY TOWN VILLAGE

CON BLOCK TRACT SURVEY, ETC.

LOT	25-27
-----	-------

COUNTY OR DISTRICT
OTTAWA C. It

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE
Cumberland

CONC

8

20

Cumberland. ONT.

DATE COMPLETED _____

DAY 28 MO 07 YR 89.

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)[illegible]

31

32

1 2 10 14 15 21 32 43 54 65 75 80

41		WATER RECORD			
WATER FOUND AT - FEET		KIND OF WATER			
10-13 140	1	<input checked="" type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	14
	2	<input type="checkbox"/> SALTY	4	<input type="checkbox"/> MINERALS	
15-18 170	1	<input checked="" type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	19
	2	<input type="checkbox"/> SALTY	4	<input type="checkbox"/> MINERALS	
20-23	1	<input type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	24
	2	<input type="checkbox"/> SALTY	4	<input type="checkbox"/> MINERALS	
25-28	1	<input type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	29
	2	<input type="checkbox"/> SALTY	4	<input type="checkbox"/> MINERALS	
30-33	1	<input type="checkbox"/> FRESH	3	<input type="checkbox"/> SULPHUR	34
	2	<input type="checkbox"/> SALTY	4	<input type="checkbox"/> MINERALS	

51		CASING & OPEN HOLE RECORD			
INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET		
			FROM	TO	
10-11	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	12		13-16	
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	19	120	20-23 175	
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	26		27-30	

SCREEN	SIZE S ₁ OF OPENING (SLOT NO.)	31-33	DIAMETER	34-38	LENGTH	39-40
				INCHES		FEET
	MATERIAL AND TYPE		DEPTH TO TOP OF SCREEN		41-44	30
					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	80	

PUMPING TEST	PUMPING TEST METHOD		10	PUMPING RATE		11-14	DURATION OF PUMPING	
	1 <input type="checkbox"/> PUMP 2 <input checked="" type="checkbox"/> BAILER			25		GPM	2 15-16 0 17-18 HOURS MINS	
	STATIC LEVEL	WATER LEVEL END OF PUMPING		25		WATER LEVELS DURING		1 <input type="checkbox"/> PUMPING 2 <input type="checkbox"/> RECOVERY
	19-21	22-24		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES	
	40 FEET	60 FEET		60 ²⁶⁻²⁸ FEET	60 ²⁹⁻³¹ FEET	60 ³²⁻³⁴ FEET	60 ³⁵⁻³⁷ FEET	
IF FLOWING, GIVE RATE		38-41		PUMP INTAKE SET AT		WATER AT END OF TEST		42
				175		1 <input type="checkbox"/> CLEAR 2 <input checked="" type="checkbox"/> CLOUDY		
RECOMMENDED PUMP TYPE		RECOMMENDED PUMP SETTING		43-45		RECOMMENDED PUMPING RATE		46-49
<input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/> DEEP		160		FEET		20		GPM
10-53								

FINAL STATUS OF WELL	54 1 <input type="checkbox"/> WATER SUPPLY 2 <input type="checkbox"/> OBSERVATION WELL 3 <input type="checkbox"/> TEST HOLE 4 <input checked="" type="checkbox"/> RECHARGE WELL	5 <input type="checkbox"/> ABANDONED. INSUFFICIENT SUPPLY 6 <input type="checkbox"/> ABANDONED. POOR QUALITY 7 <input type="checkbox"/> UNFINISHED <input type="checkbox"/> DEWATERING
	55-56 1 <input checked="" type="checkbox"/> DOMESTIC 2 <input type="checkbox"/> STOCK 3 <input type="checkbox"/> IRRIGATION 4 <input type="checkbox"/> INDUSTRIAL <input type="checkbox"/> OTHER	5 <input type="checkbox"/> COMMERCIAL 6 <input type="checkbox"/> MUNICIPAL 7 <input type="checkbox"/> PUBLIC SUPPLY 8 <input type="checkbox"/> COOLING OR AIR CONDITIONING <input type="checkbox"/> NOT USED
METHOD OF CONSTRUCTION	57 1 <input checked="" type="checkbox"/> CABLE TOOL 2 <input type="checkbox"/> ROTARY (CONVENTIONAL) 3 <input type="checkbox"/> ROTARY (REVERSE) 4 <input type="checkbox"/> ROTARY (AIR) 5 <input type="checkbox"/> AIR PERCUSSION	6 <input type="checkbox"/> BORING 7 <input type="checkbox"/> DIAMOND 8 <input type="checkbox"/> JETTING 9 <input type="checkbox"/> DRIVING <input type="checkbox"/> DIGGING <input type="checkbox"/> OTHER

LOCATION OF WELL

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

WILLSHAWEN.

1 km

FRANK KENNY.

.25

51997

DRILLERS REMARKS

CONTRACTOR	NAME OF WELL CONTRACTOR		WELL CONTRACTOR'S LICENCE NUMBER	
	Dond R Well Drilling.			
	ADDRESS			
	ST-ALBERT ONTARIO			
	NAME OF WELL TECHNICIAN		WELL TECHNICIAN'S LICENCE NUMBER	
	MARTIN Raymond		T-0522	
	SIGNATURE OF TECHNICIAN/CONTRACTOR		SUBMISSION DATE	
	[Signature]		DAY 28 MO 07 YR 89	

OFFICE USE ONLY	DATA SOURCE	58 CONTRACTOR	58-62	DATE RECEIVED	63-68	80
	6006		AUG 09 1989			
	DATE OF INSPECTION		INSPECTOR			
	REMARKS					

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9



The Ontario Water Resources Act

WATER WELL RECORD

Mark correct box with a checkmark, where applicable.

1533156

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15011

Year	Population (millions)
1950	10
1955	12
1960	14
1965	16
1970	18
1975	20
1980	22
1985	24
1990	26
1995	28
2000	30

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

[illegible][illegible]

41	14 15 21				WATER RECORD	
Water found at - feet	Kind of water					
10-13 25	1 <input checked="" type="checkbox"/> Fresh	3 <input type="checkbox"/> Sulphur	14			
	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	19			
	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	24			
	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	29			
	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	34			
	2 <input type="checkbox"/> Salty	4 <input type="checkbox"/> Minerals				
		6 <input type="checkbox"/> Gas				

CASING & OPEN HOLE RECORD				
Inside diam inches	Material	Wall thickness inches	Depth - feet	
			From	To
10-11 6 1/2	<input type="checkbox"/> Steel <input checked="" type="checkbox"/> Galvanized <input type="checkbox"/> Concrete <input type="checkbox"/> Open hole <input type="checkbox"/> Plastic	188	0	20
17-18 6	<input type="checkbox"/> Steel <input type="checkbox"/> Galvanized <input type="checkbox"/> Concrete <input checked="" type="checkbox"/> Open hole <input type="checkbox"/> Plastic		20	190
24-25	<input type="checkbox"/> Steel <input type="checkbox"/> Galvanized <input type="checkbox"/> Concrete <input type="checkbox"/> Open hole <input type="checkbox"/> Plastic			

SCREEN	Sizes of opening (Slot No.)	31-33	Diameter	34-38	Length	39-40
			inches		feet	
	Material and type			Depth at top of screen		
				41-44		3
				feet		

61				PLUGGING & SEALING RECORD			
<input type="checkbox"/> Annular space				<input type="checkbox"/> Abandonment			
Depth set at - feet		Material and type (Cement grout, bentonite, etc.)					
From	To						
0-13	14-21	Cement Grout					
18-21	22-25						
26-29	30-33	80					

PUMPING TEST	Pumping test method ¹⁰ 1 <input type="checkbox"/> Pump 2 <input checked="" type="checkbox"/> Bailor		Pumping rate ³ 3 GPM		Duration of pumping ¹¹⁻¹⁴ 5-16 Hours ¹⁷⁻¹⁸ 20 Mins	
	Static level		Water level end of pumping ²⁵		Water levels during 1 <input type="checkbox"/> Pumping 2 <input checked="" type="checkbox"/> Recovery	
	19-21 10 feet	22-24 190 feet	15 minutes ²⁶⁻²⁸ 150 feet	30 minutes ²⁹⁻³¹ 125 feet	45 minutes ³²⁻³⁴ 100 feet	60 minutes ³⁵⁻³⁷ 60 feet
	If flowing give rate ³⁸⁻⁴¹ GPM		Pump intake set at ⁴² 190 feet		Water at end of test <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Cloudy	
	Recommended pump type <input type="checkbox"/> Shallow <input checked="" type="checkbox"/> Deep		Recommended pump setting ⁴³⁻⁴⁵ 185 feet		Recommended pump rate ⁴⁶⁻⁴⁹ 3 GPM	

FINAL STATUS OF WELL		54
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		55-56
1 <input type="checkbox"/> Domestic	5 <input checked="" type="checkbox"/> Commercial	9 <input type="checkbox"/> Not use
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		57
1 <input checked="" 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 checked="" type="checkbox"/> Rotary (air)	8 <input type="checkbox"/> Jetting	

LOCATION OF WELL

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

300

Brush Rd

Backlund Rd

251075

Name of Well Contractor DAR-WATER-Well-Drilling	Well Contractor's Licence No. 6006
Address St-Albert-on	
Name of Well Technician Louis Desrochers	Well Technician's Licence No. T-925
Signature of Technician/Contractor <i>[Signature]</i>	Submission date 2/22/02 day mo yr

MINISTRY USE ONLY	Data source	58	Contractor	59-62	Date received	63-68
			6006		SEP 09 2002	
	Date of inspection	Inspector				
	Remarks	CSS.ES2				



Ministry of
the Environment

Well Tag Number (Please sticker and print number below)

A 012454

A 012454

Well Record
Regulation 903 Ontario Water Resources Act

page ____ of ____

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

MUN _____ CON _____ LOT _____

Address of Well Location (County/District/Municipality)

Ottawa Carleton

Township

(Cumberland) Ottawa

21

8

RR#/Street Number/Name

City/Town/Village

Site/Compartment/Block/Tract etc.

5138 Frank Kenny vars

Maran

GPS Reading

NAD

Zone

Easting

Northing

Unit Make/Model

Mode of Operation:

☐ Undifferentiated

☒ Averaged

☐ Differentiated, specify

813

18

470236

5023777

Mazillon

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth	
				From	To
Brown	Sandy	clay		0	2
Brown	clay			2	10
grey	hard pan			10	20
grey	rock			20	60

Hole Diameter			Construction Record				Test of Well Yield			
Depth	Metres	Diameter	Inside diam	Material	Wall thickness	Depth	Metres	Pumping test method	Draw Down	
									Time	Water Level
From	To	Centimetres	centimetres		centimetres	From	To		min	Metres
0	60'	6 inch								
			Casing							
			6 1/4	<input checked="" type="checkbox"/> Steel <input type="checkbox"/> Fibreglass	188	0	23	Pump intake set at -	Static	
				<input type="checkbox"/> Plastic <input type="checkbox"/> Concrete				(metres) 30'	Level	
				<input type="checkbox"/> Galvanized				Pumping rate -	1	3.60
								(litres/min) 60		1
				<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass				Duration of pumping	2	3.90
				<input type="checkbox"/> Plastic <input type="checkbox"/> Concrete				1 hrs + min		2
				<input type="checkbox"/> Galvanized				Final water level end	3	3.96
								of pumping		3
								30' metres		
								Recommended pump	4	4.03
								type.		4
								<input type="checkbox"/> Shallow <input checked="" type="checkbox"/> Deep		
								Recommended pump	5	4.08
								depth. 40 metres		5
								Recommended pump	10	4.21
								rate. 45 (litres/min)		10
								If flowing give rate -	15	4.28
								6 (litres/min)		15
								If pumping discontin-	20	4.33
								ued, give reason.		20
									25	4.36
									25	4.74
									30	4.40
									30	2.71
									40	4.44
									40	2.69
									50	4.47
									50	2.68
									60	4.49
									60	2.67

Plugging and Sealing Record			<input checked="" type="checkbox"/> Annular space	<input type="checkbox"/> Abandonment			
Depth set at -	Metres	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed	(cubic metres)			
0	20	grout	4	Bag			
Method of Construction							
<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Rotary (air)	<input type="checkbox"/> Diamond	<input 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					
Well Contractor/Technician Information							
Name of Well Contractor		Well Contractor's Licence No.					
Maurice Cayer Inc		1517					
Business Address (street name, number, city etc.)							
Ottawa Carleton R R 1							
Name of Well Technician (last name, first name)		Well Technician's Licence No.					
Signature of Technician/Contractor		Date Submitted					
X Maurice Cayer		2004 11 22					

Location of Well	
In diagram below show distances of well from road, lot line and building. Indicate north by arrow.	
Audit No.	Date Well Completed
7 12615	2004 11 24
Was the well owner's information package delivered? <input type="checkbox"/> Yes <input type="checkbox"/> No	Date Delivered
	2004 11 24
Ministry Use Only	
Data Source	Contractor
	1517
Date Received	Date of Inspection
JAN 14 2005	
Remarks	Well Record Number

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.

Well Owner's Information and Location of Well Information

Ministry Use Only									
MUN						CON			LOT

RR#/Street Number/Name: 5120 Frank Kenny Rd

City/Town/Village: Georgetown

Site/Compartment/Block/Tract etc.: 0902

GPS Reading: NAD 83 Zone 18 Easting 470253 Northing 5024186

Unit Make/Model: Magellan Utm

Mode of Operation: ☐ 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
Gray	Clay		Packed	0	5.18
blue	clay		Packed	5.18	6.09
blue	Shale		Layered	6.09	2377

Hole Diameter

Depth From	Metres To	Diameter Centimetres
0	6.09	2123
6.09	2377	1555

Water Record

Water found at 22 m

Kind of Water: ☒ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Metres To
15.55	<input checked="" type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	0.48 + 0.60	6.09	2377

Screen

Outside diam	Material	Slot No.
	<input type="checkbox"/> Steel <input type="checkbox"/> Fibreglass <input type="checkbox"/> Plastic <input type="checkbox"/> Concrete <input type="checkbox"/> Galvanized	

No Casing or Screen

☒ Open hole

Plugging and Sealing Record

Depth set at - From	Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	6.09	cement slurry	36ag

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: Gilles Bouglione

Well Contractor's Licence No.: 1414

Business Address (street name, number, city etc.): 57 A16 St

Name of Well Technician (last name, first name): S A me

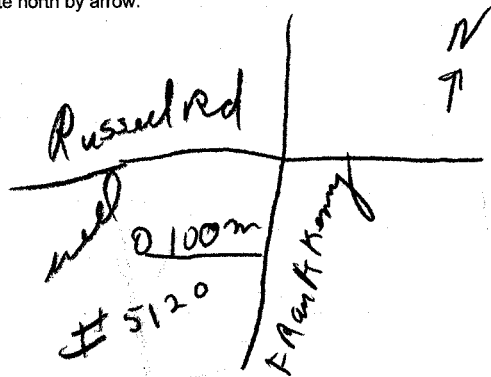
Well Technician's Licence No.: 05193

Signature of Technician/Contractor: [Signature]

Date Submitted: 05/08/15

Location of Well

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



Audit No.: 27956

Date Well Completed: 05/08/15

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

Date Delivered: 05/08/15



Measurements recorded in: ☒ Metric ☐ Imperial

Page of

Address of Well Location (Street Number/Name) 7891 Russell Rd. Township Cumberland Lot 20 Concession 8
County/District/Municipality Ottawa City/Town/Village Vars Province Ontario Postal Code K0A3H0
UTM Coordinates Zone Easting Northing NAD 83 184701165024316 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
Brown clay grey	limestone	Silt	Hard layered	0 4.5	4.5 18.5

Annular Space			
Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	6	ciment grout	.2 m³

Method of Construction		Well Use		
<input checked="" type="checkbox"/> Cable Tool	<input type="checkbox"/> Diamond	<input type="checkbox"/> Public	<input type="checkbox"/> Commercial	<input type="checkbox"/> Not used
<input type="checkbox"/> Rotary (Conventional)	<input type="checkbox"/> Jetting	<input checked="" type="checkbox"/> Domestic	<input type="checkbox"/> Municipal	<input type="checkbox"/> Dewatering
<input type="checkbox"/> Rotary (Reverse)	<input type="checkbox"/> Driving	<input type="checkbox"/> Livestock	<input type="checkbox"/> Test Hole	<input type="checkbox"/> Monitoring
<input type="checkbox"/> Boring	<input type="checkbox"/> Digging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling & Air Conditioning	
<input type="checkbox"/> Air percussion		<input type="checkbox"/> Industrial		
<input type="checkbox"/> Other, specify		<input type="checkbox"/> Other, specify		

Construction Record - Casing					Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To	<input checked="" type="checkbox"/> Water Supply <input type="checkbox"/> Replacement Well <input type="checkbox"/> Test Hole <input type="checkbox"/> Recharge Well <input type="checkbox"/> Dewatering Well <input type="checkbox"/> Observation and/or Monitoring Hole <input type="checkbox"/> Alteration (Construction) <input type="checkbox"/> Abandoned, Insufficient Supply <input type="checkbox"/> Abandoned, Poor Water Quality <input type="checkbox"/> Abandoned, other, specify <input type="checkbox"/> Other, specify	
15.55	Steel	.48	6	6		
15.55	Open Hole		6	18.5		

Construction Record - Screen					Status of Well	
Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To	<input type="checkbox"/> Other, specify	

Water Details		Hole Diameter		
Water found at Depth 17 (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify	0	6	28.23
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	6	18.5	15.55
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify			
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested			
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify			

Well Contractor and Well Technician Information
Business Name of Well Contractor: Bourgeois Well Drilling
Business Address (Street Number/Name): 151 Montée D'Aoust
Province: ON Postal Code: K0A3C0 Business E-mail Address: N/A
Well Contractor's Licence No.: 14117
Municipality: Natic
Bus. Telephone No. (inc. area code): 6139875291
Name of Well Technician (Last Name, First Name): Michael Genier
Well Technician's Licence No.: 3493
Signature of Technician and/or Contractor: [Signature]
Date Submitted: 20130805

Results of Well Yield Testing			
After test of well yield, water was: <input checked="" type="checkbox"/> Clear and sand free <input type="checkbox"/> Other, specify		Draw Down	
If pumping discontinued, give reason:		Time (min)	Water Level (m/ft)
Pump intake set at (m/ft) 16		Static Level	5.37
Pumping rate (l/min / GPM) 20		1	4.81
Duration of pumping 1 hrs + min		2	4.69
Final water level end of pumping (m/ft) 5.37		3	4.42
If flowing give rate (l/min / GPM)		4	4.24
Recommended pump depth (m/ft) 16		5	4.14
Recommended pump rate (l/min / GPM) 20		10	3.81
Well production (l/min / GPM)		15	3.57
Disinfected? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		20	3.37
		25	3.22
		30	3.22
		40	3.22
		50	3.22
		60	3.22

Map of Well Location
Please provide a map below following instructions on the back.
[Hand-drawn map showing well location relative to a house and Frank Kenny Rd. with distances of 75m and 200m.]

Comments:
Well owner's information package delivered: ☒ Yes ☐ No
Date Package Delivered: 20130729
Date Work Completed: 20130729
Ministry Use Only
Audit No.: z120341
Received: AUG 27 2013

Well Owner's Information

First Name

Last Name / Organization

E-mail Address

☐ Well Constructed by Well Owner

2572768 Ontario Inc

N/A

Mailing Address (Street Number/Name)

Municipality

Province

Postal Code

Telephone No. (inc. area code)

2930 French Hill Road

Cumberland On

K4C1K7

6138331917

Well Location

Address of Well Location (Street Number/Name)

Township

Lot

Concession

8015 Russell Road

Navan

County/District/Municipality

City/Town/Village

Province

Postal Code

Navan

Ontario

K4B1J4

UTM Coordinates

Zone

Easting

Northing

Municipal Plan and Sublot Number

Other

NAD

8

3

184704855024552

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)					
General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft)	
				From	To
Brown	clay	Silt	Hard	0	3.1
Grey	shale	Silt	Hard	3.1	4.8
Grey	Shale		layered	4.8	36.6

Annular Space			Results of Well Yield Testing			
Depth Set at (m/ft)	From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)	Draw Down	
					Time (min)	Water Level (m/ft)
6.2	0		ciment grout	.2m³		

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Public ☒ Commercial ☐ Not used ☐ Rotary (Conventional) ☐ Jetting ☒ Domestic ☐ Municipal ☐ Dewatering ☐ Rotary (Reverse) ☐ Driving ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Boring ☐ Digging ☐ Irrigation ☐ Cooling & Air Conditioning ☒ Air percussion ☐ Industrial ☐ Other, specify _____ ☐ Other, specify _____

Well Use

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

Construction Record - Casing				Status of Well	
Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft)	From	To
15.55	Steel	.48	11.5	6.2	
15.53	Open Hole		6.2	36.6	

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

Water Details			Hole Diameter	
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input checked="" type="checkbox"/> Untested	Depth (m/ft)	From	To
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____			
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested	0	6.2	24.9
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____	6.2	36.6	15.55
Water found at Depth (m/ft)	Kind of Water: <input type="checkbox"/> Fresh <input type="checkbox"/> Untested			
	<input type="checkbox"/> Gas <input type="checkbox"/> Other, specify _____			

Well Contractor and Well Technician Information

Business Name of Well Contractor

Well Contractor's Licence No.

14245 Conco 10-11

7417

Business Address (Street Number/Name)

Municipality

14245 Conco 10-11

Crysler

Province

Postal Code

Business E-mail Address

On

K0A1R0

N/A

Bus. Telephone No. (inc. area code)

Name of Well Technician (Last Name, First Name)

6139875291

GENIER, MICHAEL

Well Technician's Licence No.

Signature of Technician and/or Contractor

Date Submitted

31493

20180129

Well owner's information package delivered

Date Package Delivered

Ministry Use Only

☒ Yes ☐ No

20180130

Audit No. 276175

Date Work Completed

Received

20180123

0506E (2014/11)

Ministry's Copy

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APPENDIX B
Pump Test Data

Pump Test Data
Hydrogeological Assessment and Terrain Analysis For Proposed Commercial Development
 8015 Russell Road, Ottawa (Vars), Ontario
 LRL File No. 170254

Date: 1/25/2018
Well Number: A236235
Depth of Well (m bgs): 36.6
Ground Surface Elev. (m): --
Top of Casing Elev. (m): 0.16
Water Level (m) 1.48

Technician: A. Sare
Pump Depth (m): 29.5
Start Time: 8:09 AM 01.24.2018
End Time: 3:25:00 PM 01.25.2018
Average Pump Rate (L/min): 44 L/min & 26 L/min

Time ¹ (min)	Water Level (Pump In) (m BTC)	Drawdown (m)	Flow Rate (L/min)	Turbidity (NTU)	Residual Chlorine (mg/L)	Field Parameters			Total Dissolved (mg/L)
						Colour (TCU)	pH	Conductivity (µs)	
0.0	1.48	0.00	44						
0.3	1.80	0.32							
1	1.94	0.46							
1.5	2.05	0.57							
2	2.14	0.66							
2.5	2.21	0.73							
3	2.27	0.79							
3.5	2.32	0.84							
4	2.36	0.88							
4.5	2.41	0.93							
5	2.43	0.95							
6	2.49	1.01							
7	2.53	1.05							
8	2.59	1.11							
9	2.64	1.16							
10	2.68	1.20							
15	2.82	1.34							
20	2.93	1.45							
25	2.98	1.50							
30	3.04	1.56							
40	3.12	1.64							
50	3.17	1.69							
60	3.21	1.73	44	38.4	0.01	519	8.50	1787	849
120	3.30	1.82	44	43.7	0.00	573	9.16	728	364
180	3.34	1.86	40	44.0	0.00	562	9.08	677	336
240	3.35	1.87	56	40.6	0.02	523	9.04	587	294
300	3.36	1.88	44	36.7	0.01	477	9.24	611	304
360	3.37	1.89	48	34.4	0.00	452	9.27	530	278
420	3.37	1.89	48	32.6	0.00	410	9.19	528	257
480	3.37	1.89	48	29.8	0.02	398	9.00	511	255
480.5	2.67	1.19	26						
756	2.52	1.04							
1316	2.52	1.04	28	9.4	0.02	79	9.20	533	267
1650	2.53	1.05	26	7.8	0.02	61	7.84	1392	695
1710				7.2		63			
1770	2.53	1.05	24	7.2		54	8.77	759	383
1880				7.0		44	8.75	510	255
1860	2.53	1.05	28	7.0	0.01	46	9.04	518	292
Recovery			% Recovery						
1876	2.53	1.05		44.4					
1935	1.54	0.06		96.8					
1946	1.53	0.05		97.4					
1965	1.52	0.04		97.9					

¹ Time elapse from pump turning on.

BTC: Below Top of Casing

NM: Not Measured

APPENDIX C

Laboratory Analysis

Certificate of Analysis

LRL Associates Ltd.

5430 Canotek Road
Ottawa, ON K1J 9G2
Attn: Andrea Sare

Client PO:
Project: 170254
Custody: 7339

Report Date: 31-Jan-2018
Order Date: 25-Jan-2018

Order #: 1804341

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

Paracel ID	Client ID
1804341-01	8015 Russell Rd-3hr
1804341-02	8015 Russell Rd-8hr
1804341-03	8015 Russell Rd-31hr

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 31-Jan-2018
Order Date: 25-Jan-2018
Project Description: 170254

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Alkalinity, total to pH 4.5	EPA 310.1 - Titration to pH 4.5	25-Jan-18	25-Jan-18
Ammonia, as N	EPA 351.2 - Auto Colour	29-Jan-18	29-Jan-18
Anions	EPA 300.1 - IC	26-Jan-18	27-Jan-18
Colour	SM2120 - Spectrophotometric	25-Jan-18	25-Jan-18
Conductivity	EPA 9050A- probe @25 °C	25-Jan-18	25-Jan-18
Dissolved Organic Carbon	MOE E3247B - Combustion IR, filtration	30-Jan-18	31-Jan-18
E. coli	MOE E3407	25-Jan-18	25-Jan-18
Fecal Coliform	SM 9222D	25-Jan-18	25-Jan-18
Heterotrophic Plate Count	SM 9215C	25-Jan-18	25-Jan-18
Metals, ICP-MS	EPA 200.8 - ICP-MS	29-Jan-18	29-Jan-18
pH	EPA 150.1 - pH probe @25 °C	25-Jan-18	25-Jan-18
Phenolics	EPA 420.2 - Auto Colour, 4AAP	26-Jan-18	26-Jan-18
Subdivision Package	Hardness as CaCO ₃	29-Jan-18	29-Jan-18
Sulphide	SM 4500SE - Colourimetric	26-Jan-18	26-Jan-18
Tannin/Lignin	SM 5550B - Colourimetric	25-Jan-18	25-Jan-18
Total Coliform	MOE E3407	25-Jan-18	25-Jan-18
Total Dissolved Solids	SM 2540C - gravimetric, filtration	26-Jan-18	30-Jan-18
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	26-Jan-18	26-Jan-18
Turbidity	SM 2130B - Turbidity meter	26-Jan-18	25-Jan-18

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 31-Jan-2018

Order Date: 25-Jan-2018

Project Description: 170254

Client ID:	8015 Russell Rd-3hr	8015 Russell Rd-8hr	8015 Russell Rd-31hr	-
Sample Date:	24-Jan-18	24-Jan-18	25-Jan-18	-
Sample ID:	1804341-01	1804341-02	1804341-03	-
MDL/Units	Drinking Water	Drinking Water	Drinking Water	-

Microbiological Parameters

E. coli	1 CFU/100 mL	ND	ND	ND	-
Fecal Coliforms	1 CFU/100 mL	ND	ND	1	-
Total Coliforms	1 CFU/100 mL	ND	ND	ND	-
Heterotrophic Plate Count	10 CFU/mL	<10	<10	<10	-

General Inorganics

Alkalinity, total	5 mg/L	229	230	235	-
Ammonia as N	0.01 mg/L	0.81	0.78	0.83	-
Dissolved Organic Carbon	0.5 mg/L	1.6	0.8	2.4	-
Colour	2 TCU	18	9	3	-
Conductivity	5 uS/cm	521	519	531	-
Hardness	mg/L	6.3	7.9	8.6	-
pH	0.1 pH Units	8.7	8.7	8.6	-
Phenolics	0.001 mg/L	<0.001	<0.001	<0.001	-
Total Dissolved Solids	10 mg/L	332	324	320	-
Sulphide	0.02 mg/L	1.42	1.56	1.38	-
Tannin & Lignin	0.1 mg/L	1.1	1.1	1.4	-
Total Kjeldahl Nitrogen	0.1 mg/L	0.9	0.8	0.7	-
Turbidity	0.1 NTU	55.4	40.5	8.3	-

Anions

Chloride	1 mg/L	23	22	23	-
Fluoride	0.1 mg/L	0.5	0.4	0.4	-
Nitrate as N	0.1 mg/L	<0.1	<0.1	<0.1	-
Nitrite as N	0.05 mg/L	<0.05	<0.05	<0.25 [1]	-
Sulphate	1 mg/L	25	25	26	-

Metals

Calcium	0.1 mg/L	1.6	1.7	2.3	-
Iron	0.1 mg/L	0.4	0.8	<0.1	-
Magnesium	0.2 mg/L	0.6	0.9	0.7	-
Manganese	0.005 mg/L	0.020	0.020	0.017	-
Potassium	0.1 mg/L	3.0	4.1	3.5	-
Sodium	0.2 mg/L	100	101	97.4	-

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 31-Jan-2018
Order Date: 25-Jan-2018
Project Description: 170254

Method Quality Control: Blank

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

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 31-Jan-2018
Order Date: 25-Jan-2018
Project Description: 170254

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	22.8	1	mg/L	22.8			0.1	10	
Fluoride	0.46	0.1	mg/L	0.46			0.6	10	
Nitrate as N	ND	0.1	mg/L	ND				20	
Nitrite as N	ND	0.05	mg/L	ND				20	
Sulphate	25.0	1	mg/L	24.8			0.7	10	
General Inorganics									
Alkalinity, total	27.2	5	mg/L	27.5			1.0	14	
Ammonia as N	0.020	0.01	mg/L	0.032			47.9	17.7	QR-01
Dissolved Organic Carbon	11.5	0.5	mg/L	10.2			12.4	37	
Colour	ND	2	TCU	ND				12	
Conductivity	137	5	uS/cm	137			0.5	11	
pH	7.1	0.1	pH Units	7.2			0.1	10	
Phenolics	ND	0.001	mg/L	ND				10	
Total Dissolved Solids	52.0	10	mg/L	52.0			0.0	10	
Sulphide	ND	0.02	mg/L	ND				10	
Tannin & Lignin	0.2	0.1	mg/L	0.2			0.0	11	
Total Kjeldahl Nitrogen	0.98	0.1	mg/L	0.88			11.1	10	QR-01
Turbidity	0.5	0.1	NTU	0.5			1.9	10	
Metals									
Calcium	14.2	0.1	mg/L	14.4			1.5	20	
Iron	ND	0.1	mg/L	ND			0.0	20	
Magnesium	2.2	0.2	mg/L	2.3			5.9	20	
Manganese	ND	0.005	mg/L	ND			0.0	20	
Potassium	0.7	0.1	mg/L	0.7			4.1	20	
Sodium	3.8	0.2	mg/L	4.1			6.2	20	
Microbiological Parameters									
E. coli	ND	1	CFU/100 mL	ND				30	
Fecal Coliforms	ND	1	CFU/100 mL	ND				30	
Total Coliforms	ND	1	CFU/100 mL	ND				30	
Heterotrophic Plate Count	ND	10	CFU/mL	30			0.0	30	

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 31-Jan-2018
Order Date: 25-Jan-2018
Project Description: 170254

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	32.2	1	mg/L	22.8	94.5	78-112			
Fluoride	1.36	0.1	mg/L	0.46	90.5	73-113			
Nitrate as N	0.99	0.1	mg/L	ND	98.8	81-112			
Nitrite as N	0.982	0.05	mg/L	ND	98.2	76-117			
Sulphate	34.0	1	mg/L	24.8	92.0	75-111			
General Inorganics									
Ammonia as N	0.273	0.01	mg/L	0.032	96.4	81-124			
Dissolved Organic Carbon	11.5	0.5	mg/L	0.8	106	60-133			
Phenolics	0.026	0.001	mg/L	ND	105	69-132			
Total Dissolved Solids	106	10	mg/L		106	75-125			
Sulphide	0.45	0.02	mg/L	ND	90.8	79-115			
Tannin & Lignin	1.0	0.1	mg/L	0.2	82.4	71-113			
Total Kjeldahl Nitrogen	3.01	0.1	mg/L	0.88	107	81-126			
Metals									
Calcium	883		ug/L		88.3	80-120			
Iron	851		ug/L	15	83.7	80-120			
Magnesium	2920		ug/L	2290	62.5	80-120			QM-07
Manganese	55.4		ug/L	2.90	105	80-120			
Potassium	1560		ug/L	729	83.5	80-120			
Sodium	962		ug/L		96.2	80-120			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 31-Jan-2018
Order Date: 25-Jan-2018
Project Description: 170254

Qualifier Notes:

Sample Qualifiers :

1 : Elevated Reporting Limit due to matrix interference.

QC Qualifiers :

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

QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

Certificate of Analysis

LRL Associates Ltd.

5430 Canotek Road
Ottawa, ON K1J 9G2
Attn: Andrea Sare

Client PO:
Project: 170254
Custody: 29955

Report Date: 23-Jan-2018
Order Date: 19-Jan-2018

Order #: 1803451

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

Paracel ID	Client ID
1803451-01	TP1
1803451-02	TP2
1803451-03	TP3
1803451-04	TP4

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 23-Jan-2018
Order Date: 19-Jan-2018
Project Description: 170254

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Ammonia, as N	EPA 351.2 - Auto Colour	22-Jan-18	22-Jan-18
Anions	EPA 300.1 - IC	19-Jan-18	20-Jan-18
Total Kjeldahl Nitrogen	EPA 351.2 - Auto Colour, digestion	23-Jan-18	23-Jan-18

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 23-Jan-2018

Order Date: 19-Jan-2018

Project Description: 170254

	Client ID:	TP1	TP2	TP3	TP4
	Sample Date:	18-Jan-18	18-Jan-18	18-Jan-18	18-Jan-18
	Sample ID:	1803451-01	1803451-02	1803451-03	1803451-04
	MDL/Units	Water	Water	Water	Water

General Inorganics

Ammonia as N	0.01 mg/L	1.03	10.7	1.48	0.33
Total Kjeldahl Nitrogen	0.1 mg/L	13.8	20.7	15.3	5.7

Anions

Nitrate as N	0.1 mg/L	<0.1	0.3	<0.1	<0.1
Nitrite as N	0.05 mg/L	<0.05	0.97	<0.25 [1]	<0.05

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 23-Jan-2018

Order Date: 19-Jan-2018

Project Description: 170254

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	ND	0.1	mg/L						
Nitrite as N	ND	0.05	mg/L						
General Inorganics									
Ammonia as N	ND	0.01	mg/L						
Total Kjeldahl Nitrogen	ND	0.1	mg/L						

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 23-Jan-2018

Order Date: 19-Jan-2018

Project Description: 170254

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	0.24	0.1	mg/L	0.26			6.0	20	
Nitrite as N	0.057	0.05	mg/L	0.057			0.0	20	
General Inorganics									
Total Kjeldahl Nitrogen	34.6	2.0	mg/L	40.2			15.0	10	QR-05

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 23-Jan-2018
Order Date: 19-Jan-2018
Project Description: 170254

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Nitrate as N	1.23	0.1	mg/L	0.26	97.0	81-112			
Nitrite as N	1.09	0.05	mg/L	0.057	103	76-117			
General Inorganics									
Ammonia as N	0.245	0.01	mg/L		98.1	81-124			
Total Kjeldahl Nitrogen	1.97	0.1	mg/L		98.5	81-126			

Certificate of Analysis
Client: LRL Associates Ltd.
Client PO:

Report Date: 23-Jan-2018
Order Date: 19-Jan-2018
Project Description: 170254

Qualifier Notes:

Sample Qualifiers :

1 : Elevated Reporting Limit due to matrix interference.

QC Qualifiers :

QR-05 : Duplicate RPDs higher than normally accepted. Remaining batch QA\QC was acceptable. May be sample effect.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

APPENDIX D
Test Pit Logs



Project No.: 170254

Client: Bob Cousins

Date: January 18, 2018

Excavation Method: Hydraulic Shovel

Test Pit Log: TP-1

Project: Hydrogeological Assessment & Terrain Analysis

Location: 8015 Russell Road, Ottawa (Vars), Ontario

Field Personnel: AS

Excavation Contractor: Client

SUBSURFACE PROFILE		SAMPLE DATA			Shear Strength (kPa)	Water Content (%)			Water Level (Standpipe or Open Excavation)
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number		25	50	75	
0	Ground Surface	100.81							
0	TOPSOIL Sandy loam, dark brown, dry.	0.00							
1	FILL Sand and gravel, brown, some brick and concrete debris (ranging from 0.3 m to 0.9 m), moist.			TP1-1					
2									
3									
4	Water found at 1.29 m bgs.								
5	SILTY CLAY Trace fine to medium grained sand, dark grey, wet, weathered in appearance.	99.52							
6		1.29		TP1-2					
7									
8									
9				TP1-3					
10	End of Test Pit	97.92							
11		2.89							
12									
13									



Easting: 470572

Northing: 5024510

Site Datum: Property pin by south-west entrance off Russell Road (100.00 m)

Groundsurface Elevation: 100.81

Top of Riser Elev.: 101.64

Excavation Width: 1.6 m

Excavation Length: 4.2 m

BGS: Below Ground Surface

Groundwater sample collected on January 18, 2018 and submitted for general chemistry and nutrients parameters (Nitrate, Nitrite, Total Kjeldahl Nitrogen and Ammonia).



Project No.: 170254

Client: Bob Cousins

Date: January 18, 2018

Excavation Method: Hydraulic Shovel

Test Pit Log: TP-2

Project: Hydrogeological Assessment & Terrain Analysis

Location: 8015 Russell Road, Ottawa (Vars), Ontario

Field Personnel: AS

Excavation Contractor: Client

SUBSURFACE PROFILE		SAMPLE DATA			Shear Strength (kPa)	Water Content (%)			Water Level (Standpipe or Open Excavation)
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number		25	50	75	
0	Ground Surface	101.48							
0	TOPSOIL Sandy loam, dark brown, dry.	0.00							
1	FILL Sand and gravel, reddish-brown, some brick and concrete debris (ranging from 0.9 m to 1.2 m), dry to moist.			TP2-1					
2									
3	Wood debris found at 1 m bgs. Water found at 1.2 m bgs.								
4									
5									
6									
7		99.50							
7	SAND Fine to medium grained sand with some silt and clay, trace fine gravel, dark grey, wet, increase in clay content with depth.	1.98		TP2-2					
8		99.28		TP2-3					
8		2.20							
9	End of Test Pit								
10									
11									
12									
13									

Easting: 470531

Northing: 5024584

Site Datum: Property pin by south-west entrance off Russell Road (100.00 m)

Groundsurface Elevation: 101.476

Top of Riser Elev.: 102.236

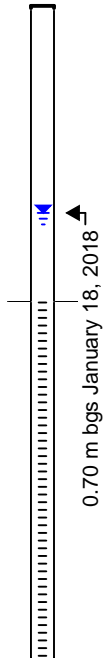
Excavation Width: 1.7 m

Excavation Length: 3.9 m

BGS: Below Ground Surface

Approximately 0.9 m of standing water at end of test pit.

Groundwater sample collected on January 18, 2018 and submitted for general chemistry and nutrients parameters (Nitrate, Nitrite, Total Kjeldahl Nitrogen and Ammonia).





Project No.: 170254

Client: Bob Cousins

Date: January 18, 2018

Excavation Method: Hydraulic shovel

Test Pit Log: TP-3

Project: Hydrogeological Assessment & Terrain Analysis

Location: 8015 Russell Road, Ottawa (Vars), Ontario

Field Personnel: AS

Excavation Contractor: Client

SUBSURFACE PROFILE			SAMPLE DATA									Water Level (Standpipe or Open Excavation)
Depth	Soil Description	Elev./Depth (m)	Lithology	Sample Number	Shear Strength (kPa)				Water Content (%)			
					50	100	150	200	25	50	75	
0	Ground Surface	101.66										
0	FILL Sand and gravel, brown, trace clay & brick debris, dry.	0.00										
1												
2		101.06		TP3-1								
2	SILTY CLAY Some fine to medium grained sand, trace fine gravel, dark grey, wet at 2.1 m bgs, weathered appearance.	0.60		TP3-2								
3												
4												
5												
6												
7												
8												
8		99.26		TP3-3								
8	End of Test Pit	2.40										
9												
10												
11												
12												
13												

1.48 m bgs January 18, 2018

← 1.48 m bgs January 18, 2018

Easting: 470441

Northing: 5024542

Site Datum: Property pin by south-west entrance off Russell Road (100.00 m)

Groundsurface Elevation: 101.656

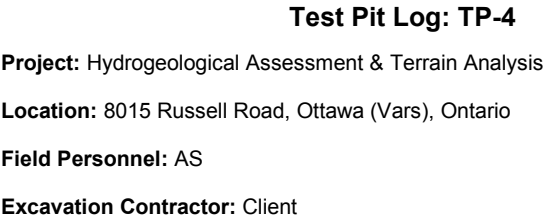
Top of Riser Elev.: 102.286

Excavation Width: 1.6 m

Excavation Length: 4.2 m

BGS: Below Ground Surface

Groundwater sample collected on January 18, 2018 and submitted for general chemistry and nutrients parameters (Nitrate, Nitrite, Total Kjeldahl Nitrogen and Ammonia).



BGS: Below Ground Surface

Groundwater sample collected on January 18, 2018 and submitted for general chemistry and nutrients parameters (Nitrate, Nitrite, Total Kjeldahl Nitrogen and Ammonia).

APPENDIX E
Sieve/Hydrometer Analysis Results



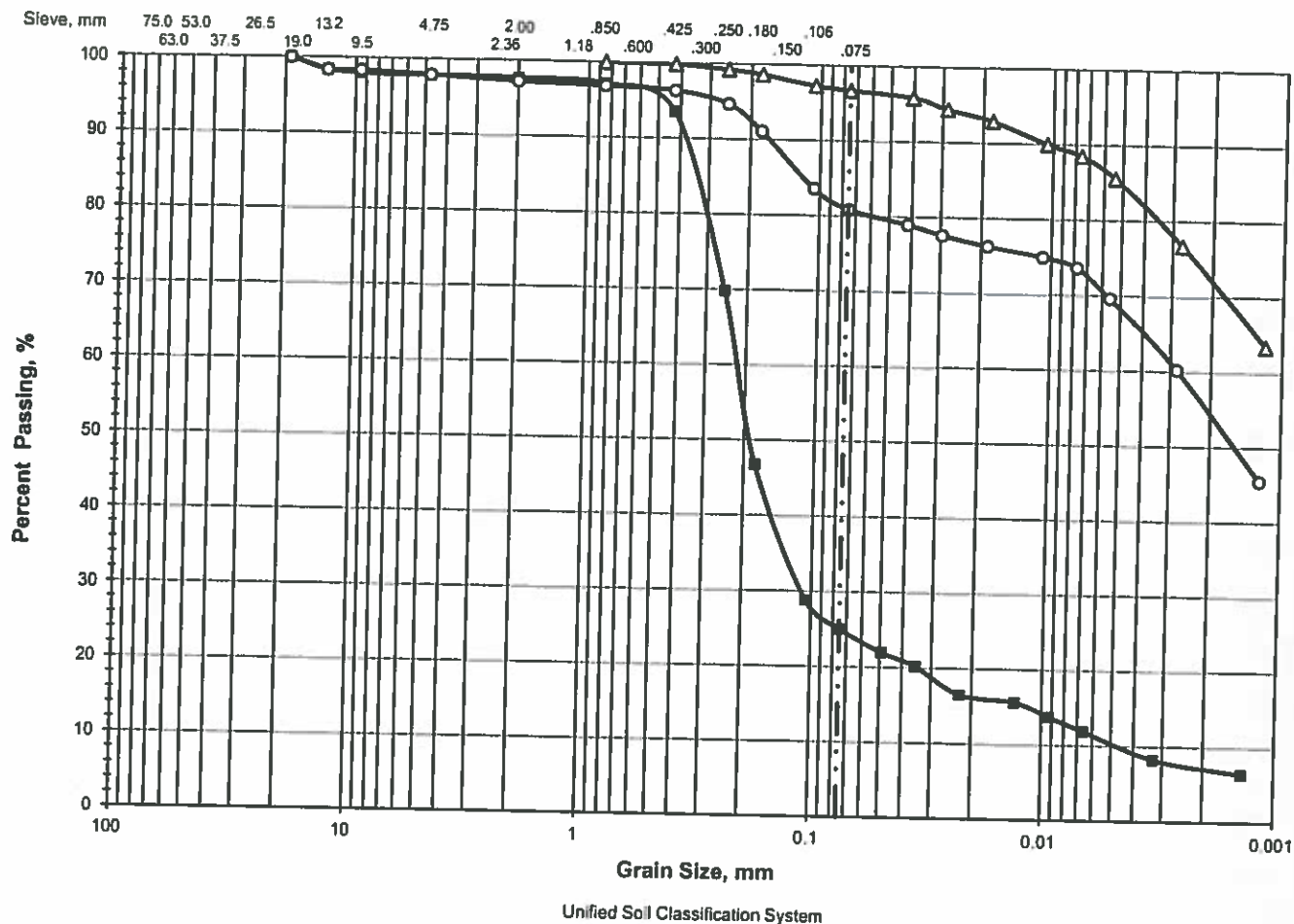
LRL Associates Ltd.

PARTICLE SIZE ANALYSIS

ASTM D 422 / LS-702

Client: Mr. B. Cousins
 Project: Hydrogeological Assessment
 Location: 8015 Russell Road, Ottawa, ON.

File No.: 170254
 Report No.: 1
 Date: January 18, 2018



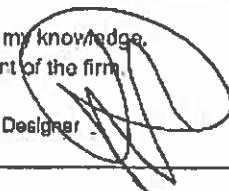
	% GRAVEL		% SAND			% FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
Δ	0.0	0.0	0.0	0.2	3.1	26.2	70.5
■	0.0	2.2	0.1	4.2	68.5	18.0	7.0
○	0.0	2.1	0.7	0.9	15.5	28.2	52.7

	Location	Sample	Depth, m	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
Δ	TP1	Sa 2	1.57							
■	TP2	Sa 2	1.98	0.2201	0.1898	0.1108	0.0118	0.0049	11.4	44.9
○	TP3	Sa 2	0.61	0.0028	0.0017					

APPENDIX F
Septic Design

Schedule 1: Designer Information

Use one form for each individual who reviews and takes responsibility for design activities with respect to the project.

A. Project Information			
Building number, street name 8015 RUSSELL ROAD		Unit no.	Lot/con.
Municipality GATTAWA	Postal code	Plan number/ other description	
B. Individual who reviews and takes responsibility for design activities			
Name P. SAVARD		Firm DIMENSIONAL ANALYSIS	
Street address 17171 UNIT 3, CORNWALL CENTER ROAD		Unit no.	Lot/con.
Municipality LENG SAULT	Postal code K0C 1P0	Province ON	E-mail
Telephone number (613) 362-8312	Fax number ()	Cell number ()	
C. Design activities undertaken by individual identified in Section B. [Building Code Table 3.5.2.1. of Division C]			
House Small Buildings Large Buildings Complex Buildings	HVAC – House Building Services Detection, Lighting and Power Fire Protection	Building Structural Plumbing – House Plumbing – All Buildings <input checked="" type="checkbox"/> On-site Sewage Systems	
Description of designer's work DESIGN SEPTIC SYSTEM			
D. Declaration of Designer			
I <u>PIERRE SAVARD</u> declare that (choose one as appropriate): (print name)			
I review and take responsibility for the design work on behalf of a firm registered under subsection 3.2.4. of Division C, of the Building Code. I am qualified, and the firm is registered, in the appropriate classes/categories. Individual BCIN: <u>13527</u> Firm BCIN: <u>43452</u>			
I review and take responsibility for the design and am qualified in the appropriate category as an "other designer" under subsection 3.2.5. of Division C, of the Building Code. Individual BCIN: _____ Basis for exemption from registration: _____			
The design work is exempt from the registration and qualification requirements of the Building Code. Basis for exemption from registration and qualification: _____			
I certify that:			
1. The information contained in this schedule is true to the best of my knowledge.			
2. I have submitted this application with the knowledge and consent of the firm.			
Date Dec 28, 2017		Signature of Designer 	

NOTE:

- For the purposes of this form, "individual" means the "person" referred to in Clause 3.2.4.7(1) (c) of Division C, Article 3.2.5.1. of Division C, and all other persons who are exempt from qualification under Subsections 3.2.4. and 3.2.5. of Division C.
- Schedule 1 is not required to be completed by a holder of a license, temporary license, or a certificate of practice, issued by the Ontario Association of Architects. Schedule 1 is also not required to be completed by a holder of a license to practise, a limited license to practise, or a certificate of authorization, issued by the Association of Professional Engineers of Ontario.



Schedule 4 Proposed Services Complete Sections 1 thru 7

Do Not Complete

Permit No _____

Revision No _____

Date _____

1. Engineered

☐ Yes

☒ No

3. Type of work proposed

☒ New Installation

☐ Replacement

☐ Alteration

2. Water supply

☒ Proposed

☐ Existing

4. Type of Well

☐ Dug/bored/Sandpoint well

☒ Drilled well

☐ Municipal

☐ Other

5. Residential Sewage Design Flow Info.

Bedrooms _____

House (floor area) _____ m²

People _____

Total Fixture Units _____ (Schedule 8)

Residential Flow _____ L/day

6. Sewage Design Flow Other Occupancies

Design Flow 2850 L/day

Detailed sewage flow calculations:

38 EMPLOYEES X 75 L/PERSON
= 2850 LITERS/DAY

7. Type of System

☐ Treatment Unit _____

☐ Class 2 – Leaching Pit

☐ Class 3 – Cesspool

☐ Class 4 – Shallow Buried Trench

☒ Class 4 – Trench (Schedule 9)

☐ Fully raised

☒ Partially raised

☐ In-ground

☐ Class 4 – Filter Media (Schedule 10)

☐ Fully raised

☐ Partially raised

☐ In-ground

☐ Class 4 – BMEC Area Bed (Schedule 11)

☐ Fully raised

☐ Partially raised

☐ In-ground

☐ Class 4 – "Type A" Dispersal (Schedule 13)

☐ Fully raised

☐ Partially raised

☐ In-ground

☐ Class 4 – "Type B" Dispersal (Schedule 14)

☐ Fully raised

☐ Partially raised

☐ In-ground

☐ Class 5 – Holding Tank (9000L min)

☐ Tank/Treatment Unit/Pump Chamber ONLY

☐ Effluent Filter/Risers ONLY



Schedule 5 Sewage System Details

Do Not Complete

Permit No _____

Revision No _____

Date _____

Type of System CLASS 4 TRENCH (Schedule 4)

Septic/Holding Tank Size: 13290 Litres

Make: _____

Septic Tank Effluent Filter Make: POLYLOK

Model: PL 525

Treatment Unit - Make & Model _____

Number of Units:

Other: _____

Refer to Typical Drawing # A1

Pump(s) required YES

Mantle Information:

Pump Rate 859 L/15min

Native or imported = 15m in 1 direction(s)

Note: Alarm required for all
pumping systems

Slope subgrade 1 % slope

GNE direction(s)

Site to be Scarified (If clay) YES / NO

Clay Seal Required (If bedrock) YES / NO

☐ Trench

Distribution Pipe Length 145.6 m

Loading Area 882.3 m²

Type of Chamber PIPE & GRAVEL

Length of Chamber 18.2 m

☐ Shallow Buried Trench

Pipe Length _____ m

☐ Filter Media Bed

Stone _____ m²

Extended Base _____ m²

Pipe _____ m

Weight of Filter Media _____ Kg

Loading Area _____ m²

☐ BMEC Area Bed

☐ Type A

☐ Type B

Stone _____ m²

Sand _____ m²

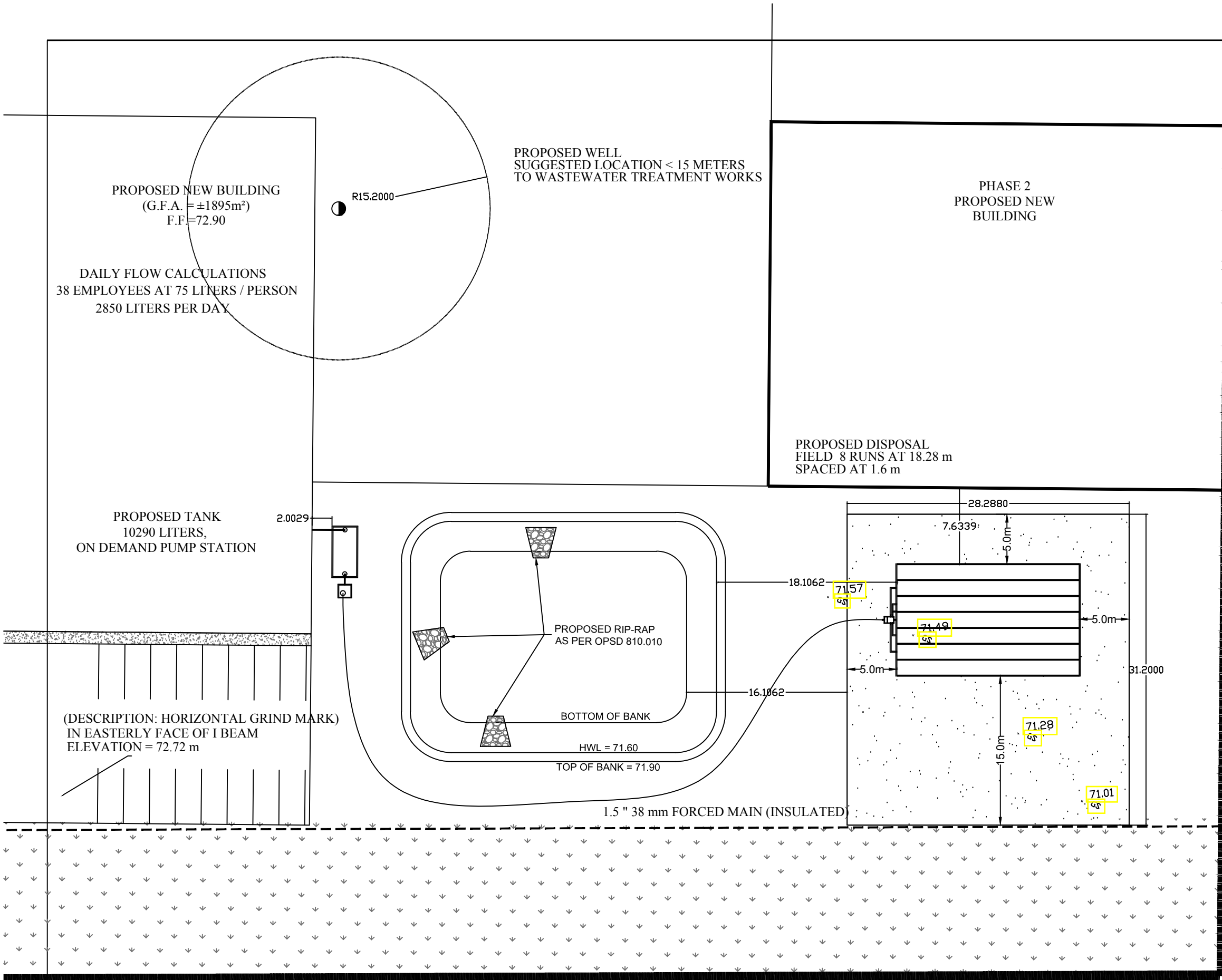
Pipe _____ m

Linear Loading _____ L/m²

☐ Tank/Treatment Unit/Pump Chamber Replacement ONLY

☐ Effluent Filter & Riser ONLY

Construction Notes:



- NOTE:**
1. ALL TREATMENT UNITS AND LEACHING BEDS ARE TO BE INSTALLED IN ACCORDANCE WITH MINIMUM ONTARIO BUILDING CODE CLEARANCE DISTANCES.
 2. CARE IS TO BE EXERCISED DURING CONSTRUCTION ACTIVITIES NEAR OVERHEAD HYDRO WIRES.
 3. EXISTING ELEVATIONS ARE APPROXIMATE, CONTRACTOR MUST VERIFY ALL ELEVATIONS AND DIMENSIONS PRIOR TO CONSTRUCTION.
 4. SOIL CONDITIONS ARE ACCURATE FOR THE LOCATIONS SHOWN, CONTRACTOR MUST CONTACT THE DESIGN ENGINEER OR REGULATORY AUTHORITY SHOULD SOIL CONDITIONS DIFFER.
 5. LOT TO BE SERVICED WITH A DRILLED WELL.

LEGEND	
100.438	PROPOSED ELEVATION
100.438	EXISTING ELEVATION
—	EXISTING WORKS
—	PROPOSED SEWAGE WORKS
---	PROPERTY LINE
TBM	TEMPORARY BENCH MARK (DESCRIPTION: HORIZONTAL GRIND MARK) IN EASTERLY FACE OF I BEAM ELEVATION = 72.72 m

CODES:	BM = BENCH MARK
HS = HOUSE	FIB = FOUND IRON BAR
CL = CENTER LINE	ST PI = STAND PIPE
CD = CENTER LINE OF DITCH	PL = PROPERTY LINE
SIB = STEEL IRON BAR	TP = TEST PIT
GS = GROUND SHOT	DRW = DRILLED WELL
EP = EDGE OF PAVEMENT	bot sw = BOTTOM OF SWALE
OG = ORIGINAL GROUND	BBR = BOTTOM-BRICK
TW = TOP OF WELL	ST = SEPTIC TANK
HK = HYDRO KIOSK	ga = GARAGE
GD = GRAVEL DRIVEWAY	CSL = CONCRETE SLAB
HP = HYDRO POLE	ED = EDGE OF DITCH
TS = TOP OF SLOPE	t of b = TOP OF BANK

Drawn by: prs		Designed by: prs			Checked by: prs	
Description					Date	Approved
City of Ottawa	Plan#	Lot	Sublot	Con		
					No.: SD/227/2017	
Civic Address 8015 RUSSELL ROAD					Date: Dec. 28, 2017	Scale: 1:400
DIMENSIONAL ANALYSIS					BCIN 13527, 43452	
ON-SITE SEWAGE TREATMENT PLAN FOR OF: BOB COUSINS						

