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Hydrogeological Assessment and Terrain Analysis

Proposed Residential Subdivision 1730 Wilhaven Drive Ottawa, Ontario



Prepared For 2183144 Ontario Ltd

August 29, 2016

Report: PH1236-REP.02R2



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1.0 INTRODUCTION

Paterson Group (Paterson) was retained by **2183144 Ontario Ltd.** to conduct a hydrogeological investigation and terrain analysis for a proposed rural residential subdivision at 1730 Wilhaven Drive, Cumberland Ontario. The property is situated approximately 2.8 km southwest of the Village of Cumberland, as shown on Figure 1 (Site Location) in Appendix 5.

The purpose of this study has been to ascertain and assess the specific terrain and hydrogeological conditions which currently exist at the subject property as they relate to the suitability of the site for residential development on private services with minimal impact on groundwater resources.

1.1 Terms of Reference

This study was conducted in general accordance with Ontario Ministry of the Environment and Climate Change (MOECC) guidance as follows:

- Guideline D-5: Planning for Sewage and Water Services (August 1996).
- Procedure D-5-4: Technical Guideline for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment (August 1996).
- Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment (August 1996).

1.2 Site Description

The subject property is located approx. 2.8 km southwest of the Village of Cumberland, Ontario, on the south side of Wilhaven Drive (see Figure 1). Existing development at the subject property includes a house, and two outbuildings. The house and outbuildings are located near Wilhaven Drive. Most of the subject property is crop land. A treed area occurs to the south of the house area and extends to the southern property boundary. Narrow tree lines run along most of the site boundary and in rows between the crop fields.

The subject property encompasses a total area of approximately 19.91 Ha, and is gently sloping from west to east across the site. There are several shallow drainage ditches which run north to south. The drainage ditches flow towards the southeast corner of the site to roadside ditches that flow to the south, towards Cardinal Creek.

1.3 Legal Description

The following legal description of the subject property was obtained from the City of Ottawa's interactive GIS mapping system, GeoOttawa (http://maps.ottawa.ca/geoottawa/):

- PIN 145320196
- Concession 7 North Part Lots D and E Registered Plan; 50R844 Part 2

1.4 Surrounding Land Uses

Surrounding land uses within approx. 500 m of the subject site are described below:

- North
 - Wilhaven Drive right-of-way
 - o Rural residential lots
 - o Forest
- East
- O'Toole Road right-of-way
- Agricultural land (pasture and crop land)
- Agricultural buildings (two sheds)
- o Residential lots
- West
 - Agricultural land (pasture and crop land)
 - Residential lots
 - Wilhaven Drive
- South
 - Agricultural land (crop land)
 - Unused partially cleared land
 - o Forest
 - Farm house and buildings
 - Hydro Easement
 - Hydro substation

All existing development in the area utilizes private individual water supply and sewer system services.

1.1 Proposed Subdivision

The proposed residential subdivision will include 21 lots as indicated on Figure 8 (Lot Development Plan). The minimum lot size is 8,043 m², or (i.e. slightly more than 0.8 hectares (Ha)). The lots range in size from 8,043 m² to 11,100 m². The average lot size is 8,761 m². The lot sizes are consistent with the current City of Ottawa zoning for the property (City of Ottawa, Official Plan, Rural Designations, 2016).



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The proposed subdivision will be serviced by individual onsite wells and onsite wastewater treatment systems (OWTS). This form of servicing is consistent with the established hierarchy prescribed in the Ontario Provincial Policy Statement and is consistent with the established neighbouring rural estate lot developments, based on both the planning rationale and Servicing Options Report prepared in support of a Plan of Subdivision Application for the subject property.



2.0 METHOD OF STUDY

2.1 Topographic Survey

A topographic survey of the site was conducted by Annis, O'Sullivan, Vollbekk Ltd. of Ottawa Ontario in 2009. The survey information was used to develop Figure 8 (Lot Development Plan). A copy of the Plan of Survey is included as Figure 7 in Appendix 5.

2.2 Test Pitting

Test pitting was conducted as part of the geotechnical investigation of the site by Paterson (Paterson, 2009). The test pitting program aimed to assess the near-surface terrain at the site. Twelve (12) test pits were excavated at locations across the site using a small track mounted excavator in December, 2009.

The test pits were advanced to depths ranging from 2.34 to 3.83 m below ground surface (bgs). The test pit locations are indicated on Figure 5 (Test Hole Location Plan), located in Appendix 5.

2.3 Soil Sampling and Grain Size Analysis

The soil profile at each test pit was logged by direct examination of the sides and bottoms of the test pits. Representative soil samples were recovered from the walls and bottoms of the test pit excavations. All soil samples were initially classified on site, placed in sealed plastic bags and transported to Paterson's Ottawa materials testing laboratory. The depths at which the samples were recovered are shown as G on the Soil Profile and Test Data sheets, attached in Appendix 1.

A total of four (4) soil samples were submitted to Paterson's materials testing laboratory in Ottawa Ontario for grain size analysis. The samples that were submitted were representative of the main soil types that were encountered during the investigation. Grain size analysis results are included in Appendix 1.

2.4 Water Well Records

A review of available MOECC Water Well Records in the vicinity of the site was undertaken as part this study. Water well record information was obtained directly from the MOECC water well records interactive GIS system located at: http://www.ontario.ca/environment-and-energy/map-well-records

MOECC water well records that were identified are indicated in Figure 2 (Appendix 5). Overburden thickness, depth of casing, aquifer interception points and reported well yields



were reviewed in detail in order to assist in establishing a hydrogeological conceptual model for the site. A summary is provided in Table 1 below.

Table 1- MOECC Water Well Records Summary

Well Record ID	Year drilled	Depth to BR (m)	Casing depth (m)	Depth to water bearing fractures	Total depth (m)	Recommended pumping rate (L/min)
1531266	2000	2.13	6.10	30.5 53.6	61.9	7
1534621	2004	1.83	3.66	4.3	30.5	23
1534787	2004	1.83	6.71	26.5	67.4	18
1534819	2004	3.05	7.01	27.1 96.9	99.4	36
1536079	2004	1.83	6.71	52.7 89.3	100.0	45
1535083	2004	3.05	6.71	91.7	10 1.5	45
1535703	2005	1.21	6.66	77.3	84.8	23
7 113 10 5	2008	5.18	6.40	93.6 131.7	134.1	34
1513095	1956	1.83	6.40	21.0	21.0	
15 13 10 0	1970	1.52	6.10	45.7	45.7	18
7100598	2008	3.96	10.67	96.9	152.4	23
7045759	2007	2.13	8.84	83.9 99.7	103.6	41
711538	2008	2.74	13.11	85.3	95.1	23
7129154	2009	3.63	12.12	16.7	15 1.5	23
1512686	1969	2.44	6.10	44.5	44.5	27
1513924	1973	0.00	6.71	33.2	33.2	18
15 17 9 0 9	1982	5.18	6.40	57.9 78.6	82.6	9
1517920	1982	3.66	12.19	57.6	61.0	9
1534811	2004	0.61	6.70	64.6 84.4	91.7	12
				89.3		
1534818	2004	1.00	7.81	90.9	98.5	45
1534792	2004	1.80	6.70	66.6	70.1	10
1534791	2004	0.76	6.70	64.0 72.8	75.3	42
1533452	2002	0.61	12.80	12 1.9	129.5	23
1533134	2002	0.00	12.80	106.7	128.6	5
15 12 0 3 3	1972	0.00	6.71	27.4 68.6	88.4	23
				87.2		
4E 40 E 4E	40.70	450	0.40	57.9	700	
15 12 5 15	1972	1.52	6.40	64.0 73.2	73.2	36
15 12 5 16	1972	1.22	5.49	24.4 29.0	30.5	27
1512685	1966	0.00	3.96	27.4	48.8	9
1513097	1966	1.22	7.62	34.1	34.1	27
7175488	2011	2.59	6.10	13.4	24.4	1
1512688	1967	1.22	5.18	42.7	42.7	27
1512689	1970	0.30	6.71	67.1 85.3	98.5	23
1533753	2003	0.00	6.10	74.7	74.7	9
7040752	2009	11.58	18.29	54.0 73.2	73.2	0
1513931	1973	1.52	6.71	38.1	38.1	41
1534816	2004	3.40	6.70	65.8 15.0	73.1	55
7109809	2008	3.05	9.14	15.2	152.4	2
7233585	2014 2006	3.65 0.60	6.40 12.00	121.0	155.4 128.0	14 20
1536595	200n	0.00				



2.5 Permit to Take Water (PTTW) Search

A review of the MOECC PTTW database was carried out within a 1 km radius of the site. PTTW information was obtained directly from the MOECC interactive GIS system located at: http://www.ontario.ca/environment-and-energy/map-permits-take-water

Results of the search are discussed in Section 3.3.4 below.

2.6 Test Well Construction

Three (3) test wells (TW1, TW2 and TW3) were constructed in 2009 by Air Rock Drilling Company Ltd. of Richmond, Ontario. These wells were drilled to depths of between 110 to 152 m using air-rotary techniques, and were generally found to have relatively low yields and relatively poor water quality (elevated concentrations of TDS, sodium and chloride).

TW1 (not used as a representative test well)

A casing hole (9" or 228 mm in diameter) was advanced into competent limestone bedrock to a depth of 6.2 m below ground surface (bgs). A 6.7 m section of new steel casing (6" or 150 mm diameter) was installed and grouted into the hole. The resultant casing stickup is approximately 0.5 m above ground surface. Paterson inspected the casing installation and grouting process and confirmed that grouting of the annular space was conducted in compliance with Ontario Regulation 903.

An open borehole (6" or 152 mm diameter) was advanced to a total depth of 152.40 m, using rotary <u>air percussion</u> methods. Several water bearing fractures were encountered during drilling of the open borehole. Well development, chlorination and a one hour constant rate pumping test were all carried out according to the requirements of O.Reg. 903.

TW2 (not used as a representative test well)

TW2 was constructed in the same way as TW1. Bedrock was encountered at 3.66 m bgs. Steel casing was advanced into the limestone bedrock to a depth of 6.1 m bgs to ensure an effective seal into competent bedrock. The open borehole was advanced using <u>air percussion</u> techniques to a total depth of 109.73 m bgs. Grouting, well development, chlorination and a one hour constant rate pumping test were all carried out according to the requirements of O.Reg. 903.

TW3 (not used as a representative test well)

TW3 was constructed in the same way as TW1. Bedrock was encountered at 3.35 m bgs. Steel casing was advanced into the limestone bedrock to a depth of 6.1 m bgs to ensure an



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effective seal into competent bedrock. The open borehole was advanced using <u>air percussion</u> techniques to a total depth of 134.11 m bgs. Grouting, well development, chlorination and a one hour constant rate pumping test were all carried out according to the requirements of O.Reg. 903.

NOTE: Initial water quality results from TW1, TW2, and TW3 included relatively high concentrations of TDS, chloride, and sodium. It was noted that the water quality and quantity at the existing house well (HW) is significantly better than at the first three test wells. A decision was made at that time to focus on the "upper bedrock aquifer zone" (i.e. poor water quality appears to occur below approximately 70 m depth, so the 'upper bedrock aquifer zone' is defined (for the purposes of this report) as the bedrock aquifer above that depth.

TW4 (not used as a representative test well)

The casing hole for TW4 was advanced through the overburden and a further 0.9 m into the underlying bedrock at a total depth of 6.1 m bgs. The open borehole was advanced using <u>cable tool</u> techniques to a total depth of 8.53 m bgs. Water bearing fractures were encountered at 7.16 m bgs. Well development, chlorination and a one hour constant rate pumping test were all carried out according to the requirements of O.Reg. 903.

TW5

The casing hole for TW5 was advanced through the overburden and seated approximately 1.1 m into the underlying bedrock with a total depth of 10.2 m bgs. The open borehole was advanced using a <u>cable tool</u> rig to a total depth of approximately 24.38 m bgs. Water bearing fracture zones were encountered at 15.70 m and 22.25 m bgs. Well development, chlorination and a one hour constant rate pumping test were all carried out according to the requirements of O.Req. 903.

TW6

The casing hole for TW6 was advanced through the overburden and seated approximately 4.1 m into the bedrock to achieve a casing depth of 6.1 m below ground surface. The open borehole was advanced with the <u>cable tool</u> to a total depth of approximately 69.19 m bgs. Water bearing fractures were encountered at 16.76 m bgs. Well development, chlorination and a one hour constant rate pumping test were all carried out according to the requirements of O.Reg. 903.



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TW7 (not used as a representative test well)

The casing hole for TW7 was advanced through the overburden and seated approximately 3.5 m into the bedrock to achieve a casing depth of 6.1 m below ground surface. The open borehole was advanced using <u>air percussion</u> techniques to a total depth of approximately 24.4 m bgs. A water bearing fracture were encountered at 13.4 m bgs. Well development, chlorination and a one hour constant rate pumping test were all carried out according to the requirements of O.Reg. 903.

NOTE: This well is relatively shallow and the expected yield (based in the driller's one hour pumping test) is extremely low. The well was not used as a test well for the project. An attempt was made to stimulate the well (see Section 3.10) but further testing was abandoned when favourable results were identified at the other onsite test wells.

HW

The MOECC Water Well Record for HW shows that the well was constructed with approximately 7.9 m of 150 mm diameter steel casing (7.3 m bgs and a 0.6 m stickup) set into grey limestone bedrock. Cement grout was used to seal the annular space.

The open borehole was advanced with 'rotary air drilling' techniques (i.e. <u>air percussion</u>). The well contractor reported grey limestone bedrock with shale interbeds. A water bearing fracture was encountered at a depth of 18.3 m bgs and the total well depth was reported to be 26 m bgs. The well depth was independently measured by Paterson.

Four (3) additional wells (TW4, TW5 and TW6, and TW7) were constructed in 2011 by Saunders Well Drilling Ltd. of Braeside, Ontario. These wells were drilled to depths of between 8 and 69 m using cable tool techniques (NOTE: the nature of cable tool drilling (slow pounding of the formation using the weight of the drill string, and removal of cuttings using a bailer) is known to promote advantageous open fracturing, and is often preferable to rapid percussion drilling which can cause blockage and sealing of fractures in some situations).

MOECC water wells records for the test wells are included in Appendix 2.

Offsite Well – 1490 O'Toole

A new drilled well was installed at 1490 O'Toole Road (a recently severed residential lot) in June 2015. This well is located approximately 80 m south of the southern property boundary (see Figure 5). This well was observed by Paterson to be artesian in March 2016.

The casing hole for the '1490 O'Toole' well was advanced through the overburden and seated approximately 7.6 m into the bedrock to achieve a casing depth of 12.12 m below ground surface. The open borehole was advanced using 'rotary air' techniques (i.e. <u>air percussion</u>) to a total depth of 103.03 m bgs. A water bearing fracture were encountered at 18.2 m bgs. Well development, chlorination and a one hour constant rate pumping test were all carried out according to the requirements of O.Reg. 903.

The following table provides a summary of the available test wells in the vicinity of the site. For the purpose of this study the <u>four most important test wells are TW5, TW6, HW and 1490 O'Toole.</u>

Table 2 - Test Wells Summary

TEST WELLS SUMMARY													
Well Record ID	Year Drilled	Depth to Bedrock (m)	Casing Depth (m)	Depth to Water Bearing Fractures (m)	Total depth (m)	Recommended Pumping Rate (L/min)							
Non-representative Test Wells													
TW1	2009	3.81	6.10	109.7	152.40	4.5							
TW2	2009	3.66	6.10	105.2 107.0	109.73	54.6							
TW3	2009	3.35	6.10	131.1	134.11	27.3							
TW4	2011	5.18	6.10	7.2	8.53	45.5							
TW7	2012	2.59	6.10	13.4	24.38	1.1							
Representativ	e Test We	lls											
TW5	2011	9.14	10.21	15.7 22.3	24.38	22.7							
TW6	2011	1.98	6.10	16.8	69.19	9.1							
HW	2003	4.27	7.92	18.29	25.30	27.3							
1490 O'Toole	2015	3.63	12.12	18.18	103.03	22.0							

2.7 Pumping Tests

Pumping tests were conducted sequentially at each test well using the other test wells as observation wells where deemed appropriate. The pumping tests were carried out following full development of each well, began with a static water level and involved pumping at a fixed rate (+/- 5%) for at least six hours. Water levels were measured at the pumping well and observations wells at one minute intervals, and the pumped water was discharged far enough away from the test wells to ensure that artificial recharge did not occur.

Each of the test wells was pumped at a constant rate and was then allowed to recover. The pumping discharge rates were selected to ensure a demonstrable reduction in potentiometric head (i.e. a lowering of the static water levels) within the water supply aquifer



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being tested. During the pumping test, the pumping rate was monitored at 60 minute intervals in order to ensure that the rate of discharge remained reasonable constant (i.e. < 5% variation).

Drawdown observations during pumping and recovery were recorded using manual measurements taken with an electronic water level tape. Electronic dataloggers (Schlumberger Micro-DiverTM) were installed in each test well (and at some observation wells) prior to the each test. Full recovery was monitored using the dataloggers which were not removed from the wells until at least 24 hours after each pumping test.

Turbidity and free chlorine residual measurements were taken using a Hanna HI93414 Fast Tracker portable meter. Testing was conducted in the field at regular intervals during each pumping test. No residual chlorine was detected at the time that the water samples were collected for analytical analyses.

Field measurements of pH, temperature, conductivity and TDS were carried out during each test using an ExtechTM ExStik II portable multi-meter.

All field instruments were calibrated prior to use, and calibration records are retained within the project file.

TW1

A pumping test was carried out at TW1 on December 3, 2009. The well was pumped with an electric submersible pump from Air Rock Drilling at a rate of 11.3 L/min for six (6) hours. The total drawdown was 77.9 m. Recovery was not fully monitored.

TW2

A pumping test was carried out at TW2 on December 1, 2009. The well was pumped with an electric submersible pump from Air Rock Drilling at a rate of 18.9 L/min for six (6) hours. The total drawdown was 5 m. 100% recovery was achieved in less than 12 hours.

TW3

A pumping test was carried out at TW3 on December 2, 2009. The well was pumped with an electric submersible pump from Air Rock Drilling at a rate of 15.1 L/min for six (6) hours. The total drawdown was 8.4 m. Recovery was not fully monitored.



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TW4

TW4 was pumped for six (6) hours on December 15, 2011. Information about the pumping rate and drawdown are not available for analysis. Water samples were collected at 3 and 6 hours.

A pumping test was carried out at TW4 on June 12, 2015. The well was pumped with an electric submersible pump from Air Rock Drilling at a rate of 114 L/min for six (6) hours. The total drawdown was 0.94 m. 100% recovery was achieved in 1 minute.

TW5

TW5 was pumped for six (6) hours on December 19, 2011. Information about the pumping rate and drawdown are not available for analysis. Water samples were collected at 3 and 6 hours.

A pumping test was carried out at TW5 on May 11, 2016. The well was pumped with an electric submersible pump from Air Rock Drilling at a rate of 19 L/min for six (6) hours. The well was then pumped for a further three (3) hours at a rate of 15 L/min in an effort to reduce turbidity. The total drawdown was 4.6 m. 95% recovery was achieved in 21 minutes. A datalogger was also placed in a nearby observation well (1490 O'Toole), but no response to pumping was identified at the observation well.

TW6

TW6 was pumped for 22 hours on December 17, 2011. Information about the pumping rate and drawdown are not available for analysis. Water samples were collected at 6 and 22 hours.

A pumping test was attempted at TW6 on January 13, 2016. The well was pumped with an electric submersible pump from Air Rock Drilling at a rate of 18 L/min for six (6) hours. The water level dropped below the datalogger, so the test was abandoned.

On May 5, 2016 the well was pumped at a rate of 9.6 L/min for 3 hours before the water level dropped below the datalogger. The test was abandoned. A datalogger was also placed in a nearby observation well (HW), but no response to pumping was identified at the observation well.

A successful pumping test was carried out on July 8 and 9, 2016. The well was pumped with Grundfos pump (2" sampling pump) from Pine Environmental Canada, at a rate of 2.8 L/min for twenty four (24) hours. The total drawdown was 15.3 m. 95% recovery was achieved in 13 hours.



HW

HW was pumped for six (6) hours on December 8, 2009. Information about the pumping rate and drawdown are not available for analysis. Water samples were collected at 3 and 6 hours.

Another pumping test was carried out on May 24, 2016. The well was pumped using the existing electric submersible pump that is installed in the well. A licensed well technician/plumber/electrician from H.O. Smith Plumbing, disconnected the discharge line from the pump and attached a separate discharge line for the pumping test. The well was pumped at a rate of 20 L/min for six (6) hours. The total drawdown was 4.1 m. 95% recovery was achieved in 1.15 hours.

1490 O'Toole

A pumping test was carried out at the well at 1490 O'Toole Road by Kollard Associated Inc. on March 24, 2016 (Kollard, 2016). The well was pumped at 24 L/min for five (5) hours, then the pumping rate was varied (3 to 24 L/min) in order to develop the well and reduce turbidity. The total drawdown was 11.8 m. 95% recovery was achieved in 27 minutes. Further pumping was required (7 hours on March 22) to reduce the concentration of turbidity to an acceptable level.

A summary of pumping tests is provided in the table below.

Table 3 - Pumping Tests Summary

PUM PING TE	STS SUM N	IARY						
Well Record	Test date	Pumping rate	Duration of test	Static water	Drawdow	Recovery (% and	Transmissivity (m²/day)	
ID	rest date	(L/min)	(hours)	level (mbtoc)	n (m)	time)	Pumping	Recovery
Non-represe	ntaive test w	re IIs	•		•		•	•
TW1	03-Dec-09	11	6	1.32	77.85	33% in 2 hours	0.1	insufficient data to calculate
TW2	01-Dec-09	19	6	52.20	5.01	62% in 7 hours and 100% in <12 hours	1.5	insufficient data to calculate
TW3	02-Dec-09	15	6	54.12	8.41	80% in 8 hours	1.5	2.0
TW4	12-Jun-15	114	6	0.82	0.94	100% in 1 minute	86.4	1620
Representaiv	e test wells							
TW5	11-May-16	19	8	0.37	4.63	99% in 16 minutes	2.6	1.4
TW6	08-Jul-16	3	24	4.56	15.34	95% in 13 hours	0.02	0.2
HW	24-May-16	20	6	3.20	4.14	95% in 1.16 hours	14.3	8.2
1490 O'Toole	16-Mar-16	24	24	0.6	11.8	95% in 27 mins	146.0	13.0



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2.8 Groundwater Sampling

Groundwater samples were collected at the midpoint and at the end of each pumping test. Prior to collection of the pumping test water samples, the free chlorine residual was verified to be non-detectable using field test equipment.

Two (2) offsite water supply wells were also sampled as part of the investigation. The locations are indicated on Figure 5 (Test Hole Location Plan) in Appendix 5. Well owner interviews were conducted at the time of sampling the offsite wells.

All groundwater samples were submitted for comprehensive testing of bacteriological, chemical and physical water quality parameters consistent with standard 'Subdivision Water Supply' suite of parameters.

The final groundwater sample from TW5 was also submitted for analysis of 'RVCA recommended metals' and phosphate.

The final groundwater sample from HW was also submitted for analysis of 'RVCA recommended metals', phosphate, petroleum hydrocarbons (PHCs), and volatile organic compounds (VOCs).

All samples were collected unfiltered and unchlorinated and were placed directly into clean bottles supplied by the analytical laboratory. Samples were placed immediately into a cooler with ice and were transported directly to the Exova laboratory in Ottawa. All samples were received by the laboratory within 24 hours of collection.

Exova is fully accredited by the Canadian Association for Laboratory Accreditation (CALA) having received a Certificate of Laboratory Proficiency in 1991 (CALA Registration Number 2602). Exova has ISO 17025 accreditation (Standards Council of Canada) and is fully accredited for Ontario Safe Drinking Water Act (OSDWA) testing.

Offsite Well Sampling

Offsite water samples were collected at 1753 Wilhaven Drive and at 1865 Wilhaven Drive (see Figure 2 for locations) on July 7, 2016. The sample was submitted to EXOVA Ottawa for analysis of the standard 'subdivision water supply' suite of parameters (see Section 4.2.1 for a discussion of the results).

2.9 Offsite Well Owner Interviews

An attempt was made to interview neighbouring well owners about their well and septic systems. A standard form was used to conduct each brief interview. The form includes

standard questions about the well location, water quality, water quantity and potential environmental concerns. Well owner interview log sheets are included in Appendix 4.

2.10 Hydraulic Fracturing

Hydraulic fracturing (also known as hydro-fraccing, or fraccing) is a well stimulation technique in which bedrock is fractured by a pressurized liquid. The process involves the high-pressure injection of 'fracking fluid' (in this case clean water) into a wellbore to open up fractures through which groundwater will flow more freely) was conducted by Outaouais Well Fracturing of Greely, Ontario. Hydraulic fracturing was completed on two wells (TW6 and TW7) on June 14, 2016.

A downhole camera survey of the each well was carried out before and after the well pressurization (fraccing) sequence. The following table provides a summary of the fractures that were identified.

Table 4 - Downhole Camera Survey

DOWNHOLE CA	MERA SURVEY OF FRACTURES
Depth (m btoc)	Description
TW6	
6.86	bottom of casing to bedrock
10.67	large empty void with no water entry
17.98	annulus fracture (1st water production area following hydrofracturing)
23.93	small fracture/void
29.87	small fracture
35.05	small fracture
41.45	small fracture
49.99	borehole rough
69.19	bottom
TW7	
6.89	bottom of casing
8.53	small fracture
14.33	small fracture
19.51	slight fracture (1st water production area following hydrofracturing)

Hydraulic fracturing was carried out using a truck mounted 'fraccing rig' comprised of a 11,000 L water tank, six metric tonne crane, high pressure fraccing pump (heavy duty triplex piston pump and gear transfer box capable of producing 5000+ psi of water pressure, at up to 200 IGPM), and a twin packer downhole assembly.

The hydraulic fracturing sequence at each well involved pressurization of sections of the well where fractures were identified by the downhole camera survey.

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 Surficial Geology

Surficial geology mapping information from the Ontario Geological Survey (OGS) was obtained from the OGS Earth website at: http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth, and is included on Figure 3 (Overburden Geology) in Appendix 5.

The mapping data from OGS indicates that the eastern half of the site has 'fine textured glaciomarine deposits' (silt and clay with minor sand and gravel) at surface, and the western half of the site has 'Paleozoic bedrock' at surface. Till material (stone-poor, sandy silt to silty sand-textured till) occurs to the immediate east of the site. This pattern is generally consistent with the findings of the test pitting program. A detailed description of the upper overburden stratigraphy, based on the test pit findings, is provided below.

The thickness of the overburden unit, based on available water well record information from wells drilled on the subject site, varies from 1.98 m to 9.14 m (average thickness = 4.2 m).

A total of 12 onsite test pits were advanced to depths from 2.34 to 3.83 m bgs (see Figure 5 in Appendix 5, and the test pit logs in Appendix 1), to assess the surficial stratigraphy (Paterson, 2009).

The general stratigraphy that was encountered in the test pits is as follows:

- Topsoil
- Silty Sand / Sandy Silt
- Silty Clay
- Till

Please refer to the geotechnical report by Paterson (Paterson, 2009) for further details. Grain size distribution curves for the main units that were identified are included in Appendix 1.

3.2 Bedrock Geology

Geological mapping information from the OGS Earth website (OGS, 2016) shows that the site is located in an area where the Bobcaygeon Formation is the uppermost bedrock unit.



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Figure 4 (Bedrock Geology) in Appendix 5 shows the OGS Earth mapping information in the vicinity of the site.

OGS describes the lithology of the Bobcaygeon Formations as "limestone, with minor shales in upper part". Information from nearby MOECC Water Well Records shows that the dominant rock type is limestone. This information is consistent with the information from OGS mapping.

3.3 Hydrogeology

A shallow unconfined 'aquifer' exists within the overburden unit. Observations made during test pitting suggest that the overburden groundwater is typically encountered at depths from 0.8 m to 1.6 m below ground surface. The direction of groundwater flow in the overburden 'aquifer' is interpreted to be to the south.

In the Ottawa area, the most important water supply 'aquifers' occur within the horizontally bedded Palaeozoic carbonate sedimentary bedrock. Permeability within these strata is controlled by fractures. The primary porosity (i.e. the 'primary fracture network') is controlled by large fractures including horizontal bedding plane fractures and large interconnecting vertical/subvertical fractures. A significant secondary porosity is caused by small scale fracturing of the entire mass of rock. These fractures are small and closely spaced.

The direction of groundwater flow in the bedrock aquifer is interpreted to be to the north, towards the Ottawa River.

The locations of MOECC Water Well Records located in the vicinity of the site are included on Figure 2 (Please note: well location accuracy is variable based on the MOECC database).

Water well record information was obtained from the MOECC water well records database. Overburden thickness, depth of casing, aquifer interception points and reported well yields were reviewed in detail.

A total of 40 water well records were identified. The drilled wells typically intercept a water supply 'aquifer zone' within the Bobcaygeon Formation.



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3.3.1 Conceptual Hydrogeological Model

Please refer to Figure 6 (Cross Section) when reading this section of the report.

• Overburden Unit

- Stratigraphy includes thin topsoil over silty sand / sandy silt, over silty clay, over till
- Overburden thickness is typically 4-5 m
- Shallow unconfined 'aquifer'
- Overburden groundwater is typically around 1 m bgs
- Groundwater flows to the south

Bedrock Unit

- Bobcaygeon Formation
- Lithology is limestone with some shale in the upper part of the formation
- Confined bedrock 'aquifer'
- Groundwater occurs in fracture controlled porosity
- Groundwater flows to the north

In Paterson's experience, the upper portion of the Bobcaygeon Formation (i.e. the 'upper bedrock aquifer zone' provides relatively good quality groundwater. The lower portion of the Bobcaygeon Formation is typically associated with diminished water quality (elevated TDS, sodium, and chloride).

NOTE: The potentiometric groundwater elevations at TW2 and TW3 are much lower than those observed in all of the surrounding wells. This is probably due to the drilling technique that was used (air rotary) which may have caused small water bearing fractures in the 'upper bedrock aquifer zone' to be sealed during the drilling process. This provides evidence that there is some degree of isolation between the 'upper bedrock aquifer zone' and the 'lower bedrock aquifer zone', and shows that the hydrogeological gradient between the two is downwards.

3.3.2 Hydrogeological Sensitivity

The terrain analysis findings (see Section 4.0) show that the overburden thickness varies across the site from 1.98 m to 9.18 m, and appears to be more than 3 m thick across most of the site. A small area near the western end of the site, between the house and the southwest corner of the property has soils that vary from 2-3 m in thickness.



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The overburden soils at the site are not highly permeable. The overburden material includes a significant proportion of clay (see Section 4.1 and the test pit logs, and grain size analyses in Appendix 1). There is a significant proportion of clay in the overburden material at the three locations (TW6, TW7 and TP4) where overburden was identified to be between 1.98 and 3 m thick.

The western half of the site occurs within in area mapped as 'inferred karst' as determined by OGS (OGS, 2015). This means that the area is within a region of carbonate bedrock which is vulnerable or susceptible to karstification, as evidenced by the Cardinal Creek karst (a small cave and associated features) which is located approximately 2.5 km to the west of the site. The eastern half of the site occurs within in area mapped as 'potential karst'. There is no bedrock outcrop at the site, so no karstic features were identified.

The subject site is not considered to be hydrogeologically sensitive. There are no karstic features onsite and the bedrock is protected by overburden (generally greater than 3 m in thickness) that contains a significant proportion of clay.

3.3.3 Potential Sources of Contamination

Onsite

The site is developed as a farm with cleared fields, an access laneway and a farmyard area with house and outbuildings. Potential sources of onsite contamination include pesticide use, fuel storage & handling, chemical storage & handling, and the existing onsite sewage system attached to the house. Most of these activities are confined to the farmyard area.

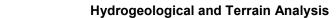
The only potential onsite source of contamination that may have affected the entire property is the historical use of pesticides. The overburden thickness at the site is generally between 3-5 m based on the onsite water wells. Surficial geology mapping information from the Ontario Geological Survey indicates the overburden material at the location of the proposed lots is 'till' comprised of sandy silt and silty sand (see Section 4.1 and Figure 3).

Given the fact that there has been no use of pesticides for 16 years or more, and there have been no reports of pesticide contaminated groundwater in the vicinity of the site (including at least one dug well), the potential for any significant impacts to the bedrock aquifer beneath the proposed new lots is considered to be insignificant. No further action is recommended.

Offsite

The following potential offsite sources of contamination were identified:

Wilhaven Drive (potential spills, road salt use).





Road salt impacts are expected to be localized and confined to groundwater in the overburden unit.

3.3.4 Large Water Uses and PTTW Review

Based on a review of large water taking uses in the vicinity of the site, there are no single large groundwater uses within 750 m of the site. The closest PTTW users of groundwater are as follows:

- Camelot golf club (greater than 850 m to the north of the site)
- Proulx fruit farm (greater than 1.4 km to the south)

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4.0 AQUIFER ANALYSIS

In order to evaluate the water supply aquifer(s) underlying the site, a total of seven (7) test wells (TW1 to TW7) were constructed across the site from 2009 and 2012. The existing well at the onsite house (HW), and a nearby offsite water supply well (1490 O'Toole) were also used as test wells to evaluate the bedrock aquifer.

The locations of the wells were selected by Paterson to ensure representative lot coverage for aquifer testing. See Figure 5 (Test Hole Location Plan) in Appendix 5.

4.1 Aquifer Characteristics

The pumping test data was analyzed using Aquifer Test Pro[™] (V2016) software. Drawdown data was measured using an electronic water level tape. An electronic datalogger unit was also used to monitor drawdown in the test wells.

The drawdown data at the pumping well was analyzed using the Theis (Theis, 1935), and the Cooper & Jacob methods of analysis (Cooper & Jacob, 1946). Recovery data was also analyzed using Theis.

Transmissivity of the 'upper bedrock aquifer zone' is estimated to be approximately 7.5 m²/day (average of values from TW5, HW and 1490 O'Toole). Aquifer analysis details are included in Appendix 4.

Aquifer storativity was not calculated. Several attempts to obtain data at nearby observation wells did not provide any data (i.e. no response to pumping was identified at any of the observation wells). Aquifer storativity is estimated to be approximately 1 x 10⁻⁶ based on Paterson's knowledge of the bedrock aquifer systems in the Ottawa region.

The following table provides a summary of aquifer characteristics.

Table 5 - Summary of Aquifer Characteristics

SUMMARY OF AQUIFER CHARACTERISTICS										
	TW5	TW6	HW	1490 O'Toole						
Transmissivity (m²/day)	1.4	0.2	8.2	13						
Pumping Rate (L/min)	19	3	20	24						
Available Drawdown (m)	24	64	22	102						
Maximum Drawdown (m)	4.63	15.34	4.14	11.8						
% Drawdown	19.3%	24.0%	18.8%	11.6%						
Specific Capacity (L/min/m)	4.1	0.2	4.8	2.0						

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The average transmissivity value (based on TW5, HW and 1490 O'Toole) is considered to be a reasonable approximation of the general transmissivity of the 'upper bedrock aquifer zone', measured in wells that encountered the primary fracture network. Two onsite wells (TW6 and TW7) do not appear to have encountered the primary fracture network and have very low yield. Any future wells that do not encounter the primary fracture network will probably need additional storage at surface to meet peak demand requirements (as discussed in Section 5.2).

4.2 Water Quality

Analytical results from the groundwater sampling program are presented in Tables 6, 7 and 8 below. Laboratory certificates of analysis are included in Appendix 3.

Deep Wells

For the purpose of this report the term 'deep wells' refers to wells that are deeper than 70 m. Analytical results from TW1, TW2 and TW3 are summarized in Table 6 below.

The analytical results from the three deep onsite test wells show that water quality is relatively poor in these wells that extend beyond 70 m in depth. Water quality in the deep wells is characterized by high concentrations of salt (Na and CI), TDS and turbidity.

The well at 1490 O'Toole Road (**1490 O'Toole**) is one of the four selected 'Test Wells' for this project. Although this is a deeper well, the water quality is generally good. The only exceedances of the ODWS limits are for hardness and iron.

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Table 6 - Groundwater Geochemistry - Deep Wells

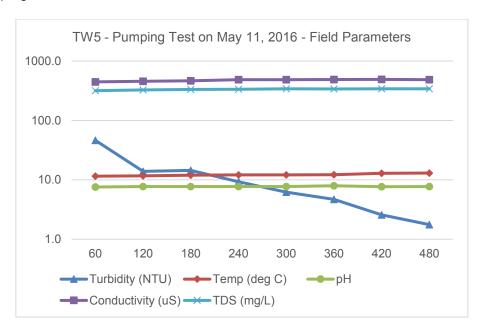
		ODWS	S								
				N1 ec-09		V2 ec-09	02 D	V3 ec-09		90 O'Too ar-16	
			03-D	ec-09 I	0 FD6	1	02-0	ec-09	IO-IVI	a1-10	22-Mar-16
Parameters	Units	Limit	3 Hour	6 Hour	3 Hour	6 Hour	3 Hour	6 Hour	3 Hour	6 Hour	7 hour
Microbiological Parame	eters (Hea			ı	ı	ı	I	I	ı		1
Escherichia Coli	ct/100 mL	0 ^{MAC}	0	0	0	0	0	0	0	0	-
Faecal Coliforms	ct/100 mL	not specified	0	0	0	0	0	0	0	0	-
Faecal Streptococcus	ct/100 mL	not specified	2	11	0	0	2	0	-	-	-
Heterotrophic Plate Count	ct/1mL	not specified	135	291	>500	>500	181	11	90	153	-
Total Coliforms	ct/100 mL	0 ^{MAC}	0	60	0	0	11	0	0	0	-
Chemical Parameters (I	Health)										
Fluoride	mg/L	1.5 ^{MAC}	0.12	0.16	1.94	1.96	0.61	0.63	0.25	0.41	-
Ammonia	mg/L	not specified	0.13	0.14	0.20	0.19	0.46	0.46	0.11	0.11	
TKN	mg/L	not specified	0.39	0.23	0.24	0.23	0.58	0.64	0.2	0.2	
Nitrite	mg/L	1 ^{MAC}	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
Nitrate	mg/L	10 ^{MAC}	0.41	0.42	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
Chemical Parameters w	ith Aesth	etic Objectiv	es/ Opera	tional G	uidelines	Į.			Į.		
Alkalinity	mg/L	500 ^{OG}	408	403	212	213	244	244	235	241	-
Chloride	mg/L	250 ^{AO}	7 18	666	153	153	304	305	16	22	-
Colour	TCU	5 ^{AO}	<2	<2	<2	<2	10	5	2	<2	-
DOC	mg/L	5 ^{AO}	1.7	1.5	0.9	0.9	1.7	1.6	1.8	1.5	-
Conductivity	uS/cm	not specified	3200	3040	1500	1480	2730	2780	502	543	
Hydrogen Sulfide	mg/L	0.05 ^{AO}	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.02	<0.02	-
рН	pH units	6.5-8.5 ^{AO}	7.81	7.85	8.18	8.18	7.88	7.93	8.06	8.1	-
Sulphate	mg/L	500 ^{AO}	121	117	295	287	768	784	18	23	-
Hardness	mg/L	100 ^{og}	808	662	166	157	687	691	210	212	-
Sodium	mg/L	200 ^{AO}	382	4 18	272	266	345	340	34	40	-
Calcium	mg/L	not specified	246	199	35	33	173	173	61	62	
Potassium	mg/L	not specified	5	5	5	5	8	8	6	7	
Iron	mg/L	0.3 ^{AO}	5.51	0.73	<0.03	<0.03	1.55	0.06	0.62	1.47	0.48
Magnesium	mg/L	not specified	47	40	19	18	62	63	14	14	
Manganese	mg/L	0.05 ^{AO}	0.15	0.06	<0.01	<0.01	0.04	0.03	0.03	0.10	0.03
Total Dissolved Solids	mg/L	500 ^{AO}	2080	1980	975	962	2180	2220	326	353	-
Tannin & Lignin	mg/L	not specified	0.1	0.3	0.1	<0.1	0.2	0.4	0.2	0.3	
Phenols	mg/L	not specified	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Turbidity (lab)	NTU	1MAC	81.7	15.4	0.7	0.3	19.4	1.3	95	>100	5
NOTE:		imum Acceptab			<u></u>	<u> </u>					

Shallow Wells

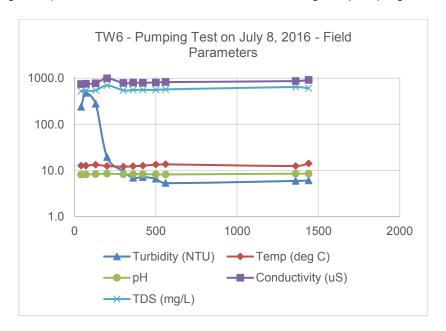
For the purpose of this report the term 'shallow wells' refers to wells that are less than 70 m in depth. All of the shallow wells are completed in the 'upper bedrock aquifer zone'. Analytical results from TW4 and TW5 are summarized in Table 7 below. Analytical results from TW6 and HW are summarized in Table 8.

TW4 is an extremely shallow well (total depth = 8.53 m) that is not considered to be technically suitable as a test well for the site (the well configuration makes it extremely difficult to conduct a meaningful pumping test). The water quality is generally good. Previous sampling of the well in December 2011 demonstrated that there are no bacteria in the aquifer (the well should have been shock chlorinated prior to pumping on December 6, 2015). The only other exceedances of the ODWS limits are for hardness and TDS.

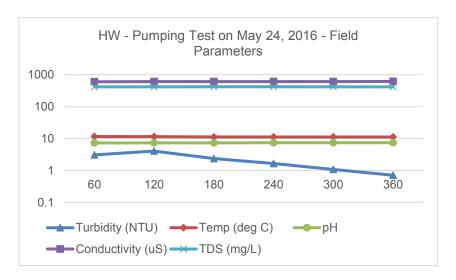
TW5 is one of the four selected 'Test Wells' for this project. The water quality at TW5 is generally good. The only exceedances of the ODWS limits are for hardness and manganese. Analysis of additional parameters at this location revealed that all results for RVCA metals and for phosphate either had very low concentrations (well below the ODWS limits) or were non-detectable. The following field parameters trends were measured during the pumping test at TW5:



TW6 is one of the four selected 'Test Wells' for this project. Although the yield is very low, the water quality is generally good. The only exceedances of the ODWS limits is for TDS. The following field parameters trends were measured during the pumping test at TW6:



HW is one of the four selected 'Test Wells' for this project. The water quality at HW is generally good. The only exceedances of the ODWS limits is for hardness. Analysis of additional parameters at this location revealed that all results for RVCA metals, phosphate, PHS and VOCs either had very low concentrations (well below the ODWS limits) or were non-detectable. The following field parameters trends were measured during the pumping test at HW:



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Table 7 - Groundwater Geochemistry - Shallow Wells (A)

		ODWS		TV	V 4		TW5			
			15-D	ec-11	06-D	ec-15	19-D	ec-11	11-Ma	ay-16
Parameters	Units	Limit	6 hour	12 Hour	3 Hour	6 Hour	3 Hour	6 Hour	3 Hour	6 Hour
Microbiological Param	eters (Heal	th)		•		•				
Escherichia Coli	ct/100 mL	0 ^{MAC}	0	0	0	1	0	0	0	0
Faecal Coliforms	ct/100 mL	not specified	0	0	-	-	0	0	0	0
Faecal Streptococcus	ct/100 mL	not specified	1	0	-	-	0	0	0	0
Heterotrophic Plate Count	ct/1mL	not specified	4	3	-	-	5	11	4	2
Total Coliforms	ct/100 mL	0 ^{MAC}	0	0	50	62	2	0	0	0
Chemical Parameters (Health)		•	•		•				
Fluoride	mg/L	1.5 ^{MAC}	< 0.10	< 0.10	<0.10	<0.10	0.14	0.14	<0.10	< 0.10
Ammonia	mg/L	not specified	<0.02	<0.02	<0.05	<0.05	0.04	0.04	0.05	0.05
TKN	mg/L	not specified	0.20	0.18	0.51	0.14	<0.1	0.13	0.1	0.1
Nitrite	mg/L	1 ^{MAC}	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nitrate	mg/L	10 MAC	<0.10	<0.10	0.89	0.91	<0.10	<0.10	<0.10	<0.10
Chemical Parameters w	ith Aesthe	tic Objectives	/ Operati	onal Guid	delines	•		•		
Alkalinity	mg/L	500 ^{og}	193	180	266	278	242	242	258	250
Chloride	mg/L	250 ^{AO}	43	31	69	72	20	24	21	24
Colour	TCU	5 ^{AO}	11	10	6	5	5	9	2	<2
DOC	mg/L	5 ^{AO}	4.2	4.3	3.0	3.3	1.1	1.2	1.4	1.3
Conductivity	uS/cm	not specified	551	481	778.0	791	535	533	527	527
Hydrogen Sulfide	mg/L	0.05 ^{AO}	<0.01	<0.01	<0.002	<0.002	<0.01	<0.01	<0.02	<0.02
pH	pH units	6.5-8.5 ^{AO}	8.06	8.02	8.02	7.97	7.9	7.83	8.21	8.16
Sulphate	mg/L	500 ^{AO}	27	21	34	34	14	16	13	13
Hardness	mg/L	100 ^{0G}	206	182	338	343	257	267	260	262
Sodium	mg/L	200 ^{AO}	30	25	42	44	12	13	14	15
Calcium	mg/L	not specified	76	68	124	126	78	82	81	82
Potassium	mg/L	not specified	<1	<1	1	<1	6	6	4	4
Iron	mg/L	0.3 ^{AO}	0.08	0.03	0.18	0.08	1.31	0.65	0.7	0.18
Magnesium	mg/L	not specified	4	3	7	7	15	15	14	14
Manganese	mg/L	0.05 ^{AO}	<0.01	<0.01	<0.01	<0.01	0.14	0.14	0.13	0.11
Total Dissolved Solids	mg/L	500 ^{AO}	358	3 13	506	514	348	346	343	343
Tannin & Lignin	mg/L	not specified	0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1
Phenols	mg/L	not specified	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001
Turbidity (lab)	NTU	5 ^{AO}	3.0	1.2	3.1	1.3	38.5	11.6	6.9	1.6



Table 8 - Groundwater Geochemistry - Shallow Wells (B)

		ODWS		TW6		HW			
			17-D	ec-11	09-Jul-16	08-Dec-09		24-May-16	
Parameters	Units	Limit	6 Hour	22 Hour	24 Hour	3 Hour	6 Hour	6 Hour	
Microbiological Parame	ters (Healt	h)		•	-		-	-	
Escherichia Coli	ct/100 mL	0 ^{MAC}	0	0	-	0	0	0	
Faecal Coliforms	ct/100 mL	not specified	0	0	-	0	0	0	
Faecal Streptococcus	ct/100 mL	not specified	0	0	-	0	2	0	
Heterotrophic Plate Count	ct/1mL	not specified	14	14	-	8	5	16	
Total Coliforms	ct/100 mL	0 ^{MAC}	0	0	-	90	2	0	
Chemical Parameters (H	lealth)			•				•	
Fluoride	mg/L	1.5 ^{MAC}	0.82	1.0	0.68	0.11	0.11	<0.10	
Ammonia	mg/L	not specified	n/a	0.21	0.25	<0.02	0.06	0.03	
TKN	mg/L	not specified	n/a	0.19	0.30	<0.1	<0.1	0.2	
Nitrite	mg/L	1 ^{MAC}	<0.10	< 0.10	<0.10	<0.10	< 0.10	<0.10	
Nitrate	mg/L	10 ^{MAC}	<0.10	< 0.10	0.12	<0.10	< 0.10	< 0.10	
Chemical Parameters w	ith Aesthet	ic Objectives/	Operation	nal Guideli	nes				
Alkalinity	mg/L	500 ^{og}	263	285	296	257	258	283	
Chloride	mg/L	250 ^{AO}	41	106	94	24	25	39	
Colour	TCU	5 ^{AO}	12	11	<2	7	<2	<2	
DOC	mg/L	5 ^{AO}	1.1	0.9	1.0	1.6	1.3	1.2	
Conductivity	uS/cm	not specified	n/a	991	1.0	580	587	628	
Hydrogen Sulfide	mg/L	0.05 ^{AO}	<0.01	<0.01	<0.02	0.06	0.01	<0.02	
рН	pH units	6.5-8.5 ^{AO}	8.38	8.42	8.27	7.74	7.76	7.96	
Sulphate	mg/L	500 ^{AO}	42	63	61	19	20	19	
Hardness	mg/L	100 ^{0G}	70	70	98	274	277	341	
Sodium	mg/L	200 ^{AO}	141	211	168	4	4	7	
Calcium	mg/L	not specified	n/a	15	21	90	91	112	
Potassium	mg/L	not specified	n/a	4	5	2	2	2	
Iron	mg/L	0.3 ^{AO}	0.57	0.07	0.10	0.78	0.5	0.19	
Magnesium	mg/L	not specified	n/a	8	11.00	12	12	15	
Manganese	mg/L	0.05 ^{AO}	0.01	<0.01	<0.01	0.04	0.04	0.03	
Total Dissolved Solids	mg/L	500 ^{AO}	457	644	597	377	382	408	
Tannin & Lignin	mg/L	not specified	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	
Phenols	mg/L	not specified	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	
Turbidity (lab)	NTU	5 ^{AO}	27.7	5.8	4.6	15.1	6.7	1.6	

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A review of the laboratory groundwater geochemistry results for the wells within the preferred water supply aquifer zone (i.e. TW4, TW5, TW6 and HW) confirms that the raw water within the 'upper water supply aquifer system' is potable and meets the health related parameter requirements specified by the Ontario Drinking Water Standards (ODWS) for the analyzed parameters.

The water quality in the "<u>upper bedrock aquifer zone</u>' generally satisfies the aesthetic objectives/operational guidelines of the ODWS, with the exception of the following parameters:

- Hardness (TW4, TW5 and HW)
- TDS (TW4 and TW6)
- Manganese (TW5)

Hardness

At the measured concentrations, the water is considered to be moderately hard, which is typical of wells drilled throughout eastern Ontario. Hardness is a measure of the dissolved calcium and magnesium in water and is expressed as the equivalent quantity of calcium carbonate. Hardness can lead to the formation of scale deposits and can form excessive scum (MOE, 2003).

TDS

Total dissolved solids (TDS) refers to the concentration of inorganic substances dissolved in water. The main constituents are typically chloride, sulphates, calcium, magnesium and bicarbonates. High concentration can cause hardness, bad taste, mineral deposition or corrosion. Water with a TDS concentration above 500 mg/L may not palatable.

Manganese

The aesthetic objective for manganese is colour related. Manganese can cause black staining of laundry and fixtures. At excessive concentrations it can cause an undesirable taste.

Additional Parameters

The final groundwater sample from TW5 was also submitted for analysis of 'RVCA recommended metals' and phosphate. The final groundwater sample from HW was submitted for analysis of 'RVCA recommended metals', phosphate, petroleum hydrocarbons (PHCs), and volatile organic compounds (VOCs). Analytical results are summarized in



Tables 9 and 10 below. All of the results are either non-detectible, or were detected at concentrations well below the ODWS limits.

Table 9 - Groundwater Geochemistry - Metals and PHCs

		ODWS	TW5	HW
Parameters	Units	Limit	11-May-16	24-May-16
RVCA Metals				
Silver	mg/L	not specified	<0.0001	<0.0001
Aluminum	mg/L	0.1 ^{og}	0.01	<0.01
Arsenic	mg/L	0.025 ^{IMAC}	<0.001	<0.001
Boron	mg/L	5 ^{IMAC}	0.05	0.02
Barium	mg/L	1 ^{MAC}	0.14	0.18
Beryllium	mg/L	not specified	< 0.0005	<0.0005
Cadmium	mg/L	0.005 ^{MAC}	<0.0001	<0.0001
Chromium	mg/L	0.05 ^{MAC}	<0.001	<0.001
Copper	mg/L	1.0 ^{AO}	<0.001	0.002
Molybdenum	mg/L	not specified	<0.005	<0.005
Nickel	mg/L	not specified	<0.005	<0.005
Lead	mg/L	0.010 ^{MAC}	<0.001	<0.001
Antimony	mg/L	0.006 ^{MAC}	<0.0005	<0.0005
Sellenium	mg/L	0.01 ^{MAC}	<0.001	<0.001
Strontium	mg/L	not specified	1.02	1.01
Thallium	mg/L	not specified	<0.0001	<0.0001
Uranium	mg/L	0.02 ^{MAC}	<0.001	<0.001
Zinc	mg/L	5 ^{AO}	<0.01	<0.01
Mercury	mg/L	0.001 ^{MAC}	<0.0001	<0.0001
Petroleum Hydrocarbo	ons			
F1 (C6-C10)	ug/L	not specified	-	<20
F2 (C10-C16)	ug/L	not specified	-	<20
F3 (C16-C34)	ug/L	not specified	-	<50
F4 (C34-C50)	ug/L	not specified	-	<50
Chemical Parameters				
Phosphate (as P)	mg/L		<0.6	<0.2



Table 10 - Groundwater Geochemistry - VOCs

DADAMETER	LINUTO	HW	ODIAC LIMIT	
PARAMETER	UNITS	24-May-16	ODWS LIMIT	
Volatile Organic Compounds				
1,1,1,2-tetrachloroethane	ug/L	<0.5	-	
1,1,1-trichloroethane	ug/L	<0.4	-	
1,1,2,2-tetrachloroethane	ug/L	<0.5	-	
1,1,2-trichloroethane	ug/L	<0.4	-	
1,1-dichloroethane	ug/L	<0.4	_	
1,1-dichloroethylene	ug/L	<0.5	14 ^{MAC}	
1,2-dichlorobenzene	ug/L	<0.4	200 ^{MAC} / 3 ^{AO}	
1,2-dichloroethane	ug/L	<0.2	5 ^{IMAC}	
1,2-dichloropropane	ug/L	<0.5	-	
1,3-dichlorobenzene	ug/L	<0.4	-	
1,3,5-trimethylbenzene	ug/L	<0.2	-	
1,4-dichlorobenzene	ug/L	<0.4	5 ^{MAC} / 1 ^{AO}	
Benzene	ug/L	<0.5	5 ^{MAC}	
Bromodichloromethane	ug/L	<0.3	-	
Bromoform	ug/L	<0.4	-	
Bromomethane	ug/L	<0.5	-	
c-1,2-Dichloroethylene	ug/L	<0.4	-	
c-1,3-Dichloropropylene	ug/L	<0.2	-	
Carbon Tetrachloride	ug/L	<0.2	5 ^{MAC}	
Chloroform	ug/L	<0.5	-	
Dibromochloromethane	ug/L	<0.3	-	
Dichlorodifluoromethane	ug/L	<0.5	_	
Dichloromethane	ug/L	<4.0	50 ^{MAC}	
Ethylbenzene	ug/L	<0.5	2.4 ^{AO}	
Ethylene Dibromide	ug/L	<0.2	-	
Hexane	ug/L	<5	-	
m/p-xylene	ug/L	<0.4	-	
Methyl Ethyl Ketone (MEK)	ug/L	<10	-	
Methyl Isobutyl Ketone (MIBK)	ug/L	<10	-	
Methyl Tert Butyl Ether (MTBE)	ug/L	<2	_	
Monochlorobenzene	ug/L	<0.2	80 ^{MAC} / 30 ^{AO}	
o-xylene	ug/L	<0.4	_	
Styrene	ug/L	<0.5	_	
t-1,2-Dichloroethylene	ug/L	<0.4	_	
t-1,3-Dichloropropylene	ug/L	<0.2	_	
Tetrachloroethylene	ug/L	<0.3	30 ^{MAC}	
Toluene	ug/L	<0.5	24 ^{AO}	
Trichloroethylene	ug/L	<0.3	5 MAC	
Trichlorofluoromethane	ug/L	<0.5	-	
Vinyl Chloride	ug/L	<0.2	2 ^{MAC}	
Xylene; total	ug/L	<0.5	300 ^{AO}	

4.2.1 Offsite Well Water Quality

Water samples were collected at 1753 Wilhaven Drive and at 1865 Wilhaven Drive on July 7, 2016. The analytical results are summarized in Table 9 (below).

Table 11- Groundwater Geochemistry - Offsite Wells

		ODWS	1753 Wilhaven	 1865 Wilhaven	
Parameters	Units	Limit	07-Jul-16	07-Jul-16	
Microbiological Paramete	ers (Health)				
Escherichia Coli	ct/100 mL	0 ^{MAC}	0	0	
Faecal Coliforms	ct/100 mL	not specified	0	0	
Faecal Streptococcus	ct/100 mL	not specified	0	0	
Heterotrophic Plate Count	ct/1 mL	not specified	39	196	
Total Coliforms	ct/100 mL	0 ^{MAC}	5	11	
Chemical Parameters (He	ealth)	•		-	
Fluoride	mg/L	1.5 ^{MAC}	<0.10	0.11	
Ammonia	mg/L	not specified	0.03	0.11	
TKN	mg/L	not specified	<0.1	0.3	
Nitrite	mg/L	1 ^{MAC}	<0.10	<0.10	
Nitrate	mg/L	10 ^{MAC}	0.6	2.23	
Chemical Parameters wi	th Aesthetic Ob	jectives/ Opera	ational Guidelines		
Alkalinity	mg/L	500 ^{og}	273	347	
Chloride	mg/L	250 ^{AO}	16	153	
Colour	TCU	5 ^{AO}	3	3	
DOC	mg/L	5 ^{AO}	2.0	2.8	
Conductivity	uS/cm	not specified	529	1220	
Hydrogen Sulfide	mg/L	0.05 ^{AO}	<0.02	<0.02	
рН	pH units	6.5-8.5 ^{AO}	7.86	7.83	
Sulphate	mg/L	500 ^{AO}	16	85	
Hardness	mg/L	100 ^{OG}	288	452	
Sodium	mg/L	200 ^{AO}	9	84	
Calcium	mg/L	not specified	107	135	
Potassium	mg/L	not specified	<1	5	
Iron	mg/L	0.3 ^{AO}	0.06	0.03	
Magnesium	mg/L	not specified	5	28	
Manganese	mg/L	0.05 ^{AO}	<0.01	<0.01	
Total Dissolved Solids	mg/L	500 ^{AO}	344	793	
Tannin & Lignin	mg/L	not specified	<0.1	<0.1	
Phenols	mg/L	not specified	<0.001	<0.001	
Turbidity (lab) MAC = Maximum Acceptable Conce	NTU	5 ^{AO}	0.5	0.3	

The analytical results from 1753 Wilhaven Drive show that one parameter (Total Coliforms) exceeded the ODWS Maximum Acceptable Concentration. The well owner was immediately



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notified in writing of this health related exceedance and instructions for disinfecting the well (shock chlorination) were provided. The only other exceedance is for the operational guideline limit for hardness.

The analytical results from 1865 Wilhaven Drive also show that Total Coliforms exceeded the ODWS Maximum Acceptable Concentration. The well owner was immediately notified in writing of this health related exceedance and instructions for disinfecting the well were provided. The only other exceedances were for hardness and TDS which are elevated above the ODWS operational/aesthetic limits.

4.3 Water Quantity

4.3.1 Peak Demand Water Use

The suitability of the aquifer to supply the proposed development was assessed using the methodology provided in MOECC Procedure D-5-5 (MOEE, 1996), which indicates the number of people per house is the number of bedrooms plus one. New houses in the proposed development will be four bedroom single family homes, so the number of persons per house will be five (5).

Procedure D-5-5 indicates the minimum 'per-person water requirement' is 450 L/day, which is 2,250 L/day per house (or per well).

Procedure D-5-5 indicates that 'peak demand' occurs over a 120 minute period and is to be based on a per person usage rate of 3.75 L/min during that period. Using this information, the 'peak demand rate' per house is $3.75 \times 5 = 18.75 \text{ L/min}$.

Table 3 in Section 2.6 shows that the pumping rates chosen for most of the shallow well pumping test, were above the estimated 'peak demand rate'. Only one pumping test was conducted at a lower rate (TW6 was pumped at approximately 3 L/min for 24 hours).

All of the shallow test wells used less than 25% of the available drawdown during the pumping tests (see Table 5 in Section 4.1).

This shows that the calculated yield at most of the well locations is representative of the yields which residents of the proposed development are likely to obtain from future wells installed at the site. It is likely that a small percentage of the new wells do not intersect the primary fracture network (like TW6), and these locations will require some additional water storage at surface to meet peak demand requirements.

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4.3.2 Average Daily Residential Water Use

Information from the City of Ottawa website indicates the Canadian average daily residential water use per capita is 326 L/day. The Canadian Mortgage and Housing Corporation's Household Guide to Water Efficiency (CMHC, 2000, revised 2014) indicates that the average daily residential water use per capita in Ontario is 225 L/day.

Current Ontario Building Code requirements (OBC, 2012) for water conservation specify that toilet and shower consumption must now comply with lower use requirements (OBC Table 7.6.4.2.A & B and Table 7.6.4.1). Based on the new requirements, toilet water demand is reduced from approximately 13 L/flush to 4.8 L/flush. Shower consumption is reduced from 18 L/min. to 7.6 L/min.

Toilet use accounts for approximately 25% of total domestic water use, and shower use accounts for approximately 20% (CMHC, 2014). The OBC efficiencies will result in an average per person domestic water usage of 163 L/day.

A summary of daily usage estimates and associated peak demand usage rates is provided below in Table 12.

Table 12- Peak Demand Estimate Comparison

PEAK DEMAND ESTIMATE COMPA				
Daily Usage Estimate Source	L/day/ person	L/min/person (during peak demand period)	L/min/house (during peak demand period)	Daily Household Water Demand (L/day)
Procedure D-5-5	450	3.75	18.8	2,250
City of Ottaw a	326	2.72	13.6	1,630
СМНС	225	1.88	9.4	1,125
CMHC (w new efficiency changes)	163	1.36	6.8	815

This suggests that the daily household water demand could often be less than 1,000 L/day.

As stated above, it is likely that a small percentage of the new wells do not intersect the primary fracture network (like TW6), and these locations will require some additional water storage at surface to meet peak demand requirements.

In order to be conservative, the additional storage volume should be calculated based on Procedure D-5-5 'average daily residential water use' values.



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4.3.3 Potential Well Interference

It is anticipated that a total of 21 individual water supply wells (including some of the existing wells if suitably configured) will be used at the proposed subdivision. All of the wells will be completed in the 'upper bedrock aquifer zone'. The well spacing will vary according to lot size and the locations of wells on each lot. There will be no clustering of wells as there will be one well on each lot.

No drawdown was identified at any nearby wells during the pumping test. Dataloggers were placed in the closest well during several tests and no drawdown was observed at the observation well during the pumping test.

A potential well interference model was used to reflect a hypothetical worst case scenario for drawdown at the site. The model assumes a series of wells arranged in a concentric circular array, with each well pumping continuously over a period of 20 years. Mathematical model calculations are presented in Appendix 4. The calculations were based on an average of the transmissivity results from TW5, HW and 1490 O'Toole (as presented in Section 5.1).

The well interference model developed by Paterson assumes a series of approximately evenly spaced wells, located along concentric circular spacings extending outward from one central well, (i.e. a regular concentric circular array) each pumping continuously at a rate of 2,250 L/day over a period of 25 years. The model assumes 29 wells at a spacing of 50 m, in order to simulate the 21 onsite wells plus an additional 8 offsite wells located in close proximity to the site). The model creates an array of wells with a well spacing that is close to the minimum well spacing in the proposed subdivision. It is a worst case scenario because the actual well spacings are mostly greater than the minimum well spacing.

The well interference model predicts that there will be an 11.6 m decline in the potentiometric head of the water supply aquifer. This represents a reduction of approximately 18% of the available drawdown (based on TW6 which has an available drawdown 63 m). The findings of this analysis suggest the proposed use of well water in the subdivision will not result in unacceptable water quantity interference conflicts between onsite and offsite wells.



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5.0 DEVELOPMENT CONSIDERATIONS

The following sections outline the recommendations for development which have been formulated from the data collected in this study.

Based on the results of this study, the subject site is considered to be suitable for the development of 21 lots as supported in the analysis advanced in the body of this report.

An adequate water supply aquifer of sufficient quality and quantity is located beneath the subject property and can be intercepted by private wells drilled in accordance with Ontario Regulation 903.

The on-site sewage disposal needs can be accommodated with standard Class 4 sewage systems consisting of a septic tank and fully raised leaching bed, as per Part 8 of the Ontario Building Code.

5.1 Future Well Construction

New lots in the proposed subdivision will be serviced by individual drilled wells water supply wells completed in the 'upper bedrock aquifer zone'. The wells must be installed by a licensed well contractor in accordance with Ontario Regulation 903.

New wells should be configured as follows:

- Minimum depth of 15 m.
- Total depth from 60-70 m bgs.
- Steel casing to be installed at least 0.3 m into competent bedrock.

The minimum depth is specified in order to ensure new wells that encounter water bearing fractures at shallow depths are drilled deep enough to accommodate long term potentiometric fluctuations in the 'shallow bedrock aquifer zone'.

The creation of the casing hole, the installation of the casing and the grouting of the annular space should be inspected by a licensed Professional Engineer or Professional Geoscientist of Ontario.

New wells should be developed by surging or pumping until the water is developed to a sand free state at the time of construction in accordance with Ontario Regulation 903. If the water is observed to be cloudy at the completion of the prescribed well development, extended well development should be performed until all visible turbidity is removed.



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

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

The grading around the well casing should be slightly elevated to direct surface runoff away from the well. The casing should project approximately 400 mm above the mounded soil within 3 m in all directions from the casing.

Consideration should be given to changing the configuration of some of the existing onsite wells to make them consistent with the configuration that is provided above. TW1, TW2 and TW3 are too deep (water quality is poor due to salty, high TDS water from fractures below 70 m). The bottoms of these wells can be filled with grout below 70 m. The remained well section may have a low yield (possibly die to the drilling technique used). Well stimulation by hydraulic fracturing may cause an increase in yield. Alternatively, the deep wells should be abandoned.

TW7 should be drilled deeper (to 70 m total depth) if it is in a suitable location.

5.2 Surface Storage for Low Yield Wells

As discussed above in Section 5.1, two onsite wells (TW6 and TW7) do not appear to have encountered the primary fracture network and have very low yields. Any future wells that do not encounter the primary fracture network will probably need additional storage at surface to meet daily usage and peak demand requirements.

The daily water usage according to Procedure D-5-5 is 2,250 L/day. The peak demand water usage is (18.75 L x 120 mins) 2,250 L in 120 minutes.

The volume of water that can be stored in each new well (based on 6" diameter well that is 70 m deep) is approximately 1,270 L. However, the pumping rate in the well will be relatively low (to ensure the water level does not draw down past the pump), so the water stored in the well will not be delivered at a fast enough rate for use during peak demand periods. For example, if the maximum sustainable flow rate from a well is 3 L/min, it can only deliver 360 L during the 120 minute long peak demand period, so an additional 1,890 L of surface storage would be required.



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In cases where surface storage is deemed to be necessary, the amount of surface storage should be determined based on the actual sustainable yield of the well.

5.3 Potable Water Treatment

The water within the bedrock aquifer has elevated hardness, TDS and manganese.

Hardness

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

TDS

The Langelier Saturation Index (LSI) and Ryznar Stability Index (RSI) were calculated for the three test wells (Appendix 4). The LSI result indicate the water is super saturated and tends to precipitate a scale layer of calcium carbonate (scale forming but non-corrosive). The RSI result indicates the water is aggressively corrosive.

TDS is primarily comprised of the inorganic substances dissolved in water including chloride, sulphates, calcium, magnesium and bicarbonates. The palatability of drinking water with TDS above 500 mg/L may be unacceptable. Reverse osmosis treatment can be used to remove TDS if raw water is considered to be unpalatable. Point of use systems (at kitchen sink) are recommended due to the relatively high cost of reverse osmosis treatment.

Manganese

Manganese can cause staining of plumbing fixtures and laundry. The concentration of manganese in TW5 is well below the treatable limit according to Procedure D-5-5. A standard residential grade water softener should be sufficient to significantly reduce the concentration of manganese to an acceptable level. Alternatively, a green sand filter can also be used to effectively reduce the concentration of manganese.

5.4 Wastewater Treatment and Disposal

MOECC Procedure D-5-4 (Technical Guidelines for Individual On-site Sewage Systems: Water Quality Impact Risk Assessment, MOEE, 1996) provides a methodology for assessing the risks associated with individual onsite sewage systems. Procedure D-5-4 indicates that developments consisting of lots which average 1 Ha (with no lot being smaller than 0.8 Ha) may not require a detailed hydrogeological assessment if it can be demonstrated that the area is not hydrogeologically sensitive. Since the average lot size in



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the proposed subdivision is 0.87 Ha, the following nitrate impact assessment has been provided.

5.4.1 Predictive Nitrate Impact Assessment

Groundwater within the bedrock aquifer will be protected from sewage system effluent by the available overburden and the massive nature of the upper bedrock units.

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

In conducting our assessment, a mean annual precipitation value (net of evaporation and evapotranspiration processes) of 943 mm/year was used (Environment Canada, 2015). An estimation of infiltration was calculated based on site specific information and the infiltration factors provided in the document MOEE Hydrogeological Technical Information Requirements for Land Development Applications (MOEE, 1995). A calculation is provided in Appendix 4.

The cumulative nitrate impact for this subdivision has been calculated to be **4.4 mg/L**. Nitrate concentrations in onsite and offsite wells are typically non-detectible or below 1 mg/L, so the additional loading will be well below the provincially mandated limit of 10 mg/L. As such, it is Paterson's opinion that the proposed development will have acceptable impacts on the drinking water aguifer.

5.4.2 **Sewage System Design**

The fieldwork program carried out on the site shows that the surficial soils are of low permeability and have significant vertical thickness overlying the limestone bedrock of the Bobcaygeon Formation. As such, the site is not considered to be hydrogeologically sensitive to surficial sources of contaminants in the long term.

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



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OBC requirements state that the must be a minimum of 900 mm of suitable soil or leaching bed fill present between the base of the absorption trenches and the high groundwater table, bedrock or soil with a percolation rate greater than 50 min/cm. Some lots are located in areas with permeable cover which may permit either in-ground or partially raised leaching beds. Where lots are located in areas with moderately low permeable silty clayey sand and silty sand within the overburden soils, combined with the flat topography, most Class 4 absorption trench style leaching beds are expected to be fully raised above the existing ground surface. An imported sand mantle having a minimum thickness of 250 mm and extending a minimum of 15 m beyond the absorption trenches in the direction of effluent flow is also required.

Based on OBC design sewage flow tables, a four bedroom house may produce up to 3,000 L/day of sewage effluent per day. Based on the quality of the sand deposits available in the local pits, imported sand is anticipated to have a percolation rate (a.k.a. T-time) of between 6 and 8 min/cm. Considering the design flows and percolation rate of the available imported sand, a tile length of 140 metres will be required.

The Lot Development Plan (Figure 8 in Appendix 5) shows the size of the leaching beds. The leaching beds have been placed in the front of each lot, between the house and the roadside ditch in order to maximize subsurface effluent movement and facilitate maintenance.

The sewage system layouts detailed on Figure 8 are fully raised leaching beds with a 15 m imported sand mantle. The Lot Development Plan shows the size of the leaching beds on each lot.. The end of each mantle will be unobstructed and free draining.

A minimum separation of 18 m for fully-raised systems is required between a well and a Class 4 sewage system. Clearance distances also apply to wells and sewage systems located on neighbouring lots.

In all instances, careful, site specific analysis of the soil morphology in the area of each proposed leaching bed is required during the design stages of the leaching bed in order to determine if sufficient soil exists to facilitate the use of native soil for subgrade preparation. Detailed soil morphology should only be determined by a qualified geotechnical specialist.

It is not the intent of Figure 8 (Lot Development Plan) to restrict placement of a dwelling on each lot. While the actual configuration and position of the home may change, the relative position of the home, sewage system and well should be maintained. In all cases, the separation criteria for the immediate and neighbouring lots should be followed.



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Alternative Sewage System Design Considerations

As an alternative to the use of a traditional fill based absorption trench style leaching bed, advanced treatment of sanitary sewage may be utilized. While not shown on the Lot Development Plan, the sewage system envelopes associated with effluent meeting Column 3 of Table 8.6.2.2.A of the OBC will be upwards of 40% smaller than the conventional absorption trench leaching beds.



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6.0 CONCLUSIONS

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

- The test wells (TW5, HW, and 1490 O'Toole) and all future domestic wells in the proposed subdivision will provide water that is safe and suitable for human consumption.
- Each future domestic well in the proposed subdivision will provide a sufficient quantity
 of water for normal domestic purposes. In some cases additional above ground storage
 will be required in order to satisfy peak demand requirements.
- Adverse effects on well water in the proposed subdivision from potential onsite and offsite sources are considered to be minimal/insignificant.
- In Paterson's professional opinion the probable well yields determined on the basis of this investigation are representative of the yields which residents of the proposed subdivision are likely to obtain from their wells in the long term.
- Potential well interference between neighbouring wells within the subdivision and nearby offsite wells is considered to be minimal.
- The subject property is suitable for development as a residential subdivision at the proposed density. Impacts to the neighbouring well users are expected to be minimal.



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7.0 RECOMMENDATIONS

Water Supply

- All new wells should be constructed such that the casing hole extends into sound bedrock at least 0.3 m as per O.Reg. 903, with a minimum casing length of 6.7 metres below grade.
- All new wells in the subdivision should be drilled using 'cable tool' drilling techniques
 to maximize potential yield. There are at least two companies in the Ottawa region that
 offer this service. Costs are approximately 100% higher compared to regular air rotary
 drilling techniques.
- All new wells should have a minimum depth of 15 m and a maximum depth between 60 m and 70 m below ground surface (NOTE: wells should not be drilled deeper in order to improve yield, as the 'deep bedrock aquifer zone' has diminished water quality).
- Existing wells at the site which are not to be utilized for water supply wells, should be decommissioned according to the requirements of O.Reg. 903. Consideration should be given to the reconfiguration and stimulation of some of the existing deep wells if they are suitably located. Reconfiguration would typically involve grouting the hole below 70 m depth, then hydraulic fracturing of the remainder of the well to stimulate flow (the original drilling method may have led to some fractures in the upper bedrock aquifer zone being sealed).
- At the time of new well installation, the drilling of the casing hole, installation of casing, and grouting of the annular space should be inspected by a licensed Professional Engineer or Professional Geoscientist of Ontario. All well construction must be carried out by a licensed well technician.
- Wells should be developed to a sand free state in order to ensure that the residual turbidity created by the well drilling activities is completely purged from the well. Additional well development, prior to placing the well into use, is strongly recommended in order to provide adequate development of the formation and remove extraneous rock debris from the aquifer pathways. It is likely that future wells at this site will require additional well development.



Proposed Rural Residential Subdivision 1730 Wilhaven Drive, Cumberland, Ontario

- All future water wells to be completed such that the top of well casing is a minimum of 450 mm above the finished grade within a 3 m radius of the wellhead. The grade should slope away from the wellhead in all directions for a distance of at least 3 m.
- Well owners should ensure that the wellhead and surrounding area are maintained in accordance with the requirements of O.Reg. 903. Future well owners should refer to the MOECC Water Supply Wells Requirements and Best Management Practices, (Revised April 2015) website at: https://dr6j45jk9xcmk.cloudfront.net/documents/4410/a-wwbmp-titlemaster-table-of-contents-chapter-1.pdf
- The raw water found in the water supply aquifer system is considered to be hard.
 Residential grade water softeners are recommended where water hardness is deemed
 unsuitable. A warning clause addressed to people on low sodium diets should be
 registered on title regarding the elevated concentration of sodium (> 20 mg/L)
 associated with water softeners.
- Additional treatment to address TDS, and manganese may be required. Additional treatments methods may include reverse osmosis, coagulation/flocculation processes, biological filtration, and/or granulated activated charcoal filtration.
- Although artesian conditions are not anticipated, such conditions have been
 encountered historically in some nearby wells. Drilling and instrumentation should be
 carried out by a suitably experienced and licensed well technician taking precautions
 as provided in the document Water Supply Wells Requirements and Best Management
 Practices, (Revised April 2015). https://dr6j45jk9xcmk.cloudfront.net/documents/4410/a-wwbmp-title-master-table-of-contents-chapter-1.pdf

Wastewater Treatment

- A site specific investigation should be carried out for the detailed sewage system design at each lot, as part of the building permit application process.
- The septic systems should be constructed with all appropriate setbacks as per Ontario Building Code requirements.
- The native soils should be assessed at the proposed septic location and imported fill should be used, if the native soils are unsuitable.
- Proposed well, septic, and building locations are noted on Figure 8 (Lot Development Plan) in Appendix 5.



Proposed Rural Residential Subdivision 1730 Wilhaven Drive, Cumberland, Ontario

 Future owners of individual onsite wastewater treatment systems should familiarize themselves with basic safety and maintenance information which is available at: http://www.omafra.gov.on.ca/english/environment/facts/sep_smart.htm

In summary, it is our professional opinion that this site is suitable for development as a residential subdivision at the proposed lot density. The hydrogeological recommendations contained within this report, if followed, will ensure that the development takes place in an effective manner, with a minimal impact on the natural environment.

patersongroup

Russell L. Chown, P.Geo. Senior Hydrogeologist

Report: PH1236-REP.02R2



Proposed Rural Residential Subdivision 1730 Wilhaven Drive, Cumberland, Ontario

8.0 STATEMENT OF LIMITATIONS

This Hydrogeology and Terrain Analysis report has been prepared in general accordance with the agreed scope-of-work and the requirements of MOECC/MOE Guideline D-5: Planning for Sewage and Water Services (August 1996), Procedure D-5-4: Technical Guideline for Individual Onsite Sewage Systems: Water Quality Impact Risk Assessment (August 1996), and Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment (August 1996).

The conclusions presented herein are based on information gathered from a limited historical review along with a field inspection and testing program. The findings of this investigation are based on a review of readily available geological, historical, and regulatory information and a cursory review made at the time of the field assessment. The historical research relies on information supplied by provincial agencies and was limited within the scope-of-work, time, and budget of the project herein.

The client should be aware that any information pertaining to soils and all test hole logs are furnished as a matter of general information only and test hole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those described by the test holes themselves.

This report was prepared for the sole use of **2183144 Ontario Ltd.** Permission from the above noted party and our firm will be required to release this report to any other party.



Proposed Rural Residential Subdivision 1730 Wilhaven Drive, Cumberland, Ontario

9.0 REFERENCES

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Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Trans. American Geophysical Union, Vol. 16, pp. 519-524.



Proposed Rural Residential Subdivision 1730 Wilhaven Drive, Cumberland, Ontario

Appendix 1

- Soil Profile and Test Data Sheets
- Symbols and Terms
- Soil Grain Size Analytical Results

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

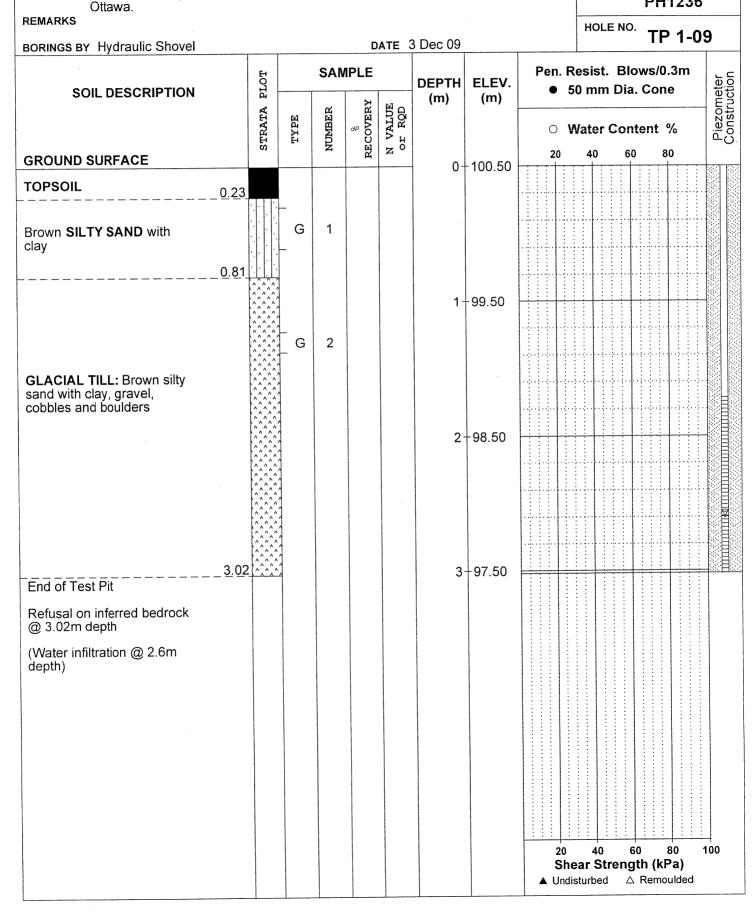
Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

DATUM

Elevations interpolated based on topographic information supplied by the City of

FILE NO.

PH1236



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

DATUM

Elevations interpolated based on topographic information supplied by the City of

FILE NO. PH1236

REMARKS HOLE NO. TO 2-09

BORINGS BY Hydraulic Shovel				D	ATE :	3 Dec 09			L		P 2-0	<u>-</u>
SOIL DESCRIPTION			SAN	IPLE		DEPTH (m)	ELEV. (m)			Blows/0		neter
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	,		0 V		Content		Piezometer
GROUND SURFACE				2	2	0-	99.25	20	40 	60 	80 + : : : :	<u> </u>
FOPSOIL 0.2	25	G	1									
Brown SILTY CLAY		_ G										
1.:	22					1-	-98.25					7
GLACIAL TILL: Brown silty clay with sand, gravel, cobbles and boulders	65 \\ \^\^\	G	2									-
GLACIAL TILL: Coarse	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			,		2.	97.25					
and with gravel, clay, cobbles and boulders	44 \\ \^\^\											
End of Test Pit												
Water infiltration @ 0.9m lepth)												
								20	40	60	80 1	100
								She	ar Stı	rength (k	Pa)	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

DATUM

Elevations interpolated based on topographic information supplied by the City of

FILE NO.

PH1236

REMARKS

BORINGS BY Hydraulic Shovel					n	ATE (3 Dec 09			HOLE	NO. TP	3-09	 }
SOIL DESCRIPTION		PLOT		SAM	/IPLE		DEPTH	1	Pen. Resist. Blows/0.3m • 50 mm Dia. Cone			1	eter tion
SOIL DESCRIPTION		STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)			ontent %		Piezometer Construction
GROUND SURFACE		O)		24	RE	z °	0-	99.10	20	40	60 80)	
TOPSOIL	0.25					 							
Brown SILTY CLAY , some sand	0.60		G	1									
GLACIAL TILL: Grey-brown silty clay with sand, gravel and cobbles	0.86		G	2									
Janu coppies	/		G	3			1-	98.10					
												.,	_
GLACIAL TILL: Brown silty sand with clay, gravel, cobbles and boulders			_										Δ
			G	4			2-	97.10					
End of Test Pit	2.72	[^^^^											
(Water infiltration @ 1.6m depth)													
													I
									20 She	40 ar Strei	60 80 ngth (kPa	a))0
									▲ Undis		△ Remoul	ded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

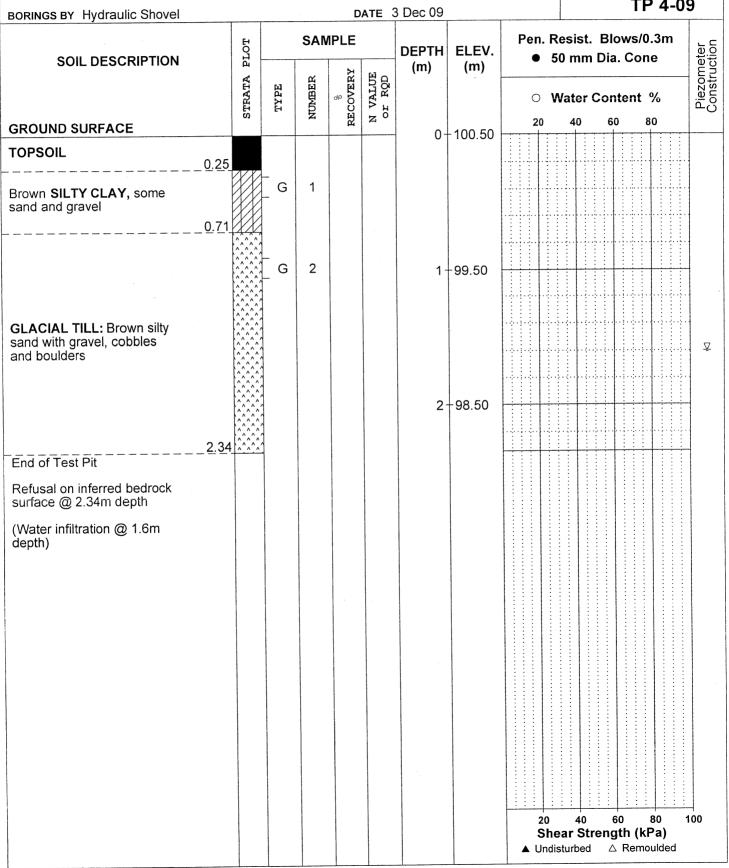
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Elevations interpolated based on topographic information supplied by the City of

FILE NO.

PH1236

REMARKS HOLE NO. TP 4-09 DATE 3 Dec 09 BORINGS BY Hydraulic Shovel



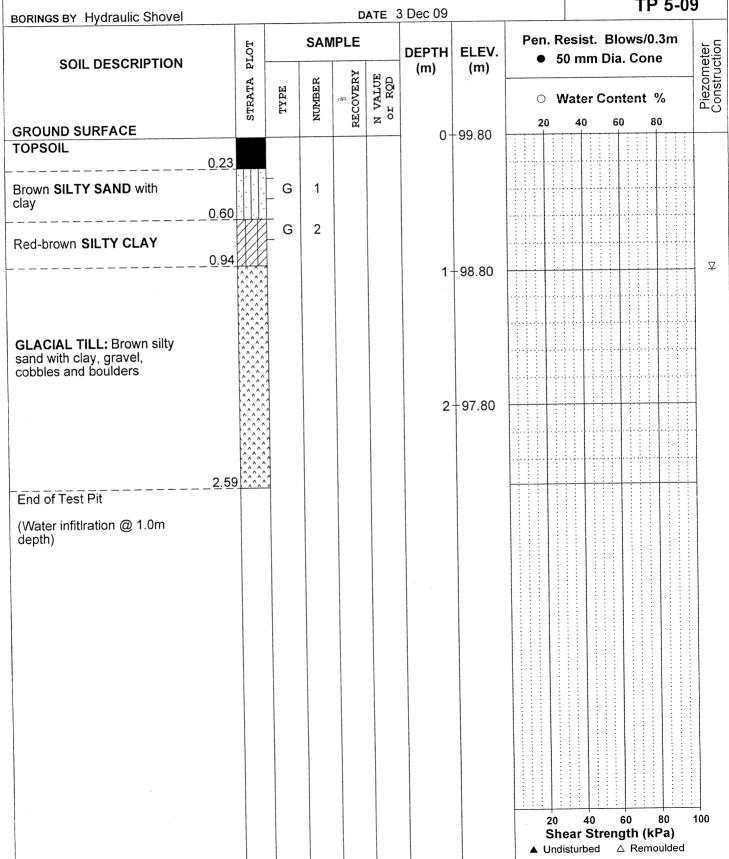
SOIL PROFILE AND TEST DATA Terrain Analysis & Hydrogeological Study

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

1730 Wilhaven Drive Ottawa, Ontario

Elevations interpolated based on topographic information supplied by the City of FILE NO. DATUM PH1236 Ottawa. REMARKS

HOLE NO. TP 5-09 DATE 3 Dec 09



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

DATUM

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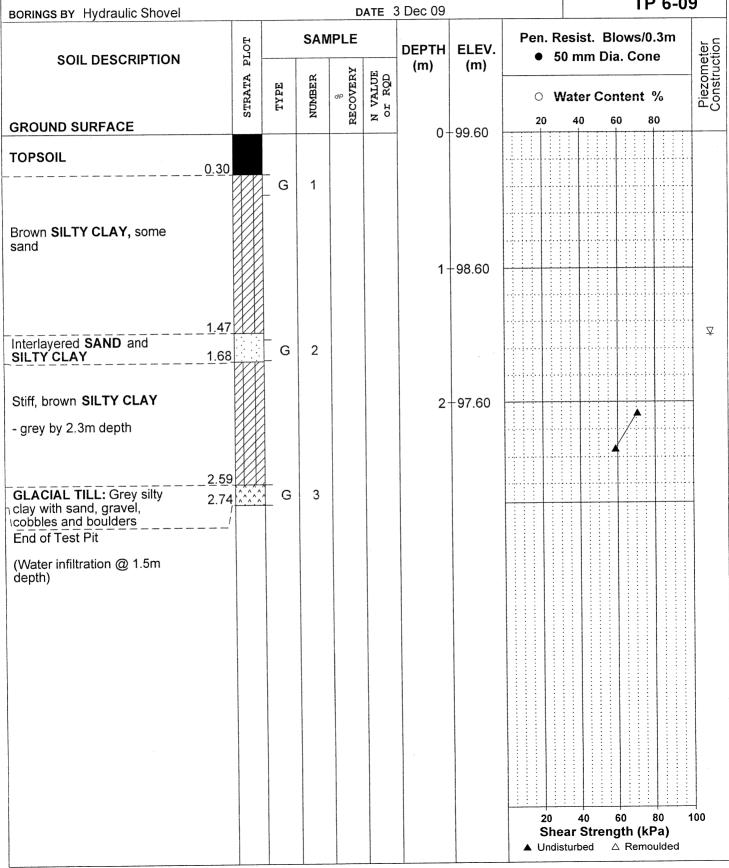
FILE NO.

PH1236

REMARKS

HOLE NO.

TP 6-09



SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive 28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 Ottawa, Ontario Elevations interpolated based on topographic information supplied by the City of DATUM FILE NO. PH1236 REMARKS HOLE NO. TP 7-09 DATE 3 Dec 09 BORINGS BY Hydraulic Shovel **SAMPLE** Pen. Resist. Blows/0.3m PLOT Piezometer Construction **DEPTH** ELEV. • 50 mm Dia. Cone SOIL DESCRIPTION (m) (m) N VALUE or RQD RECOVERY STRATA NUMBER TYPE Water Content % 20 40 60 80 **GROUND SURFACE** 0 + 99.20**TOPSOIL** 0.23 Brown SANDY SILT, trace clay 1 + 98.201.07 ∇ G 1 GLACIAL TILL: Brown fine

to coase sand with gravel, cobbles and boulders

2.90

- grey by 2.1m depth

End of Test Pit (Water infiltration @ 1.1m

depth)

2 + 97.20

40 60 80 100 Shear Strength (kPa)

△ Remoulded

▲ Undisturbed

SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 DATUM

Elevations interpolated based on topographic information supplied by the City of

FILE NO.

Ottawa.

PH1236

REMARKS BORINGS BY Hydraulic Shovel				D	ATE (3 Dec 09		HOLE NO.	TP 8-09	
SOIL DESCRIPTION		SAMPLE SAMPLE			T	DEPTH ELEV.		Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone		
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Water Conter	"	
GROUND SURFACE				<u> </u>		0-	99.00	20 40 60	80	
OPSOIL 	0.25									
Brown SANDY SILT, trace clay						1-	-98.00			
	2.41					2	97.00			
Brown fine to medium sand with clay seams Firm, grey SILTY CLAY End of Test Pit (Water infiltration @ 1.5m depth)	2.84 3.05	G	1	·	-	3	96.00			
depun)										
								20 40 60 Shear Strength ▲ Undisturbed △ Re	80 100 (kPa) moulded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

DATUM

Elevations interpolated based on topographic information supplied by the City of

FILE NO.

PH1236

REMARKS SORINGS BY Hydraulic Shovel				D	ATE 3	3 Dec 09			HOL	E NO	TF	9-0)9
SOIL DESCRIPTION			SAN	IPLE		DEPTH		Pen. Resist. Blows/0.3n ■ 50 mm Dia. Cone			n eter		
GROUND SURFACE	STRATA PLOT	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	O W	/ater	Con		% 80	Piezometer
OPSOIL 0.28	3					0-	99.80						
Brown SANDY SILT, trace clay						1-	-98.80						-
		_ _ _	1			2-	-97.80						
GLACIAL TILL: Brown silty sand with clay, gravel, cobbles and boulders 3.0 End of Test Pit (Water infiltration @ 0.8m depth)	5 222					3	96.80						
								20 She	40 ar Stı	6 reng	0 th (ki		100

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

DATUM

Elevations interpolated based on topographic information supplied by the City of

FILE NO.

Shear Strength (kPa)

△ Remoulded

▲ Undisturbed

PH1236

Ottawa.

REMARKS HOLE NO. TP10-09 DATE 3 Dec 09 BORINGS BY Hydraulic Shovel Pen. Resist. Blows/0.3m SAMPLE PLOT DEPTH ELEV. 50 mm Dia. Cone **SOIL DESCRIPTION** (m) (m) VALUE RECOVERY STRATA NUMBER TYPE 0/0 O Water Content % N OH O 40 80 60 **GROUND SURFACE** 0 + 99.50**TOPSOIL** 0.25 ∇ 1 + 98.50Brown SANDY SILT, trace clay 1.98 2 + 97.50Firm, grey SILTY CLAY with sand 3 + 96.50**GLAICAL TILL:** Grey silty clay with sand, gravel, 3.81 cobbles and boulders End of Test Pit (Water infiltration @ 0.9m depth) 20 40 60 80 100

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

DATUM

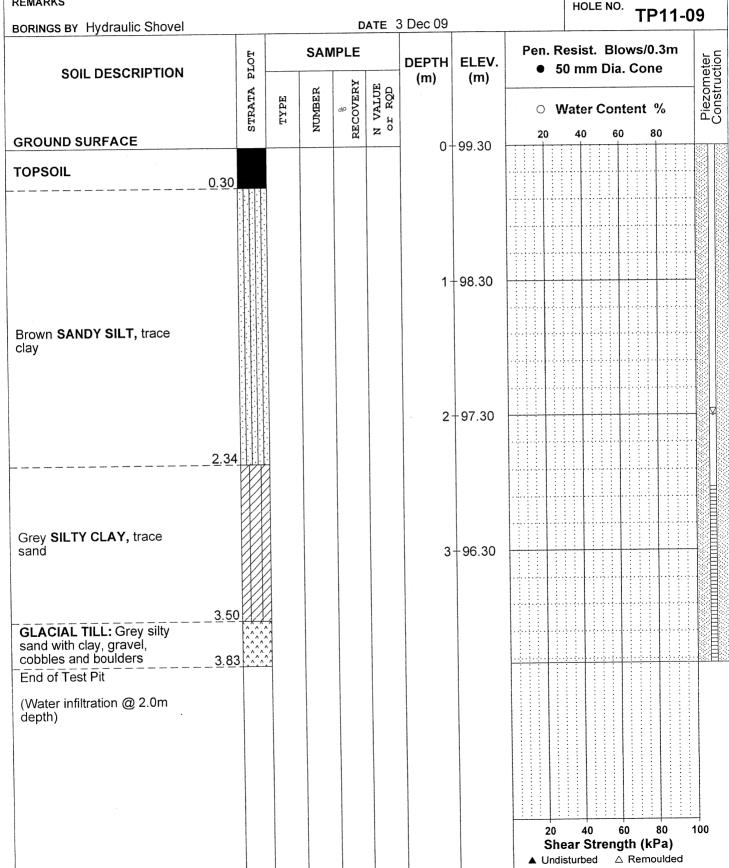
Elevations interpolated based on topographic information supplied by the City of

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PH1236

Ottawa. REMARKS

HOLE NO.



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Terrain Analysis & Hydrogeological Study 1730 Wilhaven Drive Ottawa, Ontario

DATUM

Elevations interpolated based on topographic information supplied by the City of

Ottawa.

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Ottawa.									1101		11123	
BORINGS BY Hydraulic Shovel				D	ATE (3 Dec 09			HOLI	E NO.	TP12-	09
SOIL DESCRIPTION	PLOT		SAN	1PLE		DEPTH	ELEV.		lesist. 60 mm		/s/0.3m Cone	eter stion
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 V	Vater	Conte	nt %	Piezometer Construction
GROUND SURFACE	ß		Z	RE	z ^o	0-	- 100.50	20	40	60	80	
TOPSOIL 0.28	^^^^ ^^^^					0	100.30					
						1 -	-99.50					
GLACIAL TILL: Brown silty sand with clay, gravel, cobbles and boulders	^^^^^^ ^^^^^ ^^^^ ^^^^					2-	-98.50					
End of Test Pit	^^^^^^											
(Water infiltration @ 2.1m depth)												
								20 She ▲ Undis			80 (kPa) emoulded	100

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated		having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured		having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %		
Very Loose	<4	<15		
Loose	4-10	15-35		
Compact	10-30	35-65		
Dense	30-50	65-85		
Very Dense	>50	>85		

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value	
Very Soft	<12	<2	
Soft	12-25	2-4	
Firm	25-50	4-8	
Stiff	50-100	8-15	
Very Stiff	100-200	15-30	
Hard	>200	>30	

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also classified according to their "sensitivity". The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called "mechanical breaks") are easily distinguishable from the normal in-situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the
		Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-,	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.) Rock core samples are obtained with the use of standard diamond drilling bits

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC% Natural moisture content or water content of sample, %

LL Liquid limit, % (water content above which soil behaves as a liquid) PL Plastic limit, % (water content above which soil behaves plastically)

Ρi Plasticity index, % (difference between LL and PL)

Dxx Grain size at which xx% of the soil, by weight, is of finer grain sizes

These grain size descriptions are not used below 0.075 mm grain size

D₁₀ Grain size at which 10% of the soil is finer (effective grain size)

D60 Grain size at which 60% of the soil is finer

 $(D30)^2 / (D10 \times D60)$ Сс Concavity coefficient

Uniformity coefficient D60 / D10 Cu

Cc and Cu are used to assess the grading of sands and gravels:

Well-graded gravels have: 1 < Cc < 3 and

Cu > 4 1 < Cc < 3 Well-graded sands have: and Cu > 6

Sand and gravels not meeting the above requirements are poorly-graded or uniformly-graded. Cc and Cu are not applicable for the description of soils with more than 10% silt and clay (more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

Present effective overburden pressure at sample depth p'o

p'c Preconsolidation pressure of (maximum past pressure on) sample

Ccr Recompression index (in effect at pressures below p'c) Cc Compression index (in effect at pressures above p'c)

OC Ratio Overconsolidation ratio = p'_c / p'_o

Void Ratio Initial sample void ratio = volume of voids / volume of solids

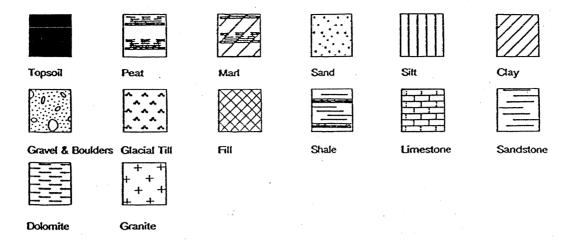
Wo Initial water content (at start of consolidation test)

PERMEABILITY TEST

k Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

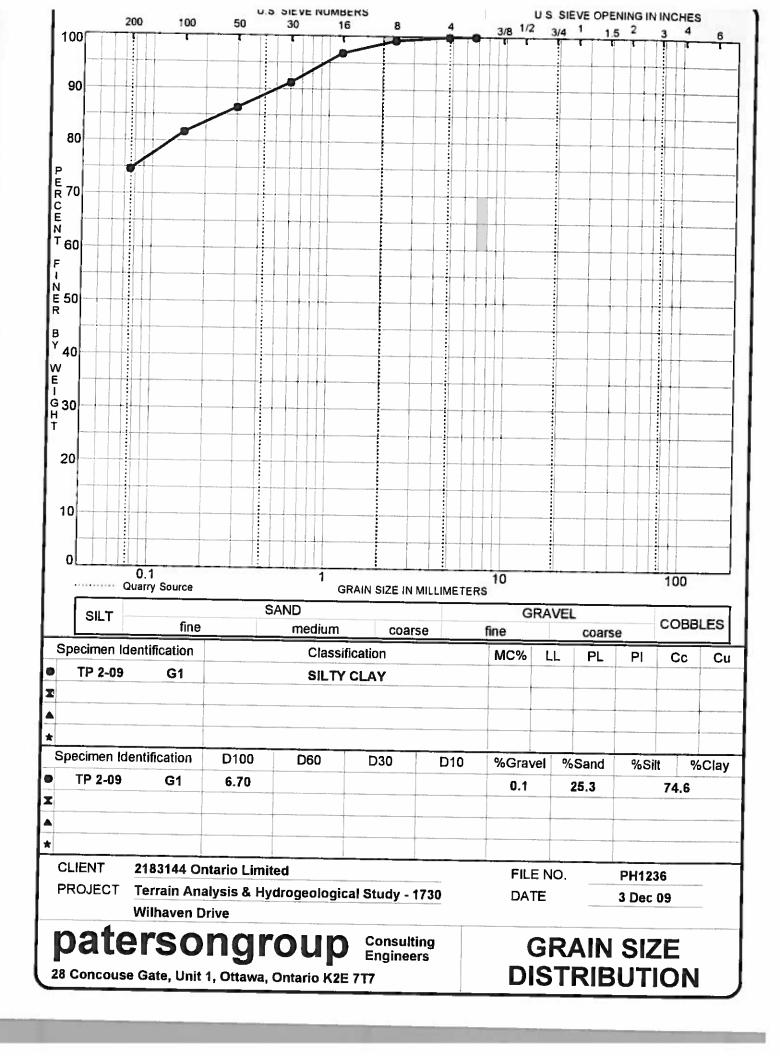
SYMBOLS AND TERMS (continued)

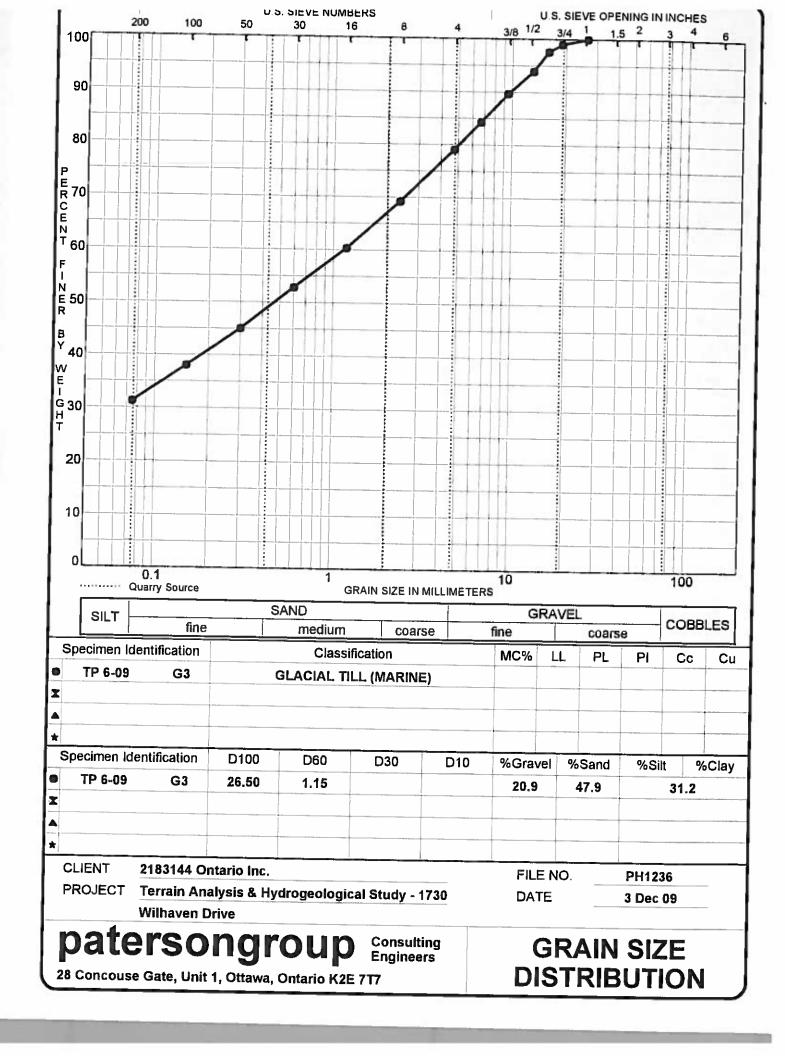
STRATA PLOT

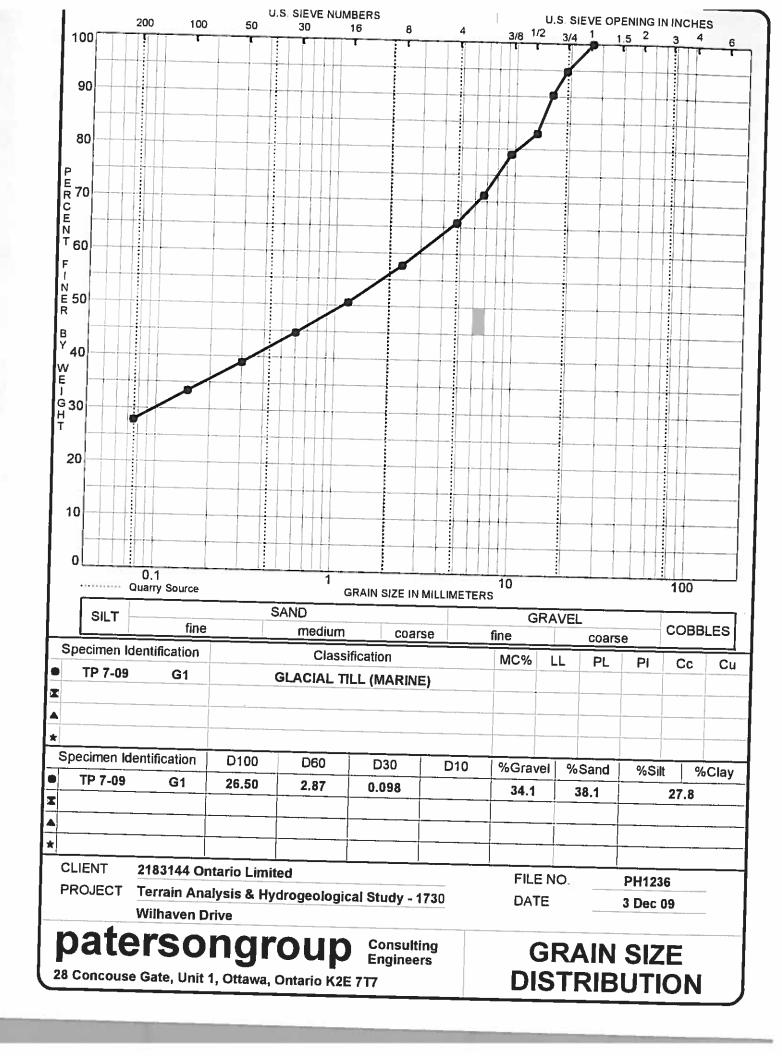


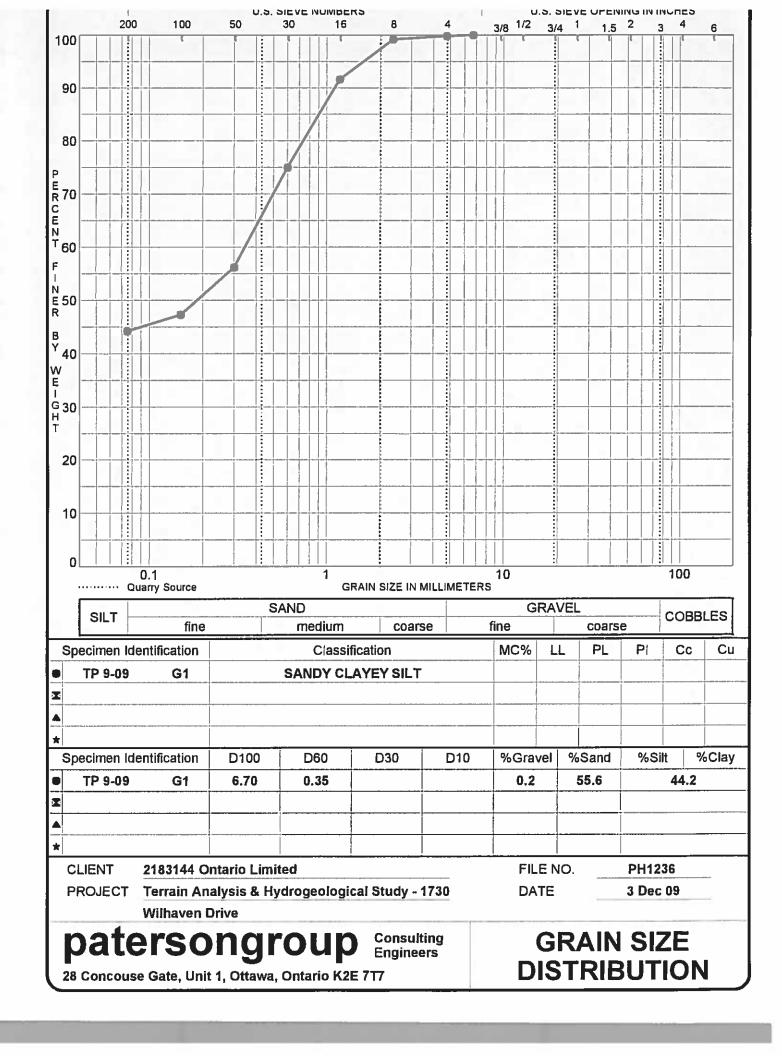
MONITORING WELL AND PIEZOMETER CONSTRUCTION

Monitoring Well Construction CONCRETE CAP BENSEAL OR BENTONITE STEEL CASING IN SITU SOIL SAND PACK PVC SCREEN BOTTOM PACKING













Proposed Rural Residential Subdivision 1730 Wilhaven Drive, Cumberland, Ontario

Appendix 2

MOECC Water Well Records

Report: PH1236-REP.02R2

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Ministry Use Only 102654 03/10

TW1

Well Record t Below) Ministry of Well Regulation 903 Ontario Water Resources Act Ontario the Environment Page_ Measurements recorded in: Metric Hymperiat Well Owner's Information Will Constructed A Care Name / Organization 92183 E-mail Address FRED Mailing Address (Street lectac Well Location Address of Wall Location (Street Number/Name) St. 1750 M County/District/Municipality Postal Code Ontario ANTRPSOR arto 503812 ment Sealing Record (see instructions on the back of this form) Overburden and B General Description Other Materials Most Common Material General Colour 0' 19 10' inestone Results of Well Yield Testing Annular Space Draw Down Type of Sealant Used (Material and Type) Volume Placed (m)(ft) Depth Set St (1997) Time Water Level Time Water Level (ITATE) 4,68 101 2057 created give reason: 1909 ump intake set at (((m)) 2 1855 21804 300 3 1123 rate (Minh (GFM) Well Use Duration of pumping Method of Construction 1 182'5 Not used
Dewatering
Manitoring Commercial 1 Public Diamon Cable Too! Demestic Livestock Jelting Driving ☐ Municipal 5 179'7" Retary (Conventional) hra + min Test Hole Rotary (Reverse) 10 175 9" water levelend of pumping (m/ Irrigation
Industrial
Other, specify Cooling & Air Constituting 93'2 Borng Diagra Describe (Amin COPM) 15 1747 Air percussion 15 1971 Status of Well 13'5" Construction Record - Casing Recommended pump depth (m/li) 20 Wyoter Supply
Reptacement Well
Teel Hole
Rectarge Well
Dewatering Wen Recommended pump rate
(Vmin GPM) Depth (mm) Open Hole OR Material (Galvanized, Foreglass, Controle, Plastic, Steel) Insuring Digmelier (cm/in) Wolf. 25 To 30 归山 188 40 170 Observation and/or Monitoring Hole
Alteration (Construction)
Abandoned, insufficient Supply Well production (White (SPA) 50 169'5" 0 Districted? 69205'7" BO Ores I No Map of Well Location Abandoned, Poor Water Quality Construction Record - Screen provide a map below following instructions on the back Depth (m/h) Outsking ! Moterial Sicely 282 Sto: No Azandoned, othe 130 Wilhauen specify DINE TWEE THE A CONT Hole Diameter Water Details Water found at Depth Kind of Water Fresh Ontested
Water found at Depth Kind of Water Fresh Ontested
Water found at Depth Kind of Water Fresh Ontested
Water found at Depth Kind of Water Fresh Ontested
Water found at Depth Kind of Water Fresh Ontested MXG. 360 (m/h) _Gas; _Other, specify_ Well-Contractor and Well Technician Information nitross Name of Well Contractor

12 Lock D2 LL

africas Address (Street Number/Name) Colap Ministry Use Only Aude No. 2 102633 2009 No. Cuoun's Printer for Omena, 2007 Ministry's Copy 0505E /12/200/1

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W. A UDJUUJ Well Record rint Below) Ontario Regulation 903 Ontario Water Resources Act the Environment Measurements recorded in: (1) Metric Amperial Well Owner's Information Municipality Well Location haven Di Postal Code Ontario まま 5038 General Description General Colour 337 405 231 440 Results of Well Yield Testing Annular Space Drew Down After test of prediction in a Type of Sealant Used Water Level Time Water Level (m/h) (m/h) (Famorial and Type) 468 Stetic 184 1854 201 1879" 2 196 umparative set at (AVA) 1 3 194 Well Use Duration of pumping min Method of Construction Pa'1' Public
Domestic
Livestock
Imagation Not used
Dewatering
Monitoring Diamond Commercia: Cable Tool 93'7" 5 191 Digging Municipal
Test Hole Rotary (Conventional) Rotary (Reverte) ms weler level end of pumpips (m/t) 199'5 10 Cooling & Air Conditioning 10 Boring
Sair percussion
Other, spearly Industrial Da 9" 15 18L Rowing give rate (Isour GPM) Other, specify A'9" 20 178:4" Status of Well Construction Record - Casing Water Supply
Heplacement Well
Test Hole ommended pump depth (1978) Open Hoto OR Meterial (Gehreniced, Fibreglass, Concrete, Presig, Steel) Wall Thickness (cm/in) Inside Diamete (cm/h) Recommended pump ra 188 Recharge Well u Dewstering Well Observation and/or Monitoring Hole Map of Well Location

Map provide a map below following instructions on the back

1 7 2 50 Alteration (Construction) Absorboned.
Insufficient Supply Construction Record - Screen Abandoned, Poor Water Quality Depth (m/8) Abandoned, other specify 100 Hours Water Details Hole Diameter found at Depth Kind of Water: Water found at Depth Kind of Water: Fresh Intested

O (notif) Gas Other, specify
Water found at Depth Kind of Water: Fresh Unicested (m/ft) | Gas _ Other, specify
Water found at Depth Kind of Water: Frash Gas Ciner, specify Well Contractor and Well Technician Information Business E-mail Address Ministry Lise Only Well owner's | Date Package De z 102630 © Queen's Printer for Orland, 2007 Ministry's Copy

TW3

7134729

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

A106363

TW4

YWI Well Record

egulation 903	Ontario Water	Resources Ad
7175490	Page	of

Measurements	recorded in:	Metric [Imperial		A100000		7175490	O Page		of
Well Owner's First Name		ast Name / Organiza	ation		E-mail Address] Well (Constructed
	ED (Street Number/Na	me) FAG	25/	unicipality	Province	Postal Code		by We	ell Owner
1730	WILHAU			TTAWA CARE	TON ONT	KIABITT	17111		
Address of Well	Location (Street Nu	mber/Name)	To	ownship	editoesin kia managa	Lot N PT	Concession	n	
County/District/M	Municipality	EN DR.		DRMERLY CI	UMBFRLANO I	OFDYE	rovince	Postal	Code
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STATE OF STATE OF		Annular Space	the planters of the	Current Manufactured or	Re	sults of Well	Yield Testing		
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	Januare III			Codine Sunt _ St	Pumping rate (Vmin / GF	PM)	3 2.05	3	073
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Rotary (Conve	ntional) Jetting	☐ Domestic ☐ Livestock	☐ Municipa	al Dewatering	Duration of pumping hrs + mir	n	5 2.05	5	04
Boring Air percussion	Digging	☐ Irrigation		& Air Conditioning	Final water level end of p	oumping (m/ft)	10 2.05	10	04
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	Ilvanized, Fibreglass, ncrete, Plastic, Steel)	Thickness (cm/in) From	п То	Replacement Well Test Hole	2.5 Recommended pump r	ate	25 2.05	25	64
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100	Construction F	Record - Screen		Abandoned, Insufficient Supply	Yes No	Map of Well	9.00	3 00	0.7
Outside Diameter (Diameter	Material stic, Galvanized, Steel)	Slot No.	epth (<i>m/ft</i>)	Abandoned, Poor Water Quality Abandoned, other,	Please provide a map be	elow following in	structions on the		
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(m/ft) [Gas Other, sp			1//			1		15
Business Name	of Well Contractor	or and Well Techn		Il Contractor's Licence No.				700	ا اوه و
	S (Street Number/N	ORILLI NO ame)	LTO 4	nicipality	Comments:		-	300	r _301'
RR#)		R	RAESIDE	2.00				
Province	Postal Code	Business E-mail	Address			ckage Delivered		stry Us	e Only
Bus.Telephone No	o. (inc. area code) N	SAULUDER		First Name)	information package delivered	r IN BUTTO	Audit No.	131	190
Well Technician's L	icence No. Signature	e of Technician and/o		e Submitted	Yes Date Wo	ork Completed	1	LOT	130
0506E (2007/12)	© Queen's Printer for Or	ntario, 2007	1%	Well Owner's Co		N IN BN 19	Received		

wa TW5 Well Tag No. (Place Sticker and/or Print Below) Well Record Ministry of Regulation 903 Ontario Water Resources Act the Environment A115887 Page 7175491 Well Owner's Information Last Name / Organization E-mail Address First Name FARSI by Well Owner Postal Code Telephone No. (inc. area code) Mailing Address (Street Number/Name) Municipality Province OR OVAWA CARELTON 1730 WILHAVEN ON 164471 Well Location Lot A Township Concession Address of Well Location (Street Number/Name) FORMERLY 20 WILHAVEN CUMRERIANO City/Town/Village Province Postal Code County/District/Municipality OTTAWA Ontario MANTE VTM Coordinates Zone Easting
NAD 8 3 Municipal Plan and Sublot Number Other Northing LOTS WORTH PARTS OF Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form) Depth (m/ft) Most Common Material Other Materials **General Description** From BROWN SOFT CLAY GRAVEL RDUN UMESTONE LIMESTONE Results of Well Yield Testing **Annular Space** Depth Set at (m/ft) Type of Sealant Used Volume Placed After test of well yield, water was: Draw Down Recovery (m³/ft³) (Material and Type) Clear and sand free Time Water Level Other, specify UEARING (min) (m/ll)(m/ft) ENTONITESLURR Static If pumping discontinued, give reason: Leve 1 1 Pump intake set at (m/ft) 2 2 Pumping rate (I/min / GPM) Method of Construction Well Use 4 4 Cable Tool ☐ Diamond Public ☐ Commercial ☐ Not used Duration of pumping Rotary (Conventional) ☐ Jetting ☐ Domestic Municipal □ Dewatering 5 5 Test Hole Mon Cooling & Air Conditioning hrs + () min Rotary (Reverse) Driving ☐ Livestock ☐ Monitoring Final water level end of pumping (m/ft) ☐ Boring ☐ Irrigation ☐ Digging Air percussion
Other, specify ☐ Industrial Other, specify 15 15 If flowing give rate (Vmin / GPM) Construction Record - Casing Status of Well 20 20 Water Supply
Replacement Open Hole OR Material (Galvanized, Fibreglass, Wall Thicknes Depth (m/ft) Recommended pump depth (m/ft) Diameter (cm/in) Replacement Well 25 Concrete, Plastic, Steel) (cm/in) Test Hole
Recharge Well Recommended pump rate 30 30 STEEL (I/min / GPM) ☐ Dewatering Well 40 40 0 OPENHOUR ☐ Observation and/or Well production (Umin / GPM) Monitoring Hole 50 50 ☐ Atteration (Construction) 5-85 60 Yes No 60 Abandoned, Insufficient Supply Map of Well Location Construction Record - Screen Abandoned, Poor Please provide a map below following instructions on the back. Outside Depth (m/ft) Water Quality **Material** Slot No (Plastic, Galvanized, Steel) Abandoned, other, From specify FRANK KENNYRO Other, specify Water Details Hole Diameter Water found at Depth Kind of Water: Fresh Duntested Depth (m/ft) Diamete: (cm/m) (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Well Contractor and Well Technician Information Business Name of Well Contractor Well Contractor's Licence No. TISAUNDERS ORILLING. Business Address (Street Number/Name) Municipality Comments: Province Postal Code Business E-mail Address Well owner's Date Package Delivered Ministry Use Only DIUT. K10191/60 informatio package delivered Bus. Telephone No. (inc. area code) Name of Well Technician (Last Name, First Name) DIDIY14 MIRIONS Well Technician's Licence No. Signature of Technician and/or Contractor Date Submitted z131189 Date Work Completed ☑ Yes No No MENDINE Well Owner's Copy

Measurements recorded in: Metric Imperial

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

Tag#: A124333

TW6

Twb **Well Record**

Regulation 903 Ontario Water Resources Act Page_

First Name	FREC	11	ast Name /	Organization		calcondinate and	E-mail Add	lress		Well Constructed by Well Owner			
	ess (Street No			DR.	IM	lunicipality	Province	Postal Code	To Tele	ephone N	ne No. (inc. area code)		
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	Constr	ruction R	ecord - Cas	sing		Status of Well	The state of the s		20	10	20	17/	
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64	STEE	-6-	0/88	0+2	20	Recharge Well	(l/min / GPM))	30	2.9	30	44.0	
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Well Tag No. (Place Sticker and/or Print Below)

Tag#: A124334

TW7 Well Record Regulation 903 Ontario Water Resources Act

Well Location Address of Well Location (Street Number/Name) LOTU PTOFE 1730 WILHAVEN

County/District/Municipality FORMERLY CUMBERLAND DR. City/Town/Village Postal Code OTTAWA CARELTON Ontario KUETITI UTM Coordinates | Zone | Easting | Northing | NAD | 8 | 3 | 1 | 8 | 465 | 7 | 1 | 9 | 50 | 3 | 8 | 2 | 7 | 4 Municipal Plan and Sublot Number Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form General Colour Most Common Material Other Materials General Description BROWN LOAM BROWN CLAY DENSE BROWN GRAVEL STONES BROWN UMESTONE Annular Space Results of Well Yield Testing Depth Set at (m/ft) Type of Sealant Used Volume Placed After test of well yield, water was Draw Down Recovery (m³/ft³) From (Material and Type) Clear and sand free Water Level Time Water Level 224 ☐ Other, specify CLEARING (min) (m/ft) 20 BENTONITE SLUBRY f pumping discontinued, give reason 408 eve 10.0 Pump intake set at (m/ft) 75 3 Pumping rate (I/min / GPM) Method of Construction Well Use '2.0 Cable Tool Diamond Public ☐ Commercia ☐ Not used 30. Duration of pumping Rotary (Conventional) Jetting ☐ Domestic ☐ Dewatering Municipal hrs + 💍 min 6 Rotary (Reverse) ☐ Driving Livestock ☐ Monitoring X Test Hole Boring
Air percussion
Other, specify Final water level end of pumping (m/ft) Digging ☐ Irrigation Cooling & Air Conditioning Industrial Other, specify 7.8 If flowing give rate (I/min / GPM) Construction Record - Casing Status of Well 20.5 Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel) Inside Well Depth (m/ft) ☐ Water Supply Recommended pump depth (m/ft) Diameter (cm/in) Thicknes Replacement Well 25 25 From (cm/in) 🛣 Test Hole Recommended pump rate . 188 24.4 Recharge Well 30 20 STEEL (I/min / GPM) Dewatering Well OPEN HOLE 20 80 Observation and/or Well production (I/min / GPM) Monitoring Hole 22.6 50 50 ☐ Alteration Disinfected? (Construction) Abandoned, Insufficient Supply 60 Yes 🗌 No Construction Record - Screen Map of Well Location Abandoned, Poor Outside Depth (m/ft) Water Quality Please provide a map below following instructions on the back. Slot No. Abandoned, other From specify Other, specify Water Details Hole Diameter Water found at Depth Kind of Water: Fresh Wintested Depth (m/ft) Diamete (cm/in) From (m/ft) Gas Other, specify 20 \circ Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify 6 20 80 Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Well Contractor and Well Technician Information Business Name of Well Contractor 41817 7. SAUNDERS Comments RR#I BRAESIDE Business E-mail Address KIDIAI GO Well owner's information Date Package Delivered Ministry Use Only Name of Well Technician (Last Name, First Name)

SAUNOERS TROY 2011/1206 package delivered z131192 Date Work Completed X Yes JAN 2 4 2012 20/201/06

☐ No

Ministry of Environment and Energy

WATER WELL RECORD
House Well (HW)

Print only in spaces provided.

Mark correct box with a checkmark, where applicable.

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Ontario	Ministry of state the Environment				ow) Regulatio		Well Record Water Resources Aci
Measurements records	— ····· — ····· p-····	1	173263	3			age 3 of 3
Well Owner's Infor	mation Last Name / Organi				为外的 主义。在1967年5	(4.6 m) (10)	Connections Color
Jenw	(aputh:			E-mail Ad	Idress		☐ Well Constructed
Mailing Address (Street	Number/Name)		Municipality	Province	Postal Code		ne No. (inc. area code)
Well Location	ouk-Keeny	Ral	Cumberlas	vd 01	1 3 42	M9613	9097297
Address of Well Location	n (Street Number/Name)	1	Township 70 0	Tool-Rd	Lot	Conces	sion
//90 0 7 0 County/District/Municipa	or Rolp		Ejel en beg	elopanid.	DRP		77
OTT NWG	O, FY			1-1		Province	Postal Code
UTM Coordinates Zone	1	1	Municipal Plan and Su	blot Number		Ontario Other	K141C11 1/119
NAD 8 3 / 4	466 3335 503	P1200	48-20	P736			
General Colour	ock Materials/Abandonment Most Common Material		ord (see instructions on ner Materials	the back of this form	General Description		Depth (m/ft)
Brown	(9/av				Palana (- 12-6	From To
60ey	SHALE	<u> </u>		 	(militarily)	<u>07~/</u>	0 3.63
61e/ 6	imestone:	-	<u> </u>		Hand		3.63 4.54
		·····	· , · · · ·		170,000		4.54 103.03
				-			
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				-			
 	Annular Space	The state of the state of	n unitation en manglace en jest	All Paratagraphic Statements	St. Springer (a) in the standard of		
Depth Set at (m/ft) From To	Type of Sealant Use	d	Volume Placed	After test of well	Results of We	Il Yield Testin Draw Down	
12.12 0	(Material and Type)	· +	(m³/ft³)		sand free	Time Water Le	vel Time Water Level
701150	(204 0 00 1 /	rent_	240 h 5.		ontinued, give reason:	Static / G	
				41		1 1, 57	
				Pump intake se	et at (m/ft)		
				Pumping rate (t	46	2 2.00	2 34.96
. Method of Const		Well Use	The state of the s		(min / GPM)	3 2.77	3 34./7
Rotary (Conventional)	☐ Diamond ☐ Public ☐ Jetting ☐ Domestic	☐ Commerc ☐ Municipal		Duration of pun	nping	4 3.57	<u> </u>
	☐ Driving ☐ Livestock ☐ Digging ☐ Irrigation	Test Hole	Monitoring	hrs + _0	<u>Ø</u> min	5 4,74	5 32.94
Air percussion Other, specify	☐ Industrial		Air Conditioning	Trinai water level	end of pumping (m/ft)	10 7.28	1 10 29.39
	Uction Record - Casing	<u> </u>		If flowing give ra		15 13.	6 15 25,001
Inside Open Hele Of	Notes de la companya della companya de la companya de la companya della companya	pth (<i>m/ft</i>)	Status of Well	Recommended	pump depth (m/ft)	20 17.20	
Diameter (Galvanized, F (cm/in) Concrete, Plas	Ibregiass. Thickness	То	Replacement Well		? ! <i>OO</i>	25 20.0	
15.40 Open	Hole 0	12.12	☐ Test Hole ☐ Recharge Well	Recommended (Vmin / GPM)		30 02 04	30 /5 . 62
			Dewatering Well Observation and/or		2:00	₩.X. >0	
5,55 Stee	1 0.90 1.31	100	Monitoring Hole	Well production		7.(, /6	
	1 0.90 1.21	12.12	☐ Alteration (Construction)	Disinfected?	300	50 32.40	
Const	ruction Record - Screen	The state of the state	Abandoned, Insufficient Supply	≝ Yes □ No		60 37.57	160 3.56
Outside Materia	De De	oth (<i>m/ft</i>)	Abandoned, Poor Water Quality	Please provide a	Map of Well map below following ins	Location structions on the	back.
(cm/in) (Plastic, Galvania	zed, Steel) Slot No. From	То	Abandoned, other, specify				
	<i></i>	1			Wilhabe	W Pri	U.S.
			Other, specify	2			
W	Vater Details	Hol	le Diameter		\ & C	3	
water found at Depth Kind (m/ft) □ Gas □ (of Water: OFresh Unteste	d Depth	(m/ft) Diameter To (cm/in)	3	(X "		
Water found at Depth Kind	of Water: Fresh Unteste	_	13.03 15.55	🖺	00 C-30	3	
(m/ft)	Other, specify		1212	- 🔀	A 9	, ä	
(m/ft) Gas C	of Water: Fresh Unteste	d 		1 - 1/2			
Well C	Ontractor and Well Technici	an Informati-	in a language designation in	اکی ا		O	
business Name of Well Con	tractor		ontractor's Licence No.	1	wwes Ro	, vicing	
DAR-WATER Business Address (Street Nu	- We / Wolling	; 6	006	- And and - Desired to a second control of the last of		Secondary Property	encommenda tempera para reproducto de personario de como de esta filosocia.
163 - Route	= for west	Munic	t jour	Comments:			
Province Postal	Code Business E-mail Ad	dress					
Bus. Telephone No. (inc. area c	ode) Name of Well Technician	l ast Name El-	et Nama	iniomation	te Package Delivered		try Use Only
タカンドアデストンド	TO MINING TO	1 Page	<i>!</i>	package delivered	615 66 3	Audit No.Z	197757
vell Technician's Licence No. S	Signature of Technician and/or C	ontractor Date S	ubmitted	Yes Dat	te Work Completed	71	
506E (2007/12) © Queen's Prin	nter for Ontario, 2007		K 15 KM KM 16 155	□ No 🖟	PAND MEN PE	Received	·
		V	ell Owner's Copy	•			

Ontario Ministry of the Environment	. 17, 10		The Ontario Wat WATER W	er Resour IELL RE	ces Aci CORD
rint only in spaces provided. lark correct box with a checkmark, where applicable.	. 11	1531266	U.SOLII I	<u>ຼັຕິດ</u> ທ	107
County or Dietrict OTTAWA - Carleton	Township/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/City/Borough/	WINDOW	Con block tract at Data comple		D 7/00
	VERBURDEN AND BEDRO			Depth	- feet
General colour Most common material	Other materials	/ G	eneral description	From	70
Buova Clay	Bould	ev.	6005=	7	3(-
Gary Limestone			Paraus	25	5-5-
Cory Limestone			Hand	5.5	203
			111717171.11	!	La III
32	CASING & OPEN HOLE R	FCORD		mater 15-24 Long	ا اجسات
Water found Kind of water Inside dam inches	Material Wall thickness inches	Depth - teet 111	(Skd No.) Material and type	Depth at top	of screen 2
100 Sally : Games !	Definel Galvanized Gocorde Gopen hole	0 20			teet
2 [] Salty Gas	Steel	2773 61	PLUGGING & SEA	LING RECORD	mani
Belty D Gas			rom 10	pe (Cameni groul, b	/ 0
Bulphur Suphur Suphur	Steel 26	20.85	15.13 20 C-	<u> </u>	0
end of pumping 10 2 00 15 minutes 10 2 00 15 minutes 10 10 2 00 15 minutes 10 10 10 10 10 10 10 10 10 10 10 10 10 1	Pumping der Ancovery 45 minuses 10 50 minuses 10 50 minu	tn diagram beld indicate north i	N	Den lur le	or pro-A
[] Shallow & Deep pump satisfy /95 tee	Recommended 46.48 pump rate	200	wilhnes	ל נמי-	
FINAL STATUS OF WELL BM#Sirr supply Abendoned, Insufficient Observation was Abendoned, poor quality Test hole Abendoned (Otwer) Becharge wes Dewellaring	supply 4 [] Unfinished 10 [] Replacement well	1kcs			Ro
WATER USE Bottomestic Commercial Stock Municipal Impasion Public supply Industrial Cooling & air conditionin	> □ Not uses 10 □ Other	Fran			hamine
METHOD OF CONSTRUCTION v □ Cable tool □ Rotary (gorventional) □ Botring □ Darmond □ Darmond □ Darmond □ Jetting	Digging			206	825
Name of West Systemstor ACR - WA TER WELL	Injet Contractor's Licence No.	Date source Obate of inspection	ordinación 06 servición	AUG 08	2000
Name of West Technician Signature of Technician Signature of Technician Controller	Well Technician's Licence No. T-0625 Supremator Science October 1000	Hemars		CSS	.ESO
2 - MINISTRY OF THE ENVIRO	ONMENT COPY			0506 (11/	96) Front Fo

Well Tag Number (Place sticker and most number below) A 000750 A 000750

Well Record
Regulation 903 Ontario Water Resources Act

page \angle of 3

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 1/10° of a metre.

Please print clearly in blue or black ink only. 07 LOT MUN 15011 CON (CN Well Owner's Information and Location of Well Information

Address of Well I	NAD Zone Easting	Northing	ownship The wait Cityrown Village Combar Land Unit Make/Model Mode of Operat Moce // An UT M	Site/Compartment/Block/Tract etc. Ref 3 S 1 II Plum 4E/7 732 On Unafferentiated Specify Differentiated Specify
Log of Overb	urden and Bedrock Materials		TINGE TIATU CLITT	Differenced, aprily
Brown Grey Grey	Mast common material Clay SKNKE Lines Fane	Crnvc/	General Description Soft Loose Hard	Depth Motres From. To 0 1, 4/4 1, 4/4 3, 030 3, 030 30,30
/		1000	30.55	

Hole Diameter		Cons	truction Rec	ord		Tes	t of Well Y	Test of Well Yield					
Depth Metres Diameter	Inside		Wali	Depth	Metres	Pumping test method	Draw Do	i nwo	Recovery				
From To Centimetres	diam	Material	Inicknoss		1101.00	1			e Wayer you				
0 3.63 22.23	cuntmetres		centimetres	From	To	Submers 16/c	min Met	tres mir	///ess				
0 3,63 22,27			Casing			Pump intake set at (metres) 2 8.7 8	Static O.	ر دم	4				
		Steo Fibreglass	Casing			Pumping rate -	1 / /	/ 9/ 1	116				
	15.55	140	1:88	0	3.63	(litres/min) / L			- Leli-l.				
Water Record	13.31	Plastic Concrete Galvanuzed	7,00	0	3,63	Duration of pumping	2 2.0	2 2	111				
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1180		Steel Foreglass				Final water level end	3 7	76 3	1.69				
7.47m Fresh Sulphur Gas Salty Minerals	1	Plastic Concrete				of pumping metres		- X.					
"Other:		Galvaruzed				Recommended pump	4 2 3	33 4	12.76				
m Fresh Sulphur		Steel Fibreglass				Shallow Procesp	46000						
Ges Salty Minerals		Plastic Concrete				Recommended pump	5 2.	44 5	12/6				
Other: _		Galvanized				depth. 28 7 Pretres							
m Fresh Sulphur			Screen			Recommended pump rate. (litres/min)	10 2	7시 10	7.5				
Gas _ Sally Minerals	Outside	Steel Fibraglass	Slot No		24	(Intres/min)	15 3	A # 15					
Other:	diam 1	Plastic Concrete				If flowing give rate -	20 3	57 20	3.5				
Alter test of well yield, water was	;	Galvanured			Q .	(litres/min)	25 3,	g Ø 25	14,00				
X Clear and sediment free	1.				.4	If pumping discontin- ued, give reason	30 4,	0 0 30	1400				
Other, specify		No C	asing or Scr	een		, Lucia, gro ramas .	40 4.	36 40	41.00				
Chlonnated X Yes No	Ď.	Open hole		3.63	30,30		50 5. 8	34 50	434				
THOMISTON Y THE NO	1 -			3.63	30,00	ll i	60 5 6	PY 60	15.84				
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	1 12	-	Mad Table 1			
(A) O	ntario	Ministry of the Environment	Well Tag Number (Pl	AO	04837	Well Record
Instruction	s for Comple	ting Form	A0048	37		page of
• For use	in the Provin	o of Ontario only. Thi	is document is a nem	anent len	I document.	Please retain for future reference.
• Question	ons must be ns regarding o	ompleted in full to avo ampleting this applicat	eld delays in processi Ion can be directed to	g. Further the Water	instructions a Well Manage	rease retain for future reference. Ind explanations are available on the back of this form. In a condinator at 416-235-6203.
- WILLIAM	a measmans	nts shall be reported plue or black ink only.	to 1/10 th of a metre			Ministry Use Only
		n and Location of V	Vell Information	MUN /	5011	CON COM O7 LOT D
			12 117			
vouross or vve	II Location (Cou	ny/District/Municipality)		vnahlp		and Die Concession
R#/Street N	mber/Name	a con let	DV	City/Town/V	nber 1	4 Site/Compartment/Block/Tract ata
PS Reading		haven	No.	Cum	ber lan	od Parta Plany (17732
	B ₁ 3	8 465378		Make/IV	ellan	de of Operation: Undifferentiated Hawaraged Offerentiated, specify
		Bedrock Materials (- 1		
Beneral Colour	Most comm		Other Materials		Селен	ral Description Person Natres
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Just 1	green	I WASTOUT				1.8.67.9
			-14-			
						No.
	Diameter		Construction Reco	rd		Test of Well Yield
	eires Diamote To Continetr	Inside diam Maler	da) Wall	Depth	Metros	Pumping test method Draw Down Recovery Single Pumping test method Draw Down Recovery
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			Casing			Pump intake set at Static 14.32 27.9
		Steel [7	Pumping rate . 1 5.33 1 29.57 (litres/min) 18.7
	Record	15.88 Plastic D		0	6.7	Duration of pumping 2 6.25 2 27.28
Vater lound I Metres	Kind of Water	Steel []	Fibroglass		1000	hrs + min
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Gas A	Fresh Sulphi	b Plastic [_]		1		Recongregided pump 5 8.78 5.28.55
Other:		- Galvanizac	Screen			Recommended pump 10 /2, 34 10 28, 42
Gas 🗔	Freeh 🔲 Sulpha Salty 🗀 Minera	Outside [**] Outside				rate. (kres/min) 15 /6.40 15 28.39
Other;	yield, water was	County County C				If flowing give rate 20 20.07 20 25.3
Clear ord of Other, speci	\$784.79V	[] Gelvenized				(litres/min) 25 23, C 25 24.50 If pumping discontinued, give reason. 30 26.58 30 25.70
Other, speci	,,		No Casing or Scre	en		<u>40 549,64,40 223,32</u>
hlorinated	Yes 🔲 No	- Open hole		6.1	67.4	50 25.9 50 75.16 50 25.9 50 79.08
	Plugging and	Sealing Record	Prinular space Ab	ndonment	192	Location of Wolf
Depth set at - Ma		pe (bentonite sturry, neat cor		Placed netres)	In diagram belo	w show distances of well from road, lot line, and building.
6.10	Co	nentslu	114 0.12	71		
						Frank TN Kenny
						& ` _
-						1,5
		Method of Construction	on			111150440
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0	Person	Water Use	Alla Burat			₩
Domestic Stock	∏indu: □Com	ercial N	al used —	Other		
	Muni	Final Status of Well	coling & air conditioning		Audit No. Z	04945 Date Well Completed
krigation		U		ed, (Other)		wner's information Date Delivered yvvv tax po.
Water Supply			ewatering		peckage delivere	BOT APTER []NO 2004 05 19
Water Supply	MobinedA 🔲 Ne	p, insufficient supply Dr. poor quality TR	splacement well			Ministry Use Only
	Abandone Well Co	o, insulicient supply Di c, poor quality Re intractor/Technician In	eplacement well formation		Data Saures	Control to the second
Water Supply Observation w	Abandone Abandone Well Contractor	t, poor quality Rentractor/Technician in	eplacement well formation / Well Contragors Li	ence No	Data Source	Contractor 1 1 19
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Water Supply Observation w Test Hole area of Well-Ca usines: Antipus	Abandone Abandone Well Contractor	ntractor/Technician in	eplacement well formation Well Contragors Li	ence No.	Date Represed (Contractor 1 1 1 9 Date of Inspection YYYY MM DD

Well Tag Number (Plice sticker and print number below)
A 0 1 4 0 79 Ministry of Well Record প) Ontario the Environment Regulation 903 Ontario Water Resources Act A 014099 Instructions for Completing Form For use in the Province of Ontario only. This document is a permanent legas cocument. Please retain for future reference.

All Sedions must be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form. Questions reparting completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.

All motire measurements shall be reported to 1/10th of a metre.

Ministry Use Only

Please print clearly in blue or black ink only. MUN 15011 CON CON O LOT D Well Owner's Information and Location of Well Information O Chneassion
D F Conc. 7

npartment/Block/Tract etc. Address of Well Location (County/District/Municipality) D-E romenhole WII
NAD Zone Easting
1813 / P 4651/44 WilhnuEN Northing Log of Overburden and Bedrock Materials (see instructions) Motres To General Description Other Materials Most common material 3.03 Boulder 0 005 Brown 3,03 96,96 ownol 96.96 Test of Well Yield Construction Redord Recovery Diamo Depth Maires Inside Material Timo Water Leve thickness From To diam Motres From То ntimotr rump intake set at -(metres) O. CO Pumping rate 6,06 1222 6,20 32,10 Casing Cated []Fibreglas 31,40 (litres/min) **G** 5,55 Pleastic Concrete 0,48 0 7,27 Water Record
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Boting Rollary (co ☐ Jetting Rotary (re Driving Water Use 100M1 Z-Domesti industrial
Commercial
Municipal Public Supply
Not used TT Other Stock j Imgalio Cooling & air conditioning Final Status of Well Unfleisher Abanconed, (Other) Was the well owner's inf package delivered? Yes LAND Abandon Abandon Dewatering Replacement ed, poor quality Test Hole Ministry Use Only Well Contractor/Technician Information R-WATER-WC DO JUL 1 3 2004 1 Well Record Number houis Contractor's Copy Ministry's Copy Well Owner's Copy 1534819 Cette formule est disponible en français

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	nta	ario	Ministry the Env	of rironment	Well Ta	Number (P) A Q1		print number below)	1		Weii F	Reco
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		1		15 15 Piloto	Fibregiass	, _		4	6.46	(litres/min) 45, 50			
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i joner.	Fresh	Suk	um.		k .	Screen		22		Recommended pump rate. (litres/min)	10	173 10	
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Well Tap Number (Page 2 of 3 Ontario Water Resources Act Well Tap Number (Page 2 of 3 Ontario Water Resources Act A 014069 Page 2 of 3								
For use in the Province All Sections roust be cor Questions regarding con All metre measurement	of Ontario only. Thin pleted in full to avoinpleting this application shall be reported	s document is a per id delays in process ion can be directed	manent leg sing. Further to the Wate	al document. F	d explanations are ava ment Coordinator at 4	e reference. allable on the back of 416-235-6203.	_	
• Please print clearly in blu Well Owner's Information		Mall Information	MUN	1 1 1 6	Ministry Use	LOT		
Well-Owner a mitorination	and Location of 1	veii information		lll		[201		
Address of Well Location (County OTTHWA-CI RR#/Street Number/Name	/District/Municipality)		ownship	Village and	5 ub - Pho			
1620 + WILL PA	WEN Dr		City/ Jown	Model Model	Sita/Compa	rtment/Block/Tract et	G.	
GPS Reading NAD Zor	Essting 9/65/576/7	Northing 5:013/2/12	Unit Make/I	Model Mode	e of Operation: Und	forentiated Aver	eged	
Log of Overburden and Be	edrock Materials (see instructions)	7719	- llaw	CC TO Differ	renbated, specify		
General Cologr Most common	material	Other Materials	1 177	Genor	al Description	Depth From	Motros	
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Hole Diameter	<u> </u>	Comptending Co.		171				
Dopth Metres Diameter	 	Construction Rec			Pumping test method	of Well Yield	ecovery	
From To Centimetres	Inside Male	fill Pittings	Depth	Metres	ار نام	Time Water Level Time	Water Level	
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ZZ	Pleatic []	122			of brimbing CANA	3 41,19 3	7.75	
Other:	Steel		 	-	Recommended pump type.	4 22.24 4	58.56	
	Pleatic [I			Shallow Poesp Recommended pump	5 22. 26 5	57.15	
Other:	Galvanize			<u> </u>	depth 43.33 metres			
Freeh Sulphur Sulphur Sally Minerals	Outside Steel	Screen	T	ή .	Recommended pump rate (litres/mln)		53.09	
After left of well yield, water was	diam Plastic	1	4		If flowing give rate	20 75,65 20	51.16	
Clear and audiment free	Galveniza				(litres/min)	25 37 , 7 <i>f</i> 25 30 43 , <i>34</i> 30	49.32	
Other, specify		No Casing or Sc	reen		ll pumping discontin- ued, give reason.	40 50, 79 40	46.56	
Chlorinated Yes No	Dopen hole		6.66	84.84	1000	50 5 7,04 50	45.02	
Plugging and Se	aling Record	Annular apace [7]	bandonment		Location of	60 K 4, 74 60	A3'40	
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Cable Tool Rotary (s	ethod of Construction		70	ب- ا	s v	ilh nuen	D. 4	
Rotary (conventional) Air perce			Digging Other			4.5		
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Domestic Industria		ublic Supply	Other		10	8		
Stock Commer	chia ∐ N	ot used soling & sir conditioning	-	Asset No.	4 464 ft 10ais	Well, Completed		
	Final Status of Well			Audit No. Z	14210	70 7777	22 70	
Water Supply Recharge we Observation well Abandoned, i			loned (Other)	Was the well ow package delivered	Liver in a separate of L	Dolivered AAAA	MM DO	
Test Hole Abandoned,	xoor quality R	ewatering eplacement well		becyaffe president		2005	2012	
- Well Cont Name of Well Contractor	ractor/Technician in	formation Well Contractor's	Licenses No.	Onta Source	Ministry Use	Only		
DAK+WATER-		100	26			6006		
Business Address (street hame, numbe	Fally etc.) The	7-00		Data Received 1	0 2005 Do Date	of Inspection YYYY	MM DD	
Name of Well Technician (last name, fir	st name)	Well Technician's		Remarks		Record Number		
Stinature of Techniptan/Contractor	nouis	Catte Submitted			435			
xotavis Le	Capitactar's Con	2003	47.70	Camir III			<u> (===-;</u>	

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Well Record

Regulation 903 Ontario Water Resources Act

Well Owner's Information	
Overburden and Bedrock Materials/Abandonment Sealing Record (see transcent	with Number 15734 Other PART I he back of that forms.
General Colour Most Common Materials Sand Earth Orey Limestone	General Desuription Despite Invite 100 518 5.18 34.1
Annular Space Deput Sat IX (nFT) Type of Septent Used Volume Placed From To Material and Total	Results of Well Yield Testing After use of wall yield Testing Draw Dawn Recovery
6.40 0 Neat Cervent Starry 01816	Time Wasur Lover Time W
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Sign Total Company of the Name of the Name of the Technique (Last Name First Name) Sign Total Company of the Name of the Name of Technique (Last Name First Name) Sign Total Company of the Name of	Veril benner 6 Date Pischage Delevered E Ministry Use Only I

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GEOLOGICAL BRANCH DEPARTMENT of MINES	1

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Pipe and Casing	Record		· · · · · · · · · · · · · · · · · · ·	Pumping Test			
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Well Log				Water Record			
Overburden and Bedrook Record From ft.			Depth (s) at which water (a) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)		
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For what purpose(s) is the water to				.	NURTH		
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Is well on upland, in valley, or on hi		- 19	4	. Indicate north b	y arrow.		
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statements of fact ar			MONTRE	AL ADAD	. NO 17		
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Date July 3 Signature of Licensee

Form 5

WATER WELL RECORD

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Z G. Charbonneau / /		G. Charb	onneau / /	I della tradication					. John		
SIGNATURE OF CONTRACTOR BULLIUSSION DATE DAY 28-NO. 11 - YN 70.		<i>1</i> 4	Clarton			5		•	1,1,1141		<u> </u>

Well Record

Regulation 903	Ontario Weter	Resources Ac
	Page	of

A0123	Regulation 903 Ontario Water Resources Act
Well Owner's Information	
Harvacconstruction and locality and law of the construction of the construction and the construction of th	
Address of Wall Location (Street Number/Name, RR) Township	ec and 23 Concession
County/District/Municipality City/Town/Village	Province Postal Code
UTM Coordinates Zarse Easting Northing GPS Unit Make Model	Mode of Operation: Undifferentiated Waveraged
NAD [8] NAG SAG SAG SAG SAG SAG SAG SAG SAG SAG S	Market District Control of the Contr
General Colour Most Common Material Other Malerials	General Description Depth (Merros)
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00-4 a1 20K- +03	47600
Doph Sol at [Molros] Type of Sealant Used Volume Placed	
Depth Sol at (Metres) Type of Sealant Used (Cubic Metres) To (Material and Type) (Cubic Metres)	Check box if after test of well yield, Draw Down Recovery water was: Draw Down Recovery Time Water Level Time Water Level Ti
10, 0 Nest Cenart Sturry . 4086	Chimit dayshor lo square co Static 70 Static 70
	If purroing riscontismed, give reason 1 2 72 1 3 70
	Pumping lest repulsed 23,73 25048
	Sub-lump 3236 3527
Method of Construction 1998	1 41.44 42226 4 1.50
☐ Rotary (Conventional) ☐ Jetting ☐ SQ omestic ☐ Municipal ☐ Downtering ☐ Rotary (Reverse) ☐ Driving ☐ Livestock ☐ Test Hole ☐ Monitoring	Pumping rate (Linezimin) 534-27 5 78
☐ Rotany (Air) ☐ Digging ☐ Infigation ☐ Cooling & Air Conditioning ☑ Percussion ☐ Boring ☐ Industrial	Duration of pumping 10 3733 10 47 3
Other, specify Other, specify Other, specify	15 / 70 15 / 4 70
Water Supply Dowatering Well Doservation and/or Monitoring Hole	
☐ Replacement Well ☐ Abandoned, Insufficient Supply ☐ Altoration (Construction) ☐ Test Hole ☐ Abandoned, Poor Water Quality ☐ Other, specify ☐	DShallow DDeep 2545.10 2543.82
Recharge Woll Abandoned, other, specify	Recommended pump det 4HP 30 44 90 30 42 76
Please provide a major below showing: - all property boundaries, and measurements sufficient to locate the well in relation to fixed points,	Recommended pump (ale 40 50 + 9 40 10
an arrow indicating the North direction detailed drawings can be provided as attachments no larger than legal size (8.5° by 15%).	If flowing give rate 50 39 30
vidigital pictures of inside of well can also be provided	80 54. 10 60 37 11
old Montreal had	Water founds Depth Kind of Water
1	Metros PGss Fresh Solly Burphur Minerals Water Sound at Depth Kind of Water
1.5xm # 201 King Arthur	Metros Gas Fresh Solty Isutonor Minerals
1.50	Water found at Depth Kind of Water Mores Gas Fresh Sally Sulphur Minerals
Arthur	Casing Used Stroom Used Rt 200 Casing and Woll Details 200
120' 6	Galvanized Genameters)
Date Well Completed Was the woll owner's information Date the Well Record and Package	Fibroglase Fibrogram Dopth of the Holo (Metros)
Date Well Completed Was tre woll owner's information Date the Well Record and Package Daty Indianal Date the Well Record and Package Date the Well Package Date the	Plastic Plastic Wall Thickness (Mores)
Wall Contractor and Well Technician information	No Casing and Screen Used (1) justo Diameter of the Casing (Motres)
Business Name of Well Contractor AT PLOCK PRINT INC. (177)	Dopth of the Cosps (Magros)
Busingss Address (Street No./Name, number, RR) Municipality	DAYes No 0.67
Province Postal Code Business E-mail Address	Audil No. CO 4 CO Well Contractor No.
Bus Telephone No. (inc. ureo code) Name of Utgill Technician (Last Name, First Name)	Z60129
6138388170 Desaulnias Con	Date Received (2002/mm/td) Date of Inspection (2009/mm/td)
West Technician's Licence No. Signature of Technician Date Submitted (yyyimmidd)	Remarks
0506E (11/2008) Ministry's Copy	U Quean's Printer for Ontario, 2006

Woll T	A 054029	mber below)
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Weli Record
Regulation 903 Ontario Water Resources Act

Cette formule est disponible en français

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 Coetings was to be accounted to	This document is a permanent legal document. Please relain for future reference

Questions regarding co All metre measureme	ompleting ti	his application ca	ys in proces:	sing. Funt		Please retain for future re ind explanations are avallabl Desk (Toll Free) at 1-88	
Flease print clearly in c	live or black	k ink only,				Ministry Use On	ly
Well Owner's Informatio	n and Loc	ation of Well In	formation	MUN		CON	LOT
Address of Well Location (Coun	ty/District/Mu	ιηι οίρ αίηγ)		Oy yıs hip		Alloh	Facetaio
RR#/Sireqij/Number/Name /	- Car	letan		Lu	mport	and 23	Concession
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m Fresh Sulphur	 !	Galvanized	Screen		1	depthmetres	
Gas Salty Minerals	Outside	Steel Fibregians	Skil No.		<u> </u>	rate (litres/min) 15	7650 10 51.35
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		_	asing or Scre	en		40 5	7 08 40 47 23
Chlorinated Vos. No		Open hole		3,84	103.63	50 6	205 60 33 47
Plugging and Sea	iling Record	DQ Annular	space Ab	Indonment		Location of Well	203 80 34 4-1
From To Material and type	(bentonite slur	ny, neaf cement sluny)	(cubic	Placed metres)	In diagram below Indicate north by	show distances of well from road	lot line, and buildly
8. O Next	smet	Sur	1 - 18	3 6	Old	Montreal	Read (T)
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				l _ 、) au N	<u> </u>	
	nstruction		। त	3 9KM			
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	Final Status	Cooking & air e	griinessena		Audit No. Z	65055 Date Well Co	moleled
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Test Hole Abandoned, po	or quality	Replacement	Moli		package delivered?		0070516
Well Contra	ctor/Techn	Ician Information	Contractor's LLc	ence No	Data Source	Ministry Use Only	1110
Susuras suddress (street filtine, number,	CLIN OF 1	6 10Hz			- 20		TITA
	4 WAV	P PA	Kons	20	Date Received y	(ELM 21.0 2002	DD MAN YYYY ROLL
lame b) Well Technician (las) name, tire	AAA	INDVI WOLL	Technician's Lic	erice No.	Remarks		Number
signature of Technicion/Contractor	2m-04-1-1-1-1	Date 5	ubmitted your	We be	71		
500€ (08/2006)			100 L	<u>بمترم</u> ز	L		

Ministry's Copy



Well Tag No. (Place Sticker and/or Print Below)
A 052289

A052289

7111538

Well Record

Regulation 903 Ontario Water Resources Act Page

Address of Well L	Location (Street Number	er/Name, RR)	g. /	Cur	darl	and	Lot	7	Concession		
County/District/N		Copie		Town/Villag	e		4	Prov	ince tario	Postal	Code
UTM Coordinates	Zone Easting	Northing		nit Make	Model	nd late	de of Operation:		ferentiated	Aver	raged
NAD 8 3	d Bedrock Materials	रा डावउ।	-11131-10	ellan	5pm	thoch [Differentiated, sp	ecify			X. 400
General Colour	Most Common Ma		Other Materials	71)		Gen	neral Description			Depth	(Metres)
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Brown	ruck.									280	312
					8						
			The	we	HA	rodere	49al p	an m	en		
Depth Set at (Me.		Abandonment Se pe of Sealant Used		Volume	Placed		Results ifter test of well yie	eld, D	oraw Down		covery
From To		laterial and Type)		(Cubic N		water was:	d sand free	Time (Min	Water Leve (Metres)	Time \	Water Level (Metres)
0 40	gut g	2ront		9 3	ag.	Cannot d	levelop to sand-fr	ee Stati	c	Static	50 00
						If pumping dis	continued, give re		29	1	40.01
						Pumping test	method	_2		2	19 00
						Ba		3		3	47 00
Method o	of Construction	Public	Commercial	□ No	ot used		set at (Metres)	4		4	115 90
Rotary (Conver	ntional)	Domestic	☐ Municipal	☐ De	watering	Pumping rate	(Litres/min)	5	29.90	5	uuse
Rotary (Revers	☐ Digging	Livestock Irrigation	☐ Test Hole ☐ Cooling & Air		onitoring ng	Duration of po	umping min	10	00	10	4410
Other, specify	Boring	☐ Industrial ☐ Other, specif	y			hrs +	min	15	18.60	15	43.01
		Status of Well				(Metres)	rel end of pumping	20	127.01	20	11100
Water Supply Replacement V		Insufficient Supply	Observation a	onstruction)		Recommende Shallow	ed pump type	25	1000	25	4. 10
Test Hole Recharge Well		Poor Water Quality other, specify	Other, specif	ý			ed pump depth	30	29,30	30	70.00
	L	ocation of Well				295 Recommende	Metres	40	35.90	40	30.80
- all property boun	map below showing: daries, and measuremen	nts sufficient to locate	the well in relation	to fixed poir	nts,	(Litres/min)	an mine	t 50	41.60	50	31.70
- detailed drawings	ng the North direction s can be provided as atta		han legal size (8.5" l	by 14")		If flowing give (Litres/min)		60	43,10	60	36.00
- vidigital pictures	of inside of well can also l	be provided							30.00		76.00
						Water Details Water found at Depth Kind of Water A COLUMN AND AND AND AND AND AND AND AND AND AN					
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Well Contractor and Well Technician Information Business Name of Well Contractor Well Contractor's Licence No.					Open Ho	ole		Gener		and Insertes)	
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Well A 086962 [Below]

Well Record
Regulation 903 Ontario Water Resources Act
Page ______ of ______

086962 Distric | Imperial ments recorded in: Well Owner's Information Well Location Marks Postal Code K4COA2 Ontario Other Northing 05 5034452 Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this for Depin (m²t) From To General Description Other Materials General Colour 0 3.63 105E 3.63/51.51 Brown Etomo Results of Well Yield Testing After test of well yield, water was Arinular Space Draw Down Volume Placed Time Water Level Time Water Level Type of Sealant Used Clear and sand free Depth Set at (m/h) (m'/ft1) (Material and Type) mili Other specify Kuit 42.0P 120 KC 6.01 If pumping discontinued, give reason Level 4085 2 40.73 Pump intake set at (m/h) 6.25 5 1/5 1/ 3 40.60 6.20 7,44 4 40.50 Duration of pumping Well Use SECTION of Construction Not used
Dewatening Public
Domestic
Livestock Diamond | 8.03 5 40 41 Cable Tool _ hrs + 273 min Municipal Rotary (Convention ☐ Monitoring 11.29 10 39.PF Test Hole Final water level end of pumping (mil PRotary (Reverse) # JR Driving Cooling & Air Conditioning Imgation Boring □ Degging 1430 15 39.57 Industrial I flowing give rate (vmin / GPLI) Air percuss When specify WATER PETC455 Politier, specify 17.79 20 39,16 Status of Well Construction Record - Casing Recommended pump depth (m/ti) 1)-Water Supply Depth (m/ft) 25 347. 78 Open Hole OR Material (Galvanozad, Fibroglass, Concrete, Plastic, Steel) Wall 21.12 Replacement Well Inside Diameter (em/n) 24,23 00 38.38 (cm/in) Tesi Hole Recharge Well umin / GPAI) 0,48 70.45 12.1 10 37 100 Dewatering Well 1586 Observation and/or 3622 50 36586 Monitoring Hole 19.00 Alteration 36,15 /3£ 60 GO (Construction) Yes No Abandoned, Insufficient Supply Map of Well Location Construction Record - Screen Abandoned, Poor Please provide a map below following instructions on the back 14.00 Water Quality Depth (m/tl) Abundaned, other specify FUEWIT Other, specify Longaille way Water found at Depth Kind of Water Wresh Cuntested Hole Diameter Water found at Depth Kind of Water. Fresh _ Untested 15,46 12/2 (mvit) Gas Chher, specify
Water found at Depth Kind of Water Fresh Unitested (m/ft) Gas Other, specify Well Contractor and Well Technician Information 600 153 mes Ministry Use Only Date Package Delivered Well owner information package delivered "2 099704 20070817 Well Technician (Last Name, First Name) WYes SEP 03 2009 20090414

M 118 = 465450 41 5:013181117:01 Ontario Water Resources Commission Act 518 0 3 2 5 RECORD Township, Village, Town or City. Cumberland Carleton 21 April 1969 month County or District Lot ____ Date completed Cumberland, Ont. (print in block letters) Owner **Pumping Test** Casing and Screen Record Static level _____10 6n..... Test-pumping rate 8 G.P.M. Inside diameter of casing Pumping level 604 Total length of casing Duration of test pumping 2 hrs. Type of screen Water clear or cloudy at end of testclear Length of screen 6 G.P.M. Depth to top of screen Recommended pumping rate feet below ground surface Diameter of finished hole with pump setting of 60 Water Record Kind of water Well Log Depth(s) at (fresh, salty, sulphur) which water(s) found To From ft. Overburden and Bedrock Record fresh 146 3 0 Loam 8 3 loose rock & clay 146 8 grey limestone Location of Well For what purpose(s) is the water to be used clomestic In diagram below show distances of well from road and lot line. Indicate north by arrow. Is well on upland, in valley, or on hillside? upland...... Drilling or Boring FirmG. Charbonneau, Diamend & Cable Drilling, 94 Address R. R. 1, Box 194, Orleans, Ont. Licence Number 3395 Name of Driller or Borer G. Charbonneau, Address R. R. 1, Orleans, Ont. Date Lexand Charles or Boring Contractor)

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Form 7

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MINISTRY OF THE ENVIRONMENT

The Ontario Water-Resources Act	
WATER WELL RECORD	

1513924 DAY 31 #05 R. R. 1, Cumberland, Ont. LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS) GENERAL DESCRIPTION

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The Ontario Water Resources Act

WATER WELL RECORD

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The Ontario Water Resources Act WATER WELL RECORD

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Please print clear ell Owner's infor	mation and Locat	ion of Well Infor	mation	MUN / E	CON	CON	U	
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					Owner's Copy			

Well Record
Regulation 903 Ontario Water Resources Act A 014100 Ministry of Ontario the Environment page \mathcal{L} of $\mathbf{3}$ Instructions for Completing Form

• For use in the Province of Ontario only. This document is a permanent legal document. Please ratein 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 1/10% of a metre.

• Please print clearly in blue or black ink only.

• Please print clearly in blue or black ink only. Well Owner's Information and Location of Well Information MUN | 50 | CON OF | O/ LOT 20 Address of Well Location (County/District/Municipality)

OTT (1) 19 - 410 (C) 200

RR#/Street Number/Name

GPS Reading NAD Zong Easting Site/Compartment/Block/Tract etc. L'Averaged GPS Reading NAD Zong Easting A Northing SO 396 0 6

Log of Overburden and Bedrock Materials (see Instructions) UTM Differentiated, sp General Description Other Materials General Cok 0 60030 SMALE 1.00 imes tone Test of Well Yield Construction Record noing test method Draw Down Hole Diameter Motres Depth Subsection Time

Subsection Time

Pump Intake age at continue

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Pumping rate

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Rocha e well

Observation Test Hole

insufficient supply

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JUL 1 3 2004

Ministry Use Only

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Cette formule est disponible en français

Date of Inspection

Well Record Number

) Ontar	iQ Min	istry of Environment	Well Tag Nu		A 004	706	Regulation 903 O	Well Red Interio Water Resourc	es Act
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Name of Well Of	Well C	ntractor/Techn	ician Informati	Val Contract	r's Licence No.	Data Source		Contractor 11	<u> 1</u> 9
	atreed garges, III	LL CHY NCS	ad D	119		Date Receiv	2 1 2004	Date of Inspection YYYY	LANA CE
Name of Well Tuch	niduri land	The same	all I	TAIR	ari's Leance No.			15347	702
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	Ministry of	Well Tap Number	A 0047	07	Mark I I	Well Record
Y Ontario	the Environment		-		Regulation 903 Ontan	Water Resources Act
structions for Compl	ting Form	A004		Bloc	are retain for future refer	ance
For use in the Provin	ce of Ontario only. Th	s document is a perr iid delays in processi	nanent legal ooc ng. Further instru	ctions and e	ase retain for future refere explanations ere available c ent Coordinator at 416-23	n the back of this form. 5-8203.
 Questions regarding All morre measurem 	ents shall be reported	ion can be directed to 1 to 1/10 ^m of a metre	the Water Well	Manageme	ont Coordinator at 416-23 Ministry Use Only	5-01-0-1
 Pleaselprint dearly in 	blue of black the only.		MUN 157	CON	CON	/ LOT DE
Vell Owner's Informat	on and Location of	Well Imortifation _				
Address of Well Location (Co	unty/District/Municipality)	Τ·	olynship	0.10.	1 2	Concession
RR#/Street Nymber/Name	Carleton)	City/Jown/Village	erlan	Site/Compartment	Block/Tract etc.
O\A MO	treal Ke	Northing	1	Mode C	of Operation: Undifferential	
og of Overburden an	18 46514	Northing 870	mag	uun	1 Construction	
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61 PC	ent St	wy		14	Marion	
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	Method of Const		☐ Digging			, 2km
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Rolary (reverse)	Boring Water Use	☐ Ortving			11 th 7	_
	Industrial Commercial	Public Supply	Other		- WULL # Z	ell Completed
	Municipal Final Status of	Cooling & air condition		Audit No. Z	U4919 c	SODA. DARD
The state of the s	charge well endoned, insufficient supply	Unfinished A	bandored, (Other)	Was the well package dollys	CALIFEL B. ALICENTANCE	9
	manufacture i stantioners and by	Replacement well			Ministry Use C	ctor de de
ALL CONTRACT OF ALL CONTRACT O	andonati, poor quality	Wil Hilphinenan	The same black	Data Source		1119
Name of Well Sentractor	Vell Contractor/Technic	/ Yven Comus	clore Literica No.	20.500.000		
Name of Well Contractor	Vell Contractor/Technic	old Dat	COP'S LIGHTCE NO.	Date Receive	2 1 2004 1	Inspection yyyy MM CO
Name of West Contractor Business Volumes, (street n	well Contractor/Technic	nd Dat	cian's Libenco No.		2_1_20041	Inspection YYYY MM CO
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Maniposity Con

County or District	1 1 Havan	Township/Borough/City/Town	Vilgo	Con block trac	Den 44 840
My 9		1287 Lenge	1 Jamies	Cumbal Co	mpleted / Bey month year
1	7	Northing	HC Elevation		
	LOG OF O	VERBURDEN AND BEDROCI	MATERIALS (see	Instructions) General description	Depth - loet
General colour	Most common material	Other materials		Hard	Prom To
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	10 12	CASING & OPEN HOLE RE	CORD	Stee of opening 31-3	3 Diameter 34:31 Length 39-40
Water found	ER RECORD 51 Inside diam	Material Hickness Inches	Depth - feet From To	(Stot No.)	Depth at top of screen 21-44
	Fresh 2 C Suppur 14 1911	1 [] Steel []	0 130	Material and type	leet
15-10 1	Salty 6 Gas	3 Concrete a 2 Open hole b Plastic	0 42	61 PLUGGING	SEALING RECORD
	Sally 0 Gas	1 Steel 2 Quivenized 3 Concrete	12 42	Depth set at - lest From To Materia	al and type (Cement grout, bentonite, etc.
1	C Seek 1 C Sulphur 29	6 Plustic	7/30	0" 40 C	ment great
,	Selty 6 Get 31 80 /	1 Steel 2 Galvenized 1 Concerts	42 425	16 21 (25-22 16 22 15 26	
	Fresh 4 Minerals	4 (ii) Open hole 1 (ii) Pleatic			
71 Pumping tes	t mothod 10 Pumping rate / GPI		In diagram	LOCATION OF V	VELL I wall from road and lot line.
. State level	Water level 25 Water levels during	Purroing / Recovery	indicate n	orth by arrow	
20 70	420 420 400	375 350-	1	D.	i o well
If Bowing gw	re rete 28-41 Pump intake set at	Water at and of test	noon	\$17	5,00
Recommends G Shallow	nd pump type Recommended	Paccyrmended pump rete 5 GPM	1	3 /	
1643			10/	10	
1 TWater	TUS OF WELL * supply * * * Abendoned, insufficient region well * * Abendoned, poor qual	t supply * [] Unfinished by 10 [] Puplacement well	I = I		2.
7 (1) Obsert 3 (1) Test h	nole 7 [] Abandoned (Other)			K	
WATER US	SE 16-36	s [] Not use		25/	×
3 C Stock	lion r Public supply	ng 🖸 Other		2/1/	6° /
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Cable	e tool 2 (i) Air percussion ry (conventional) 4 (ii) Boring	* (*) Driving 10 Digging 11 Other			252804
3 [] Rota 4 [d] Rota	ry (reverse) Linerature]		
Name of Wall	Contractor	Well Contractor's Licence No.	III로	" T414	DEC 2 0 2002
Address A	S Bourgers		Date of inspects	n inspector	
Name of Well	Technician B	Well Technician's Licence No	J 12 L		7.03.EC2
Bighenes of T	air / Jule	3/1 management 0)	ALLS Remarks		
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inty or District Russell (seek)	Date com	pieteu		month	Jent)			
wner.	Address	R.R. 1	- Cumber.					
Casing and Screen Record			Pumping	Test				
side diameter of casing 6 3/16 otal length of casing 13	Test-	Static level 70 Test-pumping rate 125 GPH XXXXX Pumping level 90 Duration of test pumping 1 hr.						
ength of screen	14/-4	- close or cl	andy at end of	test clear				
	Wate	er clear or ch	umping rate	125 GPH	9000			
nameter of finished hole 6	Rece	ommenaca j	- of 120	feet belov	w ground surfac			
	with pump setting of			feet below ground surface				
Well Log Overburden and Bedrock Record	T	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)			
Limestone		0	160	90	fresh			
For what purpose(s) is the water to be used? farm Is well on upland, in valley, or on hillside? valley Drilling or Boring Firm J.B. DUFRESNE & CO. LIMITED Address 1014 Maitland Ave. Ottawa 5, Ont. Licence Number 2030 Name of Driller or Borer R. Laniel	нw	In diagree road an	am below show		ell from arrow.			
Name of Driller or Borer Address 6 Bellevue - Lucerne, Que. Date July 28th 1966 (Signature of Licensed Drilling or Boring Contractor) for J.B. Dufresne & Co. Limited Form 7 15M-60-4138 OWRC COPY	CON	. &	MILL)	C58.88				

M 1/18 7 141618121101E	115130	97-	56 N	327		
5 NR 5 0 18 19 16 19 N Ontario Water Resource	Commission	Act Line	1			
" ISTRICISION WATER WELL	RECC)RD	m 1200 y 460 ju			
: 215 1 1 mss 0 0.F. Con That >2 Four	iship, Village, To	own or City Ci	mberland			
inty or District	completed	20 January	1965	year)		
n. 1st. Con. from OrrawaRI.ot	ess.4102. Lakew	ood Detroi	11. Michig	an, U.S.A		
vner	-635.41.02Trave.u					
		Pumping				
Si diameter of casing	Static level	351		CPM		
251	Test-pumping ra	te 6				
11.000/00000000000000000000000000000000	Pumping level	501		en e		
	Duration of test p					
	Water clear or cl	oudy at end of t	est clear			
epth to top of screen	Recommended]	oumping rate	6	G.P.M.		
iameter of finished note	with pump setting	ng of 75	feet below ground surface			
Well Log				Record		
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)		
clay & loose rock		4				
loose rock rack & limestane	4	112	112	fresh		
grey limestone	10					
			<u> </u>			
			4 404 11			
For what purpose(s) is the water to be used? domestic.		Location		all from		
For what purpose(s) is a	In diagr	am below show d lot line. In	distances of w licate north by	arrow.		
Is well on upland, in valley, or on hillside? hillside	Ioau	المرايا		2/4		
Drilling or Boring Firm		10125		Nuc 7 12		
G.Charbonneau, Cable & Diamond Drilling				N. C.		
Address R.R. # 1, Box 194, Orleans, Ont.		1 2				
Address . RA #		15	OLD 17.			
Licence Number 2156			J. 6			
Name of Driller or Borer G. Charbonneau	9		528ML	9		
Name of Driller or Borer G. Ont. Address R.R. # 1, Orleans, Ont.	う 1::	12 7	X LILLAS W			
Date 20 January 1966.	lo'	124		•		
Date 20 January 1966.	,			Q		
(Signature of Licensed Drilling or Boring Contractor)						
Form 7 15M-60-4138			ess.	i		

Ministry of the Environment

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

Tag#: A124334

Well Record

Regulation 903 Ontario Water Resources Act

Well Location							
	ocation (Street Numb		T 16	ownship DRMERLY CUI	MRERIAND LOT P	Concess	ion
County/District/Mu	unicipality					Province	Postal Code
OTTAU	IN CARELI			City/Town/Village		Ontario	KRETITI
UTM Coordinates	Zone Easting / 18 46571	195035		Junicipal Plan and Subl	ot Number	Other	
NAD 8 3				rd (see instructions on the	hack of this form)		
General Colour	Most Commor			er Materials	General Description	n	Depth (m/ft) From To
BROWN	LOAN	1				-20710/111/11/12/2-	S 15
BROWN	C104				DENSE		12 3
BROWN	GRAVE	·	STON	rec	Devoc		2 24
BROWN	UMEST						2 0 5
BROWN	COURSIG	370 6					0200
•							
				•			
D !! 0 : ! (Annular Space				ell Yield Testin	
Depth Set at (m/ From To		/pe of Sealant Use <i>faterial and Type)</i>	d	Volume Placed (m³/ft³)	After test of well yield, water was:	Draw Down Time Water Le	
0 20	BENT	DIVITE S	111004	224	Other, specify LEARING	(min) (m/ft)	
			,		If pumping discontinued, give reason:	Static Level 4 0	<u> </u>
						1 10.0	9 1 32.6
					Pump intake set at (m/ft)	2 //	7 2 32.3
					/ 5 Pumping rate (I/min / GPM)	3 // 4	3 317
	Construction		Well Us		J	4 /2.1	7 4 26 6
Cable Tool Rotary (Conventi	☐ Diamond ional) ☐ Jetting	Public Domestic	Comme	= 1	Duration of pumping		2 20,0
Rotary (Reverse)) Driving	Livestock	🗓 Test Hol	le 🔲 Monitoring	hrs + 5 min	5/2,6	
Boring Ar percussion	Digging	☐ Irrigation ☐ Industrial	☐ Cooling	& Air Conditioning	Final water level end of pumping (m/ft)	10 1/5, 3	3 10 27.8
Other, specify		Other, specif	у		If flowing give rate (I/min / GPM)	15 /7.	8 15 27,0
	Construction Rece			Status of Well	er	20 20.	5 20 26 3
Diameter (Galva		hickness _	pth (<i>m/ft)</i>	☐ Water Supply ☐ Replacement Well	Recommended pump depth (m/ft)	25 12.2	2 25 25.7
24		[0170111]	2	Test Hole	Recommended pump rate	1 0 //	
04 5	TEEL 0	188 0	20	Recharge Well Dewatering Well	(I/min / GPM)	30 37.	7 30 12 5 /
6 OP	EN HOLE	20	80	Observation and/or Monitoring Hole	Well production (I/min / GPM)	40 2 /.	1 40 23.1
				☐ Atteration	Disinfected?	50 31.1	1 50 22.6
				(Construction)	X Yes No	60 34.	0 60 21-2
	Construction Reco	ord - Screen		Insufficient Supply Abandoned, Poor	Map of W	ell Location	
Outside Diameter (Ptactic	Material	Slot No	pth (<i>m/ft</i>)	Water Quality	Please provide a map below following	instructions on the	e back.
(cm/in) (Plastic	c, Galvanized, Steel)	From	То	Abandoned, other, specify			11
							A.
				Other specify			/N 0
	Water Detail	s	Н	ole Diameter			2
2111	epth Kind of Water:		ed Dept From	h (<i>m/ft</i>) Diameter To <i>(cm/in</i>)			
44 (m/ft) []	Gas Other, specify			$\begin{array}{c c} T_0 & (cm/in) \\ 20 & 9\frac{3}{4} \end{array}$			HAVEN
	Gas Other, specify						₹
	epth Kind of Water:		20	80 6		-	- 450 D = =
(m/ft) □ (Gas Other, <i>specify</i>	/				•	Bes 2
Business Name of	Well Contractor a	ind Well Technic		ion Il Contractor's Licence No.		ŀ	350
	NOERS E	ORILLING		1 R 7 9		-	'
	(Street Number/Name		Mu	nicipality	Comments:		
<u> </u>		D		RAESIDE			
Province	Postal Code	Business E-mail A	aaress	İ	Well owner's Date Package Delivere	ed II Min	istry Use Only
Bus Telephone No.	1/ 11 - 11 - 17 - 12 - 1	of Well Technician	(Last Name,	First Name)	information package Delivered	Audit No.	
6/3623		AUNIDERS	TROY		delivered Date Work Completed	2 P	131192
vveil rechnician's Lice	Signature of	Technician and/or	Contractor Dat		12-Yes 2011 1/12 1/12 1/14 2	16 JA	N 2 4 2012
OE085 (2007/42)	1,100	1 summ	_	0/201/016		Received	

319/6e $|O|O_{\mathsf{The}}^{\mathsf{N}}$ Ontario Water Resources Commission Ac OMTARIO WATER FS COMMISSIONTownship, Village, Town or City Lot E E Date completed **Pumping Test** Casing and Screen Record Static level Inside diameter of casing Test-pumping rate 18 Total length of casing 17 Pumping level 50 Type of screen Length of screen Water clear or cloudy at end of test. Depth to top of screen Recommended pumping rate G.P.M. Diameter of finished hole with pump setting of ______ feet below ground surface **Water Record** Well Log Depth(s) at Kind of water From (fresh, salty, sulphur) which water(s) found Overburden and Bedrock Record 140 140 For what purpose(s) is the water to be used? Domestic Location of Well In diagram below show distances of well from road and lot line. Indicate north by arrow. ab Is well on upland, in valley, or on hillside? G. CHARBO NNEAU Drilling or Boring Firm Licence Number 2593 Name of Driller or Borer... RD N 1. 194 Signature of Licensed Drilling or Boring Contractor) Form 7 15M-60-4138

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The Ontario Water Resources Commission Act

WATER WELL RECORD

316/6W 1512689

	Water management hi Onto	^{ario} 1. PRINT ONLY IN SF	ACES PROVIDED	11 57	60 1:	24.0		MUNICIP. 51600	Z B CON.		1 10.7
Ī	COUNTY OR DISTRICT	2. CHECK 🗵 CORRE	TOWNSHIP, BOROUGH, CI		,	40	CON. B	10 LOCK, TRACT, S	JRVEY, ETC.	-	XD 125-27
ļ,	WINER (SURNAME FIRST)	J 100/47	ADDRESS	land			. 17		DATE COM	PLETED 04	18-53
Ē	Johann	sen Co. L	J. B.R.3	Fallow	Fiel	<u>d</u> F.	1.0t	tawa		мо ССС	± yr.70
	21	1/8/1/2/6/5	61810 318	250		325	- [3]	251			47
· [ιο	G OF OVERBURDEN	N AND BEDRO	OCK A	MATERIA	LS (SEE IN	STRUCTIONS)			
	GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MA	TERIALS			GENERAL	DESCRIPTION		FROM	- FEET
	brown .	hel								0_	1
	grey !	limeston	<u> </u>	***			ha	مط		-/	310
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(]	41 WATER	RECORD	51 CASING &				w	OF OPENING D.)	31-33 DIAME	i	LENGTH 39-40
	10.12	IND OF WATER	INSIDE MATERIAL INCHES	THICKNESS FI	DEPTH -	0022	MATERIA	AL AND TYPE	l	DEPTH TO TOP OF SCREEN	41-44 80
9	220 20 SAL	TY 4 MINERAL	STEEL 2 GALVANIZED	12/88 (2	2216	S				FEET
4	280 2		3 CONCRETE 4 CONCRETE 4 TO TOTAL	19 2	2 7	290		UGGING	& SEA	CE (CE	MENT GROUT,
4	20-11 X N		O6 1 2 GALVANIZED 3 CONCRETE		G 0	0290	FROM 10-13	TO 14-17	MATERIAL AND	LEAD	PACKER, ETC.)
	, 1 □ 59 2 □ SAL		4 OPEN HOLE	26 26	70 -	27-30	18-2	1 22-25			
	-33 1 FRE 2 SAL	ESH 3 SULPHUR 34 84	2 GALVANIZED 3 CONCRETE 4 OPEN HOLE			0323	26-29	30-33	80		
1	PUMPING TEST METHOD						LO	CATION	OF WE	L L	
	1 D PUMP 2	BAILER 0008	GPM COM H	5-16 00 17-18 OURS MINS.		IN C			CES OF WELL FF		
H	STATIC LEVEL	PUMPING 22-24 15 MINUTES	2 L 1 30 MINUTES 1 45 MINUTE	PUMPING RECOVERY ES 60 MINUTES	ļ	LOT	LINE. INDICA	TE NORTH A	RROW.	I	-
		200 FEET 070 FEE	130 200					الآيا		•	
	IF FLOWING,	38-41 PUMP INTAKE	SET AT WATER AT EN	D OF TEST 42				3			_ \
	RECOMMENDED PUMP TY		43-45 RECOMMENDE	46-49				1		~	* 1
	SO-53			/ Э GPМ.				13	6	byra	180
i	FINAL 54	1 WATER SUPPLY	5 ABANDONED, INS					()	۵. ۲	by	
	STATUS OF WELL	OBSERVATION WE	L 6 ABANDONED, PO 7 UNFINISHED	OR QUALITY							
	55-56	DOMESTIC	5 COMMERCIAL					Ŕ			
	WATER USE	2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL	6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CO	NDITIONING				3			
	032 01	OTHER		OT USED				13			
	METHOD 57	CABLE TOOL	DEFINITION TO BORING)				8			
	OF DRILLING	3 T ROTARY (REVERSI	8 ☐ JETTING 9 ☐ DRIVING								
	MAME OF WELL CONT	5 AIR PERCUSSION		LICENCE NUMBER		DATA SOURCE		TRACTOR 5	9-62 DATE RECEIVE		63-68 80
	o aprite	2 Hal	in Supply	1358	l I ≢L	SOURCE		1558	02	1270	
	ADDRESS /	hord	D' O		띯		ECTION	INSPECTO			
	NAME OF DRILLER O	R BORER	C^{-1}	LICENCE NUMBER		REMARKS:		-		I	P //
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	OWRL COR	- Y									

Ministry of the Environment

2 - MINISTRY OF THE ENVIRONMENT COPY

The Ontario Water Resources Act WATER WELL RECORD

Environment Print only in spaces provided. 1533753 Mark correct box with a checkmark, where applicable. 11 OF SHEET County or District Township/Borough/City/Town/Village OTTAWA umber Address completed \square LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions) Depth - feet General colour Most common material General description From То 245 31 32 WATER RECORD CASING & OPEN HOLE RECORD Sizes of opening (Slot No.) Water found Inside diam Wall thickness Depth - feet SCREEN Kind of water Material inches From То Depth at top of screen inches Sulphur Minerals Gas Material and type Steel □ Fresh 2 Galvanized
3 Concrete
4 Open hole
5 Plastic 2 Galty 18 0 20 É ☐ Sulphur ☐ Minerals ☐ Gas 3 4 6 ⊺ □ Fresh 2 | Salty 61 PLUGGING & SEALING RECORD 1 Steel
2 Galvanized
3 Concrete
4 Gopen hole 20-23 Sulphur Minerals Gas ☐ Annular space Abandonmen 20-23 ₁ ☐ Fresh Depth set at - feet 20 2 Salty From To 5 🔲 Plastic 25-28 Sulphur Minerals 1 🔲 Fresh 1 Steel
2 Galva
3 Conco 27-30 2 🗆 Salty Gas Galvanized
Concrete
Open hole
Plastic ☐ Sulphur ☐ Minerals ☐ Gas Ye 30-33 ¹ ☐ Fresh 2 Salty Duration of pumping Pumping test method Pumping rate **LOCATION OF WELL** N) 17-18 **Mins** ☐ Pump 2 🔲 Bailer In diagram below show distances of well from road and lot line. Indicate north by arrow. Water level Static level Water levels during 1 🗀 Pumping 2 - Recovery end of pumping **PUMPING TEST** 15 minutes 26-28 45 minutes 32-34 60 minutes 35-37 30 minutes 29-31 feet feet feet feet 42 If flowing give rate Cloudy
46-49 ☐ Clear **GPM** Recommended 43-45 Recommended pump type Recommended pump setting pump rate ☐ Shallow ☐ Deep GPM feet withnuen- Pu FINAL STATUS OF WELL

1 Water supply 54 ☐ Abandoned, insufficient supply☐ Abandoned, poor quality☐ Abandoned (Other) 9 Unfinished ☐ Observation well
 ☐ Test hole 10 Replacement well 8 Dewatering WATER USE

1 12 Comestic
2 1 Stock
3 1 Irrigation
4 1 Industrial 9 🔲 Not use 10 🔲 Other METHOD OF CONSTRUCTION 57 5 Air percussion
 6 Boring
 7 Diamond
 8 Jetting 9 Driving
10 Digging
11 Dother 251137 6006 용 APR 0 4 2003 4006 source Date of inspectio USE Remarks MINISTRY CSS.ES3 0506 (07/00) Front Form 9



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MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

WATER WELL RECORD 1533753

FORM 7 MOE 07-091

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county or district			TOWNSH	Cumbe:		AGE			CON	BLOCK, TRACT.	SURVEY.	ETC.		LOT
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	TER RECOR	D		CASING &	OPEN HO	LER	RECORD	z.	SIZE(S)	OF OPENING		DIAMET	ER	LENGTH
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	☐ FRESH ☐ SULPHUR		64	CONCRETE						PLUG	GING	8. SEALI	ING RECO	
		INERAL		OPEN HOLE				-	DEPTH SE	T AT - FEET	TI .	TERIAL AND	TYPE (CEMI	ENT GROUT
		ULPHUR AINERAL		GALVANIZED CONCRETE					FROM	то	T **	TERIAL AND	LEAD P	ACKER, ETC.)
		SULPHUR		OPEN HOLE				$-\!$.			
		SULPHUR		GALVANIZED							₩,			
		MINERAL		OPEN HOLE				_]		1				
PUMPING TEST MET	THOD:	PUMPING RATE		DURATION OF PU	MPING				LC	CATIO	N OF	WELL		·
PUMP	BAILER WATER LEVEL	2				MINS	IN	DIAGRA	M RELOV	V SHOW DIS	TANCES	OF WELL E	ROM ROAD A	N N O
STATIC	END OF PUMPING	l	EVELS DURIN	<u> </u>	PUMPING RECOVERY					CATE NORTH			ROM ROAD A	N D
LES			30 MINUTE		60 MINUT	1								
2 If FLOWING, GIVE RATE	245	215 FEE	T 185 F	WATER AT END	ET 12	BEET	İ							
GIVE RATE	G <i>PM</i>	23	35 .	FEET DELEAR	CLO	YOU								
TECOMMENDED PU	MP TYPE	RECOMMENDED PUMP		RECOMMENDED PUMPING										
SHALLOW	V ExDEEP	SETTING 2	235	EET RATE 2		GPM.								
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FINAL STATUS	☐ OBSE	ERVATION WEL	L 🗆	ABANDONED, INSUF ABANDONED, POOR		,,,								
OF WELL	TEST	HARGE WELL	u	UNFINISHED										
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USE	- indu	OTHER	- L COO	LING OR AIR CONDI										
	☐ CABL	LE TOOL		BORING		\dashv								
METHOD OF	☐ ROTA	ARY (CONVENT		☐ DIAMOND ☐ JETTING										
DRILLING	E ROTA	ARY (AIR) PERCUSSION		☐ DRIVING										
NAME OF WELL	1				ENCE NOTE:		DRILLERS RE	MARKS:	1		т-			
!		.			ENCE NUMBER	,	ONLY					APR	0 4 20	003
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A RAME S. DR 21	Box. 1	94. 01	rleans	o, Ont	KIC.	1	nse							
NC		ourge	ois				뜅						Cee	ECO
SIGNATUREOF	CONTRACTOR	1		SUBMISSION DATE	_		DFFICE						CSS.	.E33

Ministry of the Environment

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Well Record Regulation 903 Ontario Water Resources Act

Cette formule est disponible en français

page _

Instructions for Completing Form

For use in the Province of Ontario only. This document is a permanent legal document. Please retain for future reference.

All Sections must be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.

Questions regarding completing this application can be directed to the Water Well Help Desk (Toll Free) at 1-888-396-9355. All metre measurements shall be reported to 1/10th of a metre. Please print clearly in blue or black link only. **Ministry Use Only** MUN CON LOT Well Owner's Information and Location of Well Information Address of Wall Accation (County/District/Municipality) Ownship <u>1</u> Concession 2 imper Ojty/Town(Villago Site/Compartment/Black/Trac Unit Make/Model P03890 Undiferentiated C GPS Reading NAD Zonel Easting Nathling 813 18 46513 503870 Log of Overburden and Bedrock Materials (see instructions) General Colour Most common material Other Materials General Description Š8 POLICE Hole Diameter Construction Record Test of Well Yield Recovery Dooth Metros Diameter Drnw Down Metres Depth From To Centimetre Time Water Levol Time Water Lev 1491 To mln min centimetres 73. द्धड 46 2.00 Casing .eve Steel Fibreglass 588 Plastic Concrete 18,29 .48 Water Record Galvanized _hrs -Kind of Water Steel Fibreglass Gas Other Gus Sulphui Plastic Concrete Fresh Stulphur Galvanized 16.01 Slee | Fibreglass Plastic Concrete recommended pump deption netre Mineral Galvenized Other Recommended pur 1769 10 10.48 Screen Fresh Sulphui 10 _ m Outside Steel Floreglas Skal No. Plastic Concrete (litres/min) Galvanized Il pumping disconin ued, pho reason. OMPENTED No Casing or Screen 73.15 Open hole 17,68 Chlorinated 22 es Plugging and Scaling Record Annular space Abandonment Location of Well Dooth set at - Motres Volumo Places In diagram below show distances of well from road, lot line, and buildings indicate north by arrow. Material and type (benionite slurry, neat cement slurry) etc 17,68 (cubic matres) 4086 Old Marties Method of Construction Diamond Cable Tool Rolary (air) Digging Rotary (conventional) Jetting Br percussion Other Rotary (reverse) Boring Driving Water Use Domestic Public Supply Industrial
Commercial Other Stock Irrigation Municipal Cooling & air conditioning 55562 Z Final Status of Well Unfinished Water Supply Recharge well Abandoned, (Other Was the well owner's infor Abandoned, insufficient supply Observation wall Dewatering package delivered? Abandoned, poor quality Replacement wel Ministry Use Only Well Contractor/Technician Information Data Source FEB 1 2 700/ L DO Date of inspection ICHMONE OA 270 ell Technician's Licence No Well Record Number (2122 TOB

MINISTRY OF THE ENVIRONMENT Cty 56 Thurso
The Ontario Water Resources Act WELL 1513931 1. PRINT ONLY IN SPACES PROVIDED

2. CHECK
CORRECT BOX WHERE APPLICABLE COUNTY OR DISTRICT TOWNSHIP, BOROUGH, CITY, TOWN, VIL (AGE Carleton Cumberland 16 1<u>2</u>16 LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS) MOST OTHER MATERIALS GENERAL COLOUR GENERAL DESCRIPTION COMMON MATERIAL clay & bolders 5 0 grey prown shale 15 15 125 limestone grey 32 SIZE(S) OF OPENING 41 WATER RECORD **(51) CASING & OPEN HOLE RECORD** DEPTH - FEET WATER FOUND AT - FEET KIND OF WATER WALL THICKNESS INCHES MATERIAL DEPTH TO TO OF SCREEN FROM FRESH 3 SULPHUR 2 SALTY 4 MINERAL I STEEL 188 6022 () **12**5 3 CONCRETE 1 FRESH 3 SULPHUR
2 SALTY 4 MINERAL 61 **PLUGGING & SEALING RECORD** 4 | OPEN HOLE DEPTH SET AT - FEET 1 | STEEL 3 SULPHUR 2 SALTY 06 CONCRETE
OPEN HOLE 0125 1 | FRESH 3 | SULPHUR
2 | SALTY 4 | MINERAL 1 STEEL 2 GALVANIZED 1 | FRESH 3 | SULPHUR
2 | SALTY 4 | MINERAL 30-33 CONCRETE 4 T OPEN HOLE LOCATION OF WELL Z | BAILER IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW. PUMPING
PECOVERY STATIC LEVEL WATER LEVELS DURING 1 30 MINUTES 2 CLOUDY RECOMMENDED PUMP TYPE SHALLOW DEEP FEET GPM **60** O50 50-53 001.8 WATER SUPPLY S ABANDONED, INSUFFICIENT SUPPLY FINAL OBSERVATION WELL ABANDONED, POOR QUALITY **STATUS** 7 UNFINISHED OF WELL ▲ □ RECHARGE WELL 1 DOMESTIC 2 STOCK 5 COMMERCIAL WATER O ☐ IRRIGATION 7 T PUBLIC SUPPLY INDUSTRIAL 8 | COOLING OR AIR CONDITIONING ☐ OTHER 9 D NOT USED 6 D BORING
7 DIAMOND
B DIETTING ☐ CABLE TOOL METHOD , 2 ROTARY (CONVENTIONAL)
3 ROTARY (REVERSE) OF 4 ROTARY (AIR)
5 AIR PERCUSSION DRILLING 9 | DRIVING DRILLERS REMARKS 80374 Charbonneau, Diamond & Cable Drill DATE OF OFFICE USE R. R. 2, Box 194, Orleans, Ontario LICENCE NUMBER REMARKS Leo Bourgeois MINISTRY OF THE ENVIRONMENT COPY

	inistry of Well Ta	g Number (<u> </u>	.1611	7 1534816	Well R	ecord
	e Environment	0048		The state of the s	Regulation 903 Ontari	o Water Res	
• For use in the Province of	Ontario only. This docum	ent is a perma	nent legal			ence.	
 All Sections must be comp Questions regarding compl All metre measurements 	leting this application can b	oe directed to the					this form.
Please print clearly in blue Well Owner's Information as	or black ink only.		MUN / K	O// co	Ministry Use Only	O I LOT	
Ottawa Ca	in letoñ		um	ber la	nd 25	/	
	Date al Re Easting Nort	<u>ا ا</u>	ity/Town/Vil LLY nit Make/Mo	1 Der 10	Site/Compartment/le of Operation: Undifferentiate		<u> </u>
GPS Reading NAD Zone 813 S Log of Overburden and Bed		038871	mao		Differentiated,		
General Colour Most common ma	aterial Other Ma	aterials		Genera	I Description	Depth From	Metres To
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Hole Diameter	Cons	truction Record	d			ll Yield De	
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0 73.1 14.91		Casing			Pump intake set at - Static (metres) 55 Level	0-8	00.00
	Steel Fibreglass Plastic Concrete Galvanized	.48	0	6.7	(litres/min) 45	3.41 2	39.33
Water found at Metres Kind of Water	Galvanized Steel Fibreglass	, ,		6. L	hrs + min	4.06 3	38.68
Fresh Sulphur Salty Minerals	Plastic Concrete Galvanized				of pumping 5 metres Recommended pump 4 3		38.51
Gas Salty Moerals	Steel Fibreglass Plastic Concrete				Shallow Deep	5.02 5	38.30
Other: Fresh Sulphur	Galvanized	Screen			depth. 7 metres Recommended pump 10 3	6.54 10	
Other:	Outside diam Steel Fibreglass	Slot No.			If flowing give rate - 20 3	8.47 20	37.85
After test of well yield, water was Clear and sediment free Other, specify	Galvanized	asing or Scree			(litres/min) 25 3 If pumping discontinued, give reason. 40	99.0625 99.4430 40	37.50
Chlorinated Yes No	> pen hole		ا مط	73.1	50 4	5.87 50	37.19
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From To Waterial and type ((bentonite slurry, neat cement slurry	etc. (cubic m	netres)	Indicate north by		reld	ilidii ig.
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	`.				1 IKM	· • • • • • • • • • • • • • • • • • • •	
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☐ Cable Tool ☐ Rotary (air ☐ Rotary (conventional)	ssion Jetting		Digging Other		₩ -1	CO.	~a.
Rotary (reverse) Boring Domestic Industrial	☐ Driving Water Use ☐ Public Supp		Other				
Stock Commerci	ial Not used		Miler	Test Audit No. 7	0.401 0 Date Well C		MM . DE
☐ Water Supply ☐ Recharge well		Abandone	ed, (Other)		vner's information		MM DD
Test Hole Abandoned, po	sufficient supply Dewatering Devatering Replaceme actor/Technician Information	nt well		package delivere	Ministry Use Only		
Name of Well Contractor	We latted "	'ell Contractor's Lice	ence No.	Data Source	Contractor	111	9
	mond, On	/ell_Technician's Lic	ence Ne	Date Received	2 1 2004 Date of Insper		MM DD
Name of Well Technician (last name, first	11/10/1	Talla	- . ·	Remarks		5348	16
x Kanaa	2	2004 LI		er's Copy 🔲	Cette formule e		

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United Control Service	County/District/Municipality (City/Towns/Jillinge	Province Postal Code
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Construction Cons		Results of Well Yield Testing 1 4 4 4 4 4
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During Clark and Company in Touring Control (Construction Records - Scroon Construction Records - Scroon Records -	Other specify (1) Other, specify	It stored died into the interior
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Construction Record - Scroen Constr	15.23 Cpen La Q 9.14 152.39 O Observation involve Mondaying Holes	Well production itemin (GPM)
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Ministry of the Environment

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

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Regula	ation 903 Ontario	o Water R	esources Act

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General C			mon Materia			rd (see instructi er Materials	ions on the	back of this form) Ge	neral Description	 1		De _l From	pth (<i>m/ft)</i>
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Gray		Lim	estone		Co	loured La	yers	Me	dium			151.7	8 155.4
			Annula	r Space					Results of W	ell Yie	d Testing]	
Depth S From	et at (<i>m/ft</i>) To	25, 255, 1, 1	Type of Se (Material a	ealant Used and Type)		Volume P (m³/ft		After test of well yiel		Time	aw Down Water Lev		Recovery Water Level
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								range alocalism	acci, givo roccon.	Level 1	16.7		76 20
								Pump intake set at	(m/ft)	2	18.80	J	76.20 75.09
B# 44	had af Ca				Well Us			91.43 Pumping rate (I/mir	o / GPM)	3	19.80		74.38
Cable T	ool	nstruction Diamon			Comme	rcial 🔲 No	ot used	13.65 Duration of pumpir	ın	4	20.50		73.88
Rotary (Conventional Reverse)	☐ Driving	□ Li	omestic vestock	☐ Municipa	le 🔲 Mi	watering onitoring	1 hrs + 20	min	5	20.9	4 5	73.28
☐ Boring Air perce		Digging	□ In	igation dustrial	☐ Cooling	& Air Conditionir	1g	Final water level end	f of pumping <i>(m/ft)</i>	10	23.90		71.53
Other, s		nstruction F		ther, specify		Status of	Well	If flowing give rate	(I/min / GPM)	15	26.7		69.37
Inside Diameter	Open Hole	e OR Material ed, Fibreglass,	Wall Thickness	Dept	h (<i>m/ft</i>)	Water Sup	ply	Recommended pu	mp depth (m/ft)	20	29.40		66.70
(cm/in)	Concrete,	Plastic, Šteel)	(cm/in)	From	То	Test Hole		91.43 Recommended pu	mp rate	30	32.9	0.0	65.35
15.86	Stee1	L	.48	+ .45	6.40	Dewatering Observation	g Well	(I/min / GPM) 13.65		40	35. 39.		63.55 59.85
			1			Monitoring Alteration		Well production (l/r	nin / GPM)	50			57.09
			-			(Construct		Disinfected? Yes No		60	47 10	60	54 25
	Co	onstruction F	Record - Scr	1		Insufficient Abandone	d, Poor	Please provide a ma	Map of W		ation		
Outside Diameter (cm/in)	(Plastic, Ga	aterial Ivanized, Steel)	Slot No.	Dept From	n (<i>m/ft)</i> To	Water Qua Abandone specify	- 1	riease provide a ma	ap below following	II ISII UCI	ons on the	Dack.	,
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						Other, spe	city	1#161	t 1			•	
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	lame of Well 1 Water		Ltd.		We	Il Contractor's Lic	ence No.						9
		Supply et Number/N	ame)			nicipality		Comments:					
P.O. B Province	į.	ostal Code		s E-mail Add	dress	Stittsvil	те						
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Ministry of the Environment

Well Record
Regulation 903 Ontario Water Resources Act

page ___ of ___

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Well Tag Nt	A 038772	skow)
	420000	

Instructions for Completing Form

Questions	regardi	ng complet	all he re	ported to 1/10" o	f a metre.			se retain for future explanations are available to Coordinator at 41			
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Owner's	Inform	nation and	Location	on of Well Inform	iation (
						-1-1-		Lot -	,	Concession	
ess of Well	Location	(County/Dis	trict/Munic	apality)	Town	· march	berlang	1 42	0	<u> </u>)C
Street Num		Ham			Ci	ty/Town/Villag	orland	She/Compar		82	
292	Jul	· /19	Easting	Northin		nit Make/Mod	Mode (of Operation: [] Undit	Terentiated	- Inva	raged -
Reading	NAC 81	. 11/27	14.6.6	31413 F 51013	99.28	Mazel	kas u	Differ			14-1
	burder	and Bedi	ock Mai	erials (see instri	rials		General	Description	3	Depth From	Metres
ensi Colour	_	common ma	(5)(0)					SOXX		0	1280
Rey_	Sa	ve	0				19	rend		0.60	14 40
res_	112	12)						6	1000		
0	* 1		1	33	56		- K 3/		-		
						1				-	
1	3 3 3	1	-				32	34-3484	1-71-34		H
								17 -4	-		
		71		Cons	truction Reco	ord				V Down	Recovery
	Diamet	Diameter	inside	1115	Wall	Depth	Motres	Pumping last method	Time V	Vater Level Til	me Water Lev
From	То	Centimetres	dlam	Material	thickness centimetres	From	То	Fump Intake set at -	min Static		in Motros
	2.80	2733	Q1011040		Casing			(metrus) 20	Lavel 1	960	1 27.13
2.80 1	7.00	1555		Steel Fibreglass		+060	1221	(litres/min) 10			2 24.00
1	S 1		15.53	Plastic Concrete	0.48	1 060	13.89	Duration of pumping	<u>`2</u>		2 74.00
Wat later found Metres	er Reco	rd of Water		Size Fibregius				Final water level end	3		3 2370
20 m	Fresh	Sulphur		Pleastic Concrete				Recommended puri	P 4	- 1	4 23.49
Gas Cher. —] Salty	Minerala						type. Shallow @ De		12.10	5 27.7
	Fresh	Sulphur Minerals		Plastic Concrete	1.0			Recommended puri depth. 120 metr	es		
Other: -				Galvanized	Screen			Recommended puri rate. (likres/min)	Ψ 10		10 223
ijm ∏Gas	Fresh	Sulphur Minerals	Outside	[*]Steel [*]Fibregles				(litres/min) If flowing give rate	15 20	15.40	20 20, 2
Other: -			diam	Pleatic Concrete		1		(litres/min)	25	1734	25 19 90 30 19 2
After lust of v	well yield. d sedimer	water was		Gelyunized	0-4		1	If pumping discontinued, give reason.	40	19.70	40 18.5
Other, sp					Casing or Si		100-	<u> </u>	50	2242	50 /4.0
Chlorinated	Yes	□No /	<u> </u>	Cipen hole		12.80	1280			0.132	91
	Plug	ging and S	ealing Re			Abandonment ume Placed	n disoram be	Location distances of w	all from re	and, lot line, a	nd building
Depth set at	- Metrus To	Material and to	pa (bentoni	e slurry, neat cement slu	rry) enc. (ca	ibic metres)	indicate norti	by arrow.		5	Voric
Ö	2.80	Com	2	grow	6	bags	520	1		les Les	
	-			/] [~	Tul	es 1	
		a -				E.	11		رب	3	عر
							11 /	90M	210	99	
				of Construction	d	Digging	11 "			Spir.	
Cable To	ool conventio	ØRoter nel) ∐Airpo	y (air) srcusaion	Jetting	-	Other	11 ha	4			
Rotary (□Borln		Driving			<u> </u>				
5 Domesti	ic	Indu	irial	Public 8		Cither	_	100	- A-2-12	al Complete	100
Stock		☐ Com	cipal		a sir conditionis	ng	Audit No.	51952		ell Completed	ا وقط ع
			Final	Status of Well Unfinish	hed [] Ab	andoned, (Olhe	r) Was the w	ell owner's information		elivered .	למ צ
Weler S	Supply ation well	Recharge Abandon	ed, insuffick	ent supply 🔲 Dewate			package do				
Test H		Abandon Well C	ed, poor qui ontractor	Technician Inform	netion	min limbon kin	Data Sour		y Usa C	ictor •	114
Name of V	/ell Contr		0 5	00L	Well Coglined	or Licence No	·		Date	Inspection	**** ***
Business	Address (treet name, m	In by Ty	atc) Q	N.	1	Dale Rece				
		ician (last nan	ne, first nam	(a)		lan's Licence No			Well F	Record Numbe)F
	Jan Tank								1		
Name of 1	5.7	cien/Contra	<u> </u>		O -//		. []		Ì	mule est disp	

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Well Record

Regulation 903 Ontario Water Resources Act

Page / of 3

Address of Well Location (Street Num	Wawier- Dr	Township	Lot 12	Concess	ion
\$1301-60v5e5	VANIER- UV	City/Town/Village	ind. 13	Province	Postal Code
OTTAWH-Cit	×	Municipal Plan and Subl	land.	Ontario	KYCIEI
UTM Coordinates Zone Easting	Northing		ot Number	Other	
NAD 8 3 / F 9 6 6 5 Overburden and Bedrock Materia	1 1 0 5 0 3 P P 7			D. O. D. LEWIS CO.	BANGE VENEZIO
General Colour Most Comm		Other Materials	General Description	1	Depth (m/ft) From To
Grey Line.	stowe.				0 150.15
or y himself	, , , , ,				
santaminan ang atawa	Annular Space		Results of W	ell Yield Testin	ng
Depth Set at (m/ft)	Type of Sealant Used	Volume Placed	After test of well yield, water was:	Time Water Le	Recovery evel Time Water Level
	(Material and Type)	(m³/ft³)	Clear and sand free	(min) (m/ft)	
10.60 1.51 Cem	ent buils	200Kg.	If pumping discontinued, give reason.	Static 9,00	7 48.93
				1 13.5	2 1 112 111
			Pump intake set at (m/ft)	1	
			70.90	2/6,0	10112
Method of Construction	Wi	ell Use	Pumping rate (Vmin / GPM)	3 18.0	2 3 45,09
Cable Tool Diamond		ommercial Not used	Duration of pumping	4 19,2	7 4 44,15
Rotary (Conventional) Jetting Rotary (Reverse) A IR Driving		unicipal Dewatering est Hole Monitoring	/ hrs + OD min	5 21.4	2 5 43,18
Boring Digging		ooling & Air Conditioning	Final water level end of pumping (m/li	10 18	
Air percussion	☐ Industrial		48.93	00,0	1 11101
Other, specify	Other, specify	Status of Well	If flowing give rate (Vmin / GPM)	15 29,6	0 15 39.23
Inside Open Hole OR Material	Wall Depth (m/ft)		Recommended pump depth (m/ft)	20 32,0	1 20 37,40
Diameter (Galvanized, Fibreglass, (cm/in) Concrete, Plastic, Steel)	Thickness (cm/in) From T	Replacement Well	134,84	25 35/7	9 25 35,58
	+	Test Hole Recharge Well	Recommended pump rate (Vmin / GPM)	30 37.9	72 30 34.00
15,86 Steel	178 101 13	Dewatering Well	22.50	40 40.0	1 40 32,96
		Observation and/or Monitoring Hole	Well production (l/min / GPM)	1010	0.0
		Alteration (Construction)	Disinfected?	50 94,4	2 50 29,01
		Abandoned,	Yes No	60 /8,9	73 60 27.11
Construction Re	ecord - Screen	Insufficient Supply Abandoned, Poor		Vell Location	
Outside Diameter (Plastic, Galvanized, Steel)	Slot No. Depth (m/ft)	Abandoned other	Please provide a map below followin	g instructions on t	he back.
(cm/in) (Flasuc, Galivariized, Steeli)	From 1	specify specify	L. S.		
		Other, specify	1	4	5metre
			2 4=	7 9	7
Water Det	ails	Hole Diameter	3	1	
Water found at Depth Kind of Water	F	Depth (m/ft) Diameter rom To (cm/in)	l v	el/	
Water found at Depth Kind of Water	ecity	0.60 15,86	Z Z	B	
3/, 2/ (m/ft) Gas Other, spe	olf.		17 9		
Water found at Depth Kind of Water	1/1	60 150.1515,5	3	.,,	7
(m/ft) Gas Other, spe	cify			WILL	Aven Ro
Well Contractor Business Name of Well Contractor	or and Well Technician Info	ormation Well Contractor's Licence_No.	W.		
DXR-WATER-W	-11- Dai 1/2	6006	1		
Business Address (Street Number/Na	ime)	Municipality	Comments:		
1763 - Koute		WATION			
Province Postal Code	Business E-mail Address		Well owner's Date Package Delive	red Mi	inistry Use Only
Bus.Telephone No. (inc. area code) Na	ame of Well Technician (Last N	lame, First Name)	information package 2 0 0 0 4	Audit N	
4139875598	Desnoyen	5 Louis	delivered Date Work Complete	d	2099/42
Well Technician's Licence No. Signature	of Technician and or Contrac	tor Date Submitted	No 2010 04	12	MAY D 6 2010
0506E (12/2007)	elles / longer	Ministry's Cop		© Qu	een's Printer for Ontario, 2007

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G Domerous Provident for Circlains (200)

A076804 A076804 Page Measurements recorded in; X1 Metric [] Imperial Well Owner's Information Concession Well Location Address of Well Location (Steam Number Name) 23 Province 10 Postal Code Cumberland Lot 14 Camelot Estates ___ -Ontario County/District/Municus Cumberland

Municipal Pian and Suploi Number Other Ottawa Carleton
utM Coordinates | Zone | Easting | Northing NAD | 8 | 3 | 1 | 8 | 4 | 6 | 5 | 2 | 0 | 3 | 5 | 0 | 3 | 8 | 5 | 5 | 6 Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this furn) Depth (mit) General Description Cimer Materials Most Common Material 0 1.82 General Colour Packed Stones . 1.82 77.72 Clay Brown Med i um Light Colours 77.72 91.43 Limestone Gray Dark Layers Limestone Gray Results of Well, Yield Testing Draw Down Annular Space After test of well yield, writer was. Water Level Time | Whiter Level Vulumo Placed Time ypu of Sustant Used (X Cluar and sand free Depm Set at (71/2) (117/111) (mm) (Material and Type) Other, specify To $21 \,\mathrm{m}^3$ If pumping discontinued, give reason 22.10 O Grouted Cement Slurry 24,06 34.10 33,15 Pump letake set at (n)/8) 2 25.55 83.81 32.44 26.36 Pumping rate (I/min / GPM) 31.62 27.27 Well Use 31.85 Method of Construction [7] Flot issed [7] Dewntening Communical Duration of pultipling FTI Public 27.89 30.94 Duamond 2 hrs + 30 min Municipal
Lest Hole X DUTHERIN C Rotary (Conventional) Desire ET Montoring Final water eyel and of pumping (byt) T LIVERKY, 10 28.77 10 30 X Rolling (Reverse) Air Covern Circling & Air Conditioning - Impath [Diggstig 36.43 Ladustrial 15 Boring 27,41 15 31.20 If bowing give rate What I GPMI) X An vertice Other Guide 32.07 20 20 26,82 Status of Well Construction Record - Casing Recommended pump depth (mill) Water Supply 32.80 75 € 26.31 Open Holn OR Mideral Trucionali (previo) Replacement Well 60,95 Galvanized, Fibrigatos Concrete, Frantici, Steal) Fracts Io Rucommonded nump rate (Misin / GPM) 30 Dankti Test Hole 30 33.25 25.97 (orrule) Rechargo Well 6.4 .48 4.45 40 34.01 25.48 Dewatening Well 31.85 40 15.86 Steel Well production (Imme / GPM) Observation antifor 50 50 25,18 34.53 Monitoring Hole Allemann . 00 25.02 60 (Construction) 34.98 X Yes Abandoned Insufficient Supply Map of Well Location Presser provide a may below following restrictions on the tierk Atsingeried Poor Construction Record - Screen Water Quality Durch (95%) Material Plants, General Sterili Abundoned other Dutside SDECITE Dumons (cinven) ACA Other apriory «Camedo Hole Diameter Water Details Water found at Depth Kind of Water - Frosh X Unteskid From 86.86m86.38as Other specify 15.86 6.4 0 Water and at Death Kind of Water Fresh Untested 20 83,81 15,23 gisto Gas Other specify Water Sund at Death Kind of Water Fresh Untested 91,43 83.81 1 LOT 14 first() Gas Other speedy Well Contractor and Well Technician Information Wall Contractor's Lightney No Business Name of West Contractor 1 5 5 8 Capital Water Supply Ltd. Busness Aggress (Street N. Homese Narre) Comments Municipality Stittsville Box 490 Ministry Use Only Business Elenal Address Postal Code Date Package Detvered Province intomatical office P capitalwater.ca K2S 1A6 ž 095333 Bus Texaphone No. Inc. mon Date, Name of Well Technician (Last Name, First Name) Ontario 20090320 packing o 6 1 3 8 3 6 1 7 6 6 Miller, Stephen
Verd Tuckherung Kuranter No. Sephatur ed Tuckherung nedfor Contractor Contractor Onto Submitter

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Minist Date Work Completed APR 0 6 2009 X Yus 2009031

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Measurements recorded in: Metric

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Ministry of the Environment

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Well Tag No. (A 066502

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Regulation 903 Ontario Water Re

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Address of Well Location (Street Number/Name) ### Arthur	Camber	land 23	Concess	1	
Ottawa Carleton	City/Town/Village	el arad	Ontario	Postal Co	de
UTM Coordinates Zone Easting Northing	Municipal Plan and Sublo	ot Number S/L 7	Other		
NAD 8 3 18 16 20 30 30 00 00 00 00 00 00 00 00 00 00 00	ard (eas instructions on the		C0001915301553	RECEIVED IN	130000011
	ther Materials	General Description	1	Depth (r	m/ft) To
Green Class				0	3,05
Bleedil Gross & Brown	Lineston	0		3.051	523
Jan Jan Jan Jan Jan Jan Jan Jan Jan Jan					
Annular Space			ell Yield Testin		Litte
Depth Set at (m/ft) Type of Sealant Used From To (Material and Type)	Volume Placed	After test of well yield, water was:		evel Time Wa	iter Level
9,14 O Neat Cement Slur	ray =2124	Other, special S (E)	(min) (m/ft)	(min)	(m/ft)
	/	If sumping discontinued, give reason:	Level	0 91	4:00
		Pump intake set at (m/ft),	1,8,6	9 1 2	() J.
		91.44	2, 9,3	7 2 12	21,000
Method of Construction Well U	lse	Pumping rate (Vmin / GPM)	310.0	3 3	4.11
☐ Cable Tool ☐ Diamond ☐ Rublic ☐ Comm ☐ Rotary (Conventional) ☐ Jetting ☐ Domestic ☐ Munici		Duration of pumping	4 10.	9 4 3	0.90
Rotary (Reverse) Driving Livestock Test H	Hole Monitoring	hrs + min	5 11.4	8 5 3	8.75
Air percussion Industrial	ng & Air Conditioning	Final water level end of pumping (m/ft)	10 15.8	10 3	1.84
Other, specify Other, specify	0	If flowing give rate (l/min-/ GPM)	15 19.3	4 15 3	7.04
Construction Record - Casing Inside Open Hole OR Material Wall Depth (m/ft)	Status of Well Water Supply	Recommended pump death (6v/ft)	20 22.8	30 20 3	6.25
Diameter (Galvanized, Fibreglass, Com/in) Concrete, Plastic, Steel) (cm/in) From To	Replacement Well Test Hole	193,98	25 25.5	25 3	545
15.80 Steel 1 .40 +6 9.14	Recharge Well	Recommended pump rate (I/min / GPM)	30 521.	30	
23 Openholo 9.14 1523	Dewatering Well Observation and/or	Well production (Vmin (GPM)	40 35.2	40)
	Monitoring Hole Alteration	Disigfected?	50 40 F	70 50	1
	(Construction) Abandoned,	Yes No	60 445	60	W
Construction Record - Screen	Insufficient Supply Abandoned, Poor		ell Location		
Outside Material Diameter (Plastic Galvanized, Steel) Slot No. From To	Water Quality Abandoned, other,	Please provide a map below following	instructions on th	ne back.	
(cmvin) (Figure 1250, CCC) From 16	specify			001	
	Other, specify	old W	Contrea	Q12a	_
Water Details	Hole Diameter	000	1		
	epth (m/ft) Diameter		11		
Water found at Depth Kind of Water: Fresh Untested	152.39 15,23		11 kin	a aut	hur
(m/ft) Gas Other, specify	12231 1270		11/2	0	
Water found at Depth Kind of Water: Fresh Untested		8 8	3 1/		
(m/ft) Gas Other, specify Well Contractor and Well Technician Inform	ation	(C)	1 5		
	Well Contractor's Licence No.	4/11/1	* / (-11.	
Business Address (Street Number/Name)	Municipality /	Comments:	ng Ar	thur	
YZIZ	Kichmond				
Province Postal Gode Business E-mail Address	4	Well owner's Date Package Deliver	ed Mi	nistry Use O	nly
Bus. Telephone No line, area code. Name of Well Technician (Last Name	First Name)	information package 2009 06	Audit No	0.7	A PARTY OF
Well Technician's Livence No. Signature of Technician and/or Contractor D	and Supported	delivered Date Work Completed		- 808	003
T 3 1 8 Cl Signature of Leconician and/or Contractor D	ROPOLE	1 = 2008 106	6 AUG	1 4 2008	

Well Record
Regulation 903 Ontario Water Resources Act

page ___ of ___

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A043	496

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

All metre measurements	eting this application can be shall be reported to 1/10th of or black ink only.		r Well Managem	Ministry use Chry	LOT
ell Owner's Information a	nd Location of Well Infor	nation	CO	مه د د د د د د د د د د د د د	
					Garagestan
ress pt. Well Location (County/)	istrict/Municipality)	Township	berlan	nd 100 23	Concession
() throws -	arleten	City/Town/	Village	Sile/Compariment	Block/Tract etc.
Street Number/Name	Figuring Northing	T COT Unit Make	Model Mode	of Operation: Undifferente	
Roading NAD Zone	465113250		apellon	Differentials	1, specify
	drock Materials (see instr	uctions)	Genera	Description	Depth Metres
eral Colour Most common n	Mietria Chief III				0 0.46
	Black	linesto	ne.		0,46 103.6
	4 - 25				
				(%) X0	
	Cons	truction Record		Test of V	Vell Yield
Hole Diameter Depth Metres Diameter	Inside	Wall Depti	Metres		Water Level Time Water Level
From To Centimetres	diam Material	thickness From	То	Dubkumt Imin	Metres min Metres
0363 1501	centimetres	Casing		Pump loteke et a Static (metres) Leve	
	Steel Fibregiess		21	Pumping sets 7 [1	370 1 530
		,48 p	7.31	Duration of pumping 2	4, 50 2 4,40
Water Record	Guivanized Steel Fibregiass			hrs + O min Final water level end 3	C 02 3 13 50
Metres	Plantic Concrete			of pushping Smalres	
CPC. 3994 U I MIDELENE	Gelvanized		7.	Recommended pump 4	5,60 4 1050
Other Sulphur	Steel Fibreglass	1		Recommended-perion 5	615 5 1180
Ges Sally Minerals	Plastic Concrete			der metres	235 10 88
Other: Sulphur		Screen		rate (in samin) 15	7 80 15 7,00
Gas Salty Minerals	diam Linux	Sict No.		If flowing give tale . 20	
mer that of well yield water was	Plastic Concrete	0		(litres/min) 25 If pumping discoulingued, give moran. 4r	1250 30 4.01
Cost and leading in Lings OT		Casing or Screen		_\	
Other, specific	Openhole	67	1 103.6	3 3	
Chlorinated Gree No	JL/~	der space		Location of V	Vell
Plugging and \$	Senting Record (Ashnuty) type (bantonite sturry, neat coment stu	Volume Place	d in diagram be	low show distances of well from	road, for line, and building.
		(cubic metres	2 Indicate Hote	Montreal to	ad (C)
671 O Nec	et Cenat Slu	7	ald lie	Montre	-
				1	± (81
					#181 King Arthur
	1/4		AYN AYN	160'	F 7 1
Cable Tool Rote	Method of Construction	Diggin			> Hithur
Rotary (conventional)	percussion	Diggin	[.]	X	
Rotary (reverse) Boris	Mater Use		<u> </u>		'
Damestic Indu	stnat Public S				*
T Stock ☐ Con ☐ Irrigation ☐ Mun		& air conditioning	Audit No.	48602 Date	000 C 000
	Final Status of Well	ed Abandoned, (Il owner's iglometion Date	Son 6 030
Water Supply Recharge Observation well Abandor	ned, insufficient supply Dewater	ring	package de		
C Abendor	ned, poor quality Replace Contractor/Technician Inform	otion	No. Data Source	Ministry Use Cont	Only ractor 1119
Name of Well Contractor	211102/-170	Well Contractor Licence	No. Uses Source		1119
Gundred Aridrona (street)mame, m	CILLIVO COLL	KOAOZ	Date Recei	1 1 1 2005 Dele	of Inapaction yyyy MM D
		Mail Technician er fice of	- 11 - 1		Record Number
Name of Wei Technicien flast ne	C SHANNON	Deta Submitted	<u> </u>		
Signature of Technician Gentralia	> >	000607	27	Catte for	rmule est disponible en franç
0506E (09/03)	Contractor's Copy	Ministry's Copy	Vell Owner's Copy	الما الما الما	

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Ministry of the Environment

Well Tag No. (Piace Sticker and/or Print Selow)

Well Record

*stion 903 Ontario Water Resources Act

A076803 A076803 Measurements recorded in: [XMetric | [] Imperial Well Owner's Information Well Location Township Province 10 Postal Code Address of Weil Location (Street Number/Name) Cumberland. Lot 15 Camelot Ontario County/District/Municipality Cumber land Municipal Plan and Sublot Number Other Ottawa Carleton
UTM Coordinates 2 Per Easting
Northing
NAO 8.31 8 4 6 5 1 17 9 5 0 3 8 6 0 8 Overburden and Bedrock Materials/Abandonment Sealing Record (see Instructions on the back of this form) Decemberry General Description Other Materials Most Common Material 3.65 German Colour Packed. 3.65 79.24 Clay ___ Medium Brown Light Colours 79.24, 93.26 Limestone Gray Medium Dark Layer Limestone Gray Results of Well Yield Testing Recovery Draw Down After less of well yield, writer was Timo Water Level Time Witter Level Volume Placed Type of Sestam Used (Material and Type) Clear and sand free WWT. Directly Set at (mint) (m\n2.) lu/h) privat! STATIC .21m3 18.29 it pumping discontinued, give revisor). O Grouted Cement 48.57 18.39 Pump intain set at (mill) 2 47.96 18.80 83.81 19.21 47,37 Pumping rate (thmin / GPM) Well Use 18.2 19.66. Method of Construction [] Not used] Commercial Duration of numbing Public C) Diamont 46.19. Dewalering 19.98 2 hrs * רווריי T Domestic Municipal Ratin's (Consuntional) Monitoring Test Hole Monit
Cooling & Air Conditioning Final writer level end of pumping (m/ll) 10 43.45 Livestock 10 C Driving 23.49 X Reduy (Rove 5t1 D tragation Digging 50.69 □ Boring 15 40.57 []] Industrial 15 27.03 Il flowing give rate (brain / GPM) [] Ar perpussion Other, spendy Other, specify 38.64 20 29,68 Status of Well: Construction Record - Casing 1973 Recommended pump depth (multi) (X Water Surply Depth (m/t) 25 32,15 36.84 Open Hale OR Material (Galvanized, Fibroglass, Curcretts, Plastic, Steet) Risplacoment Well 68.57 Enickness From Darnolo Test tysle Recommended bump rate 30 35.03 (cinera) 30 34.79 (cm/n) Techninga Well (Small GPM) 6.4 +.45 38.12 40 32.26 .48 Dewatering Wall -18.2040 Steel 15.86 Wes production (time) GPM) Observation and te 50 41.19 50 30.07 Montening Hour Alteration Disinfikkled? 43.59 60 28.89 (Construction) 60 XI Yes ... No [7] Abundamed. Map of Well Location inpurficient Supply Please provide a map below following instructions on the buch Abandoned Poor Construction Record - Screen Water Ouolity Depth Intiti Custom Ab indoned, other, From (Plastic, Galvanunid, Steril) ερεαίγ Char, specify Holo Diameter Water Details Diagnotes Water toesed at #epth Kind of Water: |] Fresh X Uninsted Depth (m/fl) (c/mien) Water found in survey of Water Fresh 6.4 15.86 0 Water found at Depth Kind of Water (natt) Gas Joiner, spendy Water bound at Doubth Kind of Water Fresh Unitested 83.81 15.23 6.4 83.81 93.26 14.75 (m/tt) Gas Diher, specify Well Contractor and Well Technician Information VANI Contractor a Licanos No Business Name of Wolf Contractor 1 5 5 8 Capital Water Supply Ltd. Commissions Municipality Business Address (Street Number/Mane) Stittsville Box 490 Ministry Use Only Business E-mail Address Poster Code Date Philings Delivered Province Well owns I > K2S 1 A6 office@capitalwater.ca z 095334 eformation Bus Triesprone No. (etc., wee code) Name of Wes Technique (Last Manie, First Name) 20090320 Ontario package delivered Date Work Completed Successed APR 0 6 2009

XYes No

20090314

Well Tag No. (Place Sticker under Port Below)

A068294 A 068294

Well Record tion 903 Ontario Water Resources Act

Measurements recorded in: 1½ Metric | Imperial

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Vell Owner's	Information	1.						
						Cancussio	n	
Vell Location	n Location (Street Number)	Same)	Town		10		BF	and .
	les Leger Dr.		City/T	umberland ewoVillage	prox fat-in	Ontario	Postal C	Depa
Arraus	Carleton	Nothing	C	umberland Lipat Plan and Subjoi t	4เมาซอก	Other		
UTM Coordinate	S Zone Easting	500070						
Overburden a	ind Bedrock Materials/A	bandonment Seal	Other for	sea instructions on the Re Autorials	General Description		From	10
General Colou	Limeston	D	rk, bay	ers.	. Medium Hard		6)	76.19
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and the second s	ogamen il como pinne arabattetta patom. Tära man uga en amil							
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					-Booker de	-presentation of presentation	sergent de	
		1				Inti Viola Tacti	na	
		Annular Space	1	Volume Placed	After test of well yield, water was:	Onw Dow	n i n	ecovery Water Leve
Depth Set /		pe of Sealant Used lateral and Typo)	E,	(m)(tt)	[V] Clear and sand free	Time Water L (near) Ind	- 1	Intel
6.40	0 Grouted	Bentonite	Slurg	y .110m3	If pumping discontinued, give reason	State 2.2	2	
	er g sennylodd einian i glotosgannadrilla. Han sledges in raddif e a	Brojinstone (Brit Chaldhalle) and a school need-do less				1 3.8		3.46
apulated I see y					Pump intake set at (mill) 60 - 95	2 4.	3 2	2.76
			1 101-11 1100		Pumping rate (rimin / GPH)	1 3 4.		2.55
The second secon	od of Construction	[] Public	Well Use	and ["] Not used	54 , 6 . Duration of pumping	4 4.8		2.48
Cable Too	onventional) D Jetting	XI Domestic	[]] Municipă []] Test Hole	[]] Morstaning	1 hrs + min Final water level end of pumping (*)	5 4.	9.0	2.44
Rotary (Ri	T Digging	Imgalion Industrial	[] Casking 8	CAir Conditioning	5 22	.,,	14 =	2.36 .
X Air percus	each;	Oner steem	1 -	Status of Well	It flowing gray rate (Final / GPED)	15 5.		i
	Construction Re-	Ord - Casing (14)	otn (nvft)	1 F Yoylater Souply	Recommended pump depth (n/f	25 5	t hamps on	
(Semigration	(Galvanized, Fibreglass, Cancrete, Physic, Steeli	Thickness From	To	C Replacement Well	22.85 Recommunded pump rate	30 5	1.20	
15.86	Steel	.48 +2.7	4 6.40	Dewatenna Well	(mim / GPM) 4.5 - 5	40 5		
				Coservation under Monitoring Hule	Well production (knim / GPM)	Abres merma characteristics	22 50	
			p. 6 (p. a)	(Construction)	Disinfected? X yes No	60 5.	22 60	
				Abandoned Insufficient Supply	Map	I Well Location	1	
Outselds	Construction Re	D-	ipati (mitt)	Abrindored, Poor Water Quality E' Abandored, core.	Please provide a map below folio	ang instructions o	u the pace.	
Diameter (Grivin)	Maturali (Plastic, Galvanaset, Stisil)	Slot No. From	f p	Specific	1 2		7 "	
			ŀ	Other, specify		ي المراج ولاماع		
				Hole Diameter	4 3 "	P. D.		
Andrew Chi	Water De and at Depth ⊀ind of Water		rtad De	oth (mitt) Diamete	FI Y	- do-	1	
12.19	and Gas Other, sp	eaty'	From O	6.40 15.8		eve opposit consists speci	per land today	
Water 104	and at Depath Kind of Wate			76.19 15.5	55			
Water for	und at Depth Kind of Wate	er: Fresh Unte						
	(mrn) Gas Other, sn Well Contract	or and Well Techr	ician Inform	ation . Neil Contractors Lichney (10 101441/	020		
Business	Name of Well Contractor			1 _5 5	8	physical of the second subsequence of the se	and of a summary of the summary of t	amenda-femaness this
Cupi I	tal Water Sur Address (Street Number)	laus) = S.F.W.		Municipality	Commusts.			
Box 9	490	Businoss E-ma		Stittsville	Well connects. I Date Package I	Delivers'	Ministry	Use Only
	. 900 114	office	eanil	calwater.ca w First Name)	information seed .	04=30 A	Z N	95313
	rio K25 Rephone No. (mc. mes civili) 836 1766	Mallow	SEAGNAL	1	Date Work Con		MAY	2 0 2009
W-at Teck	iyacan's Licance No - Signatu	te of Archivian and	for Contractor	2009 04 30		04 28	esett.	parter Six Contracts 2
0	0 9 7 7	Chypnia	1	Ministry's C	ору		-28 chilatan a a.	

Well Tag No. (Place Sticker und/or Print Below)

A068314 A 068314

Well Record

Hation 903 Ontario Water Resources Act Page____ ol ____

	scorded in: (X Metric	[] Imper							1115023	1115071	10251
Owner's	Information										
											(4)
Location				Town	drea		Let	Cor	CHESION		A COLUMN
	Location (Street Number)	flame)		C	umberland		B.F.	rdy-thicks	24	Postai C	0/34
t 18 - (durn chefty				ownVillage)ntari	0		
cawa Car	rleton Zene Easten	North	ng	Maine	umberland oper Plan and Sebion	Number	C	MINUT.			
	The second secon	0 5 0	387	3 1	and artists on the S	ack of this form)			11-12-22	T) until	1 (75 ft)
erburden at	N 1 8 4 6 5 0 8 nd Bodrock Materials	Mandonm	ent Sealin	Other h	Recurrial 6	Genera	il Description			rom	- 10
erens Colose	Soil	-	Bro	ken Roc	k	Fill				0	1.82
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							Results of We	il Yleld	Testing	172.74	
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6.40	0 Grouted	Bentoni	to Slu	rry	.110m ³ .	if purroing discontinu	ed, gwe roasun.	Static Lovel	9.3	3	
				-	to peak. the			1	10.1	3 1	11.57
		pdu 40			Apply with the spin spin spin spin spin spin spin spin	Pump intake eet at		2	10.6	5 2	16.96
						Pumping rate (Vinor	/GPA4	3	11.1) 3	16.42
Metho	d of Construction			Well Use		13.65		4	11.1	5 4	15.88
Carle Tool	[*] Diamend	Pub Di Dor	pere.biG	Municipa	☐ Duwatening	Duration of pumpin	min	5	11.8	7 5	15,35
Robby (Co	Driverio [7] Onwerto	Ding.	#DCIAH	Test Hole	Air Crasidiomod	Final water level enc	of pumping (m-	10	13.4	7 10	13.05
∰ Boring TX Air burcus	Charms	[] Indi	(19) Figh			18.67	main J GPM:	15	14.3	7 15	111.40
🗋 Отрыг, зрг	ed?		ine, spacely		Status of Well			20	15.3	3 20	10.43
Inside I	Construction Re	14197	Onestr	1994111	X Water Supply	Recommended bu	ng depth (nett)	25	16.0	26	9.8
(Sumeter	(Salvanized Fibreglass, Congress Puebr, Steel)	Thirkness (Cristl)	From	To	Tiest Hole	60.95 Recommended by	mp rate	30	16.5	0.0	
15.86	Steel	.48	1 + 45	6.40	Dewaltring Viell	(dmin / GPM)		40	17.5	- 01	
1 2) •(///			:		Cl Observation analysis Mentioned Hole	Well production (V	mm / GPMb	60	1	6.0	
					ARemnon (Construction)	Domitectria?		60	17.5	854	
					[] Abandowed.	X1 es No	Manag	Mali L	18.	6 0	
	Construction R	acord - Str	pen	1	Aliandoneo, Prior Water Quality	Решун ргохой в г	nup below follow	ang metri	coons on t	ne track	
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(1777/47)	(PESSC, Garrieron Chris			-	spacity	B	Lot A	D	/		
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Water four	Water De nd at Depth Kind of Water		'X Uniteste		par (men) Diamel			i		•	
79 240	num) Gas Other, sp	recit/	ı Untosti	- 0	6.40 15.8			,			
	nd at Depth Find of Water are) - Other, N		1 Chinner	6.40		23					
Water fou	ave) Gus - Other, ম and at Depth Kind of Wat		n Unitesti			114	THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER.	11/2/	07	The	
	(unit) Gils Other S Well Contrac	seafe	att Tanbals	iac Infort	ation		. 207			E-	- [
Нимпека	Well Contract Name of Well Contractor	tor and We	MI I GENING		CALLE L'AVA CAMPITAL IN ACCUSAGE	NS / CA	MELOT.			1	M
Const	at Water Suppl	y Ltd.			1 5 5	8 Openments.	L. Commission		4-164		-/
Business	Address (Street Numbern	AUTHA)			Stittsville_						
Box 4	Postat Code		ess E-mail	Address .			Date Peckage Di	Designation			y Use Onl
Province	40 K 2 S [1]	A 6' n	ffice@	capita	lwaber.ca	POSISITYON	2 0 0 8 1	mil v		No.Z	844
	10 K Z 2 J	Manne of Wi	off Tochnetia	m (Lant Nan	Mr. First Plaining				4		0.4.4
Ontar Bos Teles	shane No. (inc. area code) B 8 3; 6 1 7, 6 6 negeris Licence No. Signati	Manne of W	off Tochnicia	n (Last Nati	an, Ferth Charter)		Z O D 6 1			EB	1 2 200





Proposed Rural Residential Subdivision 1730 Wilhaven Drive, Cumberland, Ontario

Appendix 3

• Laboratory Certificates of Analysis – Groundwater

Report: PH1236-REP.02R2

Cllent: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
KZE 777

Attention: Mr. Robert Passmore

EXOVA |

Report Number: Date: Date Submitted:

2929721 2009-12-07 TW/1 2009-12-04

P.O. Number:

PH1236 Project:

Water	GUIDELINE	
Matrix:		
	764881	260-12-03
	764880	2000-12.03
	LABID:	seien Gelande
INVOICE: Paterson Group inc.	Chain of Custody Number: 11723	

		Sample ID:	Sample ID: TW1 WS1 TW1 WS2	TW1 WS2		
					L	- 1
=	UNITS	꾶				- 1
TANAMETER	1=		0	90		
Total Coliforns			_	0		

UNITS CFU/100mL CFU/100mL

0 0

LIMIT

ODWSOG

	NAGO NAGO NAGO NAGO NAGO NAGO NAGO NAGO
	60 0 0 11
	0 0 1 35 2 0 2
i de	
SENS	CFU/100mL CFU/100mL CFU/100mL CFU/100mL
6	Total Coliforms Escherichia Coli Heterotrophic Plate Count Faecal Streptococcus

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration Concentration IMAC = Interim Maximum Allowable Concentration Concentration IMAC = Interim Maximum Allowable Concentration Concentration IMAC = Interim Maximum Allowable Co

Oragana Dzeletoyic Microbiology Analyst APPROVAL.

Results relate only to the parameters tested on the samples submitted.

Exova |

Client: Paterson Group					Z.	Report Number:	5 5	2929698		
28 Cancaurse Gale, Unit 1 Nepean, ON						Date Submitted:	7 2	2009-12-04		
K2E 7T7 Attention: Mr. Robert Passmore					P	Project:	Δ.	PH1236		
INVOICE: Palerent Green Inc.					P.C	P.O. Number:	7	7873		
Chain of Castody Number: 11723				1	Ma	Matrix:	5	Water		
		148.0	764828	764829				GUIDELINE		
	Sam	Sample Date:	2009-12-03	2009-12-03		T				
	ű	Sample ID:	TW1 WS1	TW1 WS2				ODWSOG	ľ	
		1					TYPE	LIMIT	UNITS	
PAKAMETEK	DINI'S	J u	400	LUV			90	200	mg/L	
Alkalinity as CaCO3	16 E	O -	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	999			Q	250	mg/L	
Chloride	12	- 1	? ?	8			ð	co	귤	
Conductivity	uS/cm	נחינ	3200	3040			(2)	,	115	
Dissolved Organic Carbon	mg/L	0.5	1.7	7.		- 1	Q Y	n ¦	7gr	
Fluoride	щgу	-:-	0.12	0.16			S S	ر د ا	100	
Hydrogen Sulphide	шgЛ	0.1	40.1	-0.1			Ş	CO.	Jen Jen	
N-NH3 (Ammonia)	шgЛ.	0.02	0.13	0.14			945	5	Pour	
N-NO2 (Nitrite)	mg/L	0.1	<0.10	<0.10			385	2 5	1 200	
N-NO3 (Nitrate)	mg/L	1.0	0.41	0.42			2		- A	
Hd			7.81	7.85				6.0-0.0		
Phenois	шgЛ	0.001	<0.001	40.001			Ş	60	J'ou	
Sulphale	mg/L	٠- '	†21 (*)	117			}	3	h	
Tannin & Ugaln	mg/L	£; '	ם מ	6.0			QV	200	mo/L	
Total Dissolved Solids (COND - CALC)	ا ع	n ;	2080	1960			2	}		
Total Kjeldahi Nitrogen		3 6	0.38	15.4			MAC	1.0	UTN	
Turbidity		- -	808	862			8	8	mg/L	
Tardinass as Caccos	i b	0.0	1.06	1.08						
Calcius	mg/L	-	246	199						
Magnesica	mg/L	-	47	4						
Polassium	mg/L	-	ល	2				000		
Sodium	mg/L	7	382	418			ą į	3 3	man in	
Iron	mg/L	0.03	5.51	0.73			Ş Ş	2 6		
Manganase	mg/L	0.0	0.15	90.0			2	6	a	
										_
						=	•			

MRL - Method Roporting Limit INC = Incomplete AO = Asstratic Objective OG = Operational Guideline MAC - Musinum Allowable Concentration IMAC = Interim Maximum Allowable Concentration Comment:
H2S MRL elevated due to sample turbidity.

Resurts relate oxly to the parameters fested on the samples submitted.

Certificate of Analysis

Kollaard Associates Inc. Client:

210 Prescott St., Box 189

Kemptville, ON K0G 130

Ms, Colleen Vermeersch Attention:

160128

Kollaard Associates Inc. Invoice to:

2016-03-17 1603877 Report Number: Date Submitted: Date Reported: Project: COC #:

2016-03-23 160128 167385

Page 1 of 5

Dear Colleen Vermeersch:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Shyla Monette 2016.03.23 16:01:56-04'00'

Shyla Monette

APPROVAL:

Team Leader, Inorganics

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Exova Ottawa Is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.caja.ca/scopes/2602.pdf.

Exova (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water.

Exova (Mississauga) is accredited for specific parameters by SCC, Standards Council of Canada (to ISO 17025)

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Exova recommends consulting the official provincial or federal guideline as required.

Certificate of Analysis

Kollaard Associates Inc. Client:

210 Prescott St., Box 189

Kemptville, ON KOG 130

Ms. Colleen Vermeersch Attention.

160128 PO#: Kollaard Associates Inc. Invoice to:

2016-03-23 2016-03-17 160128 167385 1603877 Date Reported: Project: COC #: Report Number: Date Submitted:

																		,					_
1231377 Water	2016-03-16 TW1-6hr Sample		212*	1.04	353	241	22	<2	543	1,5	0.41	<0.10	<0.10	8.10	23	>100	62	1,47*	7	14	0.10*	40	
1231376 Water	2016-03-16 TW1-3hr Sample		210*	1,05	326	235	16	2	502	1.8	0,25	<0,10	<0.10	8.06	18	95.0*	61	0.62*	9	14	0.03	34	
Lab I.D. Sample Matrix	Sample Type Sampling Date Sample I.D.	Guideline	00100		AO-500	002-90	AO-250	AO-5	. Andreas and grant of the contract of the con	AO-5	MAC-1.5	MAC-1.0	MAC-10.0	6,5-8.5	AO-500	AO-5.0		AO-0.3			AO-0.05	AO-200	
		Units	mg/L		mg/L	mg/L	mg/L	LCO	uS/cm	mg/L	mg/L	mg/L	mg/L		mg/L	NTO	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Second in constitution of the last of the

0.10 0.10

> N-NO2 N-NO3

0.5

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Conductivity

200

Colour

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General Chemistry

AR

0.0

Hardness as CaCO3

Calculations

Group

Analyte

TDS (COND - CALC) Alkalinity as CaCO3

Ion Balance

5

8

0.03

0.1

Turbidity

Ca

Metals

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ODWSOG	All markets and all and a land
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3	2

* = Guideline Exceedence

All analysis completed in Ottawa, Ontario (unless otherwise Indicated by ** which indicates analysis was completed in Mississauga, Ontario).

Methods references and/or additional QA/QC information available on request. Results relate only to the parameters tested on the samples submitted.

146 Colonnade Rd. Unit 8, Ottawa, ON KZE 7Y1

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

<0.001

<0.001 0.11

mg/L

0.001

mg/L

0.1

Total Kjeldahl Nitrogen

Phenols

SHN-N

Subcontract

Nutrients Phenols

N

0.0

ĝ Ę

<0.02 0.11

20.02

AO-0.05

mg/L

0.02

mg/L

0.7

Tannin & Lignin

mg/L

0.0

0.2

Certificate of Analysis

Kollaard Associates Inc. Client:

210 Prescott St., Box 189

Kemptville, ON K0G 1J0

Ms. Colleen Vermeersch Attention: PO#;

160128

Kollaard Associates Inc. Invoice to:

Report Number: Date Submitted:

160128

2016-03-17 2016-03-23 167385 Date Reported: Project: COC #:

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 1304805 r. Analysis/Extraction Date 2018-03-17	16:03:17: Analysi AET		
Method C.SM2130B			
Turbidity	<0.1 NTU	101	73-127
Run No. 304836 Alaws is Extraction Date. 2016-03-21	Analysi	AET POSTALMENT	
Method: C/SM2120C		Section of the second section of the second	
Colour	nou es	100 AB 11 100 AB	80-120
Run No. 304866. Analysis/Extraction Date 2016-03-18. Analysi		SKH THE	
Method M SM3:120B-3500C			
Calcium	<1 mg/L	101	90-110
Porassium	×1mg/L	103.55.55.55	87-113
Magnesium	<1 mg/L	101	76-124
Sodium	S2 mg/L	Pop	82-118
Run No 304890. Analysis/Extraction Date 2018-03-18 Analyst NP	i(8-03-18 Analys(₁ N	Picking	
Method: C SM4500-NO3-F			
N-NO2	<0.10 mg/L	97	80-120
を の で の で の の の の の の の の の の の の の	100 ng/r	95	80-120
Run No. 304895. Analysis/Extraction Date 2016/03-191/ Analyst I K A	it6-03-19# Analyst K	Angele	的的。在春天一
Mothod EPA/200/8			

Guideline = ODWSOG

* = Guideline Exceedence

All analysis completed in Ottawa, Ontario (unless otherwise Indicated by ** which indicates analysis was completed in Mississauga, Ontario).
Results relate only to the parameters tested on the samples submitted.
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and the state of the state of Certificate of Analysis

Kollaard Associates Inc.

Client:

210 Prescott St., Box 189 Kemptville, ON

K0G 1J0

Ms. Colleen Vermeersch Attention: PO#:

160128

Kollaard Associates Inc. Invoice to:

2016-03-17 1603877 Report Number: Date Submitted:

2016-03-23 160128 167385 Date Reported: Project: COC#:

QC Summary

Analyte	Blank	QC % Rec	QC Limits
lron	<0.03 mg/L	86 86	92-107
Way garest Make Analysis (Extraction Date 2016-03-18 Analysis AET	18-03-18 P. Analysi P. A		
Method C SM4500-H-B		The state of the s	
Alkalinity (CaCO3)	<5 mg/L	66	90-110
Conductivity	46.US/cm	66.917	80-110
The control of the community of the control of the	<0.10 mg/L	66	90-110
は、一般の対象を表現している。	808	50	90-110
Run No. 304919 Analysis/Extraction Date, 2016-03-18. Analyst NP	10-03-18 Analyst N	P. S. S. W. S. S. S.	ではない。
Method SM 41,19C		Three Livers Sheeman	The state of the state with the state of the
Chloride	<1 mg/L	101	90-112
	41mg/L		90-110
Rum No. 304929 Analysis/Extraction Date. 2016:03-21 Analysis AET	16:03:21 Analys(Al		
Method C SM5310C			
DOG	<0.5 mg/L	104	84-116
Rum No. 3905053 Analysis/Extraction Date 2016 03-23 Analysis	16-03-23 Analysi Si	Sport	· · · · · · · · · · · · · · · · · · ·
Method SUBCONTRACT P		AT TO SHARE OF THE SHARE SHARE SHARE SHARE SHARE SHARE SHARE SHARE SHARE SHARE SHARE SHARE SHARE SHARE SHARE S	
EHN:N		96	
Phenols	<0.001 mg/L	88	-

Guideline = ODWSOG

* = Guideline Exceedence

All analysis completed in Ottawa, Ontario (unless otherwise Indicated by " which indicates analysis was completed in MissIssauga, Ontario).
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Cermicate of Analysis

ロメロメロ

Kollaard Associates Inc. Client:

210 Prescott St., Box 189 Kemptville, ON

K0G 130

Ms. Colleen Vermeersch 160128 Attention:

Kollaard Associates Inc. Invoice to: P0#;

2016-03-17 1603877 Report Number: Date Submitted: Date Reported:

2016-03-23 160128 167385 Project: COC #:

QC Summary

Analyte	Blank	QC % Rec	QC Limits
SS2 Thirties and the second se	<0.02 mg/L <0.1 mg/L	100	
Total 'Keldahi Nitrogen	-0.1 mg/L	102	
Method Clon Balance	を記れている。		(大) () () () () () () () () ()
ion Balance Method CiSM2340B			
Hardness as CaCO3 Method C SM2540			
TDS (COND - CALC)			

Guideline = ODWSOG * = Guideline Exceedence All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates analysis was completed in Mississauga, Ontario).

Results relate only to the parameters tested on the samples submitted.

Methods references analyor additional QA/QC Information available on request.

146 Colonnade Rd. Unit 8, Ottawa, ON K2E 7Y1

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IIMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Page 5 of 5

Certificate of Analysis

EXOVQ

Kollaard Associates Inc. Client:

210 Prescott St., Box 189 Kemptville, ON

K0G 1J0

Ms. Colleen Vermeersch 160128 Attention:

Kollaard Associates Inc. Invoice to:

Report Number: Date Submitted: Date Reported: Project: COC #:

1603879 2016-03-17 2016-03-19 160128 167385

Page 1 of 2

Dear Colleen Vermeersch:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

12:13:08 -04'00' Krista Quantrill 2016.03.19 Disease !

APPROVAL:

Laboratory Supervisor, Microbiology

Krista Quantrill

All analysis is completed in Ottawa, Ontarlo (unless otherwise indicated).

Exova Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf. Exova (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water.

Exova (Mississauga) is accredited for specific parameters by SCC, Standards Council of Canada (to ISO 17025)

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Exova recommends consulting the official provincial or federal guideline as required.

Certificate of Analysis

EXOVA

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Client: Kollaard Associates Inc.

210 Prescott St., Box 189

Kemptville, ON

K0G 1J0 Attention; Ms. Colleen Vermeersch

PO#: 160128

Invoice to: Kollaard Associates Inc.

Report Number:. 1603879 Date Submitted: 2016-03-17 Date Reported: 2016-03-19

Date Reported: 2016-03-Project: 160128 COC #: 167385

1231388 Water 2016-03-16 TW1-6Hr Sample		153	0	0	0
1231387 Water 2016-03-16 TW1-3Hr Sample		06	0	0	0
Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	Guideline		MAC-0		MAC-0
	Units	ct/1mL	ct/100mL	ct/100mL	ct/100mL
	MRL	0	0	0	0
	Analyte	Heterotrophic Plate Count	Escherichia Coli	Faecal Coliforms	Total Coliforms
	Group	Microbiology	Others	L	-

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Guideline = obwSoG
All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates analysis was completed in Mississauga, Ontario).
Results relate only to the parameters tested on the samples submitted.
Analytical Method: AMBCOLM1
additional QA/QC information available on request.

146 Colonnade Rd. Unit 8, Ottawa, ON K2E 7Y1

Certificate of Analysis

Kollaard Associates Inc. Client:

210 Prescott St., Box 189

Kemptville, ON K0G 1J0

Ms. Colleen Vermeersch Attention:

PO#:

Kollaard Associates Inc.

Invoice to:

Report Number: Date Submitted: Date Reported: Project: COC #:

2016-03-23 2016-03-24 160128 175693 1604190

Page 1 of 3

Dear Colleen Vermeersch:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to cail (613-727-5692),

Report Comments:

2016.03.24 15:14:23 -04'00' **Pinsonneault** Nadine

Team Leader, Inorganics Nadine Pinsonneault

APPROVAL:

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Exova Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf.

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The section of

EXOVA ENVIRONMENTAL ONTARIO

1

Kollaard Associates Inc. Client:

210 Prescott St., Box 189

Kemptville, ON

1604190 2016-03-23 2016-03-24

Report Number: Date Submitted: Date Reported: Project: COC #:

160128 175693

K0G 1J0 Ms. Colleen Vermeersch

Attention: PO#:

Kollaard Associates Inc. Invoice to:

1232101	Water	2016-03-22	TW1
Lab I.D.	Sample Matrix	Sampling Date	Sample I.D.

_							
101202	Water	2016-03-22	TW1		5.0	0.48*	0.03
Lab I.D.	Sample Matrix Sample Type	Sampling Date	Sample I.D.	Guideline	AO-5.0	AO-0.3	AO-0.05
				Units	NATU	mg/L	mg/L
				MRL	0.1	0.03	0.01
				Analyte	Turbidity	Fe	Mn
				Group	neral Chemistry	Metals	•

General Ch

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Page 2 of 3

Results relate only to the parameters tested on the samples submitted. Methods references and/or additional QA/QC information available on request.

All analysis completed in Ottawa, Ontario (unless otherwise Indicated by ** which indicates

analysis was completed in Mississauga, Ontario).

Guideline = ODWSOG

* = Guideline Exceedence

146 Colonnade Rd. Unit 8, Ottawa, ON K2E 7Y1

	-
Q	
8	lest
X X	Accu

	Cadmid Forest	2929469
Client: Paterson Group	Date:	2009-12-03 TW2
28 Concourse Gate, Unit 1	Date Submitted:	2009-12-01
Nepean, ON		
K2E 7T7	Project:	PH1236
Attention: Mr. Robert Passmore		
	P.O. Number:	7873
NAVOICE: Palerson Group Inc.		Water

		6	SIND I	CFU/100mL	
GUIDELINE	ODWSOG			.	
			TYPE	MAG	
Matrix					
=					
764212	2009-12-01 TW2 WS2			0 0 0 0	
F	2009-12-01 TW2 WS1			0 0 0 0	
	Sample Date: Sample ID:		ion	MRI.	
	Samp		O. L.	CFU/100mL CFU/100mL CFU/100mL CFU/100mL CFU/100mL	
108473				PARAMETER	
dy Number:					
Chain of Custody Number: 108473				Total Coliforms Escherchia Coli Heterolrophic Plate Count Faecal Coliforms Faecal Streptococcus	
2 2				Total Here Fast	

MRL = Method Reporting Limit INC = Incomplete AO = Aestretic Objective OG = Operations! Guideline MAC = Maxemun Allowable Concentration IMAC = Interim Maximum Allowable Concentration Comment:

APPROVAL: Krista Quantrili Krista Quantrili Drinking Water Coordinator

Results relate only to the peremeters tested on the semples submitted.

EXOVA |

2929470 2009-12-08 2009-12-01

PH1236

Report Number: Date: Date Submitted: Project: Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON KZE 7T7 Attention: Mr. Robert Passmore

	108473
	Chain of Custody Number: 168473
i	Chain of Cus

Type Type	Chain of Custody Number: 108473			20,00	10101		Maurix		GUIDELINE	
Sample Date: 2009-12-01 TWZ WS1 TWX WS2 TYZ WS2 WS2 WS2 WS2 WS2 WS2 WS2 WS2 WS2 WS2				764213	764214					
Sample ID: TWS WS I TWZ WS WS I TWZ WS WS I TWZ WS I TWZ WS WS I TWZ WS WS WS I TWZ WS WS WS WS WS WS WS WS WS WS WS WS WS		Sami	ple Date:	2009-12-01	2009-12-01			T		
PATAMETER UNIVERS WRITE 12 213 213 214 22 215		ii ii	ımple ID:	TWS WS1	TW2 WS2				ODWSOG	
PARAMETER UNITS WRI. 5 212 213 AD 550 5								and A	TIME	STINITS
1995 1995	PARAMETER	UNITS	ZZ.					1	TIMIT I	
Trick 1	١	шал	S	212	213			8	200	mg/L
TCU 2 42 42 42 42 40 5 1500 1480 480		Jour I	•	153	153	63		Q	220	J.
1480 1480		101	. 7	8	8			8	മ	
A		III)(Sh	LC:	1500	1480					
Sulphide 1.94 1.96 1.96 1.97 1.97 1.97 1.96 1.96 1.97 1.9	nuctivity Octobring Contract	lom.	5.0	6.0	0.9			Ą	LO.	Mg/
Sulphide mg/L 0.01 c.0.01 c.0.01 c.0.01 mg/L 0.01 c.0.10 c.0.10 mg/L 0.01 c.0.10 c.0.10 mg/L 0.1 c.0.10 c.0.10 mg/L 0.1 c.0.10 c.0.10 mg/L 0.1 c.0.10 c.0.01			-	1.94	1.96			MAC	1.5	mg/L
High Harder High Harder High Harder		3 6		<0.01	<0.01			Q	0.05	Agm Agm
Ilitide MAC 1.0 MAC	rogen surpring		000	0.20	0.19					
MAC 10.0 MAC		T COL	0	<0.10	<0.10			MAC	1,0	Jê E
High mg/L 0.001 <0.001 <0.001	52 (Millie)	Poli	-	<0.10	<0.10			MAC	10.0	mg/
Lignin mg/L 0.001 <0.001 <0.001 mg/L 0.1	OS (MITORE)			8.18	8.18				6.5-8.5	
Lignin mg/L 1 295 287 AO 500 AO 500 Gentle Mg/L 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	<u> </u>	mg/L	0.001	<0.001	<0.001				1	
Lignin Harden Mg/L 0.1 0.1 -0.1 -0.1 mg/L 6.1 mg/L 0.1 0.1 -0.1 mg/L 0.1 0.24 0.23 mg/L 1.0 mg/L 0.1 0.24 0.23 mg/L 1.0 mg/L 1 1.03 1.01 mg/L 1 35 33 mg/L 1 1 19 18 mg/L 1 1 19 0.1 mg/L 1 1 19 0.1 mg/L 1 1 19 0.01 mg/L 0.03 <0.03 <0.03	chate	mg/L	-	295	287			Q Q	200	Ê
Solved Solids (COND - CALC) mg/L 0.1 0.24 0.23 MAC 1.0 MAC 1.0 MAC 1.0 MAC 1.0 mg/L 0.1 1.03 1.01 MAC 1.0 MAC 1.0 MAC 1.0 mg/L 1 35 33 MG/L 1 1 19 18 MG/L 2 272 266 MG/L 0.03 <0.03 <0.03 MG/L 0.01 <0.01 <0.01 <0.01 <0.03 <0.03 MG/L 0.03 <0.03 MG/L 0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.02 <0.03 MG/L 0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.05 MG/L 0.01 <0.01 <0.01 <0.02 <0.02 <0.03 <0.03 <0.03 <0.03 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.05 <0.	nin & Lionin	mg/L	0.1	0.1	<u>6</u>			•	9	ĺ
delth Nitrogen mg/L 0.1 0.24 0.23 NAC 1.0 n as CaCO3 mg/L 1 166 157 0.3 0.6 100 ice mg/L 1 35 33 0.01 1.01 0.01 1.01 m mg/L 1 19 18 AO 200 mg/L 2 2772 266 AO 0.3 AO 0.3 ssa mg/L 0.03 <0.03	al Dissolved Solids (COND - CALC)	™g/L	10	975	362			Q	3	
NTU 0.1 0.7 0.3 MAC 1.0 mac 1.	Miroden	mg/L	6.7	0.24	0.23		_	-	,	Ē
mg/L 1 166 157 006 100 100 100 100 100 100 100 100 100	pldiv	DIN	2.	0.7	0.3			MAC	1.0	2
mg/L 1 35 33 1.01 mg/L 1 35 33 mg/L 1 19 18 mg/L 2 272 266 mg/L 0.03 <0.03 <0.03 mg/L 0.01 <0.01 <0.01	driess as CaCO3	шал	-	166	157			9	3	Ē
mg/L 1 35 33 AO 200 mg/L 1 19 18 mg/L 1 5 5 5 MO 200 MG/L 1 5 0.03	Balance		0.0	1.03	<u>1</u> .9					
mg/L 1 19 18 AO 200 mg/L 1 5 5 5 AO 200 mg/L 0.03 <0.03 <0.03 AO 0.3 · AO 0.05 and AO 0.05 · AO 0.05		mg/L	-	32	33					
mg/L 2 272 266 AO 200 mg/L 0.03 <0.03 <0.03 <0.03 AO 0.3 · AO 0.05 angalasa	Bijogo	m9/L	-	19	18					
mg/L 2 272 266 AO 200 CD 3 cD 200 mg/L 0.03 <0.03 <0.03 <0.03 <0.03 <0.03 <0.03 <0.05 Mg/L 0.01 <0.01 <0.01 <0.01 <0.01		mg/L	-	15	40					Ī
ganssa		mark	2	272	266			Q V	202	Ē
ganssa mg/L 0.01 <0.01 <0.01 AO 0.05		Jour Jour	0.03	<0.03	<0.03			Q Q	0.3	1,6E
		mg/L	0.01	<0.01	<0.01			o V	0.03	J.
									_	

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration Comment:

forgante Lab Supervisor

Results relate only to the parameters tested on the samples submitted.

28 Concourse Gate, Unit 1 Nepean, ON K2E 7T7

Client: Paterson Group

Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc. Chain of Custody Number: 108474

TW3

Date Submitted:

PH1236

P.O. Number: Project:

Matrix:

		ŀ	
764595	2009-12-02	TW3 WS2	
Г	12-02	48.1	

764595	2009-12-02	TW3 WS2	
764594	12-02-12-02	TW3 WS1	

Sample Date: Sample ID: LAB ID:

70-71-6002	TW3 WS2	
12-02	WS1	

W3 WSZ	0 11 0
ž	

뚩

UNITS

PARAMETER

0	0	=	0	0	
11	0	181	0	2	

18	0	7	

<u>-</u>	0	2	_

0	7	
		$\overline{}$



















Faecal Coliforms Faecal Streptococcus

Escherichia Coli Haterotrophic Plate Count

Total Colifornis

CFU/100mL CFU/100mL CFU/100mL CFU/100mL

Results relate only to the parameters tested on the samples submitted

10,

8-146 Colonrade Road, Ottowa, ON, KZE TY1

Gragana Dzeletovic Microbiology Analyst

APPROVAL:

64RL = Method Reporting Linit iNC = Incomplete A0 = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Intertra Maximum Allowable Concentration Comment:

UNITS CFU/100mL CFU/100mL

00

LIMIT

MAC

ODWS06

Water

7873

	ı					œ.	Report Number:	29	2929600	
Chent: Paterson Group						66	Date:	2 20	2009-12-07 2009-12-03	
Noosan, ON										
K2E 7T7						4	Project:	<u>.</u>	PH1236	
Attention: Mr. Robert Passmore										
INVOICE: Palarson Group Inc.						D. Z	P.O. Number:	3	Water	
Chain of Custody Number: 108474		Ī						9	GUIDELINE	
		<u>:</u>	764596	764597						_
	Sam	Sample Date:	20-21-6002	2003-12-02	†				0	
	S.	Sample ID:	TW3 WS1	TW3 WS2					ODWSOG	
									\ 	
		!						TYPE	LIMIT	SLIND
PARAMETER	UNITS	MRL						98	200	шgЛ
Alkalinity as CaCO3	mg/L	ഹ	244	747				Q	250	mg/L
	mg/L	-	304	e e				AO.	ın	칻
	5	7	9	ĸ				2		
Cotour	uS/cm	ي.	2730	2780				V	1¢,	may
Conductivity	mad.	0.5	1.7	9.1				2	, <u>«</u>	ψow
Dissayed Organic Carbon		-	0.61	0.63				3 6	2 5	l Contract
Fluoride	i e	00	<0.1	<0.01				?	2	h
Hydrogan Sulphide		002	0.46	0.46						Form
N-NH3 (Ammonia)	1 2	6	<0.10	<0.10 <				NAC.	2 6	, C
N-NO2 (Mirte)	, FO	6	<0.10	<0.10				MAC	20.00	j h
N-NO3 (Nitrate)	h H		7.88	7.93					0.0	
Ha	ma/L	1000	<0.001	<0.001				ç	000	mail
Phenois	Mo/L	Ţ	768	784				?	3	h
	₩ W	0.1	0.2	6.4				Ş	COR	MoA
	mg/L	Ŋ	2180	2220				?	2	0
	ma/L	0.1	0.58	0.64				0111	-	E L
Total Kjeldahi Milogen	Z	0.1	19.4	1.3				2 0	2 5	Vous
Turbidity	900	-	687	169				3	3	i b
Hardness as CaCO3	D	5	96:0	0.97						
Ion Balance	Ē	; -	173	173.						
Calcium			62	63						
Magnesium			¦ co	80				5	S	li com
Potassium	# W	2	345	340				Q Q	200	
Sodium	wow.	0.03	1.55	90.0				5 5	50	200
Iron	Vol.	0.01	0.04	0.03				Q	20.0	j j
Manganese	1			1						
_										

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Alfowable Concentration IMAC = Interim Maximum Allowable Concentration 764596; H2S MRL elevated due to sample turbidity.

Inorganic Lab Supervisor APPROVA

Results relate only to the parameters tested on the samples submitted.

REPORT OF ANALYSIS



Client: Paterson Group 28 Concourse Gate, Unit 1

Nepean, ON KZE 7T7

Report Number: Date:

1129193 2011-12-21 2011-12-16

Date Submitted: Project:

Attention: Mr. Robert Passmore						Project:		PH1238	
INVOICE: Palerson Group Inc.						P.O. Number:		11041	
Chain of Custody Number: 98226		LAB ID:	932535	932536		Matrix:		GUIDELINE	
	Sam	Sample Date:	2011-12-15	2011-12-15					
	SS	Sample ID:	TW4-WS1	TW4-WS2				ODWSOG	
								The same of the sa	
PARAMETER	UNITS	MRL	TREATED	TREATED		10 mm	TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/t	5	193	180			8	200	mg/L
Chloride	mg/L	_	43	31			9	250	mg/L
Colour	잗	2	=	5			ð	ιρ	
Conductivity	uS/cm	ιn	551	481				1	
Dissolved Organic Carbon	mg/L	0.5	4.2	4.3			ð	ıo.	mg/L
Puoride	mg/L	2.	0.10	€0.10			MAC	1,5	mg/L
Hydrogen Sulphide	Age.	0.0	€0.01	€0.01			Q	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	<0.02	<0.02					
N-NO2 (Nitrite)	mg/L	0.1	0.10	<0.10			MAC	1.0	mg/L
N-NO3 (Nitrate)	тв/L	0.1	0.55	0.43	,		MAC	10.0	mg/L
E			8.06	8.02				6.5-8.5	
Phenois	mg/L	0.001	€0.001	<0.001			ł		ì
Sulphate	mg/L	-	27	21			Q V	200	mg/L
Tannin & Lignin	mg/L		1.0	6.1					
Total Dissolved Solids (COND - CALC)	mg/L	-	358	313			Q V	200	mg/L
Total Kjeldahi Nitrogen	mg/L	0.1	0.20	0.18					
Turbidity	SE SE	0.1	3.0	1.2			MAC	1.0	Ĕ
Hardness as CaCO3	твЛ	_	206	182			8	50	mg/L
ton Balance		0.04	96.0	96'0					
Calcium	mg/L	-	92	88					
Magnesium	mg/L	-	4	က					
Potassium	mg/L	_	7	⊽					
Sodium	mg/L	2	8	52	10		٥	200	mg/L
lion .	mg/L	0.03	0.08	0.03			Q !	0.3	mg/L
Manganese	mg/L	0.0	~0.01	6.0			Q V	0.05	mg/l

MRL = Method Reporting Limit INC = Incomplete AO = Assilvatic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration Comment:

APPROVAL:

Inorganic Lab Supervisor

Methods references and/or additional QA/QC information available on request.

Certificate of Analysis



154 Colonnade Rd South Paterson Group Client:

Vepean, ON

Mr. Jamie Blakely Attention:

Paterson Group Invoice to:

2015-06-25 PH1236 52212 Project: COC #:

2015-06-12

1510551

Report Number: Date Submitted: Date Reported:

Page 1 of 5

Dear Jamie Blakely:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692)

Report Comments:

Nadine Pinsonneault 2015.06.25 16:26:55 -04'00'

APPROVAL:

Team Leader, Inorganics Nadine Pinsonneault

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Exova Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf Exova (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water

Exova (Mississauga) is accredited for specific parameters by SCC, Standards Council of Canada (to ISO 17025)

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Exova recommends consulting the official provincial or federal guideline as required.

Certificate of Analysis

Exova

Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr Jamie Blakely Attention:

Paterson Group Invoice to:

PO#:

2015-06-12 2015-06-25 1510551 Report Number: Date Submitted: Date Reported:

PH1236 52212 Project: COC #:

1180970	Water	2015-06-12 TW4 WS2
1180969	Water	2015-06-12 TW4 WS1
Lab I.D.	Sample Matrix Sample Type	Sampling Date Sample I.D.

				Lab I.D. Sample Matrix	1180969 Water	1180970 Water	
				Sample Type Sampling Date Sample I.D.	2015-06-12 TW4 WS1	2015-06-12 TW4 WS2	
Group	Analyte	MRL	Units	Guideline			
Calculations	Hardness as CaCO3	_	mg/L	00-100	338*	343*	
I	lon Balance	0.01			1.07	1.05	
I	TDS (COND - CALC)	_	mg/L	AO-500	506*	514*	
General Chemistry	Alkalinity as CaCO3	2	mg/L	06-500	266	278	
I	ō	-	mg/L	AO-250	69	72	
I	Colour	2	TCU	AO-5	*9	2	
I	Conductivity	2	nS/cm		778	791	
I	DOC	0.5	mg/L	AO-5	3.0	3.3	
	Ш	0.10	mg/L	MAC-1.5	<0.10	<0.10	
I	N-NO2	0.10	mg/L	MAC-1.0	<0.10	<0.10	
I	N-NO3	0.10	mg/L	MAC-10.0	0.89	0.91	
	Hd	1.00		6.5-8.5	8.02	76.7	
I	SO4	-	mg/L	AO-500	34	34	
	Tannin & Lignin	0.1	mg/L		0.2	0.2	
I	Turbidity	0.1	NTO	AO-5.0	3.1	1.3	
Metals	Ca	_	mg/L		124	126	
	Fe	0.03	mg/L	AO-0.3	0.18	0.08	
	ス	_	mg/L		_	>	
	Mg	_	mg/L		7	7	
	Mn	0.01	mg/L	AO-0.05	<0.01	<0.01	
	Na	2	mg/L	AO-200	42	44	
Nutrients	N-NH3	0.05	mg/L		<0.05	<0.05	
	Total Kjeldahl Nitrogen	0.07	mg/L		0.51	0.14	
Phenols-4AAP	Phenols	0.002	mg/L		<0.002	<0.002	
Sulphide	S2-	0.002	mg/L	AO-0.05	<0.002	<0.002	
							1

Guideline = ODWSOG

* = Guideline Exceedence

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates Results relate only to the parameters tested on the samples submitted. analysis was completed in Mississauga, Ontario).

Methods references and/or additional QA/QC information available on request.

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr Jamie Blakely Attention:

PO#:

Paterson Group Invoice to:

1510551 Report Number: Date Submitted: Date Reported:

2015-06-12 2015-06-25

PH1236 52212 Project: COC #:

QC Summary

Ar	Analyte	Blank	QC % Rec	QC Limits
Run No 288745	Analysis/Extraction Date 2015-06-13	Analyst	CF	
Method C SM2130B				
Turbidity		<0.1 NTU	101	73-127
Run No 288799	Analysis/Extraction Date 2015-06-15	Analyst	K A	
Method EPA 200.8				
Iron		7/6m £0.0>	26	92-107
Manganese		<0.01 mg/L	66	94-106
Run No 288805	Analysis/Extraction Date 2015-06-15	Analyst	NP	
Method C SM4500-NO3-F	03-F			
N-NO2		<0.10 mg/L	107	80-120
N-NO3		<0.10 mg/L	92	80-120
Run No 288808	Analysis/Extraction Date 2015-06-15	Analyst	AET	
Method C SM4500-H+B	+B			
Alkalinity (CaCO3)	()	7/6ш 5 >	86	90-110
Conductivity		<5 uS/cm	101	90-110
ш		<0.10 mg/L	66	90-110
Hd		6.21	100	90-110
Run No 288815	Analysis/Extraction Date 2015-06-16	Analyst	SKH	

Guideline = ODWSOG

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Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr Jamie Blakely Attention:

Paterson Group Invoice to:

PO#:

1510551 Report Number: Date Submitted: Date Reported:

2015-06-12 2015-06-25

PH1236 52212 Project: COC #:

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Method M SM3120B-3500C			
Calcium	<1 mg/L	100	90-110
Potassium	<1 mg/L	66	87-113
Magnesium	<1 mg/L	100	76-124
Sodium	<2 mg/L	91	82-118
Run No 288817 Analysis/Extraction Date 2015-06-16	Analyst	AET	
Method C SM2120C			
Colour	<2 TCU	100	90-110
Run No 288942 Analysis/Extraction Date 2015-06-16	15-06-16 Analyst NP	Ь	
Method SM 4110			
Chloride	<1 mg/L	66	90-110
804	<1 mg/L	102	90-110
Run No 289289 Analysis/Extraction Date 2015-06-22	Analyst	AET	
Method Exova Edmonton-SM5530D			
Phenols	<0.002 mg/L	100	
Run No 289293 Analysis/Extraction Date 2015-06-22	Analyst	AET	
Method Exova Edmonton-SM4500-NH3-G			
N-NH3	7/6w 90'0>	99	
Run No 289322 Analysis/Extraction Date 2015-06-17	Analyst	AET	

Guideline = ODWSOG

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Methods references and/or additional QA/QC information available on request. analysis was completed in Mississauga, Ontario). Results relate only to the parameters tested on the samples submitted.

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

Mr Jamie Blakely K2E 7T7

Attention:

Paterson Group Invoice to:

PO#:

1510551 Report Number: Date Submitted: Date Reported:

2015-06-12 2015-06-25 PH1236

52212 Project: COC #:

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Method SUBCONTRACT-E-INORG			
Total Kjeldahl Nitrogen	<0.07 mg/L	100	
Run No 289342 Analysis/Extraction Date 2015-06-18 Analyst AET	15-06-18 Analyst A	ET	
Method Exova Edmonton-SM5200-S2 E			
S2-	<0.002 mg/L	103	
Run No 289344 Analysis/Extraction Date 2015-06-18 Analyst AET	15-06-18 Analyst A	ET	
Method Exova Edmonton-SM5310B			
DOC	<0.5 mg/L	105	
Run No 289353 Analysis/Extraction Date 2015-06-23 Analyst AET	15-06-23 Analyst A	ET	
Method Exova Surrey-SM5550B			
Tannin & Lignin	<0.1 mg/L	103	

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Vepean, ON

Mr. Jamie Blakely Attention:

Paterson Group Invoice to:

Page 1 of 2

Project: COC #:

2015-06-12 2015-06-15 PH1236

Report Number: Date Submitted: Date Reported:

1510547

Dear Jamie Blakely:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692)

Report Comments:

This is an amendment and supercedes all previous copies of this report. The project and analytes have been corrected.

09:21:58 -04'00' Krista Quantrill 2015.06.19

Krista Quantrill

APPROVAL:

Laboratory Supervisor, Microbiology

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Exova Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf Exova (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests

Exova (Mississauga) is accredited for specific parameters by SCC, Standards Council of Canada (to ISO 17025)

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Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr Jamie Blakely Attention:

Paterson Group Invoice to: P0#:

2015-06-12 2015-06-15 1510547 PH1236 Report Number:

52212 COC#:

Date Submitted:	Date Reported:	Project:	# ()()

1180965 Water	2015-06-12 TW4 WS2		*	62*
1180964 Water	2015-06-12 TW4 WS1		0	₂₀ *
Lab I.D. Sample Matrix	Sample Type Sampling Date Sample I.D.	Guideline	MAC-0	MAC-0
		Units	ct/100mL	ct/100mL
		MRL	0	0
		Analyte	Escherichia Coli	Total Coliforms
		Group	Microbiology	

REPORT OF ANALYSIS



CFU/100mL CFU/100mL TW5 Water 1129300 2011-12-22 ODWSOG 2011-12-20 TMI PH1236 0 11836 MAC Report Number: Date: Date Submitted: P.O. Number: Project: Matrix: 932884 2011-12-19 TW 5 - WS1 -19/12/11 00000 Sample Date: Sample ID: LAB ID: MRL CFU/100mL CFU/1mL CFU/1mL CFU/100mL UNITS PARAMETER Chain of Custody Number: 150779 Attention: Mr. Robert Passmore 28 Concourse Gate, Unit 1 INVOICE: Paterson Group Inc. Escherichia Coll Heterotrophic Plate Count Client: Paterson Group Nepean, ON Faecal Coliforms Faecal Streptococcus KZE 717 Total Coliforms

MRL = Method Reporting Limit INC = Incomplete AO = Aasthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration Comment:

APPROVAL: Krista Quantili Microbiology Lab Supervisor

Results relate only to the parameters tested on the samples submitted.



Client: Paterson Group		Report Number:		
28 Concourse Cate, Criti		Date: Date Submitted:	2011-12-20	
Nepsan, ON K2E 717		Project:	PH1236	
Attention: Mr. Robert Passmore			90077	
MAZOCE: Determo Gravio Inc.		P.O. Number:	Water	
Chain of Custody Number: 150779		man.v.	GUIDELINE	
Clean of customy womans	LAB ID: 932906			
	Sample Date: 2011-12-19			
	Commission TW5-WS1-		ODWSOG	

Chain of Chatody Number: 150779								GUIDELINE	
Chamital Command in the Command in t		- in Res	932906						
	Semo	۲.	2011-12-19						
	Sar	_	TW5-WS1- 19/12/11					ODWSOG	
							TYPE	LIMIT	UNITS
DADAMETER	SLIND	MRL					50	500	mg/L
	mg/L	2	242				3 8	250	mg/L
Alkalimity as Caco	ma/L	-	8				2	LC:	10.
Chloride	<u>5</u>	7	ιρ				2	,	
Colour	uS/cm	LD.	535				4	ın	mg/L
Conductivity	TION.	0.5	7				2	4	mo/L
Dissolved Organic Carbon	L Com	5	0.14				3 6	2 2	, de
Fluoride	may	0.0	<0.01				ş	3	b
Hydrogen Sulphide	ma/L	0.02	0.04		_		200		mod
N-NH3 (Ammonia)	l cu	10	0.10				2 0	2 9	non.
N-NO2 (Nitrite)		2	010				MAC	10.0	JAN I
N-NO3 (Nitrate)			06.7					0.5-0.0	
H	Com	0.001	100.05				,	002	li cu
Phenois	and the same	-	4				Ş	3	Į,
Sulphate			5					-	
Tannin & Lignin	100	5 -	348				Q	8	Hg/L
Total Dissolved Solids (COND - CALC)	Tight.	- ;	0.00						į
Total Keldahi Ningen	age i	5 6	2 4				MAC	0,1	
Turbidity	OTU	5,	26.0				8	5	mg/L
Hardness as CaCO3	mg/L	- 0	3 :						
lon Balanca			2 2						
Calcium	mgir.	- •	ž						
Magnesium	Ē		ۍ د						
Potassium			\$				Q ·	ZOS ;	J C
Sodium	E I	, 60	5				Q	5.0	mg/L
lion	E :	3 6	44.0				٥ ٧	0.05	Mg/L
Manganese	HQFL	5	<u>:</u>						
							4		
						Į			

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Meximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration Comment:

APPROVIDE WIlson Increased Lab Supervisor

Results relate only to the parameters tested on the samples submitted.

Methods references and/or edditional QA/DC information available on request.

EXOVO Accutest

시 전 전 전 전 전 Age. IN 절 mg/L mg/L mg/L mg/L Water
GUIDELINE 2011-12-28 ODWSOG 6.5-8.5 903 000 5.5 0.0 500 250 5 1.5 0.05 2 6 800 8 1129385 PH1236 11040 MAC BG 222 A S S 8 % S MAC ð ð Date Submitted: Report Number: P.O. Number: Project: Matrix: 46 933064 2011-12-19 TW5-WS2 Sample Date: Sample (D: CAB ID: 1000 0.01 5 0.5 0.1 0.02 0.1 0.02 2-22-1967 1967 1967 1967 1967 mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L mg/L APEN APEN PARAMETER Total Dissolved Sollds (COND - CALC) Chain of Custody Number: 114763 Attention: Mr. Robert Passmore 28 Concourse Gate, Unit 1 INVOICE: Paterson Group Inc. Dissolved Organic Carbon Client: Paterson Group Total Kjeldahi Nitrogen Nepean, ON Hardness as CaCO3 Alkalinity as CaCO3 Hydrogen Sulphide V-NH3 (Ammonla) K2E 717 N-NO2 (Nitrite) N-NO3 (Nitrate) **Fannin & Lignin** Magnesium Potassium ion Balance Conductivity Turbidity Calcium Sulphate Phenols Fluoride Chloride Colour

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

H2S MRL elevated due to sample turbidity.

Manganese

Sodium

Results relate only to the parameters tested on the samples submitted. APPROVAL: (ATT)
Lama Wilson

Inorganic Lab Supervisor

Methods references and/or additional QA/QC information available on request.

Certificate of Analysis



154 Colonnade Rd South Paterson Group Client:

Vepean, ON

Mr. Russell Chown

Attention:

Paterson Group Invoice to:

Page 1 of 2

2016-05-12 2016-05-15 PH 1236 61686 Report Number: Date Submitted: Date Reported: Project: COC #:

1607368

Dear Russell Chown:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692)

Report Comments:

09:04:11 -04'00' Dzeletovic 2016.05.15 Dragana progave proletorie

Dragana Dzeletovic

APPROVAL:

Team Leader, Microbiology

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Exova Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf Exova (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water

Exova (Mississauga) is accredited for specific parameters by SCC, Standards Council of Canada (to ISO 17025)

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Certificate of Analysis

Exova

Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr. Russell Chown

Attention:

Paterson Group Invoice to: PO#:

2016-05-12 2016-05-15 PH 1236 61686 Report Number: Date Submitted: Date Reported: Project: COC #:

1607368

Lab I.D.	1239627	1239628	
Sample Matrix	Water	Water	
Sample Type Sampling Date Sample I.D.	2016-05-11 TW5 WS1	2016-05-11 TW5 WS2	

1239628 Water	2016-05-11 TW5 WS2		2	0	0	0	0
123962 <i>/</i> Water	2016-05-11 TW5 WS1		4	0	0	0	0
Lab I.D. Sample Matrix	Sample Type Sampling Date Sample I.D.	Guideline		MAC-0			MAC-0
		Units	ct/1mL	ct/100mL	ct/100mL	ct/100mL	ct/100mL
		MRL	0	0	0	0	0
		Analyte	Heterotrophic Plate Count	Escherichia Coli	Faecal Coliforms	Faecal Streptococcus	Total Coliforms
		Group	Microbiology	Others			

Certificate of Analysis



2016-05-12 2016-05-19 PH 1236

61686

Project: COC #:

1607381

Report Number: Date Submitted: Date Reported:

154 Colonnade Rd South Paterson Group Client:

Vepean, ON

Mr. Russell Chown Attention:

Paterson Group Invoice to:

Page 1 of 8

Dear Russell Chown:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692)

Report Comments:

Rebecca Koshy 2016.05.19 20:14:30 -04,00

Rebecca Koshy

APPROVAL:

Project Manager

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

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Certificate of Analysis

Exova

Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7 Attention:

Mr. Russell Chown

PO#:

Paterson Group Invoice to:

2016-05-12 2016-05-19 1607381 Report Number: Date Submitted: Date Reported:

PH 1236 61686 Project: COC #:

1239666 Water	2016-05-11 TW5 WS2		262*	1.01	343	250	24	<2	527	1.3	<0.10	<0.10	<0.10	8.16	13	<0.0001	<0.0001	0.01	<0.001	0.05	0.14	<0.0005	82	<0.0001	<0.001	<0.001	0.18	4
1239665 Water	2016-05-11 TW5 WS1		260*	0.98	343	258	21	2	527	1.4	<0.10	<0.10	<0.10	8.21	13								81				*07.0	4
Lab I.D. Sample Matrix	Sample Type Sampling Date Sample I.D.	Guideline	OG-100		AO-500	06-500	AO-250	AO-5		AO-5	MAC-1.5	MAC-1.0	MAC-10.0	6.5-8.5	AO-500	MAC-0.001		06-0.1	IMAC-0.025	IMAC-5.0	MAC-1.0			MAC-0.005	MAC-0.05	AO-1.0	AO-0.3	
		Units	mg/L		mg/L	mg/L	mg/L	TCU	mS/cm	mg/L	mg/L	mg/L	mg/L		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		MRL	_	0.01	_	2	-	2	2	0.5	0.10	0.10	0.10	1.00	-	0.0001	0.0001	0.01	0.001	0.01	0.01	0.0005	_	0.0001	0.001	0.001	0.03	_
		Analyte	Hardness as CaCO3	lon Balance	TDS (COND - CALC)	Alkalinity as CaCO3	ō	Colour	Conductivity	DOC	L	N-NO2	N-NO3	Hd	SO4	Hg	Ag	Al	As	В	Ba	Be	Ca	Cd	ပ်	Cu	Fe	ス
		Group	Calculations			General Chemistry										Mercury	Metals											

Guideline = ODWSOG

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates * = Guideline Exceedence

Results relate only to the parameters tested on the samples submitted. analysis was completed in Mississauga, Ontario).

Methods references and/or additional QA/QC information available on request.

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

Mr. Russell Chown K2E 7T7

Attention:

PO#:

Paterson Group Invoice to:

2016-05-12 2016-05-19 1607381 Report Number: Date Submitted: Date Reported:

PH 1236

61686 Project: COC #:

1239666 Water	2016-05-11 TW5 WS2		14	0.11*	<0.005	15	<0.005	<0.001	<0.0005	<0.001	1.02	<0.0001	<0.001	<0.01	80 ['] 0>	0.1	<0.001	0.05	9'0>	<0.02	<0.1	1.6
1239665 Water	2016-05-11 TW5 WS1		14	0.13*		14										0.1	<0.001	0.05		<0.02	<0.1	6.9 *
Lab I.D. Sample Matrix	Sample Type Sampling Date Sample I.D.	Guideline		AO-0.05		AO-200		MAC-0.010	IMAC-0.006	MAC-0.01			MAC-0.02	AO-5.0	0G-0.15					AO-0.05		AO-5.0
		Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	NTN
		MRL	_	0.01	0.005	2	0.005	0.001	0.0005	0.001	0.001	0.0001	0.001	0.01	0.08	0.1	0.001	0.01	9.0	0.02	0.1	0.1
		Analyte	Mg	Mn	Mo	Na	.IN	Pb	Sb	Se	Ś	L	ח	Zn	Organic Nitrogen	Total Kjeldahl Nitrogen	Phenols	N-NH3	PO4	S2-	Tannin & Lignin	Turbidity
		Group	Metals												Nutrients		Phenols	Subcontract				

Guideline = ODWSOG

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr. Russell Chown

Attention:

Paterson Group Invoice to:

PO#:

1607381 Report Number: Date Submitted: Date Reported:

2016-05-12 2016-05-19 PH 1236

61686

Project: COC #:

QC Summary

4	Analyte	Blank	QC % Rec	QC Limits
Run No 307658	Analysis/Extraction Date 2016-05-13	Analyst	SKH	
Method M SM3120B-3500C	3-3500C			
Calcium		<1 mg/L	102	90-110
Potassium		<1 mg/L	101	87-113
Magnesium		<1 mg/L	101	76-124
Sodium		<2 mg/L	105	82-118
Run No 307679	Analysis/Extraction Date 2016-05-17	16-05-17 Analyst NP	Ь	
Method SM 4110C				
Chloride		<1 mg/L	86	88-112
SO4		<1 mg/L	101	89-110
Run No 307740	Analysis/Extraction Date 2016-05-13	Analyst	KA	
Method EPA 200.8				
Iron		<0.03 mg/L	86	92-107
Manganese		<0.01 mg/L	66	94-106
Run No 307744	Analysis/Extraction Date 2016-05-13	16-05-13 Analyst NP	Р	
Method C SM4500-NO3-F	NO3-F			
N-NO2		<0.10 mg/L	110	80-120
N-NO3		<0.10 mg/L	87	80-120

Guideline = ODWSOG

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates * = Guideline Exceedence

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Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr. Russell Chown Attention:

PO#:

Paterson Group Invoice to:

1607381 Report Number: Date Submitted: Date Reported:

2016-05-12 2016-05-19

PH 1236 61686 Project: COC #:

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 307769 Analysis/Extraction Date 2016-05-14	Analyst	K A	
Method M SM3112B-3500B			
Mercury	<0.0001 mg/L	66	76-123
Run No 307866 Analysis/Extraction Date 2016-05-16	Analyst	AET	
Method C SM4500-H+B			
Alkalinity (CaCO3)	<5 mg/L	105	90-110
Conductivity	<5 uS/cm	66	90-110
ш	<0.10 mg/L	93	90-110
Hd	6.29	99	90-110
Run No 307867 Analysis/Extraction Date 2016-05-17	Analyst	AET	
Method C SM2120C			
Colour	<2 TCU	100	80-120
Run No 307899 Analysis/Extraction Date 2016-05-17	Analyst	AET	
Method C SM5310C			
DOC	<0.5 mg/L	101	84-116
Run No 307908 Analysis/Extraction Date 2016-05-18	Analyst	KA	
Method EPA 200.8			
Silver	<0.0001 mg/L	26	94-106
Aluminum	<0.01 mg/L	101	89-111

Guideline = ODWSOG

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates * = Guideline Exceedence

Methods references and/or additional QA/QC information available on request. analysis was completed in Mississauga, Ontario). Results relate only to the parameters tested on the samples submitted.

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr. Russell Chown Attention:

PO#:

Paterson Group Invoice to:

1607381 Report Number: Date Submitted: Date Reported:

2016-05-12 2016-05-19

PH 1236 61686

Project: COC #:

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Arsenic	<0.001 mg/L	101	93-106
Boron (total)	<0.01 mg/L	104	88-112
Barium	<0.01 mg/L	104	91-109
Beryllium	<0.0005 mg/L	26	93-107
Cadmium	<0.0001 mg/L	101	93-107
Chromium Total	<0.001 mg/L	86	94-106
Copper	<0.001 mg/L	66	93-106
Iron	<0.03 mg/L	102	92-107
Manganese	<0.01 mg/L	100	94-106
Molybdenum	<0.005 mg/L	103	94-106
Nickel	<0.005 mg/L	100	94-106
Pead	<0.001 mg/L	104	70-130
Antimony	<0.0005 mg/L	96	80-120
Selenium	<0.001 mg/L	103	91-108
Strontium	<0.001 mg/L	103	89-110
Thallium	<0.0001 mg/L	101	95-105
Uranium	<0.001 mg/L	103	94-106
Zinc	<0.01 mg/L	101	94-106

Guideline = ODWSOG

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates * = Guideline Exceedence

Methods references and/or additional QA/QC information available on request. Results relate only to the parameters tested on the samples submitted. analysis was completed in Mississauga, Ontario).

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

Mr. Russell Chown

K2E 7T7

Attention:

PO#:

Paterson Group Invoice to:

1607381 Report Number: Date Submitted: Date Reported:

2016-05-12 2016-05-19 PH 1236

61686 Project: COC #:

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 308060 Analysis/Extraction Date 2016-05-16	Analyst	AET	
Method SUBCONTRACT P-INORG			
N-NH3	<0.01 mg/L	105	
Phenols	<0.001 mg/L		69-132
S2-	<0.02 mg/L	98	
Tannin & Lignin	<0.1 mg/L	100	
Total Kjeldahl Nitrogen	<0.1 mg/L	95	81-126
Turbidity	<0.1 NTU		
Run No 308156 Analysis/Extraction Date 2016-05-13	Analyst	ЯК	
Method SUBCONTRACT P-INORG			
PO4			
Run No 308159 Analysis/Extraction Date 2016-05-19	Analyst	ЯК	
Method C Ion Balance			
lon Balance			
Method C SM2340B			
Hardness as CaCO3			
Method C SM2540			
TDS (COND - CALC)			
Method C SM4500-Norg-C			

Guideline = ODWSOG

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates * = Guideline Exceedence

Methods references and/or additional QA/QC information available on request. analysis was completed in Mississauga, Ontario). Results relate only to the parameters tested on the samples submitted.

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

Mr. Russell Chown K2E 7T7

Attention:

PO#:

Paterson Group Invoice to:

1607381 Report Number: Date Submitted: Date Reported:

2016-05-12 2016-05-19

PH 1236 61686 Project: COC #:

QC Summary

REPORT OF ANALYSIS



9ML 1128213 2011-12-19 2011-12-16 PH1236 11636 Water Report Number: Date: Date Submitted: P.O. Number: Matrix: Project: INVOICE: Paterson Group Inc. Chain of Custody Number: 141380 Client: Paterson Group 28 Concourse Gate, Unit 1 Attention: Mr. Robert Passmore Nepean, ON K2E 7T7

MRL	MRL 0 0 MAC MAC MAC 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Chain of Custody Number: 141380
MRL 0 0 MAC 0 0 MAC 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	MRL 0 0 MAC 0 MAC 0 0 MAC 0 MAC 0 0 MAC 0 MAC 0 0 MAC 0 0 MAC 0	Sa
MRL	MRL 0 0 MAC 0 0 MAC 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	æ
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MRL = Nethod Reporting Limit INC = Incomplete AO = Assthatic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration Comment:

APPROVAL:

(A) Microbiology Lab Supervitor

Results relate only to the perserviers tested on the samples submitted.



TCU TIES はなる A P 五百 智量 Mon Water 2011-12-21 2011-12-17 ODWSOG 6.5-8.5 0.03 1.0 5 1.5 0.05 8 5 8 읈 PH1236 250 1129218 11636 MAC 8 8 8 8 8 A A O MAC 2 2 2 ð ð Date Submitted: Report Number: P.O. Number: Project: Matrix: Z011-12-17 TW6-22hr-17/12/11 932640 285 108 11 991 0.9 1.00 <0.01 6.10 6.10 6.3 6.00 6.10 6.3 70 1.06 1.06 Sample Date: Sample ID: LABID 2000 0.01 5 0.05 0.01 0.01 0.01 mg/L TCU US/cm mg/L mg/L mg/L PARAMETER Total Dissolved Solids (COND - CALC) Chain of Custody Number: 150750 28 Concourse Gale, Unit 1 Attention: Mr. Robert Passmore INVOICE: Paterson Group Inc. Dissolved Organic Carbon Client: Paterson Group otal Kjeldahl Nitrogen Nepean, ON **Jardness as CaCO3** Alkalinity as CaCO3 N-NH3 (Ammonia) N-NO2 (Nitrite) N-NO3 (Nitrata) Hydrogen Sulphide KZE TT7 Fannin & Lignin on Balance Conductivity Aagnesium Manganese Potassium **Furbidity** Sulphate Sodium Fluoride Calcium Phenois Chloride

MRL = Method Reporting Limit INC = Incomplete AO * Assthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration Comment: APPROVAL:

Loma Wilson
Inorganic Lab Supervisor

Results relate only to the parameters tested on the samples submitted.



KOE 7T7							Date: Date Submitted:	N 61	2009-12-08	
							Project:	•	PH1236	
Attention: Mr. Kobert Fessions INVOICE: Paterson Group Inc.						17	P.O. Number: Matrix:		7875 Water	
Chain of Custody Number: 105473		2 04	785035	765936					GUIDELINE	
	TAB ID.		00-12-08	2009-12-08	1					
	Sample Date:		HW WS1	HW WS2					ODWSOG	
		_						TYPE	LIMIT	UNITS
DARAMETER	NITS	MRL			+			MAC	0	CFU/100mL
Escherichia Coli Heterotrophic Plate Count Faecal Coliforms Faecal Streptococcus	CFU/100mL CFU/100mL CFU/100mL			700						

Comment:

APPROVAL: Krista Quantrill

Drinking Water Coordinator

Results relate only to the parameters tested on the samples submitted.

1 of 1

REPORT OF ANALYSIS

Exova | | ·

Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON KZE 717

INVOICE: Paterson Group Inc. Chain of Custody Number: 105473

Attention: Mr. Robert Passmore

Report Number:
Date:
Date Submitted:
Project:
P.O. Number:

PH1236

2930081 2009-12-09 2009-12-08

P.O. Number: 7875 Matrix: Water

Chain of Custody Number: 105473						Matrix:		Water	
		LABID:	765939	765940		7		GUIDELINE	
	Sami	Sample Date:	2009-12-08	2009-12-08					
	. R	Sample ID:	HW WS1	HW WSZ				ODWSOG	
PARAMETER	UNITS	MR					TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	2	257	258			90	200	mg/L
Chloride	mg/L	-	24	25			Q V	250	mg/L
Colour	한	2	7	8			QV	ĸ	TCU
Conductivity	uS/cm	S	280	587					ľ
Dissolved Organic Carbon	mg/L	0.5	1.6	1.3			ΑO	ເດ	mg/L
Fluoride	mg/L	0.1	0.11	0.11			MAC	ر. تن	mg/L
Hydrogen Sulphide	mg/L	0.0	90:0	0.01			90	0.05	шд∕Г
N-NH3 (Ammonia)	mg/L	0.02	<0.02	90:0					
N-NO2 (Nitrite)	mg/L	0.1	<0.10	<0.10			MAC	1.0	mg/L
N-NO3 (Nitrate)	щg/L	0.1	<0.10	0.10			MAC	10.0	mg/L
H			7.74	7.76				6.5-8.5	
Phenois	mg/L	0.001	<0.001	<0.001					
Sulphate	mg/L	-	19	20			Q V	200	mg/L
Tannin & Lignin	mg/L	0.1	£0.1	0.1					
Total Dissolved Solids (COND - CALC)	mg/L	ıo	377	382			A O	200	mg/L
Totał Kjeldahl Nitrogen	mg/L	0.1	01.0	<0.10					
Turbidity	Ę	0.1	15.1	6.7			MAC	0; 0:	Ē
Hardness as CaCO3	mg/L	-	274	277			ဗ	100	mg/L
Ion Balance	·	0.0	0.92	0.92					
Calcium	твЛ	-	8	9					
Magnesium	тgЛ	-	12	12					
Potassium	mg/L	_	2	8					Ì
Sodium	твЛ	~	4	4			Q Q	200	mg/L
not light	mg/L	0.03	0.78	0.50			ð	0.3	mg/L
Manganese	mg/L	0.01	0.04	0.04			Q Q	0.05	mg/L

MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration Comment:

APPROVAL:
Ewan McRobbe
Inorganic Lab Supervisor

OFFSITE WELLS + TW6

Certificate of Analysis



154 Colonnade Rd South Paterson Group Client:

Vepean, ON

Mr. Russell Chown Attention:

Paterson Group Invoice to:

Page 1 of 2

1611722 Report Number: Date Submitted: Date Reported: Project: COC #:

2016-07-11 PH1236 2016-07-09 56558

Dear Russell Chown:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692)

Report Comments:

10:21:24 -04'00' Krista Quantrill 2016.07.11

Krista Quantrill

APPROVAL:

Laboratory Supervisor, Microbiology

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Exova Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf Exova (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water

Exova (Mississauga) is accredited for specific parameters by SCC, Standards Council of Canada (to ISO 17025)

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Exova recommends consulting the official provincial or federal guideline as required.

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr. Russell Chown Attention:

PO#:

Paterson Group

Invoice to:

2016-07-09 1611722 Date Submitted: Date Reported: Report Number:

2016-07-11 PH1236

56558 Project: COC #:

1249955 Water 2016-07-07 1865 Willhaven Dr.		196	0	0	0
1249954 Water - 2016-07-07 1753 Willhaven Dr.		39	0	0	0
Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	Guideline		MAC-0		
	Units	ct/1mL	ct/100mL	ct/100mL	ct/100mL
	MRL	0	0	0	0
	Analyte	Heterotrophic Plate Count	Escherichia Coli	Faecal Coliforms	Faecal Streptococcus
	Group	Microbiology	Others		

+

0 2,

MAC-0

ct/100mL ct/100mL

Total Coliforms

0

Certificate of Analysis



154 Colonnade Rd South Paterson Group Client:

Vepean, ON

Mr. Russell Chown Attention:

Paterson Group Invoice to:

Page 1 of 6

Report Number: Date Submitted: Date Reported: Project: COC #:

2016-07-18 PH1236 56558

2016-07-09 1611723

Dear Russell Chown:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692)

Report Comments:

Shyla Monette 2016.07.18 15:23:54-04'00'

APPROVAL:

Team Leader, Inorganics Shyla Monette

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Exova Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf Exova (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests

Exova (Mississauga) is accredited for specific parameters by SCC, Standards Council of Canada (to ISO 17025)

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Certificate of Analysis

Exova

Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr. Russell Chown Attention:

Paterson Group Invoice to: PO#:

2016-07-09 2016-07-18 1611723 Report Number: Date Submitted: Date Reported:

PH1236

56558 Project: COC #:

1249958 Water	2016-07-09 TW6-WS		98	0.95	*265	296	94	<2	919	1.0	0.68	<0.10	0.12	8.27	61	4.6	21	0.10	5	11	<0.01	168	0.3	<0.001	0.25	<0.02	<0.1
1249957 Water	2016-07-07 1865 Willhaven Dr.		452*	76.0	793*	347	153	က	1220	2.8	0.11	<0.10	2.23	7.83	85	0.3	135	0.03	2	28	<0.01	84	0.3	<0.001	0.11	<0.02	<0.1
1249956 Water	2016-07-07 1753 Willhaven Dr.		288*	96.0	344	273	16	က	529	2.0	<0.10	<0.10	09'0	7.86	16	0.5	107	90.0		5	<0.01	6	<0.1	<0.001	0.03	<0.02	<0.1
Lab I.D. Sample Matrix	Sample Type Sampling Date Sample I.D.	Guideline	OG-100		AO-500	OG-200	AO-250	AO-5		AO-5	MAC-1.5	MAC-1.0	MAC-10.0	6.5-8.5	AO-500	AO-5.0		AO-0.3			AO-0.05	AO-200				AO-0.05	
		Units	mg/L		mg/L	mg/L	mg/L	TCU	nS/cm	mg/L	mg/L	mg/L	mg/L		mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
		MRL	_	0.01	_	2	_	2	2	0.5	0.10	0.10	0.10	1.00	_	0.1	~	0.03	_	_	0.01	2	0.1	0.001	0.01	0.02	0.1
		Analyte	Hardness as CaCO3	lon Balance	TDS (COND - CALC)	Alkalinity as CaCO3	Ō	Colour	Conductivity	DOC	Ш	N-NO2	N-NO3	Hd	SO4	Turbidity	Ca	Fe	ス	Mg	Mn	Na	Total Kjeldahl Nitrogen	Phenols	N-NH3	S2-	Tannin & Lignin
		Group	Calculations			General Chemistry											Metals						Nutrients	Phenols	Subcontract		

Guideline = ODWSOG

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates * = Guideline Exceedence

Methods references and/or additional QA/QC information available on request. Results relate only to the parameters tested on the samples submitted. analysis was completed in Mississauga, Ontario).

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

Mr. Russell Chown Attention:

K2E 7T7

PO#:

Paterson Group

Invoice to:

1611723 Report Number: Date Submitted: Date Reported:

2016-07-09 2016-07-18

PH1236 56558

Project: COC #:

QC Summary

Ar	Analyte	Blank	QC % Rec	QC Limits
Run No 311052	Analysis/Extraction Date 2016-07-11	Analyst	AET	
Method C SM2130B				
Turbidity		UTN 1.0>	100	70-130
Run No 311088	Analysis/Extraction Date 2016-07-11	Analyst	NP	
Method C SM4500-NO3-F	03-F			
N-NO2		<0.10 mg/L	100	80-120
N-NO3		<0.10 mg/L	26	80-120
Run No 311122	Analysis/Extraction Date 2016-07-12	Analyst	AET	
Method C SM2120C				
Colour		<2 TCU	100	90-110
Run No 311149	Analysis/Extraction Date 2016-07-12	Analyst	SKH	
Method M SM3120B-3500C	:3500C			
Calcium		<1 mg/L	96	90-110
Potassium		<1 mg/L	101	87-113
Magnesium		<1 mg/L	94	76-124
Sodium		<2 mg/L	100	82-118
Run No 311182	Analysis/Extraction Date 2016-07-12	Analyst	NP	
Method C SM4500-NO3-F	O3-F			

Guideline = ODWSOG

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Methods references and/or additional QA/QC information available on request. analysis was completed in Mississauga, Ontario). Results relate only to the parameters tested on the samples submitted.

Certificate of Analysis



Paterson Group Client:

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Mr. Russell Chown

Attention:

Invoice to: PO#:

Paterson Group

1611723 Report Number: Date Submitted: Date Reported:

2016-07-09 2016-07-18 PH1236

56558

Project: COC #:

QC Summary

Analyte	Blank	QC % Rec	QC Limits
N-NO2	<0.10 mg/L	100	80-120
N-NO3	<0.10 mg/L	97	80-120
Run No 311211 Analysis/Extraction Date 2016-07-12	Analyst	AET	
Method C SM4500-H+B			
Alkalinity (CaCO3)	7/bm 5>	103	90-110
Conductivity	<5 uS/cm	66	90-110
Ш	<0.10 mg/L	103	90-110
Hd	6.02	66	90-110
Run No 311264 Analysis/Extraction Date 2016-07-12	16-07-12 Analyst NP	Ь	
Method SM 4110			
Chloride	<1 mg/L	101	90-110
804	<1 mg/L	103	90-110
Run No 311270 Analysis/Extraction Date 2016-07-11	Analyst	AET	
Method SUBCONTRACT P-INORG			
N-NH3	<0.01 mg/L	66	
Phenols	<0.001 mg/L	96	69-132
S2-	<0.02 mg/L	102	
Tannin & Lignin	<0.1 mg/L	110	
Total Kjeldahl Nitrogen	<0.1 mg/L	96	81-126

Guideline = ODWSOG

* = Guideline Exceedence

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates

Methods references and/or additional QA/QC information available on request. analysis was completed in Mississauga, Ontario). Results relate only to the parameters tested on the samples submitted.

Certificate of Analysis



2016-07-09 2016-07-18

Report Number: Date Submitted: Date Reported:

PH1236 56558

Project: COC #:

1611723

Client: Paterson Group

154 Colonnade Rd South

Nepean, ON

K2E 7T7

Attention: Mr. Russell Chown

PO#:

Invoice to: Paterson Group

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 311287 Analysis/Extraction Date 2016-07-13	116-07-13 Analyst KA	Y >	
Method EPA 200.8			
lron	<0.03 mg/L	101	92-107
Manganese	<0.01 mg/L	96	94-106
Run No 311340 Analysis/Extraction Date 2016-07-14	116-07-14 Analyst SCM	CM	
Method C SM5310C			
DOC	<0.5 mg/L	94	84-116
Run No 311491 Analysis/Extraction Date 2016-07-18	116-07-18 Analyst SCM	CM	
Method C Ion Balance			
lon Balance			
Method C SM2340B			
Hardness as CaCO3			
Method C SM2540			
TDS (COND - CALC)			

Hydrogeological and Terrain Analysis



Proposed Rural Residential Subdivision 1730 Wilhaven Drive, Cumberland, Ontario

Appendix 4

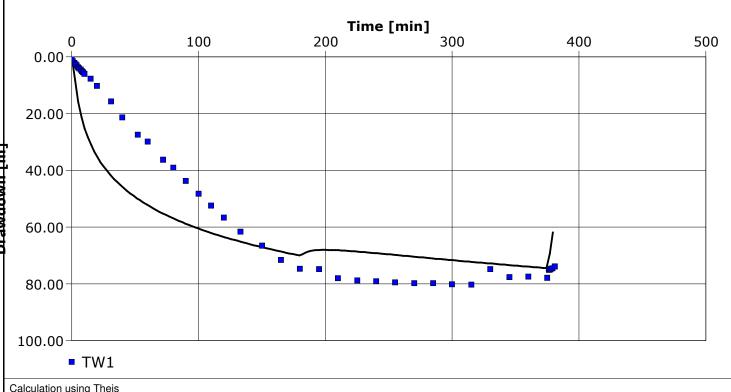
- Aquifer Analysis
- Well Interference Model
- LSI-RSI Calculations
- Nitrate Impact Assessment Calculations
- Offsite Well Owner Interviews

Paterson Group Hydrogeology 154 Colonnade Road South Ottawa, ON, K2E 7J5

Pumping Test Analysis Report
Project: Wilhaven
Number: PH1236

Location: Cumberland, ON	Pumping Test: Pumping Test of TW1	Pumping Well: TW1		
Test Conducted by: RAP		Test Date: 01/02/2016		
Analysis Performed by:	Theis (linear)	Analysis Date: 01/02/2016		
Aquifer Thickness: 146.00 m	Discharge: variable, average rate 0.1796 [l/s]			

Client: F. Farsi

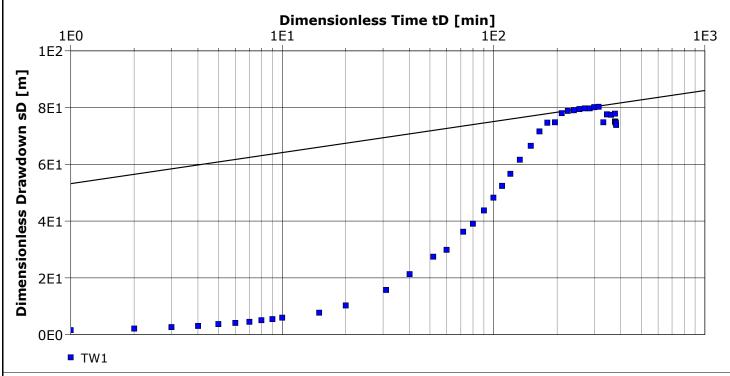


Calculation asing Theis					
Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW1	7.98 × 10 ⁻²	5.47 × 10 ⁻⁴		0.03	
1					

Pumping Test Analysis Report
Project: Wilhaven
Number: PH1236
Client: F. Farsi

Location: Cumberland, ON	Pumping Test: Pumping Test of TW1	Pumping Well: TW1	
Test Conducted by: RAP		Test Date: 01/02/2016	
Analysis Performed by:	Cooper Jacob I	Analysis Date: 14/03/2016	
A (D' 1 0 4700 IV 1		

Aquifer Thickness: 146.00 m Discharge: variable, average rate 0.1796 [l/s]



Calculation using COOPER & JACOB

Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW1	2.59 × 10 ⁻¹	1.78 × 10 ⁻³		0.03	

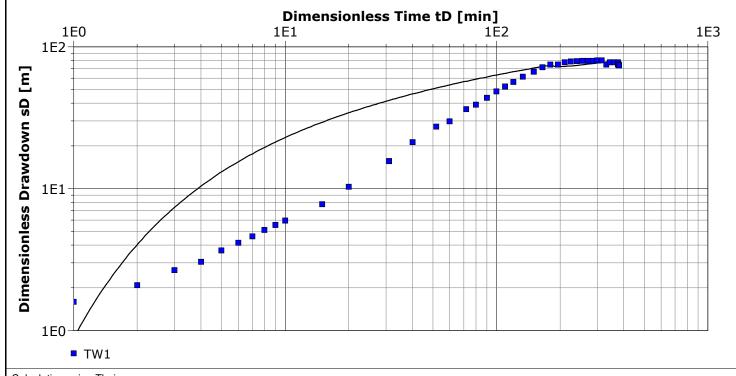
Pumping Test Analysis Report

Project: Wilhaven

Number: PH1236

Client: F. Farsi

Location: Cumberland, ON	Pumping Test: Pumping Test of TW1	Pumping Well: TW1	
Test Conducted by: RAP		Test Date: 01/02/2016	
Analysis Performed by:	Theis (log-log)	Analysis Date: 19/07/2016	
Aquifer Thickness: 146.00 m	Discharge: variable, average rate 0.1796 [l/s]		



Calculation usi	ing Theis
-----------------	-----------

Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW1	6.90 × 10 ⁻²	4.73 × 10 ⁻⁴		0.03	

Pumping Test Analysis Report
Project: Wilhaven
Number: PH1236

				-	Client: F	. Farsi				
Location: Cumberland, ON Pumping Test: Po				mping Test: Pumping Test of TW1 Pumping Well: TW1						
Test Conducted by: RAP							Test Da	te: 01/02/20	16	
Aquifer Thickness: 146.00 m			Discharge: variable, average rate 0.1796 [l/s]							
	Analysis Name	Analysis Performed by	Analysis Date	Method n	d name Well T [m²/d] K [m		K [m/d]	S		
1	Theis (linear)		01/02/2016	Theis		TW1		7.98 × 10 ⁻²	5.47 × 10 ⁻⁴	
2	Cooper Jacob I		14/03/2016	Cooper &	per & Jacob I TW1			2.59 × 10 ⁻¹	1.78 × 10 ⁻³	
3	Theis (log-log)		19/07/2016	Theis	TW1		6.90 × 10 ⁻²	4.73 × 10 ⁻⁴		
Average						1.36 × 10 ⁻¹	9.32 × 10 ⁻⁴			

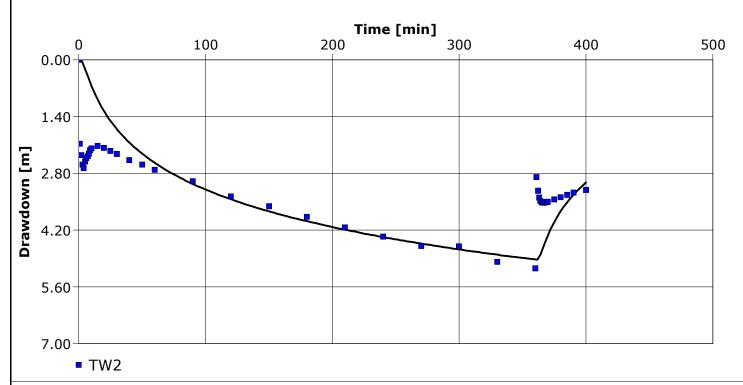
Pumping Test Analysis Report

Project: 1370 Wilhaven

Number: PH1236
Client: F. Farsi

Location: Cumberland, ON	Pumping Well: TW2	
Test Conducted by: RAP		Test Date: 01/02/2016
Analysis Performed by:	Theis	Analysis Date: 01/02/2016

Aquifer Thickness: 104.00 m Discharge: variable, average rate 0.31 [l/s]



Calculation using Theis

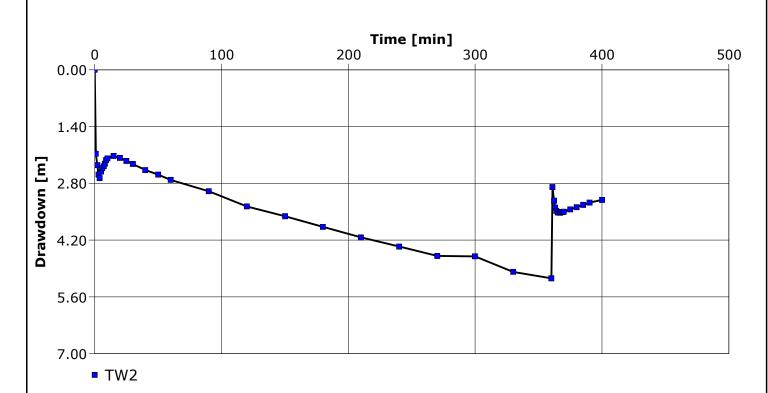
Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW2	1.53 × 10 ⁰	1.47 × 10 ⁻²		0.03	

Pumping Test Analysis Report				
Project: 1370 Wilhaven				
Number: PH1236				

Client: F	. Farsi
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Location: Cumberland, ON Pumping Test: Pumping Test of TW2		Pumping Well: TW2
Test Conducted by: RAP		Test Date: 01/02/2016
Analysis Performed by:	Time-Drawdown	Analysis Date: 01/02/2016
A '(TI' 404.00	D' 1 0 04 II/ 1	

Aquifer Thickness: 104.00 m Discharge: variable, average rate 0.31 [l/s]



Pumping Test Analysis Report

Project: 1370 Wilhaven

F. Farsi

Number: PH1236

Client:

 Location: Cumberland, ON
 Pumping Test: Pumping Test of TW2
 Pumping Well: TW2

 Test Conducted by: RAP
 Test Date: 01/02/2016

Aquifer Thickness: 104.00 m Discharge: variable, average rate 0.31 [l/s]

L									
Ī		Analysis Name	Analysis Performed by	Analysis Date	Method name	Well	T [m²/d]	K [m/d]	S
I	1	Theis		01/02/2016	Theis	TW2	1.53×10^{0}	1.47 × 10 ⁻²	

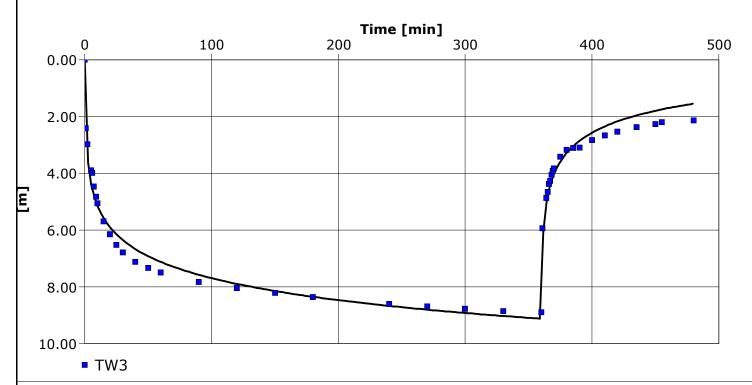
Pumping Test Analysis Report

Project: 1730 Wilhaven

Number: PH1236 Client: F. Farsi

Location: Cumberland, ON	Pumping Well: TW3	
Test Conducted by: RAP		Test Date: 01/02/2016
Analysis Performed by:	Theis (linear)	Analysis Date: 01/02/2016

Aquifer Thickness: 128.00 m Discharge: variable, average rate 0.25 [l/s]



Calculation using Theis

Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW3	1.54 × 10 ⁰	1.20 × 10 ⁻²		0.03	

Pumping Test Analysis Report

Project: 1730 Wilhaven

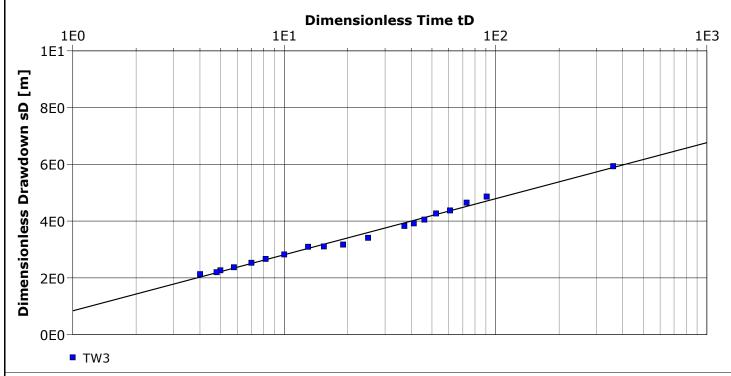
F. Farsi

Number: PH1236

Client:

Location: Cumberland, ON	Pumping Well: TW3	
Test Conducted by: RAP		Test Date: 01/02/2016
Analysis Performed by:	Theis RECOVERY	Analysis Date: 01/02/2016
,	Theis RECOVERY	

Aquifer Thickness: 128.00 m Discharge: variable, average rate 0.25 [l/s]



Calculation using THEIS & JACOB

Observation Well	Transmissivity	Hydraulic Conductivity	Radial Distance to PW	
	[m²/d]	[m/d]	[m]	
TW3	2.00 × 10 ⁰	1.56 × 10 ⁻²	0.03	

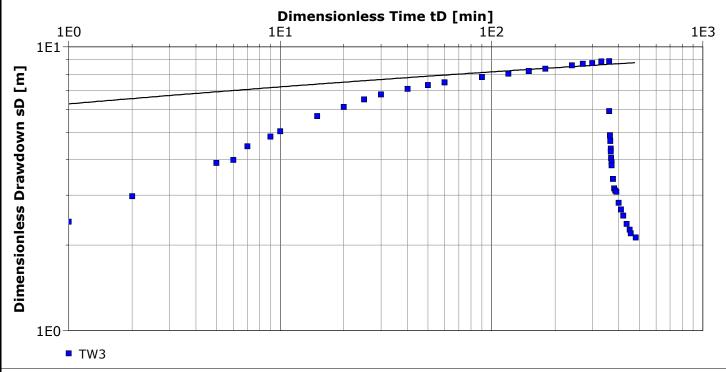
Pumping Test Analysis Report

Project: 1730 Wilhaven
Number: PH1236

Client: F. Farsi

Location: Cumberland, ON	Pumping Well: TW3		
Test Conducted by: RAP	Test Date: 01/02/2016		
Analysis Performed by:	Theis (log-log)	Analysis Date: 19/07/2016	

Aquifer Thickness: 128.00 m Discharge: variable, average rate 0.25 [l/s]



Calculation using Theis

Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW3	1.53 × 10 ⁰	1.19 × 10 ⁻²		0.03	

Pumping Test Analysis Report
Project: 1730 Wilhaven
Number: PH1236

Client: F. Farsi

Test Conducted by: RAP		Test Date: 01/02/2016
Location: Cumberland, ON	Pumping Test: Pumping Test of TW3	Pumping Well: TW3

103	rest conducted by. Fini					esi Dai	6.01/02/20	10	
Αqι	uifer Thickness: 128.0	ness: 128.00 m Discharge: variable, average rate 0.25 [l/s]			0.25 [l/s]				
	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well		T [m²/d]	K [m/d]	S
1	Theis (linear)		01/02/2016	Theis	TW3		1.54×10^{0}	1.20 × 10 ⁻²	
2	Theis RECOVERY		01/02/2016	Theis Recovery	TW3		2.00×10^{0}	1.56 × 10 ⁻²	
3	Theis (log-log)		19/07/2016	Theis	TW3		1.53 × 10 ⁰	1.19 × 10 ⁻²	
					A	verage	1.69 × 10 ⁰	1.32 × 10 ⁻²	

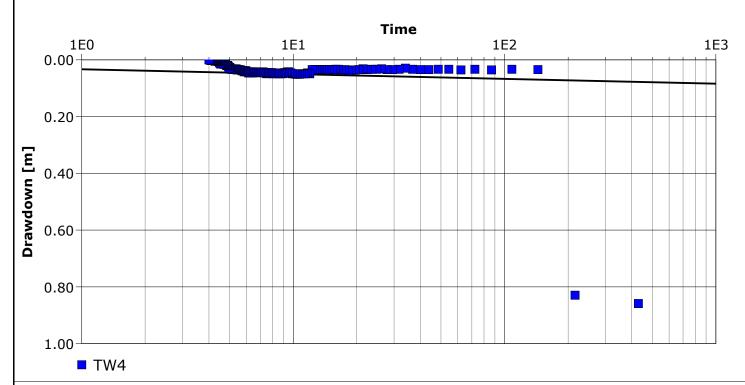
Pumping Test Analysis Report

Project: Wilhaven

Number: PH1236

Client: Fred Farsi

Location: Cumberland ON	Pumping Test: Pumping Test 1	Pumping Well: TW4		
Test Conducted by: AO		Test Date: 12/06/2015		
Analysis Performed by: Theis RECOVERY		Analysis Date: 02/11/2015		
Aquifer Thickness: 2.50 m	Discharge: variable, average rate 1.7451 [l/s]			



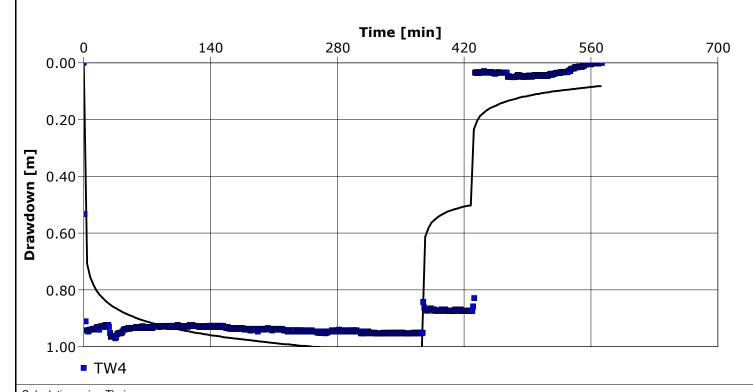
Calculation using THEIS & JACOB

Observation Well	Transmissivity	Hydraulic Conductivity	Radial Distance to PW	
	[m²/d]	[m/d]	[m]	
TW4	1.62 × 10 ³	6.48 × 10 ²	0.25	

Pumping Test Analysis Report		
Project: Wilhaven		
Number: PH1236		

Location: Cumberland ON	Pumping Test: Pumping Test 1	Pumping Well: TW4
Test Conducted by: AO		Test Date: 12/06/2015
Analysis Performed by:	Theis (linear)	Analysis Date: 19/07/2016
Aquifer Thickness: 2.50 m	Discharge: variable, average rate 1.7451 [l/s]	

Client: Fred Farsi

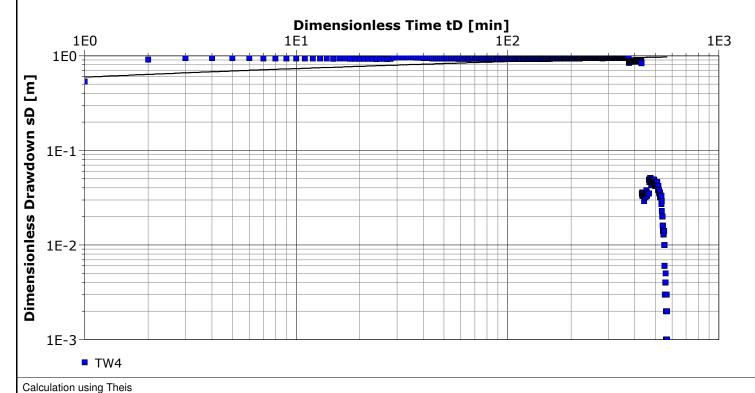


Calculation using Theis							
Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW			
	[m²/d]	[m/d]		[m]			
TW4	1.89 × 10 ²	7.56 × 10 ¹		0.25			

Pumping Test Analysis Report	
Project: Wilhaven	
Number: PH1236	

Location: Cumberland ON	Pumping Test: Pumping Test 1	Pumping Well: TW4
Test Conducted by: AO		Test Date: 12/06/2015
Analysis Performed by:	Theis (log-log)	Analysis Date: 19/07/2016
Aquifer Thickness: 2.50 m	Discharge: variable, average rate 1.7451 [l/s]	

Client: Fred Farsi



		·								
Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW						
	[m²/d]	[m/d]		[m]						
TW4	8.64 × 10 ¹	3.46 × 10 ¹		0.25						

Paterson Group
Hydrogeology
154 Colonnade Road South
Ottawa, ON, K2E 7J5

Project: Wilhaven
Number: PH1236
Client: Fred Farsi

Location: Cumberland ON
Pumping Test: Pumping Test 1
Pumping Well: TW4

Test Conducted by: AO					Test Da	te: 12/06/20	15		
Aquifer Thickness: 2.50 m			Discharge: variable, average rate 1.7451 [l/s]						
	Analysis Name	Analysis Performed by	d by Analysis Date Method name Well T [m²/d] K [m/d] S					S	
1	Theis RECOVERY		02/11/2015	Theis Recovery	TW4		1.62 × 10 ³	6.48 × 10 ²	
2	Theis (linear)		19/07/2016	Theis	TW4		1.89 × 10 ²	7.56 × 10 ¹	
3	Theis (log-log)		19/07/2016	Theis	TW4		8.64 × 10 ¹	3.46 × 10 ¹	
	Average						6.32 × 10 ²	2.53 × 10 ²	

Pumping Test Analysis Report	
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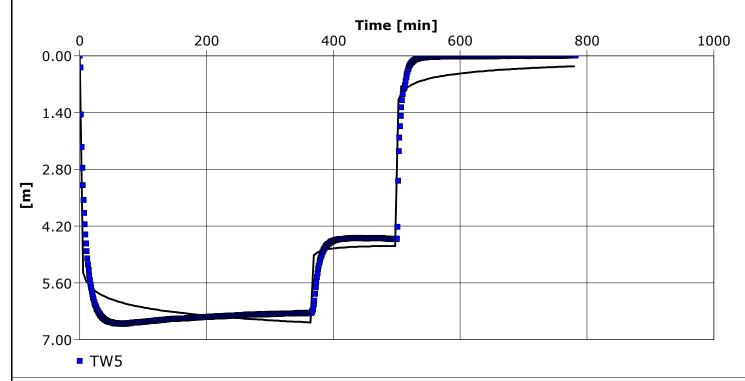
Project: Wilhaven - pumping test TW5

Number: PH1236

Client: Fred Farsi

Location: 1730 Wilhaven Drive	Pumping Test: Pumping Test 1	Pumping Well: TW5
Test Conducted by: MM		Test Date: 11/05/2016
Analysis Performed by:	Theis (linear)	Analysis Date: 12/05/2016

Aquifer Thickness: 15.24 m Discharge: variable, average rate 0.32046 [l/s]



Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW5	8.36 × 10 ⁰	5.49 × 10 ⁻¹		0.07	

Pumping Test Analysis Report

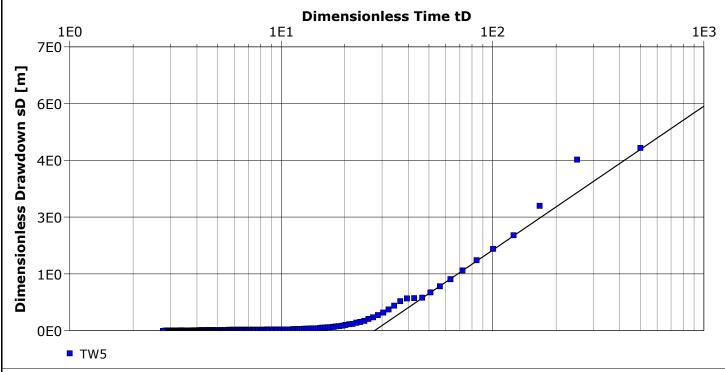
Project: Wilhaven - pumping test TW5

Number: PH1236

Client: Fred Farsi

Test Date: 11/05/2016
Analysis Date: 25/05/2016
_

Aquifer Thickness: 15.24 m Discharge: variable, average rate 0.32046 [l/s]



Calculation using THEIS & JACOB

Observation Well	Transmissivity	Hydraulic Conductivity	Radial Distance to PW	
	[m²/d]	[m/d]	[m]	
TW5	1.43 × 10 ⁰	9.36 × 10 ⁻²	0.07	

Pumping Test Analysis Report

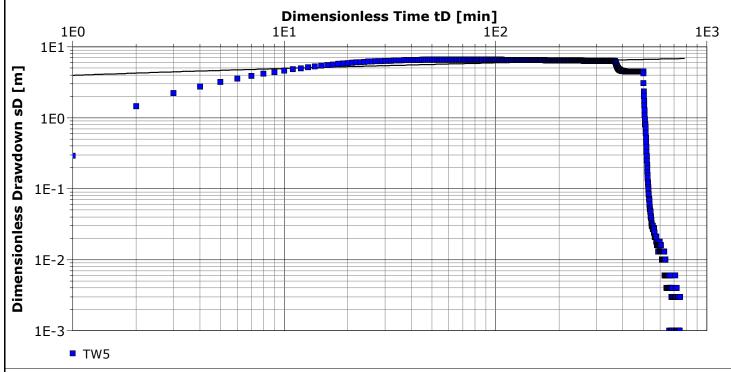
Project: Wilhaven - pumping test TW5

Number: PH1236

Client: Fred Farsi

Location: 1730 Wilhaven Drive	Pumping Test: Pumping Test 1	Pumping Well: TW5
Test Conducted by: MM		Test Date: 11/05/2016
Analysis Performed by:	Theis (log-log)	Analysis Date: 19/07/2016

Aquifer Thickness: 15.24 m Discharge: variable, average rate 0.32046 [l/s]



Calculation using Theis

Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW5	2.56 × 10 ⁰	1.68 × 10 ⁻¹		0.07	

Pumping Test Analysis Report

Project: Wilhaven - pumping test TW5

Number: PH1236

Fred Farsi

Client:

Location: 1730 Wilhaven Drive Pumping Test: Pumping Test 1 Pumping Well: TW5

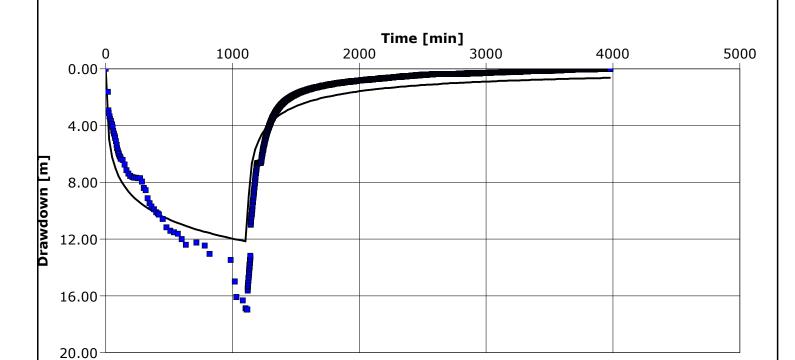
Test Conducted by: MM Test Date: 11/05/2016

Aquifer Thickness: 15.24 m Discharge: variable, average rate 0.32046 [l/s]

	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well	T [m²/d]	K [m/d]	S
1	Theis (linear)		12/05/2016	Theis	TW5	8.36 × 10 ⁰	5.49 × 10 ⁻¹	
2	Theis RECOVERY		25/05/2016	Theis Recovery	TW5	1.43 × 10 ⁰	9.36 × 10 ⁻²	
3	Theis (log-log)		19/07/2016	Theis	TW5	2.56 × 10 ⁰	1.68 × 10 ⁻¹	
					Average	4.11 × 10 ⁰	2.70 × 10 ⁻¹	

Pump	ing Test Analysis Report
Project	t: Wilhaven
Numbe	er: PH1236
Client:	Fred Farsi

Location: 1730 Wilhaven Drive, Cumberland,	@Mmping Test: Pumping Test 1	Pumping Well: TW6
Test Conducted by: MM and RLC		Test Date: 08/07/2016
Analysis Performed by:	Theis (linear)	Analysis Date: 19/07/2016
Aquifer Thickness: 63.00 m	Discharge: variable, average rate 0.046 [l/s]	



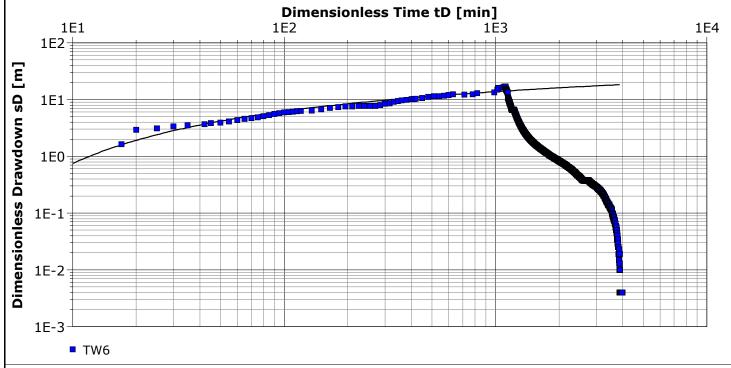
Calculation	usina	Theis

■ TW6

Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW6	1.63 × 10 ⁻¹	2.59 × 10 ⁻³		0.07	

Pumping Test Analysis Report
Project: Wilhaven
Number: PH1236
Client: Fred Farsi

Location: 1730 Wilhaven Drive, Cumberland	, ⊕∖ mping Test: Pumping Test 1	Pumping Well: TW6
Test Conducted by: MM and RLC		Test Date: 08/07/2016
Analysis Performed by:	Theis (log-log)	Analysis Date: 19/07/2016
Aquifer Thickness: 63.00 m	Discharge: variable, average rate 0.046 [l/s]	



Calculation usin	na Theis
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Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
TW6	1.04 × 10 ⁻²	1.65 × 10 ⁻⁴		0.07	

Pumping Test Analysis Report

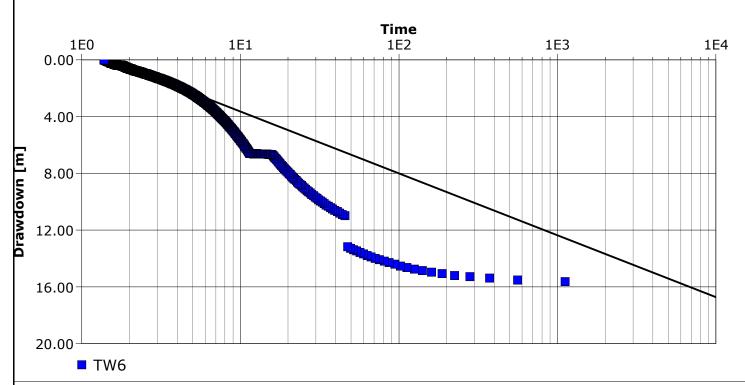
Project: Wilhaven

Number: PH1236

Client: Fred Farsi

Location: 1730 Wilhaven Drive, Cumberland,	⊕N mping Test: Pumping Test 1	Pumping Well: TW6
Test Conducted by: MM and RLC	Test Date: 08/07/2016	
Analysis Performed by: Theis RECOVERY		Analysis Date: 19/07/2016

Aquifer Thickness: 63.00 m Discharge: variable, average rate 0.046 [l/s]



Calculation using THEIS & JACOB

Observation Well	Transmissivity	Hydraulic Conductivity	Radial Distance to PW	
	[m²/d]	[m/d]	[m]	
TW6	1.67 × 10 ⁻¹	2.65 × 10 ⁻³	0.07	

Paterson Group Pumping Test Analysis Report Hydrogeology Project: Wilhaven 154 Colonnade Road South Ottawa, ON, K2E 7J5 Number: PH1236 Client: Fred Farsi Location: 1730 Wilhaven Drive, Cumberland, @Mmping Test: Pumping Test 1 Pumping Well: TW6 Test Conducted by: MM and RLC Test Date: 08/07/2016 Aquifer Thickness: 63.00 m Discharge: variable, average rate 0.046 [l/s] Analysis Name Analysis Performed by Analysis Date Method name Well T [m²/d] K [m/d] S 2.59×10^{-3} 1 Theis (linear) 19/07/2016 Theis TW6 1.63×10^{-1} 1.04×10^{-2} 1.65×10^{-4} 2 Theis TW6 Theis (log-log) 19/07/2016

Theis Recovery

19/07/2016

Theis RECOVERY

3

TW6

 1.67×10^{-1}

 1.13×10^{-1}

Average

 2.65×10^{-3}

 1.80×10^{-3}

Pumping Test Analysis Report

Project: Wilhaven - p-test HW on 24may16 by MM

Number: PH1236

Fred Farsi

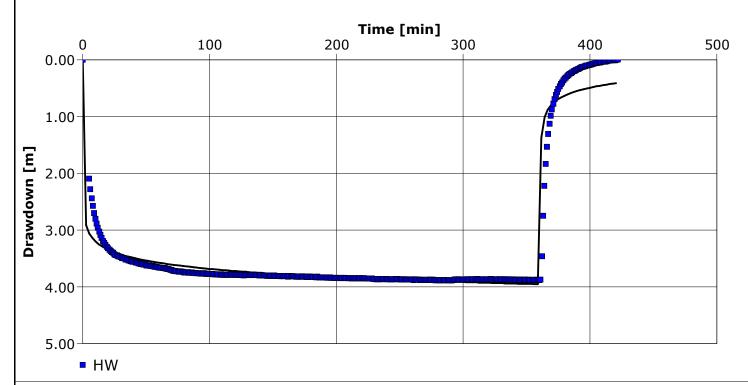
Location: 1730 Wilhaven Drive, Cumberland, PMmping Test: Pumping Test 1 Pumping Well: HW

Test Conducted by: MM Test Date: 24/05/2016

Analysis Performed by: Theis (linear) Analysis Date: 25/05/2016

Client:

Aquifer Thickness: 22.00 m Discharge: variable, average rate 0.35 [l/s]



Calculation using Theis

Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
HW	1.14 × 10 ¹	5.19 × 10 ⁻¹		0.07	

Pumping Test Analysis Report

Project: Wilhaven - p-test HW on 24may16 by MM

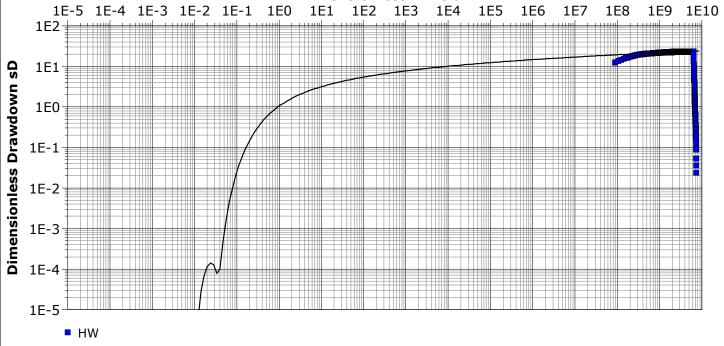
Number: PH1236

Client: Fred Farsi

Location: 1730 Wilhaven Drive, Cumberland,	Pumping Well: HW	
Test Conducted by: MM	Test Date: 24/05/2016	
Analysis Performed by:	Thies (log-log)	Analysis Date: 25/05/2016

Aquifer Thickness: 22.00 m Discharge: variable, average rate 0.35 [l/s]

Dimensionless Time tD



Calculation using Theis

Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
HW	1.43 × 10 ¹	6.49 × 10 ⁻¹		0.07	

Pumping Test Analysis Report

Project: Wilhaven - p-test HW on 24may16 by MM

Number: PH1236

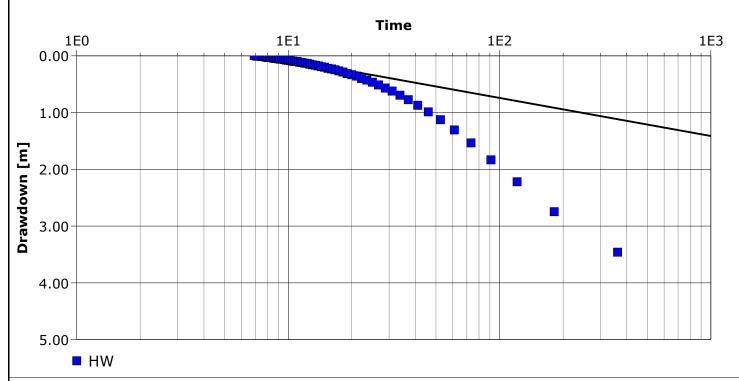
Client: Fred Farsi

Location: 1730 Wilhaven Drive, Cumberland, Pumping Test: Pumping Test 1 Pumping Well: HW

Test Conducted by: MM Test Date: 24/05/2016

Analysis Performed by: Theis RECOVERY Analysis Date: 25/05/2016

Aquifer Thickness: 22.00 m Discharge: variable, average rate 0.35 [l/s]



Calculation using THEIS & JACOB

Observation Well	Transmissivity	Hydraulic Conductivity	Radial Distance to PW	
	[m²/d]	[m/d]	[m]	
HW	8.25 × 10 ⁰	3.75 × 10 ⁻¹	0.07	

Project: Wilhaven - p-test HW on 24may16 by MM

Number: PH1236

Client: Fred Farsi

Location: 1730 Wilhaven Drive, Cumberland	, ⊕N mping Test: Pumping Test 1	Pumping Well: HW
Test Conducted by: MM		Test Date: 24/05/2016

							.0. = ., 00, =0	. •	
Aquifer Thickness: 22.00 m Discharge: variable, average rate 0.35 [l/s]									
	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well		T [m²/d]	K [m/d]	S
1	Theis (linear)		25/05/2016	Theis	HW		1.14 × 10 ¹	5.19 × 10 ⁻¹	
2	Thies (log-log)		25/05/2016	Theis	HW		1.43 × 10 ¹	6.49 × 10 ⁻¹	
3	Theis RECOVERY		25/05/2016	Theis Recovery	HW		8.25 × 10 ⁰	3.75 × 10 ⁻¹	
	Average					Average	1.13 × 10 ¹	5.14 × 10 ⁻¹	

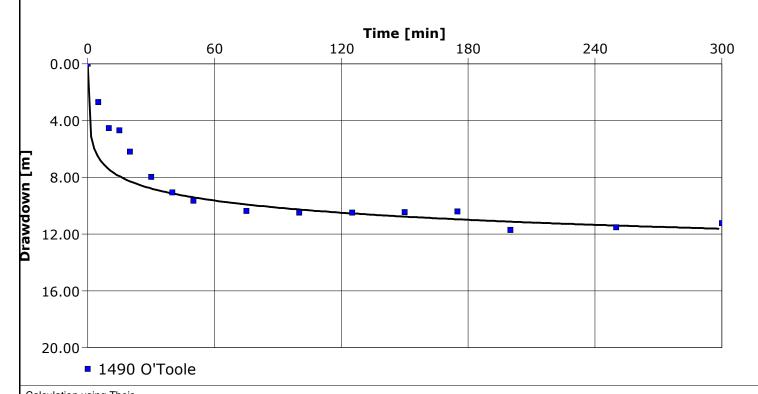
Pumping Test Analysis Report

Project: Wilhaven

Number: PH1236

Client: Fred Farsi

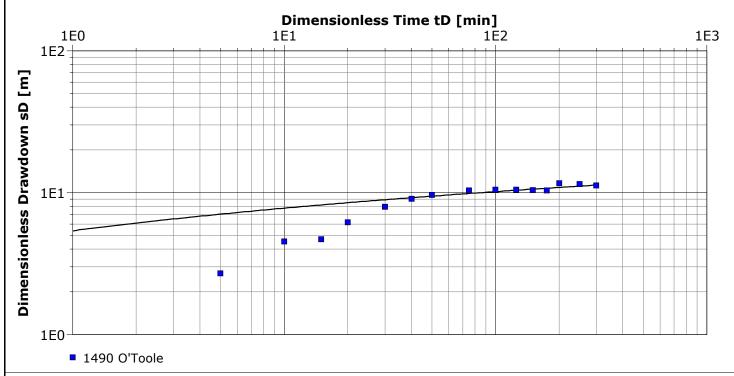
Location: 1730 Wilhaven Drive, Cumberland	Pumping Well: 1490 O'Toole	
Test Conducted by: Kollard Associates Inc.	Test Date: 16/03/2016	
Analysis Performed by:	Theis (linear)	Analysis Date: 19/07/2016
Aquifer Thickness: 91.00 m	Discharge Rate: 24 [l/s]	



Calculation using Theis						
Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	Radial Distance to PW		
	[m²/d]	[m/d]		[m]		
1490 O'Toole	1.34 × 10 ²	1.47 × 10 ⁰		0.07		

Pumping Test Analysis Report
Project: Wilhaven
Number: PH1236
Client: Fred Farsi

Location: 1730 Wilhaven Drive, Cumberland	, @M mping Test: Pumpi	ng Test 1	Pumping Well: 1490 O'Toole
Test Conducted by: Kollard Associates Inc.			Test Date: 16/03/2016
Analysis Performed by:	Theis (log-log)		Analysis Date: 19/07/2016
Aquifer Thickness: 91.00 m	Discharge Rate: 24 [l/	s]	



Calculation using	a Theis	
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Observation Well	Transmissivity	nsmissivity Hydraulic Conductivity		Radial Distance to PW	
	[m²/d]	[m/d]		[m]	
1490 O'Toole	1.59 × 10 ²	1.75 × 10 ⁰		0.07	

Paterson Group
Hydrogeology
154 Colonnade Road South
Ottawa, ON, K2E 7J5

Client: Fred Farsi

Location: 1730 Wilhaven Drive, Cumberland, @Mmping Test: Pumping Test 1

Pumping Test Analysis Report
Project: Wilhaven

Number: PH1236
Client: Fred Farsi

Pumping Well: 1490 O'Toole

Test Conducted by: Kollard Associates Inc.						te: 16/03/20	16	
Aqı	uifer Thickness: 91.00) m	Discharge Rate: 24 [l/s]					
	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well	T [m²/d]	K [m/d]	S
1	Theis (linear)		19/07/2016	Theis	1490 O'Toole	1.34 × 10 ²	1.47 × 10 ⁰	
						. = 2	0	

Theis (log-log) 19/07/2016 Theis 1490 O'Toole 1.59 × 10² 1.75 × 10⁰

Average 1.46 × 10² 1.61 × 10⁰

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Wilhaven

Determination of Potential Well Interference

PH1236

Pumping Rate (Q) m3/day 2.25

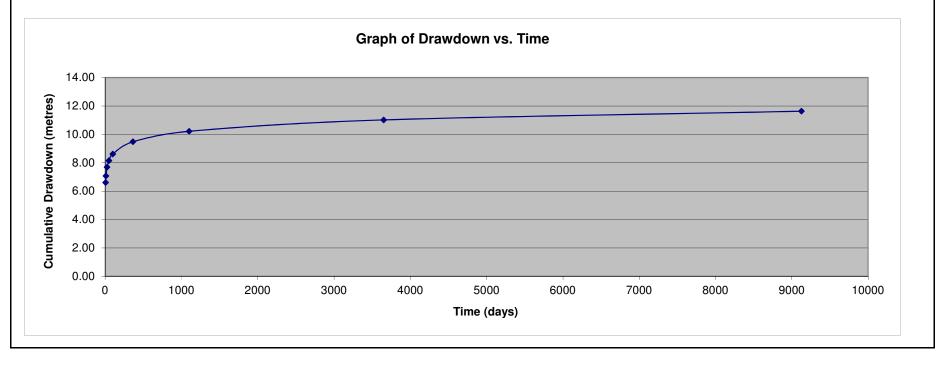
Transmissivity (T) m2/day 7.5 Transmissivity is average of results from TW5, HW and 1490 O'Toole

Average Well Spacing (m) r 5

Coefficient of Storage S 1.00E-06 Storativity is approximate - based on Paterson's knowledge of Ottawa aquifers

Notes: Analysis Assumes Continuous Pumping of 29 Wells

	1st Well Grouping		2nd Well Grouping		3rd Well Grouping		
Time (days)	u	W(u)	u	W(u)	u	W(u)	Drawdown
5	8.3E-06	11.12	2.5E-05	10.02	4.2E-05	9.51	6.61
10	4.2E-06	11.81	1.3E-05	10.71	2.1E-05	10.20	7.07
25	1.7E-06	12.73	5.0E-06	11.63	8.3E-06	11.12	7.68
50	8.3E-07	13.42	2.5E-06	12.32	4.2E-06	11.81	8.15
100	4.2E-07	14.11	1.3E-06	13.02	2.1E-06	12.50	8.61
365	1.1E-07	15.41	3.4E-07	14.31	5.7E-07	13.80	9.48
1100	3.8E-08	16.51	1.1E-07	15.41	1.9E-07	14.90	10.21
3650	1.1E-08	17.71	3.4E-08	16.61	5.7E-08	16.10	11.01
9125	4.6E-09	18.63	1.4E-08	17.53	2.3E-08	17.02	11.63



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Wilhaven PH1236

Langlier Saturation Index (LSI) Calculation

(Langlier, 1936)

LSI = pH - pHs A = (Log10 [TDS] - 1) / 10pHs = (9.3 + A + B) - (C + D) $B = -13.12 \times Log10 (oC + 273) + 34.55$ Where: C = Log10 [Ca2 + as CaCO3] - 0.4D = Log10 [alkalinity as CaCO3]

TW6	inputs					
рН	8.27	A	0.18			
TDS	597	В	2.32			
Hardness	98	С	1.59			
Alkalinity	296	D	2.47			
Temp.	13					
		pHs =	7.74			
		LSI =	0.5	1		
LSI	Effect					
0.5 to 2	Water is super saturated and	nds to precipitate a scale layer of calcium carbonate (scale f	orming but non-corrosive)			
0 to 0.5	Water is super saturated and tends to precipitate a scale layer of calcium carbonate (slightly scale forming and corrosive).					
0	Water is saturated (in equilibrium) with calcium carbonate. A scale layer of calcium carbonate is neither precipitated nor dissolved.					
0 to -0.5	Water is under saturated and tends to dissolve solid calcium carbonate (slightly corrosivebut non-scale forming).					
-0.5 to -2	Water is under saturated and	ds to dissolve solid calcium carbonate (seriously corrosive).				

Ryznar Stability Index (RSI) Calculation

(Ryznar, 1944)

RSI = 2(pHs) - pH

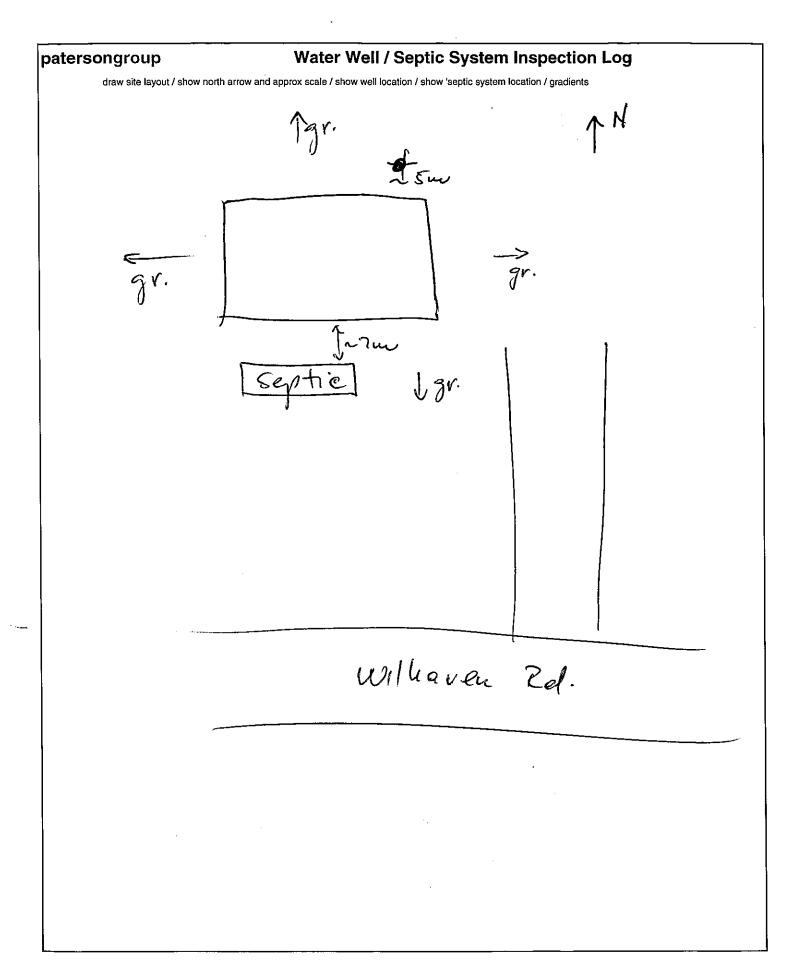
		RSI =	7.2		
RSI	Effect			Ų.	
<5.5	Heavy scale will form				
5.5 to 6.2	Scale will form				
6.2 to 6.8	No scale or corrosion				
6.8 to 8.8	Water is aggresively corrosive				
>8.5	Water is very agressively corrosive	_			

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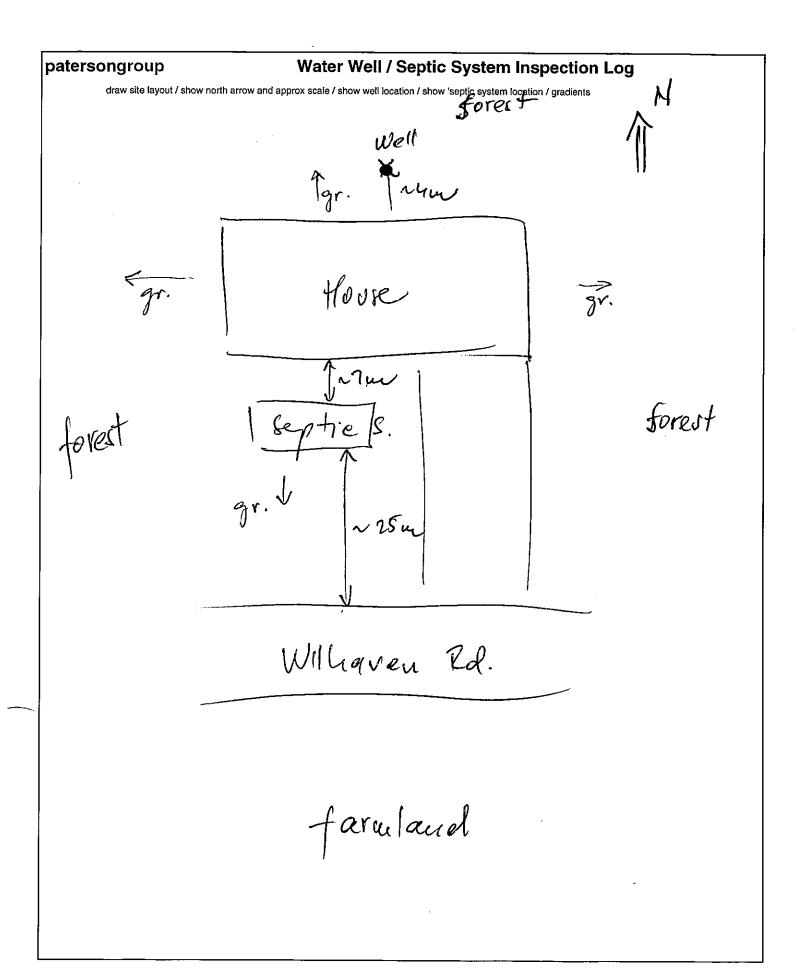
Wilhaven

Γ	I COICLIVE INILIALE	e Impact Assessment			
PRE DEVELOPMENT COND	DITIONS	POST DEVELOPMENT CONDITIONS			
Groundwater Flow Through	NOT USED	Groundwater Flow Through	NOT USED		
Background Nitrate Concentration (C _b) =	0 -mg/L	Background Nitrate Concentration (C _b) =	0 -mg/L		
ydraulic Conductivity (k) =	0 -m/s	Hydraulic Conductivity (k) =	0 -m/s		
orizontal Gradient (i) =	0	Horizontal Gradient (i) =	0		
ength (L) =	0 -m	Length (L) =	0 -m		
quifer Thickness (t) =	0 m	Aquifer Thickness (t) =	0 -m		
Groundwater Flow (Q _b) =	⊕ - m³/day	Groundwater Flow (Q _b) =	⊕ -m³/day		
nfiltration Factors		Infiltration Factors			
opography	0.30	Topography	0.30		
Soil	0.24 weighted	Soil	0.26 weighted		
over	0.13 weighted	Cover	0.12 weighted		
Т	otal 0.67		Total 0.68		
ite Characteristics		Site Characteristics			
rea of Site:	199,161 m ²	Area of Site :	199,161 m ²		
		Area of each roof:	525 m ²		
		Total of roof areas:	11,025 m ²		
		Area of each driveway:	200 m ²		
		Total of driveway areas:	4200 m ²		
		Length of roadways:	753 m		
		Width of roadways:	8 m		
		Total area of roadways:	6024		
		Impervious Area	21,249 m ²		
		Percent Impervious Area =	10.67 %		
filtration Area =	199,161 m ²	Infiltration Area =	177,912 m ²		
eptic Effluent		Septic Effluent			
oncentration of Effluent (Cs) =	0 mg/L	Concentration of Effluent (Cs) =	40 mg/L		
aily Sewage Flow (Qs)=	0 m ³	Daily Sewage Flow (Qs)=	21 m ³		
nfiltration Calculation		Infiltration Calculation			
itrate concentration in precipitation (C _i) =	0 mg/L	Nitrate concentration in precipitation (C _i) =	0 mg/L		
reciptation (from Environment Canada climate normals)	943.4 mm/yr	Preciptation (from Environment Canada climate normals)	943.4 mm/yr		
urplus Water (Environment Canada)	300 mm/yr	Surplus Water (Environment Canada)	384 mm/yr		
actored Water Surplus =	200 mm/yr	Factored Water Surplus =	261 mm/yr		
otal volume of Infiltration	39,785 m ³	Infiltraion % due to stormwater management measures	78%		
		Runoff volume (all water running off impervious areas)	20,046 m ³		
		Minimum 'storminf' volume (25mm event, Stantec, 2016)	15,550 m ³ /year		
	٥		43 m³/day		
filtration flow entering the system $(Q_i) =$	109 m ³ /day	Infiltration Flow Entering the System (Q_i) =	127 m ³ /day		
Dalama Madal (MODE 4007)		Infiltration Flow Entering the System (Q _i with 'storminf') =	170 m³/day		
ass Balance Model (MOEE, 1995)	itrata Canaantrati	Mass Balance Model (MOEE, 1995)	Nitrata Canagat		
$C_T = (Q_b C_b + Q_e C_e + Q_i C_i)/(Q_b + Q_e + Q_i) = Cumulative N$	itrate Concentration 0 m ³ /day	$C_T = (Q_bC_b + Q_eC_e + Q_iC_i)/(Q_b + Q_e + Q_i) = Cumulative$	Nitrate Concentration 0 m ³ /day		
5 = flow entering the system across the upgradient area	•	Q _b = flow entering the system across the upgradient area	•		
 background nitrate concentration flow entering the system from the septic drainfield 	0 mg/L 0 m ³ /day	C_b = background nitrate concentration Q_e = flow entering the system from the septic drainfield	0 mg/L 21 m ³ /day		
= now entering the system from the septic drainlied = concentration of nitrates in the septic effluent	0 mg/L	C_e = now entering the system from the septic drainfield C_e = concentration of nitrates in the septic effluent	40 mg/L		
•	0 mg/L 109 m³/day	C_e = concentration of nitrates in the septic efficient Q_i = flow entering the system from infiltration (with 'storminf')	40 mg/L 170 m ³ /day		
= flow entering the system from infiltration = Concentration of nitrates in the infiltrate	0 mg/L	Q_i = flow entering the system from infiltration (with storminf) C_i = Concentration of nitrates in the infiltrate	0 mg/L		
	_		9/-		
	$C_T = 0.0 \text{ mg/L}$		$C_T = 4.399 \text{ mg/L}$		
			21 lots		

patersongroup	Water Well / S	Septic System I	nspection Log
Address:	1865 Wilhow CR	Project Number:	PH1236
Name of Property Owne		Mathieu	<u>(13 833 03</u> 2/
Date of Inspection:	-r: <u>CLAUSE</u> - DULY 7, 2016 - MM	Owner telephone N	
Paterson Rep:	MM		
		· . }	
Well Details	pit less	_	
Is well casing exposed a	above ground surface ?	′ Y /(N)	Length of stickup:
Does owner have a cop	y of the 'water well record'? Y PN	Try to obtain a copy or ge	et datails (take a photo)
How old is the well?	n what year was the	house built ?	~ 1917
Depth of well ?	Depth of well casing	?	
Who drilled the well?			check well cap for driller ID
Water Quality	•		
Taste?	1		
Odour ?	9.009		
Colour ?	9000		
Hardness ?	yes		
History of bacteria testir	ng?	0	
1 *	related comments or issues ?	No	11.50
	a ^		
Water treatment details:	: coffeer	•	•
SAMPLING DETAILS:	V		
	Copy of results to well owner ? (get contact	t details / email address)	Klomath D Gmail.com
	Temp pH Co		
Water Quantity			
Size of pump in well?		Type of pump?	
Pumping rate ?			
Depth of pump in well?	The state of the s	1. 1.	has owner ever seen it layed out on surface ?
1 ' ' '		where fill	1Kg pool
Has the well ever run dr	y? yes	/	0 '
Septic System	draw location on sketch		
Class 4? Tertiary treatment?	•	_	
Have there been any pr	oblems with the septic system?	Y / (N)	
-			
Environmental Concer	'ns / s / s out		
Surface water?	oolkeg in the offill	ig	
Septic System?	No,	1	4 4605
Land use?	rested around, t	ary are d	10 194 3
Neighbouring properties	i? to rested		
Potential sources of cor	ntamination (onsite and offsite) ?	C	1 00/1)
	rns 200/icg 1k the fp// No rested exound, f 3? to rested ntamination (onsite and offsite)? No showing well location and location of septic system-	10 he (1000	7 5417 /
Please sketch the site layout s	showing well location and location of septic system -	on reverse side of this sheet	



patersongroup	Water Well / S	Septic System In	spection Log
Address:	73 Wilhar Dr.	Project Number:	PH
Name of Property Owne		ach - Ch	elsey labrecque
Date of Inspection:	July 7, 2016	Owner telephone No:	1613 827 5004
Paterson Rep:	MM	·	
		190	
Well Details			6
Is well casing exposed a	above ground surface ?	(Y)/ N	Length of stickup: O. Pu
	y of the 'water well record'? Y /(N)	Try to obtain a copy or get	datails (take a photo)
How old is the well?	\sim /980 $_{\odot}$ In what year was the	house built?	~1980
Depth of well ?	Depth of well casing	?	
Who drilled the well?			check well cap for driller ID
Water Quality			
Taste?	4		
Odour?	Good, uo odi	our	
Colour?	Good, uo odi		
Hardness ?	No		
History of bacteria testi	ng?		
Any other water quality	related comments or issues ?	NO	
	- 0 A		
Water treatment details	: Soffauer	· 	
SAMPLING DETAILS:			<u> </u>
	Copy of results to well owner? (get contact		
	Temp pH Cor	nd TD:	S
Water Quantity	; •		
Size of pump in well?		Type of pump?	
Pumping rate ?			has away over aggs it layed out as surface 2. A/
Depth of pump in well f			has owner ever seen it layed out on surface?
Has the well ever run d	ted comments or issues?		
has the well ever full d	No Mo		
Septic System	draw location on sketch		
Class 4 ? Tertiary treatment	?		in front ofalcoor
Have there been any p	roblems with the septic system?	Y /(N)	14 1.001
Environmental Conce	erns		
Surface water ?	cta done water	ria Fori	49,
Septic System ?	was and devit to	. ewell	<i>* * * * * * * * * *</i>
Land use ?	- of good and	ui coo - 11	00
Neighbouring propertie	es? To refred where		on I to the south
Potential sources of co	ontamination (onsite and offsite) ?	+ javu	and to the south
Totaliai Souloos of oc	None	" from al	calf)
Please sketch the site lavout	t showing well location and location of septic system -	on reverse side of this sheet	
l l			



patersongroup	Water Well / Septic System Inspection Log
Address: 1649	Williaven Prive
Name of Property Owner:	
Date of Inspection: Duly 7, 20	OK Project Number: PH 1236
Paterson Rep: MM	- No one at home
Well Details	Well not observed
Is well casing exposed above ground su	
Does owner have a copy of the 'water w	vell record* ? Y / N Try to obtain a copy or get datails (take a photo)
How old is the well ?	In what year was the well drilled ?
Depth of well ?	Depth of well casing ?
Who drilled the well ?	
Water Quality	
Taste ?	
Odour ?	
Colour ?	
Hardness ?	
History of bacteria testing ?	
Any other water quality realyed commer	nts or issues ?
, , , , , , , , , , , , , , , , , , , ,	
	92.9)
Water Quantity	
Size of pump in well ?	Type of pump ?
Pumping rate ?	
Depth of pump in well ?	1 91
Any water quantity related comments or	rissues?
LUL de LUL	00H
Environmental Concerns	
Surface water ?	
Septic System ?	
Land use? ren'el-	
Neighbouring properties? Foul	ruelaced-Niw,5, forested-E
Potential sources of contamination (ons	site and offsite) ?
Totalia sources of contamination (original	
3001	
Places skatch the site layout showing y	vell location and location of septic system - on reverse side of this sheet

patersongroup Water Well / Septic System Inspection Log draw site layout / show north arrow and approx scale / show well location / show 'septic system location / gradients //649

-area flat

1620

~ 400 m to TW6

· TW6

patersongroup	Water Well / Septic System Inspection Log
Address: 16	20 Wilhaven Drive
Name of Property Owner:	
Date of Inspection: Duly 7	7, 2016 Project Number: PH 12 36
Paterson Rep:	7 <u>7 2018</u>
raterson nep.	No one of longer.
Well Details	No one at hone well not observed
Is well casing exposed above groun	nd surface? Y / N Length of stickup:
	ter well record' ? Y / N Try to obtain a copy or get datails (take a photo)
How old is the well ?	In what year was the well drilled ?
Depth of well ?	Depth of well casing ?
Who drilled the well ?	
Water Quality	
Taste ?	
Odour ?	Waste Commencer
Colour ?	
Hardness ?	
History of bacteria testing?	
Any other water quality realyed con	nments or issues ?
	The section of the se
Water Quantity	AND ADDRESS OF A STATE
Size of pump in well ?	Type of pump ?
Pumping rate ?	
Depth of pump in well ?	
Any water quantity related commen	its or issues ?
3.01.1 017	027 - 7
Environmental Concerns	
Surface water ?	
Santic System 2	
Landuse? Ye h'els	esto e
Neighbouring properties?	sid to the N, farm land E, S, W
Potential sources of contamination	
- I]] [[[[[[[[[[[[[[[[[\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
_	- Invostable at the property (lames)
	- Investock at the property (lames)
	V
Please sketch the site layout showi	ing well location and location of septic system - on reverse side of this sheet

	I / Septic System Inspection Lo	g
draw site layout / show north arrow and approx scale / show we		1
	Wilhaven Dr.	_ \
(30) (4) 10 30 10 10 10 10 10 10 10 10 10 10 10 10 10	- 15/0J	
11		
W		
Son		
4008		
4000		
	1000	
17 1		
- area flat		
<i>'</i>		
	1 150m to T	W6
	7	
	TENTERATION	
	· TW6	
the property (Manuac)	• TW6	

patersongroup	post moltres	Water Well	/ Septic System Ir	nspection Log
Address:	1675		Project Number:	PH 1236
Name of Property Owne	-	_		
Date of Inspection:	July 7, 70	16	Owner telephone No	0:
Paterson Rep:	MM	100 L	100-0010/00/2010/00/00/00/00/00/00/00/00/00/00/00/00/	2 1/ 1
, attitudi, itapi		Na	way af home	only - doesn't know
Well Details		74		Well well
Is well casing exposed a			Y / N	Length of stickup:
Does owner have a cop	y of the 'water well	record'? Y / N	Try to obtain a copy or ge	et datails (take a photo)
How old is the well?		_In what year was t	the house built?	1 7
Depth of well ?		Depth of well casis	ng ?	
Who drilled the well?	14.			check well cap for driller ID
Water Quality				
Taste ?				
Odour?				
Colour ?				
Hardness ?	-			
History of bacteria testing	ig?			
Any other water quality	related comments	or issues ?))	
Water treatment details	1		14	
SAMPLING DETAILS:				
	Copy of results to	well owner ? (get con	ntact details / email address)	*-
	Temp	pH (Cond TD	OS .
Water Quantity				
Size of pump in well?			Type of pump?	
Pumping rate ?	-			W
Depth of pump in well ?				has owner ever seen it layed out on surface ?
Any water quantity relat		sues r		
Has the well ever run d	y c			
Septic System	draw location on sketc	h		
Class 4 7 Tertiary treatment				
Have there been any pr		ntic system ?	Y / N	
l lavo more been any pr				
Environmental Conce	rns			
Surface water ?	11.70			
Septic System ?				
Land use? Ve	siel.	, ,		. 1. 0 1 0 11
Neighbouring propertie	s? For	ested-E	, N; rond	farmland-SIW
Potential sources of co	ntamination (onsite	and offsite) ?	<i>t</i> - <i>t</i>	/V
NO.ST .		7 =	an success	
Please sketch the site layout	showing well location ar	nd location of septic syste	m - on reverse side of this sheet	

draw site layout / show north arrow and approx	scale / show well location / show	'septic system location / gradients	V
1675 Thouse		MM 21.85.15	
(649) Thouse 1 1/2 500			
- ævea Haf		~ 400m to	T.W6

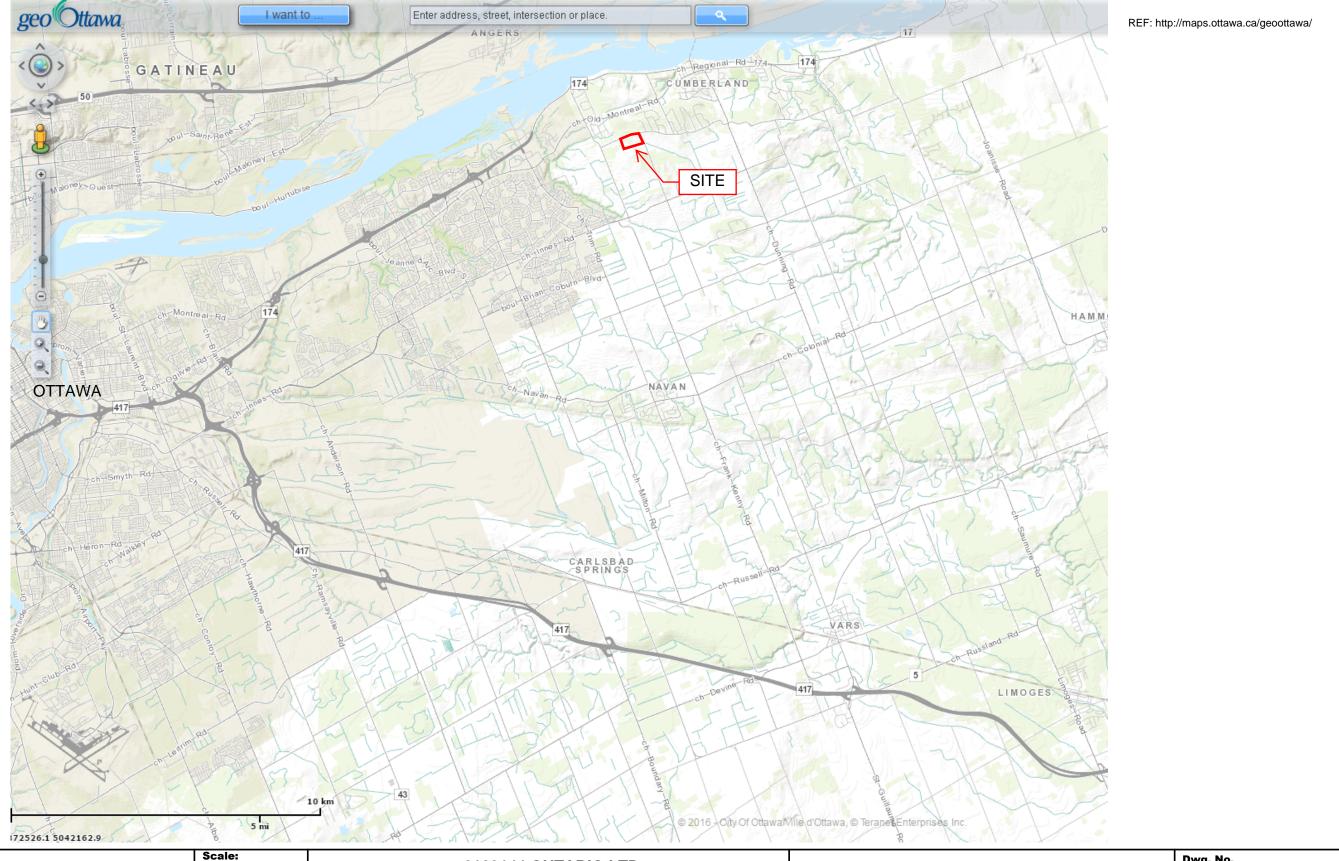
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Proposed Rural Residential Subdivision 1730 Wilhaven Drive, Cumberland, Ontario

Appendix 5

- Figure 1 Site Location Plan
- Figure 2 MOECC Water Well Records
- Figure 3 Overburden Geology
- Figure 4 Bedrock Geology
- Figure 5 Test Hole Location Plan
- Figure 6 Cross Section
- Figure 7 Draft Plan of Survey
- Figure 8 Lot Development Plan





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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Des.:
Dwn:
Chkd:

2183144 ONTARIO LTD.

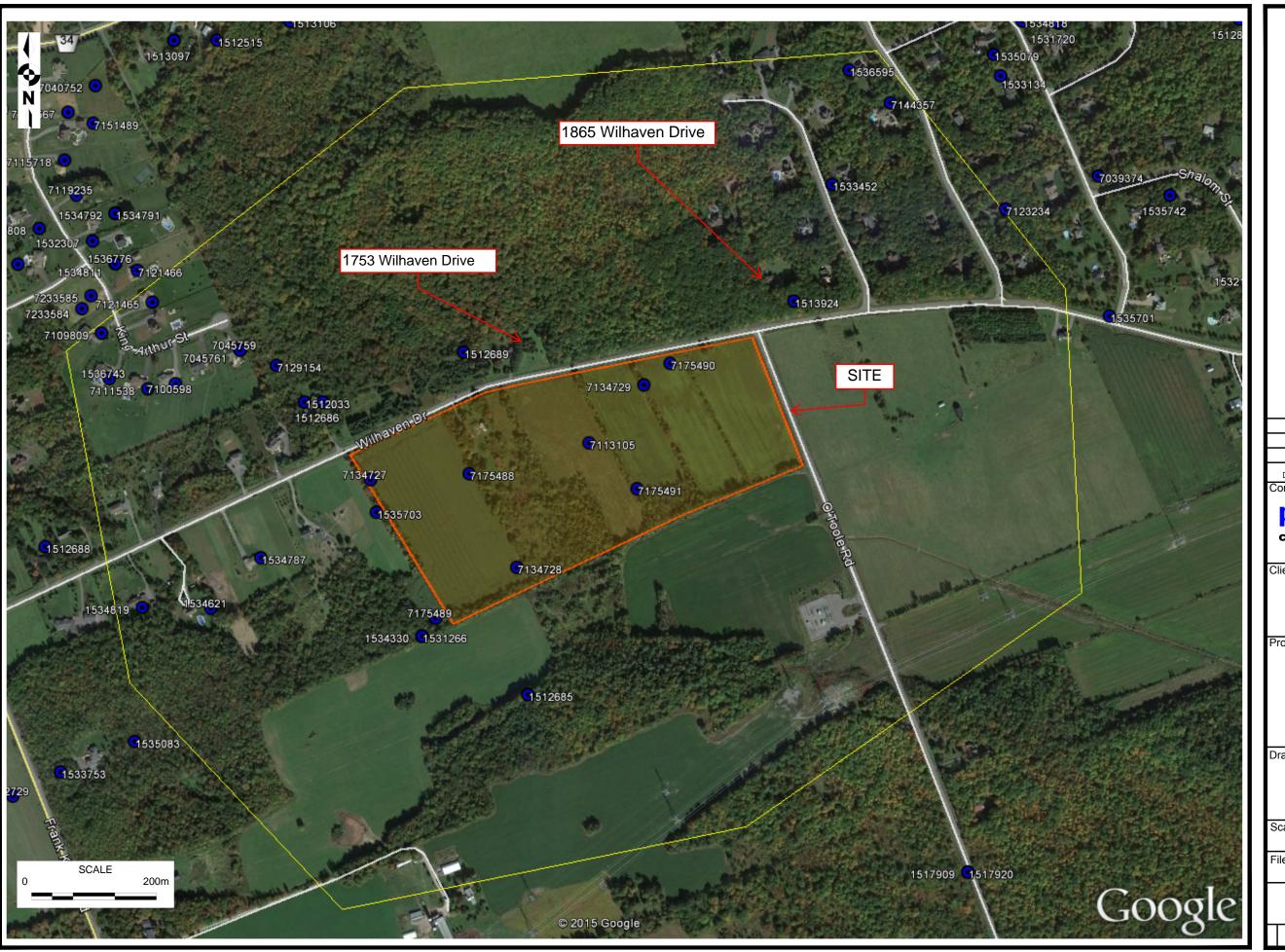
1730 WILHAVEN DRIVE, CUMBERLAND, ONTARIO

SITE LOCATION PLAN

Dwg. No.
FIGURE 1

Report No.:

Date:



DD/MM/VV	DESCRIPTION	DEV

Consultant:

patersongroup consulting engineers

Client:

2183144 ONTARIO LTD.

Project:

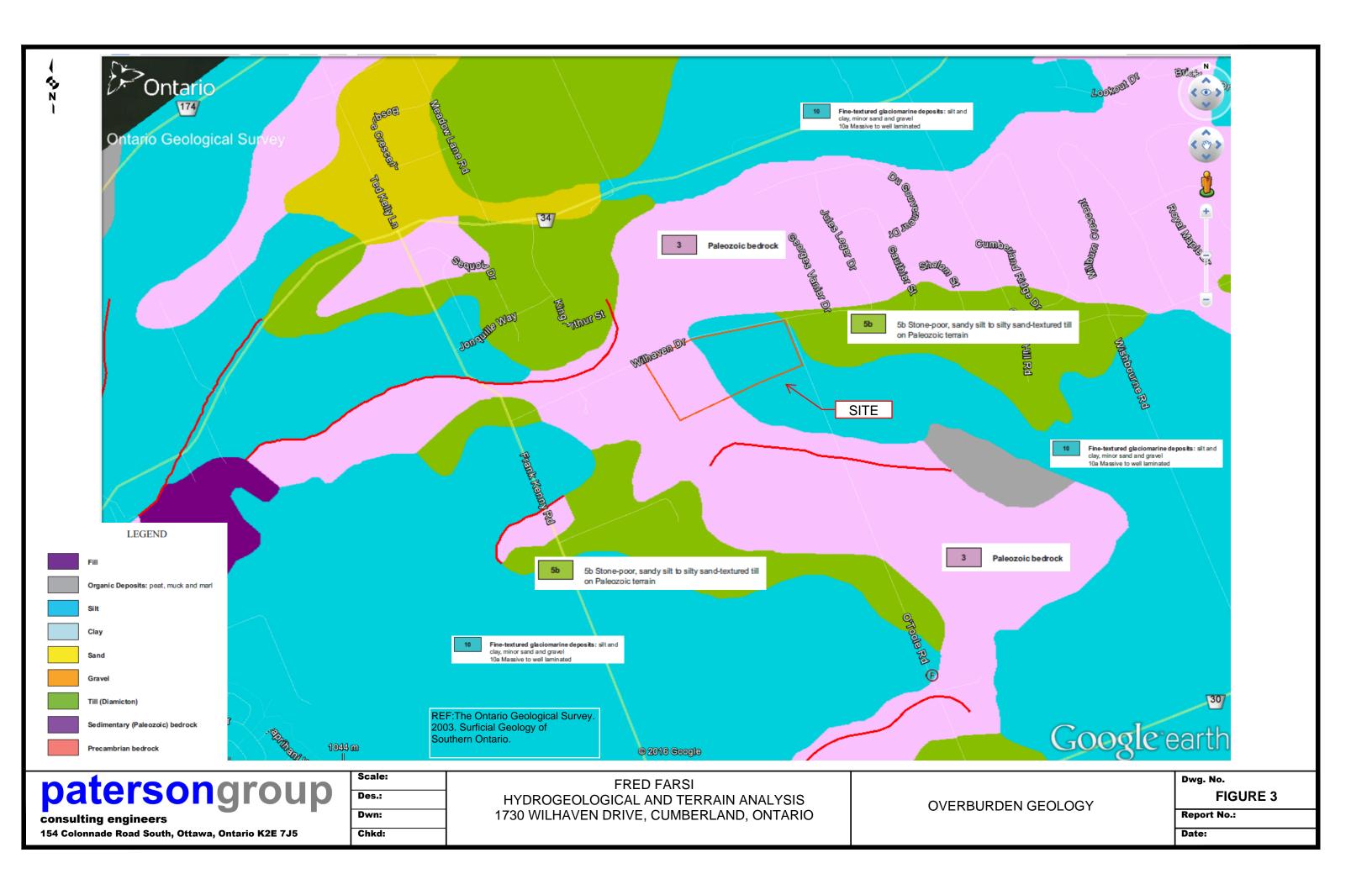
HYDROGEOLOGICAL AND TERRAIN ANALYSIS 1730 WILHAVEN DRIVE, CUMBERLAND, ONTARIO

Drawing:

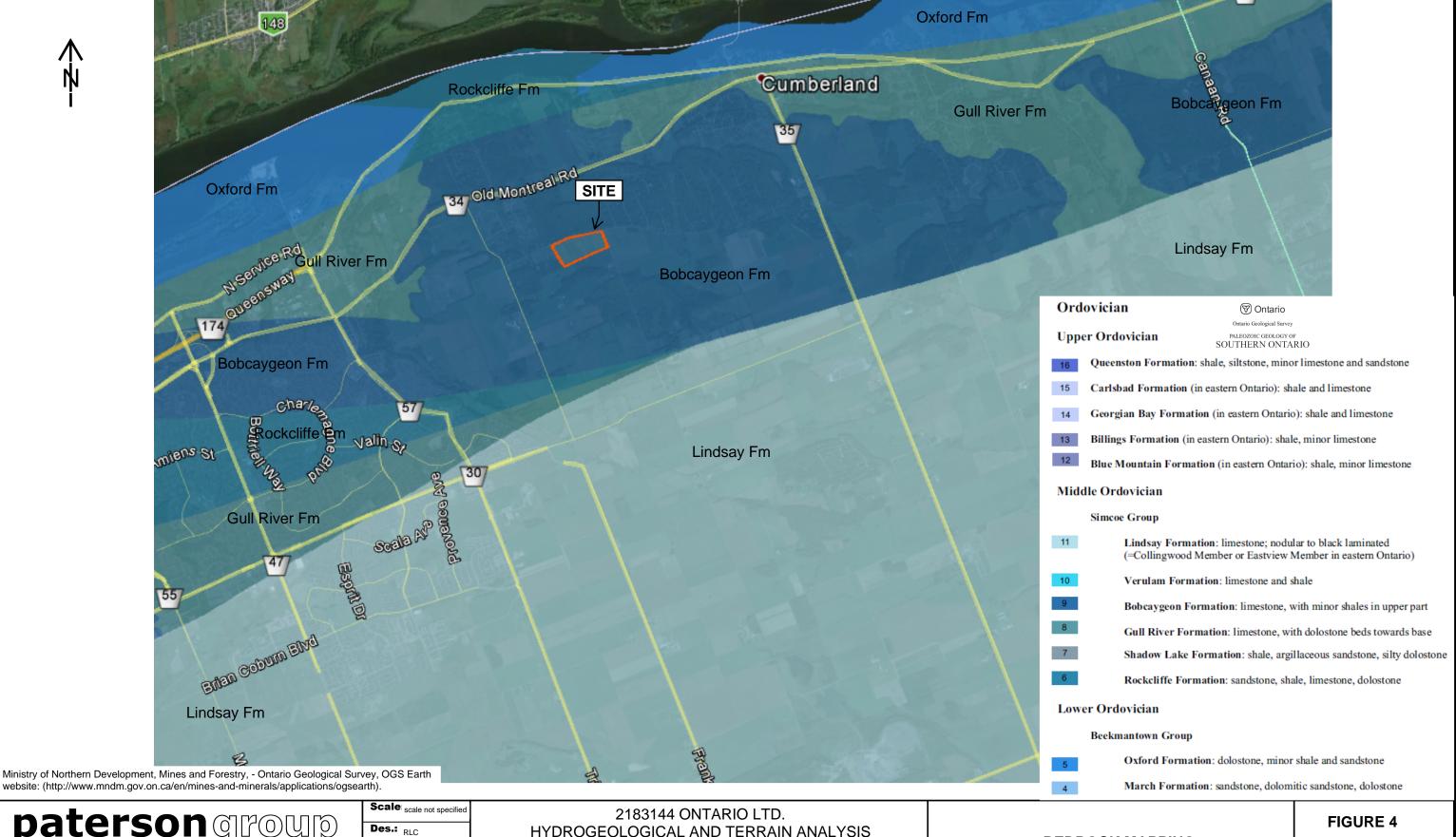
MOECC WATER WELL RECORDS

Scale:	SEE FIGURE	Drawn by:	RLC	
File:	PH1236	Checked by:	-	

FIGURE 2







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consulting engineers 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Dwn: _{RLC} Chkd:

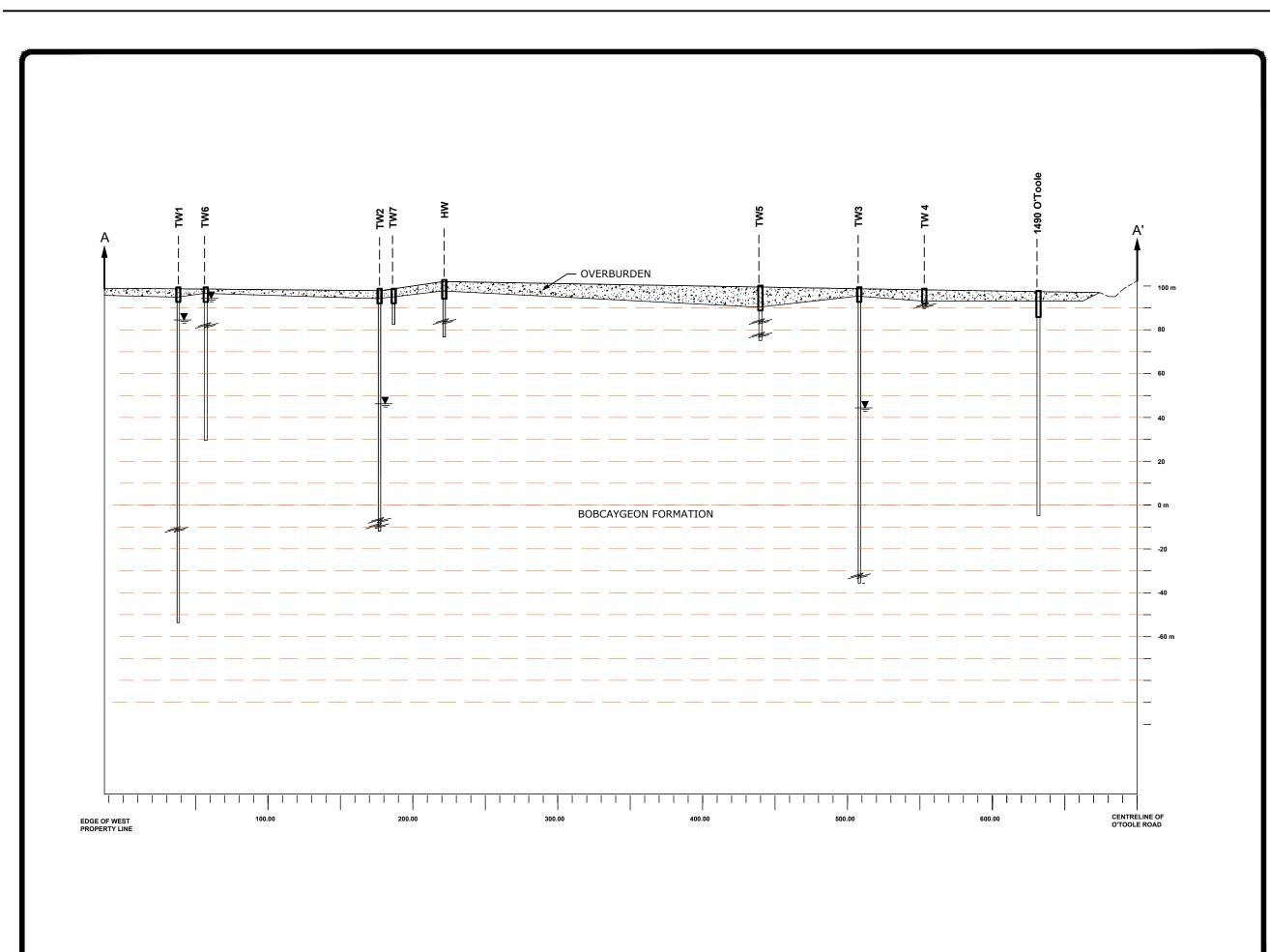
HYDROGEOLOGICAL AND TERRAIN ANALYSIS 1730 WILHAVEN DRIVE, CUMBERLAND, ONTARIO

BEDROCK MAPPING

Report No.: PH1236-REP.03

2-NOV-2015





patersongroup consulting engineers **2183144 ONTARIO** LTD. Project: **1730 WILAVEN DRIVE CUMBERLAND, ONTARIO** Drawing: **CROSS SECTION**

DESCRIPTION

Drawn by:

Checked by:

FIGURE 6

b:\autocad drawings\hydrogeology\ph12xx\ph1236 wilhaven\august 2016\ph1236-wilhaven - 11-aug-16.dwg

RLC

SW

1:2500

PH1236

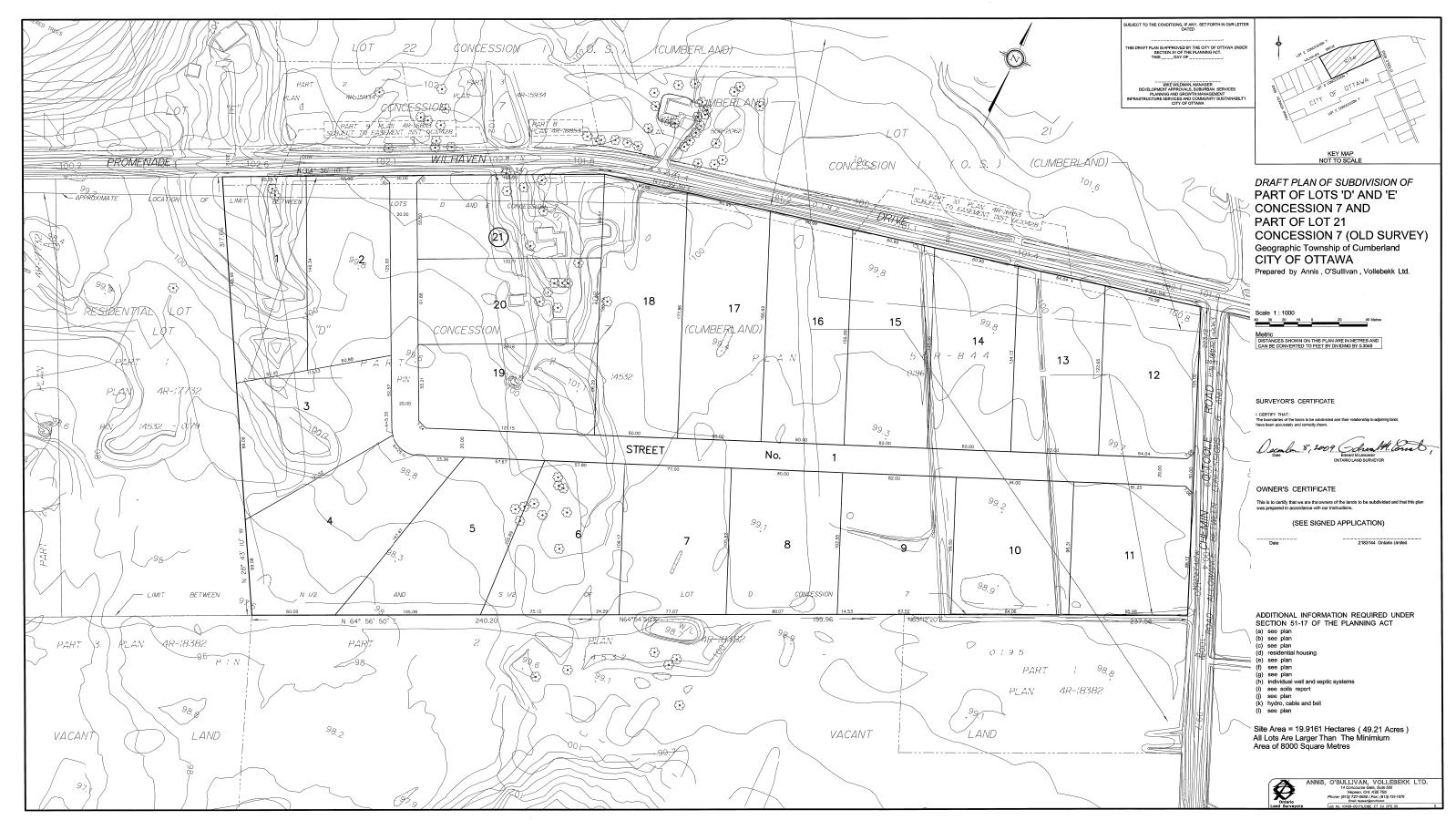
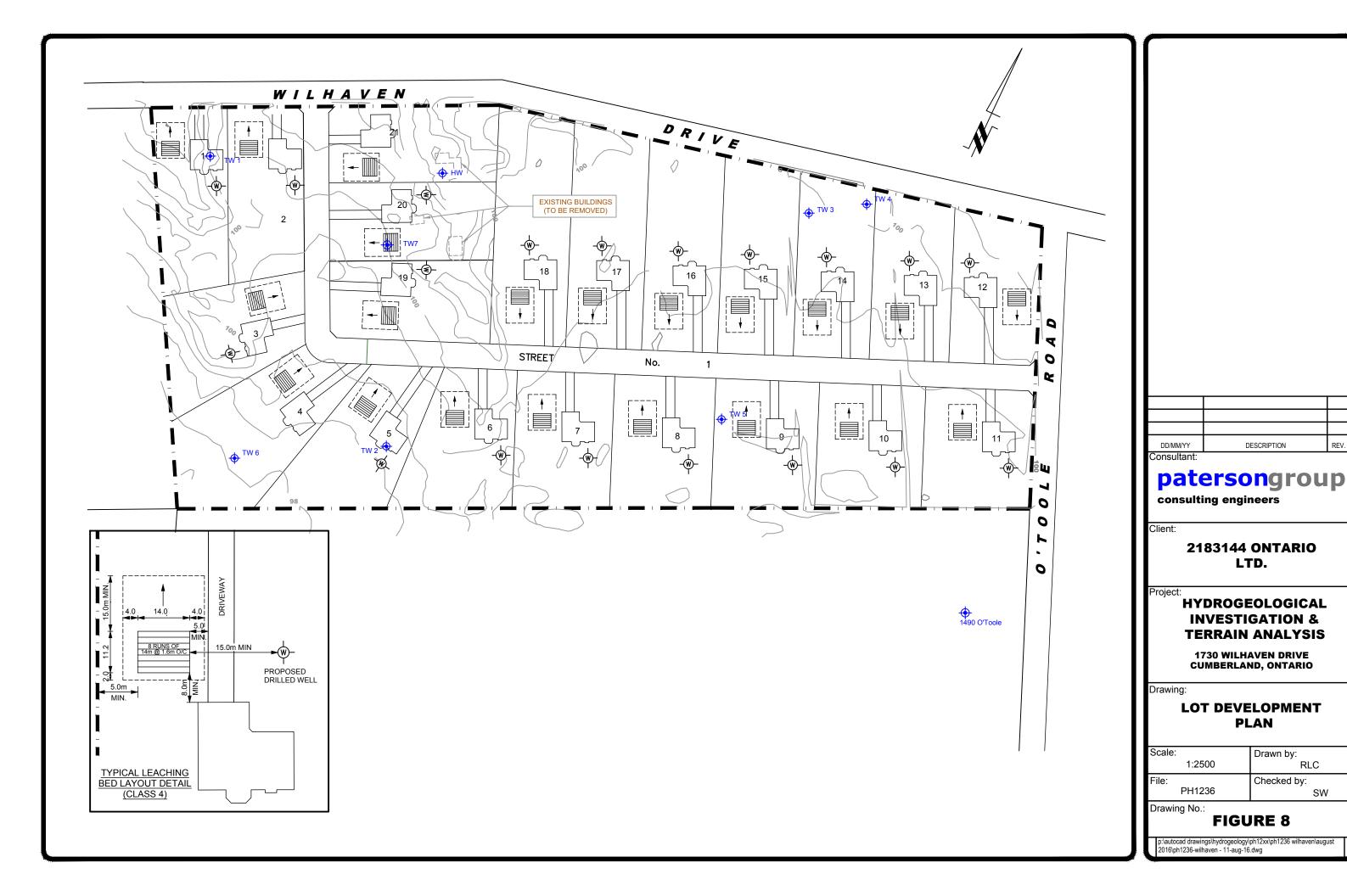


FIGURE 7
DRAFT PLAN OF SURVEY



SW