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Hydrogeological Assessment for Private Services:

Proposed Residential Development 11 King Street Richmond, Ontario

Prepared For

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February, 2010

Report: PH1292-REP.01R5 UPDATED: January, 2016

Report Revisions

This report was initially released in **February 2010** (designated PH1292-REP.01). The February 2010 report was based on test wells TW1, TW2 and TW3 that were drilled in January 2010.

Review comments from City of Ottawa and Rideau Valley Conservation Authority (RVCA) requested additional test wells, pumping tests and associated changes to the report. An updated report (designated PH1292.REP.02) was released in **December 2011**. The December 2011 report included information from two additional test wells (TW4 and TW5) that were drilled in August 2011.

Following feedback from RVCA, an updated report was released in **April 2013**. The April 2013 report includes a list of changes titled 'Syllabus of Additional Information in Response to RVCA Preliminary Comments'. The changes included addition of an EPA report, lot development plan edits, cross section edits, additional water well record information, additional pumping test data, recommendation for casing length, and aquifer analysis updates.

Following feedback from RVCA, an updated report was released in **October**, **2013**. The October 2013 report includes a list of changes titled 'Syllabus of Changes'. The changes include those listed above for the April 2013 report, plus clarification regarding geotechnical and environmental well construction, clarification of VOC sampling protocols, updated test hole location plan, edits to Figure 4, addition of well record for EW, addition of field parameters including chlorine residual and turbidity, removal of references to aquitard isolation, updated peak water use, removal of use of TW1, addition of information on Hyde Park well, augmented well interference analysis and addition of recovery statements.

Following feedback from RVCA, an updated report was released in **May**, **2015**. The May 2015 report includes a list of changes titled 'Syllabus of Changes'. The changes include those listed above for the October 2013 report, plus inclusion of an additional test well (TW6) that was drilled in July 2014, and coverage of a peak demand test (simultaneous pumping of TW4, TW5 and TW6) and an extended pumping (3 days) test of TW6.

The current report is designated PH1292-REP.01R5. The 'Syllabus of Changes' table has been removed. The current report incorporates a large number of changes and clarifications

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which have been discussed in detail with RVCA in email and telephone conversations, and in meetings on October 15 and November 26, 2015.

Executive Summary

Paterson Group (Paterson) was commissioned by Toscano Land Corp. (Toscano) to conduct a hydrogeological assessment for a proposed residential subdivision at 11 King Street, Richmond, Ontario. The site location is indicated on Figure 1 (Site Location Plan) in Appendix 5. The proposed development will use private wells to provide potable water to 40 semi-detached units. Wastewater will be directed to the Richmond Village municipal sanitary sewage system.

The purpose of this study is to determine the suitability of the site for residential development on private individual water supply wells.

A terrain analysis based on intrusive investigations conducted by Paterson in 2009 identified a deep silty clay deposit extending to more than 6.55 m below ground surface (bgs). Test well drilling identified bedrock at depths between 7.67 and 10.06 m bgs at the site. Available geological information (OGS, 2015) indicates the clay is underlain by horizontally bedded Palaeozoic strata of the Lower Ordovician Oxford and March Formations, which overlie the Cambrian Nepean formation.

Regional aquifer studies conducted by Golder Associates (Golder) have identified two (2) significant water resource aquifer units in the area; the Upper Oxford Formation aquifer, and the Lower March-Nepean Formation aquifer (see Figure 8 [Conceptual Hydrogeological Model] in Appendix 5). These two aquifers appear to be separated by a leaky aquitard layer which occurs in the upper portion of the March Formation. Most of the existing water supply wells in the Village of Richmond draw water from the Oxford Formation aquifer. This study assesses the aquifer potential of the Lower March Formation only (the Lower March Formation is referred to as the 'preferred aquifer' throughout this report).

Three (3) test wells (TW1, TW2 and TW3) were installed at the site in January, 2010. Test well locations are indicated on Figure 10 (Test Well and Observation Well Location Plan) in Appendix 5. These wells have steel casing installed to depths of between 9.7 and 12.2 m below ground surface with open holes extending through the Oxford and March Formations and extending into the upper portion of the Nepean Formation.

An initial review of this report by City of Ottawa and RVCA identified a number of concerns about the configuration of test wells TW1, TW2 and TW3 and the suitability of future wells in the proposed subdivision if constructed in the same way (i.e. potential offsite well interference and potential for cross contamination within the aquifer system). It was determined that the preferred aquifer for the proposed subdivision should be the Lower March Formation.

Two (2) additional test wells (TW4, TW5) were installed at the site in August 2011, and one (1) more test well (TW6) was installed in July, 2014. These test wells have steel casing installed to depths of between 54.8 and 56.4 m bgs, and were drilled to total depths of between 65.8 and 68.6 m bgs. This configuration places the open hole section of wells TW4, TW5 and TW6 in the Lower March Formation.

Pumping tests were conducted at TW1, TW2, and TW3 but this information has not been used to assess the Lower March Formation aquifer. TW4 and TW5 were each pumped for nine (9) hours at a constant rate (75.7 L/min at TW4 and 81.8 at TW5) to obtain drawdown and recovery data. A simultaneous pumping test of TW4, TW5 and TW6 at a rate of 99.8 L/min per well was performed to assess aquifer and well response during peak water demand periods. Extended pumping of TW6 at a rate of 34 L/min was carried out for a period of three (3) days to determine the effects of ongoing pumping from the preferred aquifer.

Groundwater samples were collected at each well at the middle and at the end of each test. Additional water quality sampling was conducted at three (3) offsite water supply wells. All groundwater samples were submitted for comprehensive testing of bacteriological, chemical and physical water quality parameters.

The analytical results for groundwater samples that were obtained from the preferred groundwater aquifer at the site (i.e. from TW4, TW5 and TW6) show that water quality is acceptable and that there are no exceedances of the applicable health related parameter limits of the Ontario Drinking Water Standards (ODWS, 2003). Minor exceedances of the non-health related operational guidelines and aesthetic objectives were noted for hardness and iron at all three test wells.

Pumping test data were analyzed using Aquifer Test Pro^{TM} software. The most significant results were obtained from the extended pumping test of TW6, where dataloggers were used to measure drawdown and recovery at the pumping well and at a number of observation wells including test wells TW4 and TW5 which intersect the preferred aquifer only. An analysis of recovery data from the extended pumping test of TW6 using a combination of Agarwal (Agarwal, 1980) and Theis (Theis, 1935) methods indicates the Lower March Formation aquifer has a transmissivity of approximately 37 m²/day. Aquifer storativity is estimated to be approximately 2.27x10⁻⁵ using the same method.

Water quantity was assessed in terms of anticipated peak demand, long term safe yield and potential well interference.

Peak demand based on three bedroom semi-detached units is estimated to be 15 L/min/unit based on Ontario Ministry of Environment and Climate Change (MOECC) Procedure D-5-5 (MOEE, 1996). Peak demand based on the Canadian Mortgage and Housing Corporation (CMHC, 2000, revised 2014) daily use estimate is 7.5 L/min/unit, or 300 L/min for 40 units. This is the same as the combined pumping rate during the simultaneous pumping test. The test results show that current and future wells in the proposed subdivision will be sufficient to handle peak demand loadings.

A long term safe yield analysis shows that the anticipated rate of water extraction at current and future wells in the proposed subdivision is at least two orders of magnitude less than the calculated long term safe yield of the wells. A well interference model indicates the maximum drawdown after 25 years of pumping will be acceptable. The simultaneous and extended pumping test results show that the wells all recover quickly after removal of large quantities of groundwater. All of these methods show that the anticipated water usage at current and future wells in the proposed subdivision will be sustainable in the long term and will not significantly impact offsite well users.

Drawdown information from pumping wells and observation wells (including onsite and offsite observation wells that intersect the Oxford Formation, The Oxford and March Formations, the Oxford, March and Upper Nepean Formations, and the Lower March Formation only) clearly shows that pumping from the Lower March Formation does not have any significant impact on shallow wells that intersect the Oxford Formation only (i.e. most of the wells in the Village of Richmond, and the vast majority of wells located close to the subject site). Impacts to offsite wells that intersect the Oxford and March Formations will be of an acceptable magnitude based on the aquifer analysis results.

Future wells at the site should be constructed according to Ontario Regulation 903 and should be similar to test wells TW4, TW5 and TW6 (i.e. a minimum of 58 m steel casing, and total depths of no more than 70 m). The pumping rate for each well should not exceed 20 L/min. Raw water is expected to be relatively hard, so residential grade water softeners are recommended.

The 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

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that the development takes place in an effective manner, with a minimal impact on the natural environment.



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1.0 INTRODUCTION

1.1 Terms of Reference

Paterson Group (Paterson) was commissioned by Toscano Land Corp. (Toscano) to conduct a hydrogeological assessment related to the use of private wells to provide potable water to 40 semi-detached homes located at 11 King Street, Richmond, Ontario.

The property, hereafter referred to as the subject property, is situated on the south side of Perth Street, and bounded by King Street, the future Hamilton Street extension and Cockburn Street. The subject property is approximately 1.59 hectares in size and has the legal description: Registered Plan D-13 Unit 59 REF Plans; 4R5234, Parts 1 and 2 (Less 4R11108); Parts 2, 4, Ottawa, Ontario. The site location is indicated on Figure 1 (Site Location Plan) in Appendix 5.

This consolidated report reflects works done in consideration of the following guidance documents prepared by the Ontario Ministry of Environment and Climate Change (MOECC):

- Guideline D-5: Planning for Sewage and Water Services (August 1996)
- Procedure D-5-5: Technical Guideline for Private Wells: Water Supply Assessment (August 1996)
- Water Supply Wells Requirements and Best Management Practices, Revised April 2015

Paterson completed a Phase I-II Environmental Site Assessment (ESA) for the subject lands (Paterson, 2009), the results of which are attached in Appendix 3. A geotechnical investigation was conducted at the site by Paterson, and results have been reported under separate cover (Paterson, 2010).

1.2 Background

It is understood that the proposed development will consist of a 20 semi-detached residential lots resulting in a total of 40 residential units. The proposed general site layout is detailed on Figure 7 (Lot Development Plan) in Appendix 5. The subject property is located within the boundary of the Village of Richmond, Ontario. The Village of Richmond has been developed on a municipal sanitary service and individual/communal water supply wells. The subject property is proposed to be serviced in the same manner with individual water supply wells for each lot and municipal wastewater collection and treatment.

A residential subdivision known as Kings Park is serviced by a communal water supply system located approximately 600 m to the south of the subject site (Golder, 2008). Two (2) municipal water wells which service this development provide approximately 450 people with drinking water. These wells have open holes that extend through the Oxford Formation, the March Formation and extend into the upper portion of the Nepean Formation. As these wells are municipal water supply wells, they are subject to Ontario's source water protection program under the Clean Water Act (2006).

A residential subdivision known as Hyde Park is to be serviced by a communal water supply system and is located approximately 650 m northwest of the subject site. This subdivision is serviced by two (2) water supply wells that are owned and operated by the developer. These wells have open holes that extend through the Oxford Formation, the March Formation and extend into the upper portion of the Nepean Formation (Golder, 2008).

The approximate locations of the Kings Park wells and the Hyde Park wells are indicated on Figure 1 (Site Location Plan) in Appendix 5.

2.0 METHOD OF STUDY

2.1 Terrain Analysis

The subsurface conditions were investigated with a series of boreholes that were drilled along the north east portion of the subject site in conjunction with the Phase I-II Environmental Site Assessment investigative works (Paterson, 2009). The fieldwork program for the investigation was carried out in July, 2009. Five (5) boreholes were advanced to depths ranging between 5 m and 6 m below ground surface (bgs). The borehole locations are indicated on Figure 10 (Test Well and Observation Well Location Plan) in Appendix 5.

A subsurface investigation was also conducted by Paterson as part of the geotechnical study for the site in 2010 (Paterson, 2010). Five (5) additional boreholes were drilled at locations across the site. The borehole locations are shown on Figure 6 (Geotechnical Investigation) in Appendix 5.

Soil stratigraphy and related information from the environmental and the geotechnical investigations are summarized on the Soil Profile and Test Data sheets located in Appendix 1 of this report.

2.2 Overburden Groundwater

Groundwater levels were measured in standpipes installed in the geotechnical boreholes and the results are summarized in Table 1 (below). The overburden groundwater table was encountered at 2.5 to 3.6 m bgs. It should be noted that groundwater levels are subject to seasonal fluctuations, so groundwater levels could vary at the time of construction.

Test Hole	Ground Surface Elevation	Groundw	Groundwater Levels		
Number			Elevation (m)		
BH 1	94.02	2.56	91.46	05-Feb-10	
BH 2	93.94	3.2	90.74	05-Feb-10	
BH 3	94.07	2.8	91.27	05-Feb-10	
BH 4	93.94	2.9	91.04	05-Feb-10	
BH 5	93.86	3.6	90.26	05-Feb-10	

Table 1 - Overburden Groundwater Elevations (Geotechnical Boreholes)

2.3 Test Well Installation

TW1

Based on background information and MOECC Water Well Records, a conceptual hydrogeological model was developed. In order to further evaluate the water supply aquifers underlying the site, an initial test well (TW1) was installed. The test well was constructed by Air Rock Drilling Company Ltd. (Air Rock) of Richmond, Ontario on January 11, 2010 at the location shown on Figure 10 (Test Well and Observation Well Location Plan) in Appendix 5. The test well location was selected by Paterson in conjunction with the civil consultant, Novatech.

With respect to the construction of TW1, a 228 mm diameter casing hole for the test well was advanced using a rotary tri-cone bit through the overburden, to the underlying bedrock. The casing hole was advanced into the bedrock of the Oxford Formation an additional 2.1 m to ensure that the casing was seated in competent bedrock.

The casing hole was filled with a combination of neat cement and bentonite grout slurry having a consistency of at least 20% bentonite solids (by weight). A neat cement slurry was introduced into the lower 2 to 3 m of the casing hole through the tri-cone bit resting at the bottom of the casing hole. Next, the tri-cone bit was raised 2.5 m off the bottom of the casing hole and the bentonite slurry was introduced down the drill stem and through the tri-cone bit and pumped upwards through the hole to the ground surface.

A new, 150 mm diameter steel casing, equipped with a drive shoe, was installed in the grout column. The density of the slurry in the casing hole was sufficient to prevent lateral movement of the casing as it was lowered into the hole, thereby ensuring proper casing alignment. The casing was seated into the bedrock using pressure applied to the top of casing from the percussion bit and bentonite slurry inside the casing was blown out prior to advancing the bit into the bedrock.

TW2 and TW3

During the interim period between the submission of the preliminary hydrogeological study report and the receipt of the comments from the review agencies, it was decided to construct two (2) additional test wells on the site in order to satisfy the requirements of Procedure D-5-5 (MOEE, 1996), with respect to the minimum number of test wells required for the site. These wells, (TW2 and TW3) were constructed utilizing the same well construction methodology as had been adopted for TW1. Reference can be made to the published MOECC Water Well Records for TW2 and TW3, which are included in Appendix 2.

TW4 and TW5

Subsequent to the receipt of the initial comments from the review agencies following submission of the preliminary hydrogeological study, and subsequent to the successful completion of the hydrogeological study carried out on the nearby property located at the corner of Perth Street and Shea Road (Paterson, 2011), several technical meetings were held with hydrogeologists from the City and RVCA.

Based on the outcome of those discussions, it was determined that the site was not considered to be hydrogeologically sensitive, but there may be potentially adverse impacts related to offsite well interference if the future water wells were constructed such that they intercepted the Oxford and March/Nepean Formations by means of an open borehole. Also, there was a greater potential for cross contamination within the aquifer system related to interception of multiple aquifers within the open boreholes. Based on discussions between the review agency and Paterson, it was decided to propose a well construction methodology which would involve an increased steel casing length to seal the annular space down to the bottom of the Oxford Formation and into the Upper March Formation.

A similar well construction methodology had been previously employed by Paterson for the construction of a test well related to a hydrogeological analysis of a property located approximately 800 m to the east/northeast of the subject property (northeast corner of the intersection of Shea Road at Perth Street, Richmond, Ontario). Note: this well is referred to as the 'Perth @ Shea' well for the purposes of this report. The location of the 'Perth @ Shea' well is indicated on Figure 1 (Site Location Plan) in Appendix 5.

Test wells TW4 and TW5 were constructed by Air Rock such that the casing hole was advanced through the overburden and through the Oxford Formation, terminating approximately 3.0 m into the March Formation. Casing was installed to a depth of 56.38 m bgs in TW4, and a depth of 56.98 m bgs in TW5. Casing was grouted in place using reverse pressure grouting techniques consistent with Ontario Regulation 903 requirements.

The open borehole was advanced into the March Formation where a strong water supply aquifer was intercepted by both wells.

The wells were surged and pumped for an initial extended period of well development to clear the formation of the majority of the fine rock cuttings.

TW6

After the submission of the October 2013 report (PH1292-REP.02R2), and several meetings involving the City of Ottawa, RVCA and Paterson, a decision was made to construct a third well, in addition to TW4 and TW5 to bring the submission into strict compliance with Procedure D-5-5 (MOEE, 1996).

TW 6 was constructed by Air Rock in July 2014. The well construction methodology utilized for this well mirrored that of TW4 and TW5. The casing hole was extended down and approximately 3 m into the March Formation at a depth of approximately 54.9 m and the annular space was pressure grouted with a sodium bentonite/neat cement slurry complying with Ontario Regulation 903 requirements.

The open borehole extended to a depth of approximately 68.9 m bgs where the water supply aquifer intercepted by TW4 and TW5 was encountered.

Table 2 (below) summarizes configuration and initial yield estimates for the test wells that were installed at the site.

TEST WELL SUMMARY									
Well ID	Year drilled	Depth to BR (m)	Casing depth (m)	depth bearing fractures		Recommended pumping rate (L/min)			
TW1	2010	7.67	9.75	71.0	73.76	91			
TW2	2010	9.14	11.58	69.2 / 69.8	71.63	91			
TW3	2010	10.06	12.19	40.5 / 65.8 / 69.5	73.15	91			
TW4	2011	8.84	56.38	68.0	68.58	91			
TW5	2011	8.53	56.98	63.3	65.83	91			
TW6	2014	9.14	54.86	56.38 / 62.5 / 66.8	68.58	91			

Table 2 - Test Well Summary

2.4 Pumping Tests

All of the six (6) test wells were subjected to an initial one (1) hour pumping test, carried out by Air Rock following stabilization of the static water level in the well column. The one (1) hour pumping tests demonstrated that the test wells, overall, had potential yields of between 68 L/min. and 227 L/min.

The following sections describe the various stages of the investigation and the pumping test approaches that were used. A summary of pumping tests is included in Table 3 (below).



Turbidity and free chlorine residual measurements were taken using a Hanna HI93414 Fast Tracker portable meter at the well head 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 Extech[™] ExStik II portable multi-meter. Field parameter results are included in Appendix 3.

Pumping	Tests Summ	nary			
Well ID	Year Drilled	Duration of test (hr)	Date	Pumping Rate (L/min)	
TW1	2010	6	13-Jan-10	75.6	
TW2	2010	6	28-Jan-10	75.6	
TW3	2010	6	Mar-10	75.6	
704	0011	9	26-Aug-11	75.6	
TW4 2011		2.78	simultaneous test 31-Oct-14	99.8	
TW5	2011	9	30-Sep-11	81.8	
1005	2011	2.78	simultaneous test 31-Oct-14	99.8	
TIMO	204.4	3 days	4 day test from 1-4-Nov-14	34	
TW6	2014	2.78	simultaneous test 31-Oct-14	99.8	

Table 3 - Pumping Tests Summary

NOTE: well records corresponding to the wells used in the investigation are identified (where possible) in Appendix 2

PLEASE NOTE: TW1, TW2 and TW3 have open boreholes that intersect the Oxford and March Formations, as noted in the previous sections. Comments from RVCA lead to the installation of three (3) additional wells (TW4, TW5 and TW6) with casing holes extending into the March Formation. The following description of pumping tests focuses on test wells TW4, TW5 and TW6.

2.4.1 **Constant Rate Pumping of TW1, TW2 and TW3**

TW1, TW2, and TW3 were subjected to individual six (6) hour constant rate pumping tests in 2010.

2.4.2 Constant Rate Pumping of TW4

TW4 was pumped at a constant rate of 75.6 L/min for 9 hours on August 26, 2011. The flow rate was measured manually during the test using standard timed volume techniques (i..e bucket and stopwatch. Manual water level readings were collected at the pumping well and at seven (7) observation wells. A maximum drawdown of 5.48 m was measured in the pumping well after 100 minutes of pumping. 95% recovery was achieved 40 minutes after the end of pumping at the pumping well.

2.4.3 **Constant Rate Pumping of TW5**

TW5 was pumped at a constant rate of 81.8 L/min for 9 hours on September 30, 2011. The flow rate was measured manually during the test. Manual water level readings were collected at the pumping well. A maximum drawdown of 3.51 m was reached in the pumping well after six (6) hours of pumping.

2.4.4 Simultaneous Pumping of TW4, TW5 and TW6

A simultaneous pumping test was carried out at TW4, TW5 and TW6 on October 31, 2014. The test was performed to assess aquifer and well response during peak water demand periods. In order to achieve this, each of the wells was pumped simultaneously at a rate of 99.8 L/min resulting in a combined pumping rate of 299.4 L/min. This rate was chosen based on a rationalized peak water demand (refer to Section 7.3.1 for details).

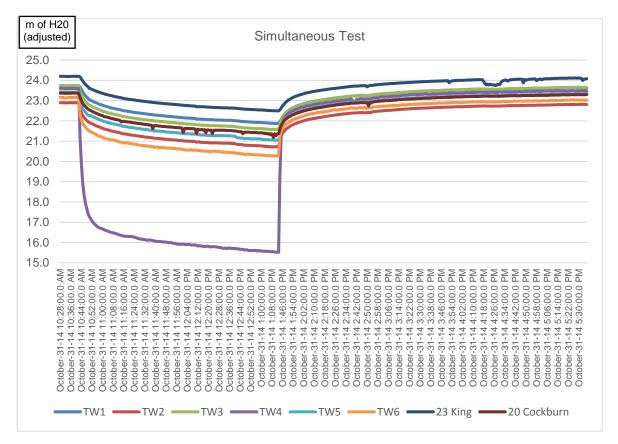
Prior to the commencement of pumping, a series of continuous recording dataloggers were deployed in the three pumping wells, the three other onsite test wells (TW1, TW2 and TW3) and in three (2) offsite wells located at 20 Cockburn and 23 King Street. The locations of all test wells plus offsite wells used in the investigation are indicated on Figure 10 (Test Well and Observation Well Location Plan) in Appendix 5.

The duration of the simultaneous pumping test was limited to 167 minutes to keep the total water volume below 50,000 L (MOECC requires a Permit To Take Water for volumes greater than 50,000 L). This time period (~2.5 hours) is consistent with the peak water demand typically associated with domestic water use. (i.e. 6 am to 8 am and from 6 pm to 8 pm).

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The dataloggers recorded the recovery period after the end of pumping. The three pumping wells all achieved 95% recovery in less than four (4) hours after the end of pumping (i.e. 76 mins at TW4, 189 mins at TW5 and 225 mins at TW6).

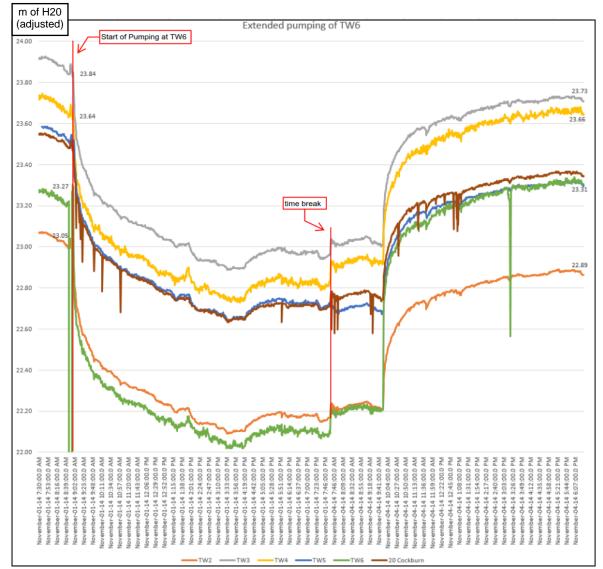


The plot provided above has superimposed pumping signatures from known and unknown sources (X axis = metres H_20 adjusted). The hydrograph traces for 23 King and 20 Cockburn show evidence of pump cycling from the pumps that are installed in those wells. The other hydrograph traces also include evidence of pumping in nearby wells. This is normal and is to be expected as the test was conducted in a residential area with multiple well users, and wells that interest the Oxford and March Formations.

2.4.5 Extended Pumping of TW6

TW6 was pumped at a rate of 34 L/min for a duration of three (3) days. The extended pumping test commenced at 9 am on November 1, 2014 and extended until 9:53 am on November 4, 2014. Discharge water was directed to the existing unopened road allowance which drains to the existing ditch network running along King Street.

Datalogger information is included as hydrographs in Appendix 4, and in the plot below. The following plot is included for demonstration purposes and shows the initial drawdown at the pumping well and selected observation wells, and the recovery response after the end of pumping. Please note that the time period has been truncated so that the drawdown and recovery data can be clearly observed. The readings have also been adjusted so that the hydrographs all plot in a similar depth range. The pumping well (TW6) achieved 95% recovery 226 mins after the end of pumping.



The plot provided above has superimposed pumping signatures from known and unknown sources. The pattern of interference reflects normal daily use patterns (see hydrographs in Appendix 4 labelled Simultaneous Test and Extended Test).

Selected datalogger readings are provided below in Table 4 (below) which highlights drawdown and recovery information at each well.

ime	TW1	TW2	тwз	TW4	TW5	TW6	23 King	20 Cockburr
November-01-14 8:57AM	23.82	23.00	23.84	42.67	54.51	41.32	24.28	23.48
Start of pumping at TW6	Novembe	r-01-14 8:59	9AM					
November-01-14 1:00PM	23.1	22.2	23.0	41.9	53.8	40.2	23.6	22.8
Drawdown	0.75	0.77	0.81	0.80	0.72	1.16	0.71	0.70
November-04-14 7:54AM	23.06	22.22	23.02	41.92	53.70	40.20	23.56	22.76
End of pumping at TW6	Novembe	November-04-14 9:53AM						
November-05-14 6:13AM	23.79	22.98	23.83	42.76	54.42	41.40	24.25	23.46
Full Recovery	0.73	0.76	0.82	0.84	0.73	1.20	0.69	0.70
Change in WLs (start to end)	0.03	0.01	0.01	-0.09	0.09	-0.08	0.03	0.01
% recovery	98%	99%	101%	105%	101%	104%	98%	100%

Table 4 - Extended Pumping Test of TW6 - Recovery Analysis

All values are pressure readings expressed as metres (H2O) and have not been converted to water level below top of casing

95% recovery was reached at pumping wells within 4 hours

2.5 Field Survey and Well Inspections

The ground surface elevations for the wells are referenced to a geodetic datum. The elevations at the wells, which are delineated on Drawing No. PH1292-1 - Test Hole Location Plan in Appendix 5, were surveyed and laid out by Novatech prior to the construction of each of the six (6) test wells. The offsite wells that were used in the investigation were also surveyed to establish water level hydrographs for the cross-section that is included as Figure 11 (Drawdown during Simultaneous and Extended Pumping Tests) in Appendix 5.

Well inspections were carried out at several offsite locations to obtain well owner information and comments. The well inspections did not identify any issues with offsite wells and the owners did not report any specific concerns about well yields or water quality. Well inspections logs are included in Appendix 3.

2.6 Groundwater Sampling and Laboratory Testing

Groundwater samples were collected from TW1, TW2 and TW3 during constant rate pumping tests at 3 and 6 hours after the start of pumping. For TW4 and TW5, which were each subjected to a nine (9) hour constant rate pumping test, samples were collected at 3 and 9 hours after the start of pumping. For TW6 raw water samples were collected at the middle and end of the extended pumping test. Additional groundwater samples were obtained from two (2) neighbouring well located at 6 King Street and 13 Cockburn Street.

Residual chlorine testing was conducted in the field using a Hanna C-114 multi-meter to ensure the absence of chlorine when the water samples were collected.

All groundwater samples were submitted to Exova Laboratories of Ottawa for analysis of the standard 'Subdivision Water Supply' suite of analyses. Laboratory certificates of analysis are included in Appendix 3. One sample from TW1 was submitted for analysis of volatile organic compounds (VOCs) and petroleum hydrocarbons (PHCs). One sample from TW6 was submitted for analysis of metals only (this sample was collected on the first day of the extended pumping test).

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.

In response to a recommendation by RVCA, a groundwater sample from TW6 was also submitted for laboratory analysis of metals.

In order to assess potential hydrocarbon impacts to bedrock beneath the site (see Section 3.2), a groundwater sample from TW1 was also submitted for analysis of VOC and PHC parameters. Paterson collected the raw water samples for VOC and PHC analysis in strict accordance with Section 2.1.4.1 of the document entitled, 'Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act', prepared by the Laboratory Services Branch MOE, dated March 9, 2004, amended July 1, 2011.



<u>Please Note:</u> Water quality results from a test well installed near the intersection Perth Street and Shea Road (for a separate Paterson project) have been included in the discussion of water quality presented in Section 7.2 of this report. Water quality at the 'Perth @ Shea' well is considered to be indicative of the Lower March Formation which is the preferred aquifer for the proposed subdivision.

3.0 SITE DESCRIPTION

3.1 Surface Conditions

The subject property is relatively flat with grass cover. The ground surface sloped very gently towards the south-southeast, towards the Jock River, which is located a distance of approximately 500 m beyond the southern limits of the property.

Site drainage is poor with drainage being achieved through a combination of surficial runoff and vertical infiltration. The neighbouring roadside ditches, which effectively box the subject property on two sides, are generally shallow and provide passive site drainage only. There was no evidence of active drainage (i.e. subsurface tile drains, grassed swales, etc.) on the subject property at the time of the site investigation.

3.2 Surrounding Land Uses

The subject property is bound by streets along the east and west property limits. A right-ofway for a street is located to the south of the subject property, beyond which, is existing single home residential development. To the north, a mix of commercial and residential uses have been established.

A former fuel station was, historically, located immediately beyond the northeastern edge of the site. The Phase I-II ESA program completed by Paterson (Paterson, 2009) focused on a series of environmental boreholes located on the subject property along the northeastern property limits. The purpose of these works was to ensure that there had been no migration of contaminants from the adjacent site onto the subject property.

The Paterson ESA did not find any evidence of volatile organic compounds (VOC's) or petroleum hydrocarbons (PHC's) at detectable concentrations in the overburden groundwater within the limits of the study area.

In order to assess groundwater within the bedrock beneath the site, VOC and PHC analyses were carried out on a raw water sample from TW1 recovered during the constant rate pumping test. All results for hydrocarbon related parameters were non-detectable in the sample that was tested.

4.0 GEOLOGY

4.1 Surficial Geology

A review of available surficial soils mapping for the area in the vicinity of the subject property indicates that the site is located within the sub-littoral and deep water facies of the Champlain Sea Deposits with isolated areas of glacial till deposits at the surface.

Surficial soils mapping information (Soils of The Regional Municipality of Ottawa Carleton Sheet 3) indicates a broad coverage of low permeable silty clays of the Dalhousie and North Grenville Soil Associations.

Figure 2 (Surficial Soils Delineation Mapping) in Appendix 5, shows surficial soils delineations mapping information from the OGS Earth website (OGS, 2015), which indicates the site is in an area of fine-textured glaciomarine deposits (silt and clay, minor sand and gravel, massive to well laminated).

The geotechnical investigation by Paterson (Paterson, 2010) identified a deep silty clay deposit extending beyond the maximum depth of investigation which was 6.55 m bgs. The upper portion of the silty clay has been weathered to a brown crust at all test hole locations. Grey silty clay was encountered below the brown silty clay crust at all test hole locations. In situ shear vane field testing conducted within the grey silty clay layer yielded undrained shear strength values ranging from 30 to 80 kPa. These values are indicative of a firm to stiff consistency.

Test well drilling conducted from 2010 to 2014 at the site indicates that bedrock was encountered at depths of between 7.67 to 10.06 m bgs (see Table 2 – Test Well Summary in Section 2.3 of this report).

Reference should be made to the Soil Profile and Test Data sheets presented in Appendix 1 for specific details of the soil profiles encountered at the test hole locations.

4.2 Bedrock Geology

Based on available geological mapping, the surficial soils are directly underlain by dolostone of the Oxford Formation which is, in turn, underlain by the March Formation, which overlies the Nepean Formation. Both the Oxford and March Formations comprise the Beekmantown Group. Figure 3 (Regional Bedrock Mapping) in Appendix 5, shows bedrock information from the OGS Earth website (OGS, 2015).

The overall maximum thickness of the Oxford Formation is approximately 70 m in the Ottawa area. TW1, which was drilled through the Oxford Formation and completed into the March Formation, passed through approximately 56 m of Oxford Formation. This is slightly less than the average thickness of the Oxford Formation, but it is consistent with Paterson's experience in the surrounding area. The Oxford Formation thins significantly as one moves eastward from the west of Richmond to the other side of the Rideau River at Manotick, Ontario. Based on available MOE Water Well Records the Oxford formation thins to an overall thickness of approximately 10 m - 15 m east of Manotick, Ontario.

The March Formation has is comprised of thick beds of grey sandstone alternating with thick beds of sandy blue-grey dolomite. The contact with the Nepean formation is generally placed at the lowest dolomitic layer, however it is often difficult to differentiate the Nepean and March formations due to similarities in appearance. In Paterson's experience, the Nepean Formation can be differentiated from the March Formation by careful evaluation of both the colour of, and integrity of the rock fragments produced during drilling through each of these layers.

The Nepean Formation consists of a cream coloured, coarse-grained sandstone with a weathered grey and irregular brown stained appearance. Near the top of the formation, the sedimentary cement is either calcareous or of iron oxide. The overall thickness of the formation varies considerably in the Ottawa area.

MOECC Water Well Records confirm the presence of limestone (i.e dolostone) which is underlain by sandstone and are considered to substantiate the published bedrock mapping information for the subject property (please note that dolostone is often interpreted as limestone by drilling contractors as it has a very similar appearance and is often associated with limestone). Dolostone typically occurs due to magnesium replacement of the calcium in limestone during lithification, and is very common in the Ottawa region.

5.0 HYDROGEOLOGY

5.1 Overburden Hydrogeology

Overburden groundwater levels are detailed in Table 1 in Section 2.2 of this report. The depth to the groundwater varies across the site, ranging from approximately 2.5 m below ground surface (bgs) to 3.6 m bgs.

The overburden material is a stiff to very stiff silty clay. The overburden groundwater occurs in a perched state within the lower extents of the weathered crust portion of the silty clay stratum. The direction of groundwater flow is interpreted to be towards the southeast.

5.2 Bedrock Hydrogeology

Based on the available published MOECC Water Well Records, the wells immediately surrounding the subject property are drilled wells utilizing water supply aquifers located within the Oxford, March and Nepean Formations.

As discussed in Section 1.2 of this report, the regional hydrogeology of the Richmond area has been extensively studied. Based on the available data, the upper aquifer, located within the Oxford Formation is the dominant source of drinking water for over 90% of the inhabitants of Richmond, Ontario. This water supply aquifer has been previously categorized as having a very high well yield and has been demonstrated to have satisfactory water quality.

A lower aquifer exists within the March Formation, located at the bottom of the formation at the March-Nepean Formation interface. This aquifer has also been demonstrated to provide significant well yields.

The deepest mapped aquifer present beneath the subject property is the Nepean Formation. This aquifer, has been well documented by Paterson, Golder, and others, to be a regional aquifer extending from Almonte, Kemptville and Merrickville eastward past Greely, Ontario. The Nepean aquifer, like that of the Oxford Formation, possesses aquifer characteristics which make it a highly productive aquifer with desirable water chemistry.

The two (2) municipal water supply wells that service the King's Park subdivision are thought to primarily exploit the Nepean Formation (Golder, 2008).

The Mississippi-Rideau Source Protection Region has summarized the wellhead protection information for the King's Park subdivision. Wellhead protection zones have been

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established for the Oxford Formation aquifer and the Nepean Formation aquifer. Neither of the wellhead protection zones associated with the underlying water supply aquifers for the communal wells servicing King's Park appear to directly coincide with the subject property.

A hydrogeological existing conditions report by Golder (Golder 2008) includes a discussion of the Hyde Park subdivision located approximately 650 m northwest of the subject property. The reports indicates the water supply wells were constructed such that they completely penetrate the Oxford and March Formations, and partially penetrate the Nepean Formation. The wellhead protection and radius of influence calculations for the well were set at 1000 m with focus placed on wells within 500 m of the water supply wells. Based on the Golder report, the Hyde Park wells have similar groundwater geochemistry to test wells TW4, TW5 and TW6. Some minor well interference is to be expected between the existing municipal wells at Hyde Park and the proposed development. The concept of potential well interference is discussed in detail in Section 6.3.3.

5.3 Water Well Record Review

An examination of the existing online database of MOECC Water Well Records for the immediate vicinity of the site was undertaken by Paterson as part of the regional hydrogeological review process. All Water Well Records within a 750 metre radius of the site are indicated on Figure 5 (Regional Wells Plan) in Appendix 5. The well records that were reviewed in detail for this study are identified on Figure 4 (Surrounding Well Information Plan) in Appendix 5.

The majority of the wells within the study limit are drilled water wells utilizing water supply aquifers located primarily within the Oxford Formation. A small group of wells located along Oradea Crescent appear to intercept the Oxford and the March Formations. One of the wells that was used for the investigation (23 King Street) also appears to intersect the Oxford and March Formations.

The test well drilled on the lands at the corner of Perth Street and Shea Road (i.e. the 'Perth @ Shea' well) is cased and grouted into the March Formation in the same configuration as is TW4, TW5 and TW6.

5.4 Surrounding Water Quality

General water quality, as it relates to the Oxford Formation water supply aquifer, is summarized for neighbouring wells at 6 King Street and at 13 Cockburn Street in Table 5, below.

Table 5 also includes raw water analytical results from the 'Perth St. @ Shea Rd' well, which intersects the Lower March Formation aquifer (i.e. the preferred aquifer for the proposed subdivision). These results are considered to be representative of the water quality within the Lower March Formation and are similar to the raw water quality analytical results obtained from TW4, TW5 and TW6 (see Section 6.2).

Table 5 - Groundwater	Conchamistr	L- Noighbouring Walls
Table J - Groundwaler	Geochennistry	- Neighbournig Weils

Parameter	Units	Neighbouring	g Water Wells		Ontario Drinking Water Standards		
Farameter	OTINS	6 KingStreet	13 Cockburn	'Perth @ Shea' well	Type Limit		
Microbiological Parameters	6						
Escherichia Coli	ct/100 mL	0	0	0	MAC	0	
Faecal Coliforms	ct/100 mL	0	0	0	-	-	
Faecal Streptococcus	ct/100 mL	0	0	0	-	-	
Heterotrophic Plate Count	ct/1 mL	0	0	2	-	-	
Total Coliforms	ct/100 mL	0	0	0	MAC	0	
Chemical Parameters (Hea	Ith Related)						
Fluoride	mg/L	0.38	0.36	1.03	MAC	2.4	
Nitrite	mg/L	<0.10	<0.10	<0.10	MAC	1	
Nitrate	mg/L	<0.10	<0.10	<0.10	MAC	10	
Chemical Parameters with	Aesthetic Obje	ctives/ Operat	tional Guideli	nes			
Alkalinity	mg/L	260	260	223	OG	500	
Chloride	mg/L	46	46	121	AO	250	
Colour	TCU	2	<2	<2	AO	5	
DOC	mg/L	1.2	1.1	1.2	AO	5	
Hydrogen Sulfide	mg/L	<0.01	0.01	<0.01	AO	0.05	
pН		7.94	7.9	8.18	AO	6.5-8.5	
Sulphate	mg/L	47	47	47	AO	500	
Hardness	mg/L	298	303	161	OG	100	
Sodium	mg/L	35	34	119	AO	20(200)	
Iron	mg/L	0.36	0.43	0.22	AO	0.3	
Manganese	mg/L	<0.01	0.01	0.01	AO	0.05	
Total Dissolved Solids	mg/L	454	451	593	AO	500	
Turbidity (Laboratory)	NTU	3.4	6.5	1.1	AO	5	
Turbidity (Field)	NTU	0.1	1.1	0	AO	5	
MAC=Maximum Allowable Concentration	AO = Aesthetic O	Dbjective	OG= Operationa	al Guideline			

5.5 Conceptual Hydrogeological Model

Based on the available background information and the site investigation carried out at the subject property, a conceptual hydrogeological model of the study area has been developed The conceptual hydrogeological model is shown as a cross section in Figure 8 (Conceptual Hydrogeological Model) in Appendix 5, and is summarized as follows:

• Overburden Clay

- Stiff silty clay having an average thickness of 8 to 10 m.
- The upper 3 to 4 m of the clay layer is weathered with some deep root penetration and desiccation cracking providing some secondary permeability within the upper soil horizon.
- Towards the bottom of the overburden layer the clay becomes considerably more stiff and the in situ hydraulic conductivity is lower by several orders of magnitude resulting in an almost impervious layer above the underlying bedrock.
- The combination of the thickness and composition of the silty clay overburden is such that the site is not considered to be hydrogeologically sensitive. As such, the surface of the bedrock is considered to be reasonably protected from anthropogenic sources of contamination originating at/near the surface of the ground in the vicinity of the subject property.
- The only significant potential pathway for anthropogenic sources of contamination to migrate into the underlying bedrock strata is via drilled wells.

• Oxford Formation

- Fractured within the upper 1 to 3 m (i.e. cap rock). Below the upper bedrock cap, the dolostone appears sound with few, if any horizontal fractured zones being reported for several metres below the top of the bedrock.
- Many of the neighbouring water wells within the study limits reported intercepting a water supply aquifer at a depth of approximately 20 to 40 m below ground surface. Based on the known topography and relatively thickness of the overburden cover, an upper water supply aquifer is present at a depth of approximately 10m to 30 m below the bedrock surface.
- This upper aquifer appears to be artesian in nature as MOECC Water Well Records indicate static water levels at several nearby wells were at or above

ground surface at the time of drilling. Several Water Well Records indicate free flowing artesian conditions in the upper water supply aquifer.

- Water Well Records indicate the presence of another aquifer located within the lower portion of the Oxford Formation. The lower aquifer, like the upper, exhibits artesian characteristics with several Water Well Records reporting free flowing artesian conditions also.
- There is little available information present to either confirm or refute the hydraulic interconnection between the upper and lower Oxford Formation aquifers. The site specific well construction program was not designed to examine this in significant detail. For the purposes of the conceptual hydrogeological model, the Oxford Formation aquifer system is considered to be connected via an intermittent vertical fracture network.

• March Formation

- Based on the studies completed by Golder related to the communal water wells at Kings Grant and Hyde Park, and the Mattamy Lands to the west of the Village of Richmond (Golder, 2008 and 2011), the hydraulic conductivity of the lower Oxford Formation significantly drops at the interface with the underlying March Formation.
- Historically, and prior to more recent findings from Golder's work on the Mattamy Lands, the lower Oxford Formation/March Formation interface was considered to be an aquitard. More recent work suggests that this zone of low hydraulic conductivity may be a leaky aquitard.
- The original aquifer analysis completed by Paterson predate the Golder works within the Mattamy Lands. As such, the original conceptual hydrogeological model prepared by Paterson prior to the execution of the work program was premised on the basis that an aquitard was present. This effectively validated the well construction methodology for TW4 and TW5 as it was thought that the March/Nepean Formation aquifer system would be effectively isolated from the Oxford Formation.
- Given Paterson's analysis of the Golder work, it is prudent to consider the lower Oxford/March Formation interface to be leaky in nature and some vertical movement of groundwater will occur between the Oxford Formation aquifer system and the March/Nepean aquifer system.



• Nepean Formation

- The March formation conformably overlies the Nepean Formation. The Nepean Formation is an extensive water bearing sandstone unit that unconformably overlies the Precambrian granitic basement. Golder (2008) estimate the Nepean Sandstone to be approximately 40 to 50 m thick in the vicinity of Richmond.
- Golder (2008) suggest that the King's Park subdivision wells, which intersect the Oxford, March and Upper Nepean Formations, probably draw most of their water from the Nepean Formation.

With respect to the inferred direction of groundwater flow, previous hydrogeological studies carried out by Paterson in the vicinity of the subject property have presented evidence to indicate that flow within the Oxford Formation is in a west to southwest direction towards the Rideau River.

6.0 AQUIFER ANALYSIS

The results of the pumping tests performed on the test wells are presented in the following sections.

PLEASE NOTE: All discussion of aquifer analysis involving pumping tests carried out at test wells TW1, TW2 and TW3 has been removed from the report. Analysis details have been retained in Appendix 4 for continuity purposes. Further analysis has been conducted on pumping test data from TW4, TW5 and TW6 and is discussed below in terms of the available data sets and applicable analysis techniques.

An analysis of the nine (9) hour pumping test at TW4 is included for comparison purposes. This analysis has not been updated (apart from the removal of some ambiguous information), and is based on hand measured drawdown and recovery data at the pumping well and several observation wells.

An updated analysis of the nine (9) hour pumping test at TW5 is included. This analysis is based on hand measured drawdown data at the pumping well only.

A thorough analysis of the simultaneous pumping test is included. This analysis is based on datalogger information from the three pumping wells and from a number of observation wells. Please note that the observation wells for this analysis have open hole sections that intersect more than just the preferred aquifer zone for the proposed subdivision. As such, the analysis results are included and discussed, but have less significance than the results from the extended pumping test of TW6.

The following aquifer analysis places the highest importance on the extended pumping test of TW6. This analysis is based on datalogger information from the pumping well and from a number of observation wells including test wells TW4 and TW5 which intersect the preferred aquifer only.

Table 6 (below) provides a summary of the wells used for the aquifer investigation/ characterization, and are grouped according to the well configuration. Well locations are indicated on Figure 10 (Test Well and Observation Well Location Plan) in Appendix 5.

Ottawa

North Bay

INVESTIGATION WELLS CONFIGURATION SUMMARY								
Well Configuration and Use in Investigation	Well ID	Year drilled	Depth to BR (m)	Casing depth (m)	Depth to water bearing fractures (m)	Total depth (m)		
	TW1	2010	7.67	9.75	71.0	73.76		
Test wells intercepting Oxford/March and	TW2	2010	9.14	11.58	69.2 / 69.8	71.63		
Upper Nepean Fms	TW3	2010	10.06	12.19	40.5 / 65.8 / 69.5	73.15		
Test wells intercepting preferred aquifer only	TW4	2011	8.84	56.38	68.0	68.58		
	TW5	2011	8.53	56.98	63.3	65.83		
(i.e. Lower March Fm)	TW6	2014	9.14	54.86	56.4 / 62.5 / 66.8	68.58		
Observation wells intercepting Oxford	20 Cockburn	2005	8.23	7.77	67.1	69.19		
and March Fms	23 King	2005	7.31	8.22	69.5	70.10		
	EW	1987	9.14	10.36	11.3	13.72		
Observation wells intercepting Oxford Fm only	13 Cockburn	MOECC W	ater Well Re	cord not identi	fied (depth measured)	18.00		
	6 King	1969	8.23	9.45	15.2	15.85		

Table 6 - Aquifer Investigation Wells Configuration Summary

6.1 **Aquifer Characteristics**

Pumping test data were analyzed using Aquifer Test Pro[™] software. All pressure data from the dataloggers was corrected for atmospheric pressure variations (i.e. barometric compensation) using Schlumberger Diver-Office[™] software and a barometric pressure data logger that was deployed during the investigation.

Aquifer analysis details based on pumping tests of TW1, TW2, and TW3 are included in Appendix 4, but are not discussed in detail because the information is not suitable for assessment of the preferred aquifer (i.e. Lower March Formation).

TW4 – 9 hour test

TW4 was initially tested for 9 hours at a rate of 75.6 L/min on August 26, 2011. Analysis of the hand measured drawdown and recovery data was conducted using Theis (Theis, 1935). Analysis details are included in Appendix 4. The most significant results from this analysis are for the Theis analysis using TW5 as an observation well. Transmissivity was estimated at 177 m²/day, and Storativity was estimated to be 1.57x10⁻⁶.

PLEASE NOTE: A discussion of offsite well impacts, included in Section 6.3.3, includes a description of hydrographs from dataloggers that were deployed during the nine (9) hour pumping test of TW4. The hand annotated hydrographs are included in Appendix 4 for discussion purposes.

TW5 – 9 hour test

TW5 was initially tested for 9 hours at a rate of 81.8 L/min on September 30, 2011. Analysis of the hand measured drawdown data from TW5 was conducted using Theis, Theis with Jacob correction (Jacob, 1944) and Cooper Jacob I (Copper & Jacob, 1946) methods. Analysis details are included in Appendix 4. The average of the three transmissivity estimates is 83 m²/day.

Simultaneous Test (TW4, TW5 and TW6)

TW4, TW5 and TW6 were pumped simultaneously for 167 mins at a rate of 99.8 L/min at each well on October 31, 2014. Analysis of datalogger records from the pumping wells and the observation wells that responded to pumping (TW1, TW2, TW3, 20 Cockburn and 6 King) was conducted using Theis and Theis with Jacob correction. Details of the Aquifer Test Pro[™] analysis are included in Appendix 4. Also included in Appendix 4 are hydrographs covering both the simultaneous test and extended test period for all wells that were monitored using dataloggers, including shallow wells 13 Cockburn and EW which did not show any response to pumping. The analysis results based on the observation wells are of limited value because none of the observation wells intersect the March Formation only.

A summary of analysis results for the simultaneous test is provided below in Table 7. Transmissivity results, based on analysis of the three pumping wells (see semi-log plots at the end of the simultaneous test analysis section in Appendix 4), range from 20 to 28 m^2 /day.

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Hydrogeological Assessment

Proposed Residential Development 11 King Street, Richmond, Ontario

Simultaneous Test (pumping of TW4, TW5 and TW6)							
Analysis	Well ID	T (m2/day)	S				
Theis	TW1	113	2.25E-05				
Theis	TW3	100	1.50E-05				
Theis	TW2	100	3.12E-05				
Theis	20 Cockburn	102	9.70E-06				
Theis	23 King	108	1.11E-05				
Theis Jacob	TW1	116	2.58E-05				
Theis Jacob	TW3	106	1.68E-05				
Theis Jacob	TW2	104	3.75E-05				
Theis Jacob	20 Cockburn	109	9.75E-06				
Theis Jacob	23 King	115	1.09E-05				
Theis Jacob (TW4, TW5, TW6)	TW4	81.7					
Theis Jacob (TW4, TW5, TW6)	TW5	33.5					
Theis Jacob (TW4, TW5, TW6)	TW6	90.8					
Theis (drawdown only)	TW4	20.2					
Theis (recovery)	TW4	22.9					
Theis (drawdown only)	TW5	28.4					
Theis (recovery)	TW5	23.9					
Theis (drawdown only)	TW6	28.4					
Theis (recovery)	TW6	25.9					

Extended Test (TW6)

As discussed above, this analysis is based on datalogger information from the pumping well and from a number of observation wells including test wells TW4 and TW5 which intersect the preferred aquifer only.

TW6 was pumped at a rate of 34 L/min for three (3) days, from November 1 to 4, 2013. Analysis of datalogger records from the pumping well and observation wells was conducted using Theis. Recovery data was analyzed using Theis and Agarwal + Theis (Agarwal, 1980) methods. Analysis details are included in Appendix 4. The results are summarized in Table 8 below.

The most significant results are those where TW4 and TW5 are used as observation wells, as these two wells are the only other ones that intersect only the preferred aquifer.

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Hydrogeological Assessment Proposed Residential Development

11 King Street, Richmond, Ontario

Extended Test (TW6)			
Analysis	Well ID	T (m2/day)	S
Theis	TW4	67.9	1.00E-
Theis	TW5	51.2	2.33E-
Theis	TW1	70.8	1.00E-
Theis	TW3	59.7	1.00E-
Theis	TW2	71.0	1.37E-
Theis	20 Cockburn	68.8	1.17E-
Theis	23 King	66.5	1.00E-
Agarwal + Theis	TW4	42.1	1.19E-
Agarwal + Theis	TW5	54.4	5.35E-
Agarwal + Theis	TW1	51.6	7.20E-
Agarwal + Theis	TW2	53.2	2.57E-
Agarwal + Theis	20 Cockburn	53.8	8.04E-
Agarwal + Theis	23 King	53.1	2.10E-
Theis Recovery	TW4	53.3	
Theis Recovery	TW5	54.3	
Theis Recovery	TW1	51.4	
Theis Recovery	TW3	51.4	
Theis Recovery	TW2	53.0	
Theis Recovery	20 Cockburn	53.7	
Theis Recovery	23 King	52.9	

In order to present a reasonable worst case scenario, further analysis focusing on the recovery data from TW4 and TW5 was performed. Semi-log plots showing just these two wells are included at the end of the extended test analysis section in Appendix 4. A summary of this analysis is presented below in Table 9. The average of these results has been used for the well interference calculation presented in Appendix 4 and discussed in Section 7.5 of this report.

Extended Test (TW6)				
Analysis	Well ID		T (m2/day)	S
Agarwal + Theis	TW4		33.8	2.58E-05
Agarwal + Theis	TW5		40.1	1.96E-05
Theis Recovery	TW4		35.2	
Theis Recovery	TW5		40.6	
		Average	37.4	2.27E-05

6.2 Groundwater Geochemistry Assessment

Groundwater analytical results from test wells TW1, TW2, and TW3 are compared the applicable Ontario Drinking Water Standards (ODWS), Objectives and Guidelines (MOE, 2003) in Table 10. Analytical results from test wells TW4, TW5, and TW6 are compared the applicable ODWS limits in Table 11.

Hydrogeological Assessment

Proposed Residential Development 11 King Street, Richmond, Ontario

	GROUNDW	ATER GEO	CHEMISTRY	′ TW1, TW2	& TW3				
Parameter	Units	т	V1	Т	W2	TW3		ODWS	
		3 HR (771127)	6 HR (771144)	3 HR (777415)	6 HR (777416)	3 HR (783870)	6 HR (783871)	TYPE	LIMIT
Microbiological P	arameters								
<u>E.coli</u>	ct/100 mL	0	0	0	0	0	0	MAC	0
Total Coliforms	ct/100 mL	0	0	0	0	0	0	MAC	0
Chemical Parame		Related)							
Fluoride	mg/L	0.31	0.31	0.29	0.29	0.34	0.36	MAC	2.4
Nitrite	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	MAC	1
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	MAC	10
Chemical Parame	eters with A	esthetic Obj	ectives/ Op	erational G	uidelines				
Alkalinity	mg/L	258	258	254	255	252	253	OG	500
Chloride	mg/L	50	51	56	55	52	52	AO	250
Colour	TCU	<2	2	<2	2	<2	<2	AO	5
DOC	mg/L	N/A	1.3	1.2	1.2	1.2	1.2	AO	5
H2S	mg/L	<0.01	<0.01	0.02	0.02	0.01	<0.01	AO	0.05
pН		7.97	7.95	7.93	7.94	7.96	7.98	AO	6.5-8.5
Sulphate	mg/L	46	46	47	47	54	53	AO	500
Hardness	mg/L	292	308	288	297	287	287	OG	100
Sodium	mg/L	26	29	29	29	29	30	AO	20(200)
Iron	mg/L	0.99	0.81	0.58	0.59	0.58	0.4	AO	0.3
Manganese	mg/L	0.02	0.02	0.01	0.01	0.01	<0.01	AO	0.05
TDS	mg/L	456	458	469	467	445	444	AO	500
Turbidity Laboratory	NTU	52.3	27.6	16.7	17.2	13.2	5.1	AO/MAC	05-Jan
General Chemical P	arameters			L	I	I		•	
Conductivity	uS/cm	702	705	722	718	685	683	-	-
N-NH3	mg/L	0.07	0.06	0.03	0.03	0.05	0.05	-	-
Phenols	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-
Tannin & Lignin	mg/L	<0.1	0.2	0.1	<0.1	0.2	0.2	-	-
Total Kjeldahl Nitrogen	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	-
Calcium	mg/L	74	77	74	76	72	72	-	-
Magnesium	mg/L	26	28	25	26	26	26	-	-
Potassium	mg/L	5	4	4	4	4	4	-	-

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Hydrogeological Assessment

Proposed Residential Development 11 King Street, Richmond, Ontario

G	ROUNDWA		CHEMISTR	RY TW4, T	W5 and TV	V6			
Parameter	Units	т١	N4	T۱	V5	ти	/6	ODWS	
		26-A	ug-11	30-S	ep-11	03-Nov-14	04-Nov-14		
		3 HR	9 HR	3 HR	9 HR			TYPE	LIMIT
Microbiological Parar	neters				1		L		
E.coli	ct/100 mL	0	0	0	0	0	0	MAC	0
Total Coliforms	ct/100 mL	0	2	0	0	0	0	MAC	0
Chemical Parameters	(Health Re	lated)							
Fluoride	mg/L	0.29	0.29	0.27	0.28	0.31	0.31	MAC	2.4
Nitrite	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	MAC	1
Nitrate	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	MAC	10
Chemical Parameters	with Aesth	etic Objec	tives/ Ope	erational C	Guidelines				
Alkalinity	mg/L	268	267	268	266	251	255	OG	500
Chloride	mg/L	44	44	45	45	52	52	AO	250
Colour	TCU	<2	3	2	<2	<2	<2	AO	5
DOC	mg/L	1.2	1.2	1.1	1.0	1.0	1.2	AO	5
H2S	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	AO	0.05
рН		8.17	8.17	7.96	7.97	8.11	8.10	AO	6.5-8.5
Sulphate	mg/L	46	46	49	49	51	51	AO	500
Hardness	mg/L	304	302	306	285	329	329	OG	100
Sodium	mg/L	24	24	27	26	32	33	AO	20(200)
Iron	mg/L	0.32	0.32	0.54	0.66	0.32	0.31	AO	0.3
Manganese	mg/L	<0.01	<0.01	0.01	0.01	<0.01	<0.01	AO	0.05
TDS	mg/L	447	446	442	449	461	460	AO	500
Turbidity Laboratory	NTU	2.8	1.5	5.7	6.5	1.2	1.2	AO	5
General Chemical Par	rameters								
Conductivity	uS/cm	687	686	680	691	709	707	-	-
N-NH3	mg/L	0.04	0.05	<0.02	<0.02	0.14	0.02	-	-
Phenols	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-
Tannin & Lignin	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
Total Kjeldahl Nitrogen	mg/L	<0.10	<0.10	0.12	<0.10	0.18	<0.10	-	-
Calcium	mg/L	79	78	78	73	84	84	-	-
Magnesium	mg/L	26	26	27	25	29	29	-	-

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Potassium

MAC=Maximum Allowable Concentration

3

mg/L

3

3

3

AO = Aesthetic Objective

3

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OG= Operational Guideline

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6.2.1 Additional Testing for Potential Contaminants

One groundwater sample from TW6 was submitted for analysis of metals. Analytical results are summarized in Table 12. The laboratory certificate of analysis is included in Appendix 3.

Table 10 - Groundwater Geo	chemistry _ TW/6 (Metals	2)
Table 10 - Gloundwaler Geo	uleillisily – 1 vv0 (ivielais	رد

GROUNDWATER GEOCHEMISTRY - METALS - TW6								
PARAMETER	UNITS	MRL	TW6	TYPE	LIMIT			
Metals								
Chromium (IV)	mg/L	0.01	<0.01					
Cyanide	mg/L	0.005	<0.005	MAC	0.2			
Mercury	mg/L	0.0001	<0.0001	MAC	0.0001			
Silver	mg/L	0.0001	<0.0001					
Arsenic	mg/L	0.001	<0.001	IMAC	0.025			
Boron	mg/L	0.01	0.15	IMAC	5			
Barium	mg/L	0.01	0.11	MAC	1			
Beryllium	mg/L	0.0005	<0.0005					
Cadmium	mg/L	0.0001	<0.0001	MAC	0.0005			
Cobalt	mg/L	0.0002	<0.0002					
Chromium (total)	mg/L	0.001	<0.001	MAC	0.05			
Copper	mg/L	0.001	<0.001	AO	1			
Mollybdenum	mg/L	0.005	<0.005					
Nickel	mg/L	0.005	<0.005					
Lead	mg/L	0.001	<0.001	MAC	0.01			
Antimony	mg/L	0.0005	<0.0005	IMAC	0.006			
Selenium	mg/L	0.001	<0.001	MAC	0.01			
Uranium	mg/L	0.001	0.001	MAC	0.02			
Zinc	mg/L	0.01	<0.01	Ao	5			
MAC=Maximum Allowable Concentration, IMAC = Interim MAC, AO = Aesthetic Objective								

One sample from TW1 was submitted for analysis of volatile organic compound (VOC) and petroleum hydrocarbon (PHC) parameters. As discussed in Section 2.6 and Section 3.2, this was part of the preliminary hydrogeological study. Results are summarized below in Table 13. The purpose of this testing was to confirm the absence of hydrocarbon related contaminants in the water supply aquifers beneath the site following the environmental remediation of an adjacent site which was formerly a retail fuel outlet.

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Hydrogeological Assessment Proposed Residential Development 11 King Street, Richmond, Ontario

Table 11 - Groundwater Geochemistry - TW1 (VOCs)

PARAMETER	UNITS	MRL	TW 1	TYPE	LIMIT
VOLATILE ORGANIC COM					Linvit i
1,1,1,2-tetrachloroethane	ug/L	2	<2		
1,1,1-trichloroethane	ug/L	2	<2		
1,1,2,2-tetrachloroethane	ug/L	2	<2		
1,1,2-trichloroethane	ug/L	2	<2		
1,1-dichloroethane	ug/L	2	<2		
1,2-dibromoethane	ug/L	4	<4.0		
1,2-dichloropropane	ug/L	2	<2		
1,3,5-trimethylbenzene	ug/L	1	<1		
1,3-dichlorobenzene	ug/L	2	<2		
Bromomethane	ug/L	2	<2		
c-1,2-Dichloroethylene	ug/L	2	<2		
c-1,3-Dichloropropylene	ug/L	0.8	<0.8		
Chloroethane	ug/L	4	<4.0		
Chloromethane	ug/L	4	<4.0		
Ethylbenzene	ug/L	2	<2	AO	2.4
Styrene	ug/L	2	<2		
t-1,2-Dichloroethylene	ug/L	2	<2		
t-1,3-Dichloropropylene	ug/L	0.8	<0.8		
Toluene	ug/L	2	<2	AO	24
Trichlorofluoromethane	ug/L	2	<2		
1,1-dichloroethylene	ug/L	2	<2	MAC	14
1,2-dichlorobenzene	ug/L	2	<2	MAC	200
1,2-dichloroethane	ug/L	2	<2	IMAC	5
1,4-dichlorobenzene	ug/L	2	<2	MAC	5
Benzene	ug/L	2	<2	MAC	5
Carbon Tetrachloride	ug/L	2	<2	MAC	5
Dichloromethane	ug/L	16	<16	MAC	50
Monochlorobenzene	ug/L	0.8	<0.8	MAC	80
Tetrachloroethylene	ug/L	1	<1	MAC	30
Trichloroethylene	ug/L	1	<1	MAC	5
Vinyl Chloride	ug/L	0.8	<0.8	MAC	2
Bromodichloromethane	ug/L	1	<1		-
Bromoform	ug/L	2	<2		
Chloroform	ug/L	2	<2		
Dibromochloromethane	ug/L	1	<1		
m/p-xylene	ug/L	4	<4.0		
o-xylene	ug/L	2	<2		
PETROLEUM HYDROCARI		. –			<u>I</u>
F1 (C6 TO C10)	mg/L	0.1	<0.1		
F1-BTEX (C6 TO C10)	mg/L	0.1	<0.1		
F2 (C10 TO C16)	mg/L	0.1	<0.1		
F3 (C16 TO C34)	mg/L	0.1	<0.1		
F4 (C34 TO C50)	mg/L	0.2	<0.2		
MAC=Maximum Allowable Concentra		0.2	AO = Aesthetic		

6.2.2 Water Quality Preferred Water Supply Aquifer

The analytical results for groundwater samples that were obtained from the preferred groundwater aquifer at the site (i.e. from TW4, TW5 and TW6) show that water quality is acceptable and that there are no exceedances of the applicable health related parameter limits of the Ontario Drinking Water Standards (MOE, 2003). Minor exceedances of the non-health related operational guidelines and aesthetic objectives limits for hardness and iron are noted at all three wells.

The laboratory measured turbidity results for TW5 exceed the aesthetic objective limit of 5 NTU. The field turbidity measurements taken at TW5 during the nine (9) hour pumping test were all non-detectable after the first two hours of pumping (see Appendix 3). The elevated turbidity results measured in the laboratory tested samples are probably caused by precipitation of iron after collection in the sample containers.

Iron has an aesthetic objective limit of 0.30 mg/L. Excessive iron concentrations in drinking water may impart a brownish colour to laundered goods and plumbing fixtures. The colour of the water may also be affected by excessive iron concentrations. Raw water containing excessive iron concentrations can produce a bitter, astringent taste. The iron concentrations at TW4, TW5 and TW6 (0.32 mg/L, 0.66 mg/L and 0.32 mg/L) are well below the maximum treatable limit of 10 mg/L as defined in Procedure D-5-5 (MOEE, 1996).

The total coliform level in TW4 was 2 counts/100 ml which exceeds the Maximum Acceptable Concentration (MAC) limit of 0 counts/100 ml in the sample taken at the end of the nine (9) hour pumping test. Please note that the total coliform count was zero in the sample that was collected after three hours of pumping. The result for the nine (9) hour sample is considered to be anomalous and is probably due to sample contamination at the time of sampling. Procedure D-5-5 (MOEE, 1996) notes that total coliform counts of less than 6 counts/100 ml shall be considered as acceptable. Field parameter results for each test are included in Appendix 3.

Hardness has an operational guideline limit of 100 mg/L. At the measured concentrations, the water is considered to be moderately hard, which is typical of wells drilled throughout eastern Ontario.

Results from the analysis of VOCs at TW1 were all non-detectable. Results from the analysis of metals at TW6 were all either non-detectable or well below the ODWS limits.

6.3 Water Quantity Assessment

PLEASE NOTE: this water quantity assessment is based on the assessment of the test wells that were completed in the March Formation (TW4, TW5 and TW6). Information from the test wells that were completed in the Oxford and March Formations (TW12, TW2 and TW3) was not used.

6.3.1 Peak Demand Use

An analysis of the suitability of the aquifer to supply the proposed development was completed using the procedure summarized in MOECC Procedure D-5-5 (MOEE, 1996). The per-person water requirement is 450 L/day. Peak demand occurs over a 120 minute period each day, so the peak demand rate is 3.75 L/min per person. Procedure D-5-5 suggests the utilization of the number of bedrooms plus one, to determine the minimum number of people per house. The proposed development is assumed to consist of three bedroom semi-detached units, so the number of persons per unit would be four (4) and the total peak demand rate will be 15.0 L/min/unit. This estimated total peak demand is well below the well yields demonstrated for the preferred water supply aquifer, as demonstrated by the pumping tests.

Table 3 in Section 2.4 shows that the pumping rates chosen for each of the pumping tests are above the estimated total peak demand rate. All of the test wells were reported to have utilized less than 75% of the available drawdown during the pumping tests. This information, combined with the calculated 20 year long term safe yield values, suggests that the specified well yields are representative of the yields which residents of the development are likely to obtain from future wells installed at the site. Long term offsite impacts on wells intercepting the March Formation are not anticipated, considering the drawdown experienced in TW4, TW5 and TW6 during the simultaneous and extended pumping tests, the spacing of the wells on the site, and the intermittent nature of the 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 14. Note that the simultaneous pumping test rate was chosen based on the CMHC estimate of 225 L/day/person (this equates to 300 L/min/40 units during the peak demand period of 120 minutes) in order to present a worst case scenario.

Daily Usage Estimate Source	L/day/ person	Peak demand period (mins)	L/Min/person (during peak demand period)	Persons per unit	L/min/unit (during peak demand period)	L/min/40 units (during peak demand period)	
Procedure D-5-5	450	120	3.75	4	15.0	600	ĺ
City of Ottawa	326	120	2.72	4	10.9	435	ĺ
CMHC	225	120	1.88	4	7.5	300	ĺ
CMHC (w new efficiency changes)	163	120	1.36	4	5.4	217	ĺ

Table 12 - Peak Demand Estimates

DISCUSSION: The simultaneous pumping test (discussed in Section 2.4.3) involved pumping three wells (TW4, TW5 and TW6) at a rate of 99.8 L/min each. Drawdown at most of the pumping and observation wells was 2-3 m and substantial recovery took less than 4 hours.

40 wells will have the effect of spreading out the water taking over the entire area of the proposed subdivision. Usage will probably be between 4 and 15 L/min/unit. The amount of drawdown at each well will be considerably less than the drawdowns that were observed during the long term pumping test, and there will be enough time between peak usage events to allow for substantial recovery.

At the start of the simultaneous pumping test, the effects of pumping were seen very quickly at the observations wells (within the first minute at TW2, TW3 and 20 Cockburn, and within 2 minutes at TW1 and 23 King). Please refer to the table and plot labelled 'Start of Simultaneous Pumping Test' in Appendix 4. The rapid response to pumping which was observed at nearby wells suggests that the effect of removing a large volume of water from



the aquifer will be about the same, whether by pumping at a high rate from three (3) wells, or at a much lower rate from 40 wells.

The simultaneous pumping test results show that current and future wells in the proposed subdivision will be sufficient to handle peak demand loadings.

6.3.2 Long Term Safe Yield

A determination of the long term safe yield (i.e. Q20 pumping rate) for test wells TW4, TW5 and TW6 was calculated using the method described by Maathius & van der Kamp (2006). For comparison purposes safe yield was also calculated using the Fervolden method (Fervolden, 1959) as described in Maathius & van der Kamp, 2006. The inputs and results of the calculation are presented in Table 15 (below).

The results of the safe yield analysis suggest that the test wells would have to be pumped continuously for 20 years at rates in excess of 56 L/min to significantly impact the aquifer. Based on CMHC's daily per person water usage rate (225 L/person/day) and four (4) persons per unit, the rate of water extraction per well in the proposed subdivision, expressed as a continuous rate, is 0.625 L/min (i.e. two orders of magnitude less than the anticipated rate of extraction). The analysis shows that the anticipated rate of water extraction at current and future wells in the proposed subdivision is well below the long term safe yield of the wells.

20 YEAR SAFE YIELD						
	:	Simultaneous Test				
Transmissivity Calculated Using	Т	W4	TW5	TW6		
Transmissivity (m2/d)		37	37	37		
Average Test Pumping Rate (L/min)	9	99.8	99.8	99.8		
Average Test Pumping Rate (m ³ /day)	1	144	144	144		
Available Drawdown (m)	1:	2.19	8.84	13.72		
Drawdown at 100 mins (m)	7	7.81	2.14	2.70		
Maximum Test Drawdown (m)	8	3.05	2.36	2.92		
% of available drawdown	6	6%	27%	21%		
Drawdown at 20 years (extrapolated)	1	5.2	9.2	9.4		
Specific Capacity (L/min/m) at 167 mins		12	42	34		
Q20 safe well yield (m³/day) _{Farvolden}	2	216	156	243		
Q20 safe well yield (m ³ /day) _{Maarthius & van der Kamp}		81	97	147		
Q20 safe well yield (L/min) _{Maarthius & van der Kamp}		56	67	102		
Farvolden, 1959, Maathius & van der Kamp, 2006						

Table 13 - 20 Year Safe Yield

6.3.3 Potential Well Interference

Interference between Future Onsite Wells

It is anticipated that a total of 40 individual water supply wells (including TW4, TW5 and TW6) will be used at the proposed subdivision. 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.

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.

Analytical model worksheets are presented in Appendix 4. Calculations were based worst case values for Transmissivity and Storativity (as presented in Section 6.1).

The model presents a projected drawdown of wells located at the centre of a development with a total of 50 wells pumping continuously for a period of 25 years (i.e. to provide a worst case scenario, the model is based on 40 wells in the proposed development plus 10 more wells on neighboring properties, all drawing water from the Lower March Formation).

The predictive well interference model indicates a 3.82 m decline in the potentiometric head of the water supply aquifer. This represents a reduction of approximately 28% of the available drawdown (based on TW6 which has an available drawdown 13.72 m). **PLEASE NOTE:** this is a worst case scenario based on the inputs and the method chosen. The real long term impacts will be minimal based on the findings of the simultaneous and the extended pumping tests, which showed rapid recovery after significant removal of groundwater.

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.

Regarding the potential for interference with the communal water supply wells associated with the Hyde Park and Kings Park subdivisions, impacts are expected to be relatively insignificant at those locations because of their distance from the proposed subdivision and the fact that the communal wells draw water from the Oxford Formation aquifer and the Lower March/Upper Nepean aquifer.

Offsite Well Impacts

The following discussion is based on hand annotated hydrograph plots (marked 'TW4 Test') included in Appendix 4. A series of dataloggers were installed in selected well locations on and off the subject property during the nine (9) hour pumping test of TW4. Dataloggers were installed at test wells TW3, TW5, and the house wells at 13 Cockburn Street, and 6 King Street. The two offsite wells intersect the Oxford Formation aquifer only (see Table 6 in Section 6.0 for a summary of wells and well configurations that were used in this study.

The MOECC Water Well Record for 6 King Street (1516749) is provided in Appendix 2. A specific water well record could not be identified for 13 Cockburn Street (location details for several MOECC Water Well Records that occur in close proximity to this address are ambiguous). The well depth was physically measured by Paterson and was found to be 18 m below top of casing.

The 'TW4 Test' hydrographs show that there was no significant drawdown at the shallow offsite wells (6 King and 13 Cockburn). Small amplitude cyclic water level fluctuations are attributed to daily use patterns as there are numerous shallow wells completed in the Oxford Formation in the area.

Significant drawdown was seen at the onsite test wells, which intersect the Oxford and March formations (and possibly extend into the top of the Nepean Formation).

The same pattern was observed during the simultaneous test and the extended pumping test (i.e. significant drawdown at observation wells that intersect the Lower March Formation, and no significant drawdown at the shallow wells that intersect the Oxford Formation only (see hydrographs labelled 'Simultaneous Test and Extended Test' in Appendix 4).

It is reasonable to conclude that there is no strong hydraulic connection between the March Formation and the Upper Oxford Formation in the vicinity of the subject property. The Lower March Formation is interpreted to be a 'leaky confined aquifer'. The primary concern with respect to pumping 40 wells on the subject property is not one of offsite impacts to the neighbouring wells (the great majority of which are completed in the Oxford Formation aquifer), but of long term drawdown within the March Lower Formation aquifer. Given the relatively minor theoretical drawdown calculated in the continuous pumping model, the onsite wells will have suitable available drawdown in the long term.

The few offsite wells that intercept the Oxford and March Formation (e.g. 20 Cockburn, 23 King) are not likely to be significantly impacted because they draw water from the Oxford Formation Aquifer and the Nepean Aquifer.

7.0 DEVELOPMENT CONSIDERATIONS

7.1 Future Water Well Construction

Drilled wells completed in the bedrock aquifer should be used for water supply in the proposed development. The wells should be drilled by a suitable experienced, MOECC licensed well contractor. All wells must be completed in accordance with O.Reg. 903.

Future wells should be drilled to depths of between 67 and 70 m. This will ensure that the wells extend to the base of the Lower March Formation aquifer. Steel well casing should extend 3 m into the top of the March Formation, and should be installed as per O.Reg. 903. A minimum casing length of 58 metres below ground surface should be installed. Well construction requirements are provided in Figure 12 (Well Construction Details) in Appendix 5.

At each well location the casing should be installed and grouted in place utilizing either a neat cement grout or sodium bentonite grout slurry pumped from the bottom of the annular space to the ground surface in accordance with O.Reg. 903. The creation of the casing hole, the installation of the casing and the grouting of the annular space should be inspected by a qualified Professional Engineer or Professional Geoscientist.

Each well 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 O.Reg. 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.

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 complete mixing of the chlorine over the entire depth of the well.

Each 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 qualified 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 each well casing should be slightly elevated within 3 m in all directions from the casing to direct surface runoff away from the well. Each well casing should project approximately 450 mm above the mounded soil.

7.2 Water Treatment

Based on the water quality analysis presented in previous sections of this report, it may be desirable, from aesthetic and operational perspectives, to address the hardness level and iron concentration in the water. Given the reported concentrations of these two parameters, treatment with a water softener will provide for sufficient removal of both the hardness and the iron concentrations noted in the water quality analysis. A water softener is recommended and should be sized by a qualified professional.

7.3 Wellhead Location

It is proposed that each of the 40 semi-detached units will be serviced by individual wells. The proposed development will have wells at a minimum 6 m spacing, and based on our review, it is our opinion that there will be no adverse impact on the overall well function and water yield. As such, the critical factor becomes that of the location of the well and the associated protection of the wellhead.

The preferred option for well location is in the front yard area between the wall of the house, the driveway and the adjacent property lines. Reference should be made to Figure 7 (Lot Development Plan) in Appendix 5.

It is noted that the preferred well locations place the wellhead less than 15 m from the proposed building sewer connections and, in some cases, less than 15 m from the sewer mains running along the cross streets. This is particularly important as it has been suggested by the RVCA that, based on their discussions with MOE, that a sanitary sewer can be considered a source of contaminants as that definition pertains to Ontario Regulation 903 requirements.

In our review of MOECC documents, we make reference to the document 'Water Supply Wells - Requirements and Best Management Practices, revised April 2015. Specifically, reference is made to Table 2.2 of the document, which states a "Source of Contaminant" means anything that discharges into the natural environment, any contaminant (as per the Environmental Protection Act, R.S.O., 1990. C E 19 (EPA) ss 1 (1)). While the document suggests that a source of contamination may include a sewer line as a potential source of contaminants, we would interpret the actual source of contamination, by strict definition, as the outlet of the pipe, which may be applicable if the pipe was discharging into a sewage lagoon. That condition does not exist on, or in the vicinity of, this site. The document also states that "Assessing and determining potential sources of contaminants that fit the definition of source of contaminants is dealt with on a case by case basis".

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While it is recognized that the document referenced above is intended to provide an MOECC interpretation of the governing legislation regarding water wells, it is also recognized that the intent of the 15 m separation distance requirement is to ensure that the location of the well is selected with thought and due diligence and all aggravating and mitigating factors should be considered.

The governing legislation (i.e. O. Reg. 903 and the OBC) effectively suggest that the primary source of contaminants in a setting where the use of wells is required, is the individual sewage system components. The separation distance from a dug or drilled well to a septic tank, for instance is 15 m while the separation distance to a leaching bed can vary from 15 m to 18 m for a drilled well to 30 m to 33 m to a dug well. The septic tank is assumed to not be a continuous source of contamination, unlike the distribution pipes in a leaching bed, otherwise the separation distances would be the same for dug wells to both the septic tank and distribution pipes. Similarly, building and sanitary sewers are not generally considered to be continuous sources of contaminant discharge. This interpretation is consistent with Table 2.2 of the MOECC document identified above.

Despite the fact that the sewer pipe does not meet the strict definition of a source of contaminant, the aggravating factor, as verbally presented by RVCA, is that the wells will be located within the 15 m radial distance to the building sewer. While we would not agree with this interpretation, we would suggest that there are several critical mitigating factors which more than compensate for RVCA's concerns. For instance, the overburden soil stratigraphy has been revealed to consist of a thick layer (i.e. upwards of 9 m) of stiff, silty clay. The hydraulic conductivity of this silty clay layer had been demonstrated to be extremely low. As such, the layer provides significant protection from surface activities to the surface of the bedrock. Moreover, proposed wells are to be cased to a depth of approximately 42 m into the bedrock and grouted using sodium bentonite. This combination of overburden and casing are considered to more than compensate for the distance reduction. Specifically, the building sewers are proposed to be within 2 m of the surface of the ground and the sewer mains are proposed to be upwards of 3 m below ground surface. In the unlikely event of a catastrophic failure of either a building sewer or sewer main, the resulting discharge will be contained within the service trench bedding (clay dykes are proposed for the sewer main). Lateral movement to the wellhead is not considered to be facilitated by the clay as the sewage will favour a downward gradient due to gravity versus hydraulic head. As such, the effective time of travel to the open borehole from the near surface area is estimated in the time frame of years, not days or minutes.

As such, it is proposed to place the wells in the front yard area and maximize the distance from the well to the building sewer and sewer main. To achieve this, the building sewer should be located beneath the driveway area, if possible, and closest to the opposite property line. In addition, the OBC provides for requirements whereby the building sewer can be pressure tested where it is located in close proximity to a water main. The pressure testing ensures a air/watertight installation. These installations and testing should be supervised by a qualified Professional Engineer of Ontario.

In addition, the water main, extending from the well to the inside wall of the house should be installed in a continuous length without joints. Moreover, the water main should be installed above the elevation of the building sewer. This will comply with the relevant OBC separation requirements for same trench installation where it is not feasible to run the building sewer under the driveway area.

8.0 CONCLUSIONS

Based on the information contained within the body of this report, the following conclusions can be drawn:

- The subject property presently exists as a vacant, grassed parcel which is generally flat to slightly sloping towards the Jock River. The surficial drainage of the site is considered to be imperfect to poor with a perched overburden groundwater table within the close proximity to the surface.
- Adjacent land uses are a mixture of residential, commercial and vacant land uses. There are no obvious offsite impacts that would adversely impact the proposed development, based on the completed testing.
- 3. A suitable water supply aquifer exists at the base of the March Formation at a depth of approximately 66 m below ground surface at the subject property. The March Formation water supply aquifer is the preferred water supply aquifer for the proposed development.
- 4. The advancement of casing to a minimum depth of approximate 3.0 m into the March Formation is considered to be the ideal method of well construction for the proposed subdivision. This methodology will effectively isolate the March Formation from the Oxford Formation.
- 5. The pumping test program, and subsequent analyses, have indicated that ample water for residential requirements is available from the underlying water supply aquifer.
- 6. Water quality in the preferred water supply aquifer satisfies all health related parameters of the Ontario Drinking Water Quality Standards. The water is considered to be reasonably treatable according to Table 3 of Procedure D-5-5 (MOEE, 1996), where aesthetic parameters are present at concentrations above the ODWS for hardness and iron. Standard residential grade water softeners will provide sufficient removal of the hardness and iron.
- 7. The subject property is suitable for development as a residential subdivision at the proposed density. Impacts to the existing adjacent high density residential development area where the majority of wells intercept only the Oxford Formation have been demonstrated to be negligible. Offsite wells intercepting the Lower Oxford/March Formation aquifer system may experience a temporary and

intermittent well interference of upwards of 5% of the available drawdown during peak pumping periods.

- 8. 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.
- 9. The water quality analytical results for samples from TW4, TW5 and TW6 is considered to be representative of the quality of water which future residents of the proposed subdivision can expect in the long term.

9.0 RECOMMENDATIONS

Considering the information presented within this report, and given the nature of the proposed development, the following recommendations are provided:

- Future wells should be constructed in a similar configuration to test wells TW4, TW5 and TW6. These wells should have steel casing that extends to a minimum of 58 m below ground surface. Total well depths should not exceed 70 m.
- 2. The maximum pumping rate for each well should not exceed 20 L/min.
- 3. A warning clause addressed to people on low sodium diets should be registered on title regarding the elevated concentration of sodium (> 20 mg/L) identified at TW4, TW5 and TW6, and potentially at other future wells at the site. The warning should also address the potential use of water softeners to reduce hardness, which was elevated at all of the test wells.
- 4. Care should be taken to protect the existing well heads for TW4, TW5 and TW6 during construction if they are to remain in use. It is recommended that a temporary concrete barrier curb, or other suitable barrier, be placed along the north and west sides of the well head during earthworks and building construction.
- 5. The excavation work for the pitless adaptor, water supply line and electrical conduit should be completed by a qualified well contractor. The work should be supervised by a qualified and licensed Professional Engineer of Ontario.
- 6. Building sewer connections should be pressure tested when located in close proximity to a water supply lines. Pressure testing should ensure an air/watertight installation. The installations and testing should be supervised by a qualified and licensed Professional Engineer of Ontario.
- 7. Once the distribution system is complete inside the building and the pump is wired and operational, the well and distribution system should be shock chlorinated in order to disinfect the entire water system.
- 8. It is recommended that if water treatment equipment is to be utilized for this site, that the sizing and selection of the equipment be made by a qualified person. Water quality testing should be done on the raw water only after a period of extended well development.

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- 9. TW1, TW2, TW3 should either be decommissioned in accordance with Ontario Regulation 903 or, should their locations be ultimately suitable for reuse, these wells should be sleeved and grouted such that the inner casing extends to the 55 m to 60 m below ground surface (i.e. into the March Formation) to make them complaint with the proposed well construction methodology. Decommissioning/sleeving operations should be carried out under the supervision of a gualified Professional Engineer or Professional Geoscientist of Ontario.
- 10. Existing onsite well EW should be decommissioned in strict accordance with Ontario Regulation 903. Decommissioning operations should be carried out under the supervision of a qualified Professional Engineer or Professional Geoscientist of Ontario.
- 11. 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-tableof-contents-chapter-1.pdf
- 12. The proposed residential subdivision is not suitable for the installation of individual earth energy systems (i.e. geothermal or heat pump systems) due to the close spacing of water supply wells and the limited space for installation of additional boreholes. Property owners are referred to the MOECC document 'Technical Bulletin, Earth Energy Systems in Ontario' (MOE, 2013) which outlines the regulatory requirements and potential provincial approval requirements associated such systems.
- 13. Hydraulic fracturing was not used at any of the test wells, and should not be required for future wells within the proposed subdivision. The measured yields at test wells TW4, TW5 and TW6 are significantly greater than the pumping rates required for individual wells within the proposed residential subdivision.
- 14. The raw water found in the preferred water supply aguifer is considered to be hard. Residential grade water softeners are recommended. Separate treatment to address iron will probably not be required if water softener are used.

- 15. Current Ontario Building Code (OBC) requirements (OBC, 2012) for water conservation specify that toilet and shower consumption must now comply with stricter, lower use requirements (OBC Table 7.6.4.2.A & B and Table 7.6.4.1, respectively).
- 16. Drilling and instrumentation of all new wells in the proposed residential subdivision 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).



10.0 STATEMENT OF LIMITATIONS

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Toscano Land Corp., or their agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the Report.

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Russell Chown, P.Geo. Senior Hydrogeologist

Reviewed by:

Stephen J. Walker, P.Eng Principal

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Hydrogeological Assessment Proposed Residential Development 11 King Street, Richmond, Ontario

APPENDIX 1

- Soil Profile and Test Data Sheets
- Symbols and Terms
- Comments from Review Agencies

patersongro		In	Con	sulting		SOIL PROFILE AND TEST DATA							
154 Colonnade Road South, Ottawa, O				ineers	Phase I-II Environmental Site Assessment 10 King Street Ottawa (Richmond), Ontario								
DATUM TBM - Top of grate located 93.71m.	on so	uth sid	le of s	ubject s	_	_			FILE NO.	PE1623	8		
BORINGS BY CME 45 Power Auger				DA	TE	July 3, 20(09		HOLE NO.	BH 1			
	Ę		SAM	IPLE				Photo I	Photo Ionization Detector				
SOIL DESCRIPTION	A PLOT		~	۲.	Шо	DEPTH (m)	ELEV. (m)	Vola	itile Organic Rd	lg. (ppm)	Monitoring Well Construction		
	STRATA	ТҮРЕ	NUMBER	% RECOVERY	N VALUE or RQD			 Lowe 	• Lower Explosive Limit %				
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		ss	2	25	7	1-	-92.80						
Brown SILTY CLAY		ss	3	58	3	2-	-91.80						
		ss	4	75	5	3-	-90.80						
- grey by 3.7m depth		ss	5	100	2		2				¥		
		ss	6	100	1	4-	-89.80						
5.18	3	ss	7	100	1	5-	-88.80						
(Open hole GWL @ 3.7m depth)									200 300 Eagle Rdg. (as Resp. △ M	(ppm)	00		

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154 Colonnade Road South, Ottawa, O		-		ineers	10	King Str	eet	ental Site A , Ontario	ssessmen	t			
DATUM TBM - Top of grate located 93.71m. REMARKS	on so	uth sid	le of s	ubject s	_	-			FILE NO.	PE1623	3		
BORINGS BY CME 45 Power Auger				DA	TE .	July 3, 20()9		HOLE NO.	BH 2			
	Ę		SAN	IPLE				Photo lo	nization De	etector	lell D		
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avou bu 0.7m donth		ss	5	100	2			A			Ţ		
- grey by 3.7m depth		ss	6	100	1	4-	-89.90	A					
5.18	3	ss	7	100	1	5-	-88.90						
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		ss	2	33	5	1-	-92.80						
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		ss	6	100	1	4-	-89.80	A					
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154 Colonnade Road South, Ottawa,		-		ineers	10	Phase I-II Environmental Site Assessment 10 King Street Ottawa (Richmond), Ontario							
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						5-	-88.80						
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		AU	1										
		ss	2	38	8	1-	-93.02						
		ss	3	0	9	2-	-92.02						
Very stiff to stiff, brown SILTY CLAY		ss	4	100	5	3-	-91.02						
							-90.02	139 A					
- stiff to firm and grey by 4.3m depth						4-	-90.02	4					
						5-	-89.02						
6.55						6-	-88.02						
End of Borehole (GWL @ 2.56m-Feb. 5/10)								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded					

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		AU	1			0	55.54				
		ss	2	4	4	1-	-92.94				
Very stiff to stiff, brown SILTY CLAY		ss	3	83	3	2-	-91.94				
- stiff to firm and grey-brown by 2.9m depth		SS	4	100	5	3-	- 90.94	4			
- grey by 4.3m depth						4-	-89.94	4			
						5-	-88.94				
6.55 End of Borehole (GWL @ 3.20m-Feb. 5/10)						6-	-87.94				
								20 Shea ▲ Undist	40 60 ar Strength turbed △ R		- 00

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DATUM TBM - Top of grate located 93.71m. REMARKS	on so	uth sid	e of s	subject s	-			=	FILE NO.	PG2022			
BORINGS BY CME 55 Power Auger				DA	TE .	January 29	9 2010		HOLE NO.	BH 3			
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		AU AU	1										
		ss	2	21	3	1-	-93.07						
		ss	3	100	3	2-	-92.07						
Very stiff to stiff, brown SILTY CLAY - stiff to firm and grey-brown by 3.5m		ss	4	88	5	3-	-91.07				ال		
depth						4-	-90.07						
- grey by 5.0m depth						5-	-89.07	×					
6.5	5					6-	-88.07						
(GWL @ 2.80m-Feb. 5/10)								20 Shea ▲ Undist	40 60 ar Strength turbed △ F		00		

patersongro		in	Con	sulting		SOI	SOIL PROFILE AND TEST DATA						
154 Colonnade Road South, Ottawa, Or		-		ineers	Geotechnical Investigation Proposed Residential Developement-King Street Ottawa, Ontario								
DATUM TBM - Top of grate located 93.71m.	on so	uth sid	e of s	ubject s				= FILE NO. PG2022					
REMARKS BORINGS BY CME 55 Power Auger					TE	January 29	0 2010	HOLE NO. BH 4					
			SAN	IPLE			5,2010	Pen. Resist. Blows/0.3m					
SOIL DESCRIPTION	A PLOT				년 o	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m □ ● 50 mm Dia. Cone □ ○ Water Content % □					
	STRATA	ТҮРЕ	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %					
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		ss	2	58	5	1-	-92.94						
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- stiff to firm and grey-brown by 2.9m depth		ss	4	100	4	3-	-90.94						
- grey by 4.4m depth						4-	- 89.94						
						5-	-88.94						
6. <u>55</u> End of Borehole						6-	- 87.94						
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DATUM TBM - Top of grate located 93.71m.	on so	uth sid	e of s	subject s	_			= FILE NO. PG2022					
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SOIL DESCRIPTION	A PLOT		<i>«</i>	ХХ	<u>ب</u>	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m □ ● 50 mm Dia. Cone □ □ □ ○ Water Content % □					
	STRATA	TYPE NUMBER % RECOVERY						○ Water Content %					
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-stiff to firm and grey by 2.9m depth		ss	4	100	4								
						3-	-90.86						
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						4-	89.86						
						5-	88.86						
						6-	-87.86						
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(GWL @ 3.60m-Feb. 5/10)													
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded					

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 the 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 be 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% LL PL PI	- - -	Natural moisture content or water content of sample, % Liquid Limit, % (water content above which soil behaves as a liquid) Plastic limit, % (water content above which soil behaves plastically) Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size 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
Сс	-	Concavity coefficient = $(D30)^2 / (D10 \times D60)$
Cu	-	Uniformity coefficient = D60 / D10
Cc and	Cu are	used to assess the grading of sands and gravels:

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

p'o	-	Present effective overburden pressure at sample depth
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)	Overconsolidaton ratio = p'_c / p'_o
Void Rat	io	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 Topsoil Asphalt Peat Sand Silty Sand Fill Δ Sandy Silt Clay Silty Clay Clayey Silty Sand Glacial Till Shale Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION









File Number: D02-02-10-0010

April 23, 2010

Novatech Engineering Consultants Ltd. Adam Thompson 240 Michael Cowpland Dr., Suite 200 Ottawa K2M 1P6

Dear Mr. Thompson:

RE: Zoning By-law Amendment Application 11 King Street

The above-noted Zoning Amendment application, which was received by the Client Service Centre on February 24, 2010, has completed the circulation and we offer the following:

- 1) A number of residents have expressed concerns with, in particular water quality and quantity but also with; potential traffic increases, parking, that the development is too dense and not in keeping with the community, drainage and sewer capacity.
- 2) Hydrogeology: The RVCA has already forwarded their comments. We have also reviewed the report and the RVCA's comments and note that we do have concerns with the rezoning proceeding at this time. The rezoning would have the effect of increasing the unit yield and as such we need to be assured that the development can be serviced with water. The Hydrogeological Report indicates that the well water does not meet the Ontario Drinking Water Guideline. Please amend your report as follows:
 - a. The reporting must include testing and reporting on the minimum number of wells specified in MOE Procedure D-5-5 (in this case three is the minimum number but we would suggest more);
 - b. Our experience in Richmond is that the potentiometric surface for the deeper aquifer(s) (March and Nepean) is often above the ground surface. This means that the wells located within the primary fracture network in the March/Nepean could be flowing artesian wells. Flowing artesian conditions may present a challenge for future homeowners. For a municipal well, flowing artesian conditions can be dealt with, but for private homeowners it would be more difficult. Flowing artesian conditions were not encountered in TW1, but the static level was close to the ground surface. Other wells completed at this same level, or lower, could exhibit flowing artesian conditions. Therefore, a number of wells would be required in order for the City to gain a comfort level.

c. TW1 is an open hole through the Oxford and March formations (the casing is only slightly into the top of the Oxford). Having 40 wells with open holes could significantly change the local groundwater regime, and this could be important, especially due to the presence of potential sources of contamination in the area (i.e.- it could cause existing contamination to spread). For this reason, and also to better protect the March/Nepean, it would be advisable to case and grout the wells through the Oxford and into the March/Nepean. This would add a few thousand dollars to the construction of each well, but it is warranted in this case.

Shaping our future together Ensemble, formons notre avenir City of Ottawa Infrastructure Services and Community Sustainability 110 Laurier Avenue West Ottawa ON KIP IJ1 Tel : 613-580-2400 Fax : 613-580-2576 www.ottawa.ca

Ville d'Ottawa Services d'infrastructure et Viabilité des collectivités 110, avenue Laurier Ouest Ottawa ON K1P IJ1 Tél: 613-580-2400 Fac: 613-580-2576 www.ottawa.ca

3

- d. The length of the pumping test and the pumping rate should be increased, considering the scope of this development. (Please note that there is a typo in the report, as the site is 1.59 ha, not 15.93 ha as indicated on page 1 -- which makes the well density very high).
- e. Observation wells in the same formation being tested are to be monitored during pumping.
- f. The lab turbidity is very high and this has not been adequately addressed. Casing the wells into the March/Nepean may help turbidity by sealing off the contribution form the upper bedrock. The report (page 19) says that turbidity may clear up with more pumping. This should be demonstrated through the additional pumping recommended above.
- g. Contact Michel Kearney to discuss these comments
- 3) Hydro Ottawa: Has standard comments that are to be faxed separately.
- 4) Sanitary Sewer: Please note that the pump station has reached its Official Plan designated capacity of 1800 units approved and built. Upgrades to the station are mandated prior to any additional units. Your servicing report will need to address this issue. Please contact Kevin Hall to discuss this.
- 5) Planning Rationale: Please ensure that it is updated as needed pursuant to any changes on the studies as noted above. As well it would be helpful to have a more detailed discussion relating to compatibility of use, building form, lot fabric, layout proposed etc.
- 6) If the soils are clay then we may have issues with the lot sizes and minimum setbacks in order to achieve appropriate separation of the trees from foundations, services and so on. Please provide information with respect to soils types and opinions with respect to the lot sizes and appropriateness of the setbacks that will allow for trees to be planted on each lot.

Please provide the additional information so that the zoning by-law amendment can proceed forward. If you wish to wait for the subdivision process to 'catch up' with the zoning, as previously discussed, let me know. Should you require any clarification or have any questions on the status of this application, please contact me, the assigned planner, at 613-580-2424, extension 30234, or at Cheryl.mcwilliams@ottawa.ca

Sincerely,

signed

Cheryl McWilliams Planner Planning and Growth Management Department

Attach:

n

c.c. Kevin Hall Michel Kearney Jocelyn Chandler RVCA

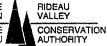
Shaping our future together Ensemble, formons notre avenir City of Ottawa Infrastructure Services and Community Sustainability 110 Laurier Avenue West Ottawa ON K1P IJ1 Tei : 613-580-2400 Fax : 613-580-2576 www.ottawa.ca Ville d'Ottawa Services d'infrastructure et Viabilité des collectivités 110, avenue Laurier Ouest Ottawa ON KIP JJI Tél : 613-580-2400 Fac : 613-580-2576 www.ottawa.ca

Conservation Partners Partenaires de conservation



Mississippi Valley Conservation de la vallée Mississippi







March 30, 2010 File: 09-GLO-ZBA

City of Ottawa, Planning & Growth Mngt. Department 110 Laurier Avenue West, 4th floor Ottawa, Ontario K1P 1J1

Cheryl McWilliams Attention:

Talos Custom Homes Ltd. Subject: Zoning By-law Amendment D02-02-10-0010 10 King St. in the Village of Richmond

Dear Ms. McWilliams:

The Conservation Partners Planning and Development Review Team has completed a review of the above noted Zoning By-law Amendment to allow the rezoning of the subject site, removing the floodplain overlay and permitting the development of 40 semi-detached dwelling units on individual private water wells and municipal wastewater. We have undertaken our review within the context of Sections 2.3 Natural Heritage, 2.4 Water Quality and Quantity and 3.1 Natural Hazards of the Provincial Policy Statement under Section 3 of the Planning Act and from the perspective of our responsibilities under O.Reg 174/06 of the Conservation Authorities Act. The following comments are offered for your consideration.

Natural Heritage

There are no natural heritage features precluding the approval of this application.

Natural Hazards

This site has been subject to the floodplain overlay based on the floodplain mapping of the Jock River prepared by the Rideau Valley Conservation Authority, dated March11, 2010. Subsequent to that mapping, an application was submitted to the RVCA for approval to re-grade the property with existing stockpiled fill material on the site. This application (RV5-04/09) was approved April 6, 2009 and the work was undertaken. An as-built elevation survey dated Sept.14/09 prepared by M. Savic of Novatech Engineering Consultants Ltd. was submitted following the work and the new grades have shown the property to be above the 1:100 year floodplain of the Jock River. The RVCA has since revised the mapping of the subject property to remove it from the floodplain designation. These new mapping files will be submitted to the City of Ottawa to make amendments to their floodplain overlay zoning in the very near future. The data files will be provided directly to Francoise Jessop, the Program Manager of Zoning Studies, as we have been instructed.

Private Servicing (water wells only)

A preliminary hydrogeological report ' Preliminary Hydrogeological Assessment for Private Services, Proposed Residential Development' dated February 4, 2010 reoprt # PH1292-REP.01 prepared by Paterson Group Inc. was submitted to the RVCA in support of this application. The report was reviewed for water quality, quantity and impacts of the proposed development on the hydrogeological and watershed environments as per the policies of the City of Ottawa (if any), applicable provincial regulations and guidelines including the document MOEE Hydrogeological Technical Information Requirements for Land Development Applications (April 1995, includes procedures D-5-4 & D-5-5). Our comments on the groundwater quality have also accounted for the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) prescribed in the provincial document titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE Revised June 2006)".

The technical review has evaluated whether the results of the preliminary investigations support the potential of the proposed groundwater supply to service the proposed development. The review has determined that the preliminary hydrogeological testing undertaken on the site supports the conclusions of the consultants that the underlying March formation bedrock aquifer has the potential to supply the groundwater for domestic use and for drinking water purposes as per requirements of the provincial guidelines (MOE 1995, Procedure D-5-5). Aesthetic related exceedances or elevations related to hardness, iron, sodium and turbidity are expected in the future wells. Further, as per opinions presented in the study, the development is not anticipated to be adversely impacted by the mutual well interference. Please see the technical memo prepared by Asher Rizvi dated March 26, 210 for detailed comments.

Stormwater management

The conceptual stormwater management proposed for this property indicates that the stormwater will be conveyed to the Hamilton drain and subsequently to an outlet at the Jock River by way of municipal infrastructure. The Hamilton drain and the Jock River are fish habitat and as such an enhanced level of quality treatment is required (80% TSS removal).

Conclusion

The Conservation Partners have no objections to the proposed zoning to allow for the development of 40 residential units on this property. Please keep us informed regarding the status of this application. Please contact me at ext. 1137 if you have any questions.

Yours truly, Chonch Jocelyn Chandler M.Pl., MCIP RPP

Planner, Planning and Regulations (RVCA)

Attachment: Technical memo-Asher Rizvi dated Mar.26, 2010.

Adam Thompson, agent: Novatech Engineering Consultants Ltd. cc:

3889 Rideau Valley Dr • Box 599 Manotick, Ontario • K4M1A5



Watershed Science and Engineering Services Technical Memo

Date: Mar. 26, 2010 File: D02-02-10-0010

To: Jocelyn Chandler, Planner (M.Pl., MCIP, RPP), RVCA From: Asher Rizvi, Hydrogeologist (P.Geo.), Conservation Partners

Subject: Preliminary Hydrogeological Assessment for Private Services, Proposed Residential Subdivision (Talos Custom Homes/ 10 King St), Part lot 24, Con. III, Village of Richmond, Ottawa (formerly Twp. of Goulbourn)

We are in receipt of a report titled "*Preliminary Hydrogeological Assessment for Private* Services, Proposed Residential Development" dated Feb. 04, 2010 from Paterson Group (PGI) Inc. The report was received on Mar. 12, 2010 in our office. The study pertains to a proposed forty (40) semi-detached dwelling subdivision to be developed on private wells (in total, 40 wells will be constructed). Private septic systems are not proposed for the development as the Village of Richmond is serviced by municipal sanitary sewers. We have reviewed the submission and offer the following comments.

The report was reviewed for water quality, quantity and impacts of the proposed development on the hydrogeological and watershed environments as per policies of the City of Ottawa (if any), applicable provincial regulations and guidelines including the document MOEE Hydrogeological Technical Information Requirements for Land Development Applications (April 1995, includes procedures D-5-4 & D-5-5). Our comments on the groundwater quality have also accounted for the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) prescribed in the provincial document titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE Revised June 2006)".

The PGI study states that this report is preliminary in nature and provides a summary of the findings to-date as they relate to the quantity and quality of the water supply aquifer(s) present beneath the subject property. The report further indicates that the investigation works on this site are on-going and a final comprehensive report will be issued upon completion of these works. Since a complete hydrogeology study is forthcoming, our review has only identified the matters that need to be addressed in the future submission accounting for the currently available information. We have also evaluated whether the results of the preliminary investigations support that the proposed groundwater supply has the potential to service the subject development.

Our review shows that the preliminary hydrogeological testing undertaken on the site supports that the underlying March formation bedrock aquifer has the potential to supply the groundwater for domestic use and for drinking water purposes as per requirements of D02-02-10-0010~10 King St.

the provincial guidelines (MOE 1995, Procedure D-5-5). Aesthetic related exceedances or elevations related to hardness, iron, sodium and turbidity are expected in the future wells. Further, as per opinions presented in the study, the development is not anticipated to be adversely impacted by the mutual well interference. The following information will need to be provided at the time the final hydrogeological assessment report is submitted for our review:

1 With respect to the site investigations, the following should be provided:

- Cars such The report has discussed the surficial and bedrock geology. However, the а geological mapping has not been attached with the report nor has a crosssection been provided. The report discussion on surficial geology (section 4,1) is incomplete. These will need to be addressed.
- The hydrogeological study (PGI dated Feb. 04, 2010) identified only the b presence of Kings Park wells as the high yield operations in proximity to the site. If any other high yield water taking operations (such as quarry extraction, municipal or communal wells etc.) are present in the surrounding area (especially in the up-gradient side of the site), then those need to be identified and discussed for their impacts on the long term well vields.

Similarly, only a gas station has been recognized as the high risk land use. A confirmation needs to be provided whether any other high risk land uses (landfills, junk yards, salt storage facilities etc.) exist in the surroundings or within recharge areas of the on-site wells that may impact the long term water quality of the target aquifer.

A water sample was analyzed for petroleum hydrocarbon fractions to С assess whether the fuel station located at the northeast edge of the site has impacted the water supplies. The lab results of the analysis are provided in Table 4 of the report. However, the results have not been discussed nor has an opinion been provided whether any impacts were evident from the analysis. The analysis results should be discussed and confirmation provided whether any impacts on the groundwater were noted.

The report has indicated that the Jock River flows in the south some 1000 d metres from the subject property. A confirmation is required whether any impacts are anticipated on the water supplies from the hydraulic interconnectivity (if any) between the surface water and the target aquifer. The report must document the recharge/discharge characteristics of the site and its relationship to the hydrological features. If any other hydrogeologically sensitive land uses (wetlands, streams etc.) are present on the site or in close proximity, then those should be identified and an impact evaluation undertaken.

D02-02-10-0010~10 King St.

- 2 The groundwater quality was tested by analyzing the water samples obtained during the pump tests from an on-site well (TW1). The following needs to be addressed regarding the raw groundwater quality exceedances from an existing test well (or any future test wells):
 - a The effects of iron and hardness exceedances (laundry staining, encrustation etc.) have not been discussed nor identified in the final recommendations. Also, the recommendation to deal with them in future wells should be documented in the final set of recommendations.
 - b The report has not provided any opinion whether the sodium and chloride levels noted in the water samples are seen as naturally occurring or a result of surficial impacts (road salt, leaching from salt storage facilities if present in the area etc.).
 - c The steps that are to be undertaken to address the turbidity in groundwater as discussed in the report (extended well development etc.) should be documented in the final set of recommendations.
- 3 The water quantity was assessed by carrying out a pump test in TW1 test well. The following water quantity related aspects need to be addressed:
 - a The pump test data and the aquifer properties analysis has been appended in the report. However, the report does not confirm whether the drawdown and the aquifer properties are exhibiting the presence of a confined aquifer. This needs to be confirmed.
 - Accounting for the presence of the Jock River, the response needs to confirm whether any boundaries (recharge boundary etc.) were
 encountered during the pump tests. If any measures need to be adopted by the future well owners to protect the water supplies (accounting for the potential of surface water impacts from the river etc.), then those need to be identified.
 - c Potential of mutual well interference has been discussed in the report (section 7.5) in a cursory manner and it has been concluded that the development is not anticipated to be adversely impacted by the mutual well interference. This opinion needs to be presented in detail with discussions on the interference between forty (40) on-site wells, and impacts beyond the property on neighboring wells. The report has stated that 90% of the wells in Richmond area are utilizing Oxford formation bedrock aquifer which is a shallower water supply aquifer compared to the March formation bedrock aquifer (a deeper aquifer) being proposed for the subject development. The likelihood of impacts on the shallow aquifers from pumping in the deeper aquifers and interference between target

aquifer and communal/municipal wells in the area should also be accounted for during the mutual interference evaluation.

In consideration of the high density of wells on the site (40 wells within 1.59 ha), it may useful to undertake a long term pumping test (longer than 6 hours) so that a more representative set of aquifer properties is available to undertaken well interference analysis.

d The final well construction recommendation should clearly identify the casing length that needs to be set well into the bedrock consistent with the test well drilling. If sufficient information is available from the on-going investigations regarding the occurrence depth of the target aquifer (March formation bedrock aquifer), then that should be specified in the final recommendations.

Accounting for the high density of wells on the site (40 wells within 1.59 ha), appropriate distances between the adjacent wells should be identified (to minimize the water quantity conflicts) and documented in the final set of recommendations.

4 Two neighboring wells (HW1 well utilizing shallow Oxford formation aquifer, and a well on 20 King Street utilizing same deep aquifer as being tested for the site) were analyzed for their water quality. The report documents that the water sample obtained from the neighboring well utilizing Oxford formation was a softened water sample. Therefore, in our opinion, this sample does not represent the raw groundwater quality from the Oxford formation. In order to establish the baseline groundwater quality for this formation, we suggest that raw water samples be obtained from additional neighboring wells (utilizing Oxford formation) and analyzed. Additional neighboring wells utilizing the target aquifer should also be analyzed for their geo-chemistry and results analyzed for long term water quality impacts.

A table (Table 3) in the report has been provided showing the comparison of water quality results from the sampled wells. It is noted that all the analyzed parameters are not shown in this table. The table should be updated to include all the analyzed parameters.

It is noted that the neighboring lot owners were not interviewed regarding water quality, quantity or issues with water supplies, nor were any well inspections conducted. The noted investigation need to be undertaken to confirm whether any issues with water supplies exist in the area. All lots included in the survey should have a well record (or information on the type of aquifer, well depth etc. obtained through appropriate investigations) and long term water quantity assessed for conflicts etc.

D02-02-10-0010 ~10 King St.

5 A complete summary of recommendations will need to be provided with the final submission. If new recommendations are made in response to our comments, or as a result of on-going investigations, then the recommendations provided in the current report (Section 9) will need to be updated accordingly. It is also noted that some of the recommendations discussed within the report have not been documented in the recommendations section. This section should include all the recommendations regarding water treatment, effects of iron and turbidity on water quality and how the future well owners should deal with them, the recommendation about the target aquifer (identify), lot development plan showing well locations (identify the figure no. PH1292-1) etc. Some of the recommendations have been identified in the above paragraphs and those should be included in this section as well.

We trust this meets your satisfaction and is sufficient for your present requirements, but please don't hesitate to call if you have any questions.



Hydrogeological Assessment Proposed Residential Development 11 King Street, Richmond, Ontario

APPENDIX 2

MOECC Water Well Records

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4	Amportal AO	39325	Page #	of	•
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Cable Tool Cable Tool Cable Tool Cable Tool Convention	Diamond Jetting Drwing Drigging Digging OrstPuttonTReco	Vali Dornestic Livestock Irrigation Industrial Other, specify Vial Dep Nakness From 188 4	Commer Municipa Test Hole Cooling 8	cial Not used Not used Montoring Air Conditioning Status Of Webles Water Supply Replacement Well Test Hole Recharge Well	210 Pumping rate (Irmin /A 20) Duration of pumping <u>thrstandor</u> Final water level end of <u>32.3</u> If flowing give rate (I/m Recommended pumping	ile	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2	10.3 2 7.2 3 7.2 4 7.2 5 7.2 10 7.2 15 7.2 20 7.2 25 7.2
Cable Tool Cable Tool Cable Tool Convention	Diamond Jetting Drving Digging Digging Original Origin	ADomestic Livestock Irrigation Industrial Other, specify Other, specify Other, specify Other, specify Thickness From	Commercial Commercial Municipal Municipal Test Hold Cooling & Cool	cial Not used Dewatering Air Conditioning Statte Sol Webl Replacement Well Test Hole Recharge Well Dewatering Well Deservation and/or	210 Pumping rate (Umin /4 20 Duration of pumping <u>1</u> hrs + <u>0</u> mm Final water level end of <u>32.3</u> If flowing give rate (Um Recommended pump in Umin / 20 20	pumping (mit) in / GPM depth (nom)	2 21.5 3 23.7 4 26.4 .5 27 10 30.1 15 30.5 20 30.8 25 31.2 30 31.6	10.3 2 7.2 3 7.2 4 7.2 5 7.2 10 7.2 15 7.2 20 7.2 25 7.2 30 7.2
Cable Tool Cable Tool Cable Tool Cable Tool Convention	Diamond Jetting Drwing Drigging Digging OrstPuttonTReco	Vali Dornestic Livestock Irrigation Industrial Other, specify Vial Dep Nakness From 188 4	Commer Municipa Test Hole Cooling 8	cial Not used Not used Montoring Air Conditioning Status Other Conditioning Status Other Nontoring Hole Montoring Hole Attention	210 Pumping rate (Vmin /A 20 Duration of pumping <u>1</u> hrs <u>+</u> <u>0</u> hrs Final water level end of <u>32'3</u> If flowing give rate (Vmin Recommended pump in (Vmin / CER) Recommended pump in (Vmin / CER) Well production.((/mip,A)	in / GPM depth (not)	2 21.5 3 23.7 4 26.4 .5 27 10 30.1 15 30.5 20 30.8 25 31.2 30 31.8	10.3 2 7.2 3 7.2 4 7.2 5 7.2 10 7.2 15 7.2 20 7.2 30 7.2 40 7.2
Cable Tool Cable Tool Cable Tool Convention	Diamond Diamond Digeting Drving Digging Constituent Constituent Constituent Dised Digeting Constituent Digeting	Albomestic Livestock Irrigation Industrial Other, specify Other, specify Other, specify Other, specify Other, specify Other, specify Other, specify Thomas Industrial Dep Industrial Dep Industrial Dep Industrial Indu	Commer Municipa Test Hole Cooling & Cooling &	cial Not used Dewatering Montoring Air Conditioning Not used Dewatering Montoring Montoring Replacement Well Replacement Well Deservation and/or Montoring Hele Observation and/or Montoring Hele Atteration Construction) Abandment	218 Pumping rate (Vmin /A 20) Duration of pumping <u>1</u> brs * <u>30</u> mm Final water level end of <u>32'3</u> If flowing give rate (Vm Recommended pump in Umin / SER 20 Well production(Vmin /A Disinfected?	in / GPMg depth (ndf)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.1	10.3 2 7.2 3 7.2 4 7.2 5 7.2 10 7.2 15 7.2 20 7.2 30 7.2 40 7.2 50 7.2
Cable Tool Cable Tool Cable Tool Convention	Diamond Diamond Digeting Drving Digging Digging CODSTRUCTIONIRECC Color OR Material ConstructionIRECC CONSTRUCTURATIONIC CONSTRUCTURATIO CONSTRUCTURATIO CO	ADormestic Livestock Irrigation Industrial Other, specify Other, specify Other, specify Other, specify Other, specify Other, specify Technology From 188 ⁴ 187 ⁴ 187 ⁴ 187 ⁴ 187 ⁴	Commer Municipa Test Hole Cooling & th (m/t) To 187 4 218	cial Not used Dewataring a Air Conditioning Not used Dewataring a Air Conditioning Not used Monitoring Replacement Well Test Hole Recharge Well Dewataring Well Dewataring Well Dewataring Well Dewataring Well Dewataring Well Dewataring Hole Alteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor	210 Pumping rate (Vmin /A 201 Duration of pumping 1 brs * 1 brs * Final water level end of 32/3 Kf flowing give rate (Vmin /A Recommended pump in 1001 2001 Well_production.(//min /A Disinflected? Shres No	in / GPM) depth (not)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Cable Tool Cable Tool Cable Tool Convention	Diamond Diamond Digeting Drving Digging Diggin	Val Dornestic Livestock Irrigation Industrial Other, specify Vial Dep Nachess From 188 ⁴ 187 ⁴ 187 ⁴ 187 ⁴	Commer Municipa Text Hole Cooling 8 To To 187 218 Cooling 1 Cooling 1 Cooling 2	cial Not used Not used Not used Montoring Air Conditioning Character Supply Character Supply Character Supply Character Supply Character Supply Character Supply Character Supply Character Supply Character Supply Construction) Construction	210 Pumping rate (Vmin /A 201 Duration of pumping 1 brs * 1 brs * Final water level end of 32/3 Kf flowing give rate (Vmin /A Recommended pump in 1001 2001 Well_production.(//min /A Disinflected? Shres No	in / GPM) depth (not)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Cable Tool Cable Tool Cable Tool Convention	Diamond Diamond Digeting Drving Digging Digging CODSTRUCTIONIRECC Color OR Material ConstructionIRECC CONSTRUCTURATIONIC CONSTRUCTURATIO CONSTRUCTURATIO CO	Vali Dornestic Livestock Irrigation Industrial Other, specify Vial Dep Nackess From 188 + 10 187 187	Commer Municipa Text Hole Cooling 8 To To 187 218 Cooling 1 Cooling 1 Cooling 2	cial Not used Dewataring a Air Conditioning Not used Dewataring a Air Conditioning Not used Monitoring Replacement Well Test Hole Recharge Well Dewataring Well Dewataring Well Dewataring Well Dewataring Well Dewataring Well Dewataring Hole Alteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor	210 Pumping rate (Umin /A 20) Duration of pumping 1 hrs + 00mm Final water level end of 32.3 If flowing give rate (Umin Recommended pump in (Umin // 200) Recommended pump in (Umin // 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Please provide a map beil	CEAN)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3	10.3 10.3 10.3 11.3 12 13 14 15 10 15 15 12 20 12 20 12 20 12 20 7.2 30 7.2 50 7.2 60 7.2
Cable Tool Cable Tool Cable Tool Convention Convention Convention Convention Converted Convention C	Diamond Diamond Diamond Digeting Driving Digging Digging Digging Construction:Recco	Vali Domestic Livestock Irrigation Industrial Other, specify Veal Depth Neckness (cm/n) From 188 ⁴ + 2 187 ⁴ 187 ⁴	Commer Municipa Test Hole Cooling & Cooling &	cial Not used Dewataring A Air Conditioning Not used Dewataring A Air Conditioning Not used Not	210 Pumping rate (Umin /A 20) Duration of pumping 1 hrs + 00mm Final water level end of 32.3 If flowing give rate (Umin Recommended pump in (Umin // 200) Recommended pump in (Umin // 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Please provide a map beil	CEAN)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3	10.3 10.3 10.3 11.3 12 13 14 15 10 15 15 12 20 12 20 12 20 12 20 7.2 30 7.2 50 7.2 60 7.2
Cable Tool Cable Tool Cable Tool Convention Convention Convention Convention Cable (Convention Cable (Convention) Cables Convention Cables Cab	Diamond Diamond Diamond Drving Drving Digging Construction/Record Asterial Asterial Asterial Construction/Record Construction/	Val Dornestic Livestock Irrigation Industrial Other, specify Vial Dep Names From 188 ⁴ 187 ⁴	Commer Municipa Cooling & Cooling &	cial Not used Dewatering A Air Conditioning Air Conditioning Air Conditioning Conditioning Construction Construction Abandoned, Well Abandoned, Other, Specify Cother, specify	210 Pumping rate (Umin /A 20) Duration of pumping 1 hrs + 00mm Final water level end of 32.3 If flowing give rate (Umin Recommended pump in (Umin // 200) Recommended pump in (Umin // 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Please provide a map beil	CEAN)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3	10.3 10.3 10.3 11.3 12 13 14 15 10 15 15 12 20 12 20 12 20 7.2 20 7.2 30 7.2 50 7.2 60 7.2
Cable Tool Cable Tool Cable Tool Cable Tool Convention Convention Convention Convention Cable Tool	Diamond Diamond Diamond Digging Drving Digging Construction:Record Asterial Asterial Asterial Asterial Asterial Asterial Asterial Asterial Asterial Construction:Record Asterial Construction:Record Construct	Connestic Livestock Irrigation Industrial Other, specify Vall Nakes From T88 T9 T87 T	Commer Municipa Cooling & Cooling &	cial Not used Dewataring & Air Conditioning Conditioning Conditioning Conditioning Conditioning Conditioning Construction Alteration (Construction) Abandoned, Poor Wetter Quality Abandoned, Poor Wetter Quality Construction	210 Pumping rate (Umin /A 20) Duration of pumping 1 hrs + 00mm Final water level end of 32.3 If flowing give rate (Umin Recommended pump in (Umin // 200) Recommended pump in (Umin // 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Please provide a map beil	CEAN)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.8 25 31.2 30 31.6 40 31.9 50 32.3	10.3 10.3 10.3 11.3 12 13 14 15 10 15 15 12 20 12 20 12 20 7.2 20 7.2 30 7.2 50 7.2 60 7.2
Cable Tool Cable Tool Cable Tool Cable Tool Convention	Diamond Diamond Diamond Digging Drving Digging Construction:Record Asterial Asterial Asterial Asterial Construction:Record Con	Connestic Livestock Irrigation Industrial Other, specify Vall Nakes From T88 T9 T87 T	Commer Municipa Text Hole Cooling 8 To Ta 187 218 1 To 187 100 10	cial Not used Dewatering B Air Conditioning Air Conditioning Conditioning Conditioning Conditioning Conditioning Conditioning Conditioning Construction Con	210 Pumping rate (Umin /A 20) Duration of pumping 1 hrs + 00mm Final water level end of 32.3 If flowing give rate (Umin Recommended pump in (Umin // 200) Recommended pump in (Umin // 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Please provide a map beil	CEAN)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3	10.3 10.3 10.3 11.3 12 13 14 15 10 15 15 12 20 12 20 12 20 7.2 20 7.2 30 7.2 50 7.2 60 7.2
Cable Tool Cable Tool Cable Tool Cable Tool Converted Converted Converted Cable Tool Cab	Diamond Diamond Digging Drving Drigging Digging Diggin	Livestock Livestock Irrigation Industrial Other, specify Vall Va	Commercial Commercial Municipal Municipal Cooling & Cool	cial Not used Dewatering Air Conditioning Air Conditioning Conditioning Conditioning Conditioning Conditioning Conditioning Conservation Conservation and/or Monitoring Hole Conservation and/or Monitoring Hole Conservation and/or Monitoring Hole Conservation and/or Monitoring Hole Conservation and/or Monitoring Hole Alteration (Construction) Abandoned, Poor Water Quality Construction Constructio	210 Pumping rate (Umin /A 20) Duration of pumping 1 hrs + 00mm Final water level end of 32.3 If flowing give rate (Umin Recommended pump in (Umin // 200) Recommended pump in (Umin // 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Please provide a map beil	CEAN)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3 50 32.3 50 32.3 50 32.4 50 32.5 50 30.5 50 50 50 50 50 5	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Cable Tool Cable Tool Cable Tool Cable Tool Cable Tool Converbe Converbe Cable Tool Converbe Cable Converbe Cable Converbe Cable Converbe Cable Converbe Cable Cab	Diamond Diamond Digeting Driving Digging Digging Digging Digging Construction:Record Record Material Sonstruction:Record Asterial Avanzed, Steel Sonstruction:Record	Livestock Livestock Irrigation Industrial Other, specify Vall Va	Commer Municipa Test Hole Cooling 8	cial Not used Dewatering Air Conditioning Monitoring Air Conditioning Monitoring Monitoring Monitoring Replacement Well Test Hole Recharge Well Dewatering Well Dewatering Well Desversion and/or Monitoring Hole Atteration Construction) Abandoned, Poor Well Construction) Abandoned, Poor Well Construction) Abandoned, Other, Specify Diservator Diservator Construction) Abandoned, Other, Specify Diservator Diservator Not used Diservator Construction) Abandoned, Other, Specify Diservator Diservator Construction] Abandoned, Other, Specify Diservator Construction] Abandoned, Other, Specify Diservator Diservator Construction] Abandoned, Other, Specify Diservator Diserva	210 Pumping rate (Umin /A 20) Duration of pumping 1 hrs + 00mm Final water level end of 32.3 If flowing give rate (Umin Recommended pump in (Umin // 200) Recommended pump in (Umin // 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Please provide a map beil	CEAN)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3 50 32.3 50 32.3 50 32.4 50 32.5 50 30.5 50 50 50 50 50 5	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Cable Tool Cable Tool Cable Tool Cable Tool Converbing	Diamond Diamond Digeting Driving Digging Digging Digging Digging Constituation Consti	Livestock Livestock Irrigation Industrial Other, specify Vall Va	Commer Municipa Cooling 8 Cooling 8	cial Not used Dewatering A Air Conditioning Not used Dewatering A Air Conditioning Not used Dewatering Not used Dewatering Not used Monitoring Replacement Well Deservation and/or Monitoring Hole Atteration Construction) Abandoned, Poor Weter Quality Abandoned, other, specify Diservation Other, specify Diameter To formal State Construction] Abandoned, other, specify Diameter To formal State State State Not used Not u	210 Pumping rate (Umin /A 20) Duration of pumping 1 hrs + 00mm Final water level end of 32.3 If flowing give rate (Umin Recommended pump in (Umin // 200) Recommended pump in (Umin // 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Well_production.(Umin/A 200) Please provide a map beil	CEAN)	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3 50 32.3 50 32.3 50 32.4 50 32.5 50 30.5 50 50 50 50 50 5	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
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Cable Tool Cable Tool Cable Tool Converted Converted Converted Converted Cable Tool Converted Cable Tool Cable	Diamond Jetting Driving Drigging Digging Digging Digging Digging Digging Digging Discontractorite		Commer Municipa Cooling & Cooling &	cial Not used Not used Montoring Air Conditioning Air Conditioning Conditioning Constructioning Constructioning Constructioning Constructioning Abandoned, Well Deservation and/or Montoring Hole Attration (Construction) Abandoned, Poor Wetter Quality Abandoned, other, specify Constructioning Constructioning Constructioning Constructioning Constructioning Constructioning Constructioning Constructioning Not used Constructioning Constru	210: Pumping rate (Umin /A 20) Duration of pumping <u>1</u> hrs + <u>0</u> m Final water level end of 32.3. If flowing give rate (Umin Recommended pump n Umin / 20) Well production.(Umin /A Disinfected? Sores No Please provide a map bel Please provide a map bel Please provide a map bel	Pumping (mt) in / GPM0 depth (nd) depth (nd) box following inst for following inst following inst followin	2 21.5 3 23.7 4 26.4 5 27 10 30.1 15 30.5 20 30.9 25 31.2 30 31.6 40 31.9 50 32.3 50 32.3 50 32.3 50 32.4 50 32.5 50 30.5 50 50 50 50 50 50 5	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
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Cable T Rotary Rotary Boring Air perc Other, s	Conventional) (Conventional) (Reverse) ussion pocify Converse, P	Diamon	d Pu	iblic prestic restock gation lustrial her, specify Depti From	Comme Municip Test Ho Cooling	Arcial Not used Not used Not used Monitoring & Air Conditioning Water Supply Replacement Well Test Hole	Pumping rate (Imin A 2015) Duration of pumping Philes Program Final wates level and of 8-77 If flowing give rate (Im Recommended pump 148	in pumping (m/t) in / GPM) depth (mttp)	- 3- - 4 - 5 - 10 - 15-	7.2 7.3 7.4 7.4 7.7 7.8	3 .4 5 10 15	4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Air perc Other, s	ool (Conventional) (Reverse) ussion peolfy Converter (Galvanizer Concrete, F Steel	Diamon Jetting Driving Digging Struction R Material , Fibreglass, Plastic, Steel)	id Provide Control of the second of the seco	iblic prestic restock gation dustrial her, specify Dept From +2	Comme Municip Test Ho Cooling h (m/ft) To 180	arcial Not used bal Dewatering ble Monitoring & Air Conditioning Water Supply Replacement Well Test Hole Recharge Well	Pumping rate (Imin A 2813 Duration of pumping This Program Final wates level and of Bear If flowing give rate (Im Recommended pump 1448 Recommended pump	in pumping (m/t) in / GPM) depth (mttp)	~ 3 5 10 15 20	7.2 7.3 7.4 7.4 7.7 7.8 7.8	3 .4 [°] 5 10 15 °20	4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Air perc Other, s	Conventional) (Conventional) (Reverse) ussion pocify Converse, P	Diamon Jetting Driving Digging Struction R Material , Fibreglass, Plastic, Steel)	d Pu	iblic prestic restock gation lustrial her, specify Depti From	Comme Municip Test Ho Cooling	arcial Not used Not used Not used Monitoring & Air Conditioning Con	Pumping rate (Imin A 2013) Duration of pumping Pinal wates level and of 8-7 If flowing give rate (Im Recommended pumping Induced pumping) Recommended pumping (Imin / 2013)	in pumping, (m/t) in / GPk() depth. (m(t)) rate	~ 3 4 5 10 15 20 25	7.2 7.3 7.4 7.4 7.4 7.7 7.8 7.8 7.9 8.1	3 .4 5 10 15 -20 25	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Air perc Other, s	ool (Conventional) (Reverse) ussion peolfy Converter (Galvanizer Concrete, F Steel	Diamon Jetting Driving Digging Struction R Material , Fibreglass, Plastic, Steel)	d Pu	iblic prestic restock gation dustrial her, specify Dept From +2	Comme Municip Test Ho Cooling h (m/ft) To 180	Arcial Not used al Dewatering be Monitoring 8. Air Conditioning Water Supply Replacement Well Test Hole Recharge Welf Dewatering Well Observation and/or Monitoring Hole Alteration	Pumping rate (Ilmin A 2015) Duration of pumping Phirs Phirs Pumping Phirs Phirs Ph	in pumping (mth) in I GPk() depth (mth) rate	~ 3 4 5 10 15 20 25 30	7.2 7.3 7.4 7.4 7.4 7.4 7.8 7.8 8.1 8.2	3 4 5 10 15 -20 25 30	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Grippero Other, a Inside Diameter (cm/in)	Conventional) (Conventional) (Reverse) ussion pecify Converter (Galvanized Converter, F Steel Open Hole	Diamon Diamon Diamon Ditving Diving Digging StructionalR OR Material OR Material , Fibreglass, Nastic, Steel) Hole	d Pu Div Div Div Div Div Div Div Div	iblic vmestic restock gation tustrial her, specify Useful From +2 180	Comme Municip Test Ho Cooling To To 180 225	arcial Not used Not used Not used Notioning & Air Conditioning & Air Conditioning Substatusion Memory Replacement Well Costruction Construction Abandoned,	Pumping rate (Imin A 2013) Duration of pumping Prinal wates level and of Bear If flowing give rate (Imin Recommended pumping Imin / 2013) Well production (Imin C	in pumping (mth) in I GPk() depth (mth) rate	- 3 - 4 - 5 - 10 - 15 - 20 - 25 - 30 - 40	7.2 7.3 7.4 7.4 7.7 7.8 7.8 8.1 8.2 8.4	3 4 5 10 15 -20 25 30 40 50	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cutside	col (Conventional) (Reverse) ussion pecify (Con (Galvanize (Canorete, F Steel Open H	Diamon Diamon Diamon Digging Diving Digging Struction:R CR Material Fibreglass lastic, Steel	d Pu	iblic interstic restock gation ustrial her, specify From +2 180	Comme Municip Test Ho Cooling To Cooling Automatic and the cooling To To 180 225	arcial Not used al Dewatering be Monitoring 8. Air Conditioning Water Supply Replacement Well Test Hole Recharge Well Observation and/or Monitoring Hole Alteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor	Pumping rate (Ilmin A 2015 Duration of pumping Phins P P P P Final wates level and of 8-27 Recommended pump 1448 Recommended pump 1448 Recommended pump 1448 Recommended pump 1448 New Production (Ilmin C 20 Well production (Ilmin C 20 Disinfected? No	in pumping (ntt) in / GPM) depth (nttp) rate	 3 4 5 10 15 20 25 30 40 50 60 	7.2 7.3 7.4 7.4 7.7 7.8 7.9 8.1 8.2 8.4 8.6 8.7 9	3 4 5 10 15 20 25 30 40 50 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Air perc Other, a Inside Diameter (cm/in)	Conventional) (Conventional) (Reverse) ussion pecify Converter (Galvanized Converter, F Steel Open Hole	Diamon Diamon Jetting Dirving Dirving Digging StructionaR OR Material OR Material StructionaR Hole	d Pu Div Div Div Div Div Div Div Div	iblic vmestic restock gation tustrial her, specify Useful From +2 180	Comme Municip Test Ho Cooling To Cooling Automatic and the cooling To To 180 225	arcial Not used al Dewatering be Monitoring 8. Air Conditioning Water Supply Replacement Well Test Hole Recharge Well Observation and/or Monitoring Hole Alteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Ilmin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Ilmin C 20) Disinfected? Disinfected?	in pumping (nvt) in I GPM) depth (ntt) rate	~ 3 · · · · · · · · · · · · · · · · · ·	7.2 7.3 7.4 7.4 7.7 7.8 7.9 8.1 8.2 8.4 8.6 8.7 *	3 4 5 10 15 20 25 30 40 50 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Chir perco Other, s Inside Diameter (cm/in)	Conic (Conventional) (Conventional) (Reverse) Ussion Ussion Ussion Open Hole (Galvanizec Concrete, P Steel Open f Used Open f Used Concrete Concrete, P Steel Open f Used Concrete Concrete Concrete, P Steel Concrete Conc	Diamon Diamon Jetting Dirving Dirving Digging StructionaR OR Material OR Material StructionaR Hole	d Pu Luiv Inn Inn Ott Wall Thickness (om/in) .188	iblic wrestic restock gation ler, specify From +2 180	Comme Municip Test Ho Cooling To Cooling f (m/ft) To 180 225 (m/ft)	arcial Not used Not used Not used Notioning & Air Conditioning & Air Conditioning & Air Conditioning Conditioning Conditional Noticents Conditional Co	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Ilmin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Ilmin C 20) Disinfected? Disinfected?	in pumping (nvt) in I GPM) depth (ntt) rate	~ 3 · · · · · · · · · · · · · · · · · ·	7.2 7.3 7.4 7.4 7.7 7.8 7.9 8.1 8.2 8.4 8.6 8.7 *	3 4 5 10 15 20 25 30 40 50 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Chir perco Other, s Inside Diameter (cm/in)	Conic (Conventional) (Conventional) (Reverse) Ussion Ussion Ussion Open Hole (Galvanizec Concrete, P Steel Open f Used Open f Used Concrete Concrete, P Steel Open f Used Concrete Concrete Concrete, P Steel Concrete Conc	Diamon Diamon Jetting Dirving Dirving Digging StructionaR OR Material OR Material StructionaR Hole	d Pu Luiv Inn Inn Ott Wall Thickness (om/in) .188	iblic wrestic restock gation ler, specify From +2 180	Comme Municip Test Ho Cooling To Cooling f (m/ft) To 180 225 (m/ft)	arcial Not used Not used Not used Not used Monitoring & Air Conditioning & Air Conditioning Substatussion Construction Construction Construction Abandoned, Insufficient Supply Abandoned, other,	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Ilmin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Ilmin C 20) Disinfected? Disinfected?	in pumping (nvt) in I GPM) depth (ntt) rate	~ 3 4 5 10 15 20 25 30 40 50 60	7.2 7.3 7.4 7.4 7.7 7.8 7.9 8.1 8.2 8.4 8.6 8.7 *	3 4 5 10 15 20 25 30 40 50 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Air perc Other, a Inside Diameter (cm/in)	Cori (Conventional) (Reverse) ussion pocify Con Con Con Con Con Con Con Con	Diamon Diamon Jetting Dirving Dirving Dirving Digging Struction:R (R Material Struction:R anized, Steel)	d Pu Diversional Care Wall Thickness (on/in) .188 Slot No.	Iblic mestic restock gation fustrial her, specify and the second	Comme Municip Test Ho Cooling h (<i>m/ft</i>) To 180 225	Arcial Not used Not used Not used Not used Notioning & Air Conditioning & Air Conditioning & Water Supply Replacement Well Test Hole Recharge Well Observation and/or Monitoring Hole Atteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor Water Quality Abandoned, Poor Water Quality Abandoned, other, specify	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Imin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Imin C 20) Disinfected? Disinfected?	in pumping (ntt) in / GPM) depth (nttp) rate	~ 3 4 5 10 15 20 25 30 40 50 60	7.2 7.3 7.4 7.4 7.7 7.8 7.9 8.1 8.2 8.4 8.6 8.7 *	3 4 5 10 15 20 25 30 40 50 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Rotary Doring Air perc Other, a Inside Diameter (cm/in) Outside Diameter (cm/in)	col (Conventional) (Reverse) ussion pecify Con (Con (Galvanerse, F Steel Open Hole (Galvanerse, F Steel Open f (Plastic, Galva (Plastic, Galva et Depti K	Diamon Diamon Jetting Dirving Dirving Dirving Digging StractionER StractionER InternationER InternatioR InternationER InternationER InternationER InternatioR InternatioR	d Pu Liv Im Im Mall Thickness (on/in) .188 Stot No.	Iblic mestic restock gation fustrial her, specify and the second	Comme Municip Test Ho Cooling To 180 225 (m/ft) To To Depth	Arcial Not used Arcial Dewatering Monitoring Arc Conditioning Keplacement Well CestHole Recharge Well Observation and/or Monitoring Hole Atteration (Construction) Abandoned, Insufficient Supply Abandoned, Poor Water Quality Abandoned, Poor Water Quality Abandoned, other, specify Other.upperv Monitoring	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Imin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Imin C 20) Disinfected? Disinfected?	in pumping (n/t) in / GPM) depth (n/t) rate	- 3 - 4	7.2 7.3 7.4 7.4 7.4 7.8 7.8 8.1 8.2 8.4 8.8 8.8 8.7 9 00 the base	3 .4 5 10 15 -20 25 30 40 50 60 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Car perc Other, a Inside Diameter (cm/in) Outside Diameter (cm/in)	Cori (Conventional) (Reverse) ussion pocify Con Open Hole (Galvane (Galvane Concrete. F Steel Open H Open f Open f Con Matr (Plastic, Galva Matr (Plastic, Galva 1 at Depth Ki f) Gas	Diamon Diamon Diamon Diamon Diamon Dirving Dirving Digging Straction:R OR Material Struction:R erial Inized, Steel) Water:Dict: Ind of Water: Other, spec		iblic interstic restock gation fustrial her, specify From +2 180 180 Depth From From	Comme Municip Test Ho Cooling To Cooling Added a cooling To To 180 225 (m/ft) To To	Arcial Not used Not	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Imin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Imin C 20) Disinfected? Disinfected?	in pumping (n/t) in / GPM) depth (n/t) rate	- 3 - 4	7.2 7.3 7.4 7.4 7.4 7.8 7.8 8.1 8.2 8.4 8.8 8.8 8.7 9 00 the base	3 .4 5 10 15 -20 25 30 40 50 60 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary I Rotary I Rotary I Rotary I Rotary I Other, a Inside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in)	Cori (Conventional) (Reverse) Ussion pecify Con Open Hole (Galvance, F Steel Open f Open f (Plastic, Galva (Plastic, Galva f t) at Depth Ki ft) Gas at Depth Ki ft) Gas	Diamon Diamon Diamon Digging StractionER OR Material Fiole F	d Pru	Iblic mestic restock gation ustrial ustrial ustrial her, specify	Comme Municip Test Ho Cooling To 180 225 (m/ft) To To Depth	Abandoned, Door Water Guality Abandoned, Door Water Supply Break and Construction) Abandoned, Insufficient Supply Abandoned, Opcor Water Cuality Abandoned, other, Specify Contraction	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Imin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Imin C 20) Disinfected? Disinfected?	in pumping (n/t) in / GPM) depth (n/t) rate	- 3 - 4	7.2 7.3 7.4 7.4 7.4 7.8 7.8 8.1 8.2 8.4 8.8 8.8 8.7 9 00 the base	3 .4 5 10 15 -20 25 30 40 50 60 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Rotary Rotary Conter, a Conter, Conter, a Conter, a Conter, Conter, a Conter,	Cori (Conventional) (Reverse) ussion pecify Con Open Hole (Galvance, F Steel Open I Open I Cot Kite (Plastic, Galva Autor (Plastic, Galva Autor (Plastic, Galva Autor (Plastic, Galva Autor (Plastic, Galva Autor (Plastic, Galva (Plastic, Galva (Diamon Diamon Diamon Diamon Diging Diging Diging Diging CR Material Struction:R istruction:R istruction:R inized, Steel) Wateri Didt Material Ofther, spec nd of Water: Other, spec nd of Water: Other, spec nd of Water:	d Pru	Iblic mestic restock gation ustrial ustrial ustrial her, specify	Comme Municip Test Ho Cooling To Cooling f (m/ft) To 180 225 (m/ft) To Cooling (m/ft) To Cooling Cooling Cooling Cooling Cooling To Cooling Cooling Cooling To Cooling Co	A bandoned, boor Water Quality Abandoned, boor Mater Quality Abandoned, boor Mater Quality Abandoned, boor Mater Quality Abandoned, boor Mater Quality Aban	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Imin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Imin C 20) Disinfected? Disinfected?	in pumping (n/t) in / GPM) depth (n/t) rate	- 3 - 4	7.2 7.3 7.4 7.4 7.4 7.8 7.8 8.1 8.2 8.4 8.8 8.8 8.7 9 00 the base	3 .4 5 10 15 -20 25 30 40 50 60 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary (Rotary (Rotary (Rotary (Cother, s Cother, s Co	Cori (Conventional) (Reverse) ussion pecify Con Open Hole (Galvance, F Steel Open f Open f Open f (Plastic, Galva (Plastic, Galva f) Gas at Depth Ki () Gas at Depth Ki () Gas	Diamon Diamon Diamon Diging Diring Diring Diring Diging Straction:R Stack, Steel) International discontinued of Water: Other, spec	d Pru	bblic instruction	Comme Municip Test Ho Cooling To Cooling To 180 225 (m/ft) To Depth From 0 +022	rcial Not used al Dewatering le Monitoring & Air Conditioning & Air Conditioning & Air Conditioning Water Supply Replacement Well Dewatering Well Observation and/or Monitoring Hole Alteration (Construction) Abandoned, Poor Water Quality Abandoned, Poor Water Quality Determent (m/ft) Diameter To (cm/in) 1880 225	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Imin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Imin C 20) Disinfected? Disinfected?	in pumping (n/t) in / GPM) depth (n/t) rate	- 3 - 4	7.2 7.3 7.4 7.4 7.4 7.8 7.8 8.1 8.2 8.4 8.8 8.8 8.7 9 00 the base	3 .4 5 10 15 -20 25 30 40 50 60 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Cair perc Other, s Dameter (cm/in) Cutside Diameter (cm/in) Cutside Diameter (cm/in) Cutside Diameter (cm/in) Cutside Diameter (cm/in) Cutside Diameter (cm/in) Cutside Diameter (cm/in)	Cori (Conventional) (Reverse) Ussion pecify Con Open Hole (Galvanizec Concrete, F Steel Open f Steel Open f Open f (Galvanizec Concrete, F Steel Open f (Galvanizec Concrete, F (Galvanizec Galvanizec (Galvanizec Galvanizec (Galvanizec Galvanizec Galvanizec (Galvanizec Galvanizec Galvanizec (Galvanizec Galvanizec (Galvanizec Galvanizec (Galvanizec (Galvanizec (Galvanizec (Galvanizec (Galvanizec (Galvanizec (Galvanizec)	Diamon Diamon Diamon Diamon Digging Digging Digging CR Material StructionaR OR Material StructionaR Hole StructionaR Steel) Hole StructionaR StructionaR Steel StructionaR StructionaR Steel StructionaR Steel Steel StructionaR Steel Ste	d Pru	bblic instruction	Comme Municip Test Ho Cooling To 180 225 (m/ft) To 180 225 (m/ft) To 180 225 (m/ft) To 180 225 (m/ft) To To		Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Imin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Imin C 20) Disinfected? Disinfected?	in pumping (n/t) in / GPM) depth (n/t) rate	- 3 - 4	7.2 7.3 7.4 7.4 7.4 7.8 7.8 8.1 8.2 8.4 8.8 8.8 8.7 9 00 the base	3 .4 5 10 15 -20 25 30 40 50 60 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Cair perc Other, s Inside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in)	Cori (Conventional) (Reverse) Ussion pecify Conrete. F Steel Open Hole (Galvanizec Concrete. F Steel Open F Steel Open f (Galvanizec Concrete. F (Galvanizec Co	Diamon Diamon Diamon Diamon Diamon Diving Digging Digging CR Material Anized, Steel) Hole Struction R anized, Steel Water Didt Ind of Water: Other, spec of Water: Other, spec of Other, spec Contractor, Other. Spec Contractor, Ditactor Co. Ltd:		bblic instruction	Comme Municip Test Ho Cooling Test Ho Cooling To 180 225	rcial Not used al Dewatering le Monitoring & Air Conditioning & Air Conditioning & Air Conditioning Water Supply Replacement Well Dewatering Well Observation and/or Monitoring Hole Alteration (Construction) Abandoned, Poor Water Quality Abandoned, Poor Water Quality Determent (m/ft) Diameter To (cm/in) 1880 225	Pumping rate (Imin A 2015) Duration of pumping Phins P 90 m Final wates level and of 8-27. If flowing give rate (Imin Recommended pump 1440 Recommended pump (Imin / 20) Well production (Imin C 20) Disinfected? Disinfected?	in pumping (mit) in / GPU() depth (mtp) rate	~ 3 ~ 4 ~ 5 ~ 10 ~ 15 ~ 20 ~ 25 ~ 30 ~ 40 ~ 50 ~ 60 ~ 60 ~ 7 ~ 7 ~ 7 ~ 7 ~ 7 ~ 7 ~ 7 ~ 7	7.2 7.3 7.4 7.4 7.4 7.8 7.8 8.1 8.2 8.4 8.8 8.8 8.7 9 00 the base	3 .4 5 10 15 -20 25 30 40 50 60 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
Cable T Rotary Rotary Boring Cair perc Other, s Inside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in) Outside Diameter (cm/in)	Cori (Conventional) (Reverse) Ussion pecify Con Open Hole (Galvanizec Concrete, F Steel Open f Steel Open f Open f (Galvanizec Concrete, F Steel Open f (Galvanizec Concrete, F (Galvanizec Galvanizec (Galvanizec Galvanizec (Galvanizec Galvanizec Galvanizec (Galvanizec Galvanizec Galvanizec (Galvanizec Galvanizec (Galvanizec Galvanizec (Galvanizec (Galvanizec (Galvanizec (Galvanizec (Galvanizec (Galvanizec (Galvanizec)	Diamon Diamon Diamon Diamon Diamon Diving Digging Digging CR Material Anized, Steel) Hole Struction R anized, Steel Water Didt Ind of Water: Other, spec of Water: Other, spec of Other, spec Contractor, Other. Spec Contractor, Ditactor Co. Ltd:		bblic instruction	Comme Municip Test Ho Cooling Test Ho Cooling To 180 225 Cooling (m/ft) To 180 225 Cooling Cooling th (m/ft) To 180 225 Cooling th (m/ft) To To		Pumping rate (Ilmin A 2015 Duration of pumping Phins Program Final wates level and of B-27 Recommended pumping If flowing give rate (Ilmin Recommended pumping If flowing give rate (Ilmin Q 20 Well production (Ilmin Q 20 Disinfected? Disinfected? Disinfected? Please provide a map be Please provide a map be	in pamping (note) in / GPU() depth (net) rate low following in the LPS TWB TWB TWB TWB TWB TWB TWB TWB TWB	~ 3 · · · · · · · · · · · · · · · · · ·	7.2 7.3 7.4 7.4 7.4 7.8 7.8 8.1 8.2 8.4 8.8 8.8 8.7 9 00 the base	3 .4 5 10 15 -20 25 30 40 50 60 60	4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5 4.5
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	Ministry of Well An Number (Place		Regulation 903 Ontario	Well Record
Instructions for Completin	ng Form A 02			page of
For use in the Province of	of Ontario only. This document is a perma npleted in full to avoid delays in processing	inent legal document. Please	retain for future referer	ice. the back of this form
 Questions regarding com All metre measurement: 	pleting this application can be directed to t is shall be reported to 1/10 th of a metre.	he Water Well Management C	Coordinator at 416-235	-6203.
Please print clearly in blu Well Owner's Information	e or black ink only. and Location of Well Information		Ministry Use Only	LOT
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Chlorinated Ves No Plugging and Se		andonment	Location of Well	37 60
Depth set at Metres Material and ty From To	pe (bentonite sturry, neat cement slurry) etc. Volume (cubic	e Placed metres) In diagram below show Indicate north by arrow	v distances of well from road,	lot line, and willing,
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Domestic Industr	nercial 🗍 Not used ——		Data Mall Co	
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	ntractor/Technician Information Well Contractor's L	Joance No, Data Source	Ministry Use Only Contractor	1119
Business Adress (street name, num	LUING O LID III	Date Received ym	- 1 11 - L	
Name of Well Tegnilician (last name,		Icance No. Remarks 2 6 2	2005 Well Record	Number
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Gas Other:	🗖 s	Salty	Minera	s	Plastic Galvaniz						depth. 30.47hetr	es	3.54 5	2.41
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After test o	fwell	yield,	water was			Concrete		1			(litres/min)	25	3.80 25	2.12
🗙 Clear a			free		Galvaniz						If pumping discontin- ued, give reason.	30 40	3.83 30 3.87 40	2.11
Other,	specity	/		┨┝────	- 1 - · ·		Casing or Sc				 	50	3.87 40 3.90 ⁵⁰	2.07
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			ging and	Sealing Rec	ord	🗙 Annul	, Lawrence	Abandonme	ent			n of Well		ilding
Depth set a From	at - Me To		Aaterial and	type (bentonite	slurry, neat o	ement slum		ime Placed bic metres)		In diagram belo	w show distances of we y arrow.	Perty		mang.
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Observa	ation v		Abandon	ed, insufficient] Dewatering	g			package deliver	ed? XYes No		2005	8 16
Test H	ole	[ed, poor quality ontractor/T			ion				Ministry			
Name of W	ell Co	ntracto	or				Vell Contractor's 1558	s Licence N	lo.	Data Source		Contractor	15	58
Business A	ddres	s (stre	et name, nu	ply Ltd. imber, city etc.)		1,7,70			Date Received	2005, MM, DD	Date of Ins	pection YYYY	MM DD
P O	Box	49	0 Sti	ttsville		10 K2	Vell Technician'	s Licence N	10.	OCI 24 Remarks		Well Reco	rd Number	1 <u> </u>
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<u>County or Territorie) District</u> (CARL	Townsh	ip Village Town or	City	
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Pipe and Casin				Pumping Test	
Casing diameter (s)					
Casing diameter (s) $\dots \dots \dots$	******		tatic level	o GPH	*****
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Well Log				Water Record	
Overburden and Bedrock Record	From	То	Depth(s) at which	No. of fest	Kind of water
	ft.	ft.	water(s) found	water rises	(fresh, salty, or sulphur)
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LIMESTONE	16	90			FRESH
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For what purpose(s) is the water	to he used?	i	-F		104
	OUSE			cation of Well	
is water clear or cloudy?	CKEAR			show distances of Indicate north	
is well on upland, in valley, or on	hillside?	lD			小 小
Drilling firm					ł
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Varia 1215T LIGI WATER WEI	LL REC Fownship, Village, 7 Date completed	Fown or City	Rich, nov-	1968
Casing and Screen Record		Pumping	1 Test	
Inside diameter of casing 577 Total length of casing 257 Type of screen Length of screen Depth to top of screen Diameter of finished hole 577	Pumping level. Duration of test Water clear or c Recommended	ate / O pumping loudy at end of pumping rate.	1 hr test 5	G.P.M. G.P.M. w ground surface
Weil Log				r Record
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sylphur)
clay	0	22'	44	fresh
		115		0
		•		
		Location	of Well	
For what purpose(s) is the water to be used? Milling or upland, in valley or on hillside? Drilling or Boring Firm Address Licence Number Name of Driller or Borer Address Date Maller Maller Kignature of Licensed Drilling or Baring Contractor) Form 7 OWRC COPY		am below show	distances of we licate north by	
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ାଙ୍କି Or	ntario	Ministry of the Eñviro	• · · · · · ·	II Tag Number (Place	sticker and prin	I number below)	· ·	- +	Well	Record
					1993	<u> </u>	Regulation 903	Ontar		esources Act
	for Complet		. L			document D] lease retain for futur	a rafai		· · · ·
 All Section 	ons must be cd	mpleted in	full to avoid d	elavs in processing	i Further Ir	structions and	d explanations are available	ailable (on the back	of this form.
 Question All metre 	s regarding co measuremer	mpleting th Its shall be	is application (e reported to	can be directed to t 1/10 th of a metre. _T	the Water V	Nell Manager	nent Coordinator at		35-6203.	
 Please pl 	rint clearly in b	ue or black	k ink only.		MUN		Ministry Use	a Only		
Well Owner	s Information	1 and Loc	ation of Well	Information						
Ottow	a CArletor				Goulboy	TO		25	4	
RR#/Street Nur	mber/Name			[c	iy/Town∕Vil	age	Site/Compa		/Block/Tract	etc.
Lot / GPS Reading		one Easti	ng		Richa elt Make/Ma	del Mode	of Operation: Und	Ifferentia		veraged
		اصغط يربع وجاجط	344	instructions)	garmin			rentlated	specify	
General Colour	Most commo			er Materials		Genera	I Description		Depth Ecom	Metres To
brown	caly		-						0	3.65
RLEA	clay								3.65	11.88
grey	sand&grav	wl							11.88	13.41
grey	limestor	ie	_						13.41	
rey & whi	<u>te sandst</u>	one			 				45.10	75,58
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				<u></u>			<u>. </u>	_ .		
	- -								+ • •	
Hole I	Diameter][Construction Recor	r a		l		ell Yield	
	etres Diameter To Centimetre		Material	Wali thickness –	Depth	Metres	Pumping test method		w Down · Vater Level Th	Recovery me Water Level
	.23 22.75	l centimetres		centimetres	From	То	Submersible	min	Metres m	nin Metres
15,23 75		7 1	· · · · ·	Casing			Pump intake set at - (metres) 45.71	Level	3.59 4.80	1 4.05
13.23 73		M	Steel Fibri	eglass	+.45	15.23	Pumping rate - (litres/min) 54.6	1	**00	1 4.05
	Record		Galvanized				Ouration of pumping 5_hrs + mir		.03	2 3.87
Water found atMetres /	Kind of Water	-	Steet Fibr		T		Einal water level and		5.27	3 3.84
🗋 Gas 🗌	Fresh 🗌 Sulphu Saity 🔲 Mineral		Plastic Con	crete			of pumping 5 58 Recommended pump		5632	4 3.83
□Other [\ o+	Fresh .		Steel Fibr	azalge		· -	1 type.			
🗋 Gas 🛛	Salty Mineral	8	Plastic Con	crete			depth. 30,47 hetres	5	5.35	5 3.83
Other:	Fresh Sulphu	t.	Gaivanized	Screen		! 	Recommended pump		5.39	0 3.74
Gas 🗍	Salty Mineral	 Outside 	Steel . Fibr	egiass Slot No.	1		rate. 45.5 (litres/min) If flowing give rate -			15 3.69
After test of wel	l yield, water was	- diam	- Plastic Cor				(litres/min)		5.35 5.37	20 3.67 25 3.66
🔀 Clear and se	diment free		Galvanized		<u> </u>		if pumping discontin- ued, give reason.			30 3.66
Other, speci		<u></u> }	.	No Casing or Scre	en :					40 3.65 50 3.64
Chlorinated 🌠	Yes No		SOpen hole		15.23	75.58][60		60 3.64
Donth set of - M	Plugging and s				andonment e Placed	in diagram belo	Location w show distances of well			d building.
	0	[slurry, neat comer		e Placed netres)	Indicate north b				
15.23	0 Groute	d Bento	mite: Slur	ry63	₽				^۲ ۳۱	16
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Cable Tool	Rota		f Construction	vond П	Cigging .	l d	¥	<u>د م</u> الا	weens	•
Rotary (convi	entional) 🔣 Alr p	ercussion	🗍 Jetti	ng 🗖	Other			6.5	- Day	
Rotary (rever	se) Borin	5	Drivi	ng		្ម			-	
Domestic	indus Com	trial	Publ		Other .		0.c.*5			•
Stock	Com	elpai		used		Audit No. 7	47075	ate Well	Completed	MM DD
Water Suppl	v Recharge		tatus of Well	nished Abando	ned, (Other)	Was the well of	wner's Information D	ata Deliv	2006	Y MM DD
Observation	well 🔲 Abandon	d, insufficient	t supply 🔲 Dew	. —		package deliver	red?		200	6 9 6
Test Hole		d, poor qualit ontractor/T	echnician info	rmation		Data Carres	Ministry U	se Onl ontracto		
Name of Well C	ontractor Water Sur	inte Ted		Well Contractor's L 1558	icence No.	Data Source		vn(12)C(C	" 1 5	58
	ss (street name, nu	inber, city.etc.)			Date Received	7"2005" , DD	ate of In	spection yr	Y MM DD
	90 Stitts		itario KZ	S 1A6 Well Technician's L	lcence No.	Remarks		ell Rec	and Number	I
Box 4	echnician (last nam						-			
Box 4 Name of Well To M 1	achnician (last nam 1er, Steph a		<u> </u>	Date Submitted	144 00					
Box 4 Name of Well To M11	echnician (last nam			Date Submitted YYYY 2006 Ministry's Copy	19 0	ner's Copy 🔲		former	a est dienon	ible en français

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🕅 Onta	ario (Ministry of he Enviro	nment		Number (Pla A 042)		nt number below)]	Well Rec	
Instructions for	Completin	ig Form		A	042038				page o	of
 All Sections m 	nust be con Jarding com	npleted in Inpleting th	full to avol is applicat	d delays ion can t	in processi be directed	ng. Further i to the Wate	instructions ar	Please retain for future re id explanations are availabl Desk (Toll Free) at 1-88	le on the back of this :	form.
 Please print cl 	learly in blu	e or black	ink only.					Ministry Use On]
Well Owner's Inf	formation	and Loca	ation of W	/ell infor	mation	MUN		ON	LOT	
Ottawa Carle RR#/Street Number// Lot 80, King	Name s Grant	Garden	s			West Car City/Town/Vi Richmon		Iuntley 24 Site/Comparime	4 ant/Block/Tract etc.	
-	VAD Zon 813 18		19 42 71	Northi	^{ng} 0521041	Unit Make/M Garmi		e of Operation: Undifferentia	ntiated Averaged	
Log of Overburd	en and Be	drock M	aterials (s	see instr	uctions)					
General Colour M	ost common			Other Mate	arials		Gener	al Description		letres To
Brown	<u>Clay</u>							ked		3.96
Gray	<u>Clay</u>	ntono	<u>+</u>				Loc			13.41
Gray Gray & White		stone tone	<u> </u>					lium lium Hard		<u>48.76</u> 75.58
			<u> </u>		· .					<u></u>
			+							
			+					.		
Hole Diame	ter		<u></u>	Const	ruction Rec	ord		Test of	Well Yield	
Depth Metres From To	Diameter Centimetres	Inside	Mater	lal	Wall	Depth	Metres	1	raw Down Recove Water Level Time Wate	
	22.75	diam centimetres	Indion		thickness centimetres	From	То	submersible min	Metres min Me	ler Level letres
	15.23		_,		Casing	·	·	(matres) 45 71 Leve	2.68	
		15.86	Steel		.48	+ .45	15.23	Pumping rate 1 (litres/min) 72.8	4.27 ¹ 3.4	45
Water Reco Water found at Metres / Kind	ord d of Water		Galvanized	s i		 		Duration of pumping 2	4.62 23.3	30
at Metres Kunt	Sulphur		Steel	_				Cinal water level and	4.80 3 3.2	22
Gas Li Salty	Minerals		Galvanized			<u>-</u>		of pumping 5 methos Recommended pump 4		
	🗋 Sulphur		Steel	-				Shallow XOeep	4.0/ 0.1	
Other:	Minerals		Galvanized					depth30_47_metres	4.91 <u>5 B.1</u>	LL
m ☐ Fresh ☐ Gas ☐ Salty	Sulphur	Outside		1	Screen		1	Recommended pump 10 rate, (litres/min) 15	4 94 10 2 9 4 98 15 2 8	25
Other:		diam	Steel	Concrete	Slot No.	-		If flowing give rate • 20	5.03 20 2.8	89 <u></u> 86
After test of well yield, X Clear and sediment			Galvanized	e l				(litres/min) 25 If pumping discontin- ued, give reason. 30	5.09 25 5 8 5 18 30 5 8	84 82
Other, specify				No Ca	ising or Scr	reen	1	40 50	5.24 40 2.8	31
Chlorinated X Yes	□ No	15.23	Open hole			15,23	75,58	50 60		30 80
Bandy and the later of	ging and Se			Annular		bandonment ne Placed		Location of W		
From To	Aaterial and typ				etc. volur (cubi	ne Placed ic metres)	In diagram belo Indicate north b	w show distances of well from ro y arrow.	iao, iot line, and building	j.
15.23 0 6	routed.	- Bento	mite_Sl	urry_	42n	13	$ \uparrow$	1 Lot 80 X	inoz L	
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								<u> </u>	_	4
Cable Tool	M Rotary (Constructio	on lamond	F	Digging		_		Ŧ
Rotary (conventional) Rotary (reverse)) Air perc		=	etting Iriving	E] Other				Hun
Domestic Stock		al	P	ubile Supply	/ [Other		Queenston E		
Stock	Comme Municipi	al	<u> </u>	lot used cooling & air	conditioning		Audit No. Z	58727 Date We	IL Completed	1 Ű
Water Supply] Recharge we		tus of Well	Infinished	Aband	ioned, (Other)	Was the well o	wner's information Date De	2006 12 Ivered yyyy MM	
Observation well		insufficient s	upply 🗍 D	lewatering leplacement	· · · ·		package delive	red? XYes No	2006 112	1.7
Name of Well Contracto	Well Con		chnician in	formatio		Licence No	Data Source	Ministry Use On Copyrac	inr.	
								1	558	
		y Ltd.			1558		D-4			
Capital Wate Business Address (street	er Suppl		rio K2S				Date Received	1807	nspection YYYY MM	1 00
Capital Wate Business Address (stree Rox 490 Stit Name of Well Technicia	er Suppl et name, húmb tsville n (last name, f		rio K2S:	_1A6	II Technician's		Date Received	1807		· b0
Capital Wate Business Address (stree Rox 490 Stit Name of Well Technicia Miller: Step Signature of Jechnician	er Suppl et name, húmb tsville n (last name, f		rio K2S.	_1A6	II Technician's TOO97 Submitted yyy			1807	nspection YYYY MM	I · 60

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Well Tag Number (Place sticker and print number below) A035469 A 035469

Well Record Regulation 903 Ontarlo Water Resources Act

page ____ of ____

Instructions for Completing Form	L_A 0354
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 All metre i 	measurement nt clearly in blu	s shall be	reported to 1/10	th of a metr	e			Ministry Us				
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Address of Well Lot 83			ncipality) <u>)ttawa CArle</u>		ownship Coul	bourn		Lot	24	Conce		
RR#/Street Numb	ber/Name		CCUME ONLIC		City/Town/Vi	llage		Site/Compa				o.
L- 83 0 GPS Reading	radea Cres NAD Zon		Nort	hing	Ri Unit Make/M			of Operation:	ifferenti	ated Date	Avera	,
	813 18	4342	2 <u>6 </u> 50	05160	Garmín					id, specify_	2	
General Colour	Most common		terials (see inst Other Ma					l Decedetion		Dep	th	Metres
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grey	<u>clay</u>		stones				cky			3.9		12.49
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grey&white	sandsto	ne			<u> </u>	ed har	a			47.2	4	75,58
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<u>+</u>										-		
						<u>.</u>						
Hole Dia	meter		Cons	struction Rec	cord	·		Tes	t of W	ell Yield		
Depth Metri	es Diameter	Inside	· ····································	Wall	Depth	Metr	es	Pumping test method	Dra	w Down		ecovery
Fram To		dlam centimetres	Material	thickness centimetres		То		Submersible	Time min	Water Level Metres	Time min	Water Level Metres
0 14.	32 22.75	CERTIFICATION CONTRACTORS				10		Pump intake set at -	Static			
14.32 75.	58 15.23	₁ ,	Steel Fibreglass	Casing	<u> </u>	1		(metres) 45.71 Pumping rate -	Level	2.18	1	4.86
		i li	Plastic Concrete	1.0	1.15	14.	22	(litres/min) 54.6				
Water R Water found at Metres	ecord Kind of Water	· ·	Galvanized	.48	+.45	14.	54	Duration of pumping hrs +30_ min	2	4.89	2	3.94
	sh Sulphur	I 13	Steel Fibreglass					Final water level end	1	5.53	_3	3.48
L73J114 □ Fre	Ity Minerals	4 1*	Galvanized					of pumping 7, 44 metres Recommended pump		5,93		3.17
	esh 🖸 Sulphur	i	Steel Fibreglass		·	1		type.	1	5.55	4	5.17
🗌 Gas 🛄 Sel	Ity Minerals		Plastic Concrete			1		Recommended pump depth. 30.4metres	5	6.12	5	2.97
Other:	ash 🔲 Sulphur	^l	Gaivanized	Screen				Recommended pump	10	6.85	10	2.63
📙 Gas 🗌 Sal	Ity Minerals	Outside	Slee! Fibreglass	Slot No.		1		rate. 45,5 (litres/min)		7.09	15	
After test of well yit	old water wae	alam i	Plastic Concrete		-			If flowing give rate -		7.14	20	2.54
Clear and sedin		0	Galvanized					(litres/min) It pumping discontin- ued, give reason.	1	7.19	25 30	2.49
KOther, specify_			No C	asing or Sc	reen			ued, give reason.	40	7.31	40	2.40
Chlorinated XYe:	s ∐No	15.23	Open hole		14.32	75.	50			7.36	50 60	2.44
	ugging and Sea	(1999) (1997)				<u></u>	90	Location			60	2,45
Depth set at - Metre	6 Material and type	a (bentonite sit	my, neat cement slumy	ni space 🔲 /	me Placed	In diagrar	n betov	v show distances of well fr			and bui	iding.
From To			ite slurry		bic matres) Bm3	Indicate r	orth by	arrow.		·		
14.52 0	Grouted	Dentor	iite sturry	.0.	1110	KA			1	il at		
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										183	١٠	
						1.3	NPQ	Crey	_ /	ł	#	1
Cable Test			Onstruction			020		Crey.	~	\mathbf{N}	\ \	
Cable Tool Rolary (conventio	MRotary (a onal) X Air perci		U Diamond		Digging Other	r					Č	
Rotary (reverse)	Boring		Driving			1				١		
Domestic	Industria	Water	Use	Ny F	Other			lucenston	_			
Stock	Commer	cial	Not used	· . –					- 11 - 12	-		ł
	Municipa	Final Statu	Cooling & a Is of Well	a whomoning		Audit No.	Z	58616	a vyêli	Completed 200	λi	₩jf6
Water Supply	Recharge we		Unfinished	Aban	doned, (Other)				e Deliv		YYY YYY	MM DD
Observation well Test Hole	Abandoned, i		pply 🔲 Dewatering	nt well		package	ueinere			200	1	<u>3 </u> 19
	Well Cont		nician Informatio	on	Line	Data D		Ministry Us				
Name of Well Contra Canital	^{actor} Water Supl	v Ltd.	W	ell Contractor's 1558	Licence No.	Data Sou	arce		ntractor	15	5	8
Business Address (s	street name, numbe	er, city etc.)		,		Date Rec	9VN	1 147120074M DO Dat	e of Ins	pection y	m	MM OD
Box 490 Name of Well Techn	Stittsvill Ician (last name, fi	<u>e Ontar</u> rst name}		A6 ell'Technician's	Licence No.	Remarks			II Beco	rd Number	<u> </u>	
Miller S	terhen			TO007	7 I	rendina				ta Namaan		
Signature of technic	cian/Contractor		- Dat	te Submitted yyy 2007	7 1 3 20							
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Instructions for Completing Form

Ministry of the Environment

Well Tag Number (Place sticker and print number below) A035472

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Well Record Regulation 903 Ontario Water Resources Act

page ____ of ____

A 035472

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 Please p 	print clearly i	n blu	e or black	ink only.				Ministry Use	Only			
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Accress of we Ottawa	Carleto		UISTRCVMU	nicipality)		Township Goulbo	ourn	Lot	24	Conce	ssìon 4	
RR#/Street Nu	mber/Name	_				City/Town/Vi		Site/Compa				2.
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GPS neading	813	18			ning 0,5240 i i	Unit Make/M Garmin	odel Modi		ifferentiate rentiated,		Aven	aged
Log of Over				aterials (see ins								
General Colour	Most com	mon	material	Other Ma	aterials		Genera	al Description		Dep Fro		Metres To
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grey& wh						·····		•		48.76		60.34
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Hole	Diameter	-		L Cons	truction Re	ecord		Toe	t of Wel	Yield	ł	
	etres Diame	eter	Inside		Walt	Depth	Metres	Pumping test method	Draw		R	ecovery
	To Centime		diam	Material	thickness			Submersible	Time Wa		Time	Water Level Metres
0 14	.93 22.	75	centimetres		centimetres	s From	То		Ctatio		min	weres
14.93 60	.34 15.	39	_		Casing			(metres) 45.71 Pumping rate -	Level 2	.51 .32	-	5.02
			1 I	Steel Fibregiass	10			(litres/mln) 54.6	1 4	.32	1	5.02
Water	Record		15.86	Galvanized	.48	+.45	14.93	Duration of pumping	25	.25	2	3.90
Water found at Metres /	Kind of Wat	er	l i	Steel Fibregiass				2 hrs + 30 min		01		-1 -1 -1
58.51	Fresh Sulp	nur		Plastic Concrete				Final water level end of pumping 7.03 metres	3)	.82	3	3.47
Gas Gas Other:N	OT TESTE	D_		Galvanized				I Recommended oump I	4 6	.22	4	3.24
	Fresh 📋 Sulp			Steel Fibregiass				type. Shallow RDeep Becommended pump			_	
	Salty 🛄 Mine			Plastic Concrete				Recommended pump depth. 30.47 metres	56	.48	5	3.01
	Fresh 🗌 Sulp				Screen		I	Recommended purps	10 7	.04	10	2.95
Gas 🗍	Salty Mine		Outside	Steel Fibreglass	Slot No.			rate. 45.5 (litres/min)		.22	15	2.90
Other:		_	diam	Plastic Concrete	GIOLINO.	_		If flowing give rate -		.26	20	2.86
After test of well Clear and se		as	.	Galvanized				(litres/min) If pumping discontin- ued, give reason.		.35		2.84
Other, specif	у		·	No C	asing or Se	creen		ued, give reason.		.44		2.79
Chlorinated 🕱	Yes 🗍 No	_	1.5 00	🗙 Open hoie				1		.48		2.75
						14.93	60.34		60 7	,49	60	2.71
Dooth opt of - Ma	Plugging an	d Sea	aling Reco	rdi 🔀 Annula		Abandonment ume Placed		Location o				
From T	o Material a	nd type	e (bentonite s	luny, neat coment sluny	etc. (cu	ibic metres)	Indicate north by	w show distances of well from y arrow.	om road,	lot line, i	and bu	lang
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l		м	ethod of C	Construction			0		\mathbf{N}			10
Cable Tool		tary (a	air)	Diamond		Digging	/		/			#
Rotary (conve Rotary (revers			ussion Wate	Jetting		Other						8
Domestic	_ Inc	lustria		Public Supp	bly	Other	<u> </u>			.		
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	MI	unicipa		Cooling & a us of Well	a costationing	·	Audit No. Z	58615	a Well Co	anpleted	007	318
Water Supply			11 <u> </u>	Unfinished		ndoned, (Other)	Was the well on	wher's information Dat	e Delivere	d Y	YYY	MM DD
Observation w Test Hole			insufficient su boor quality	pply Dewatering			package delivera	ed? XYes No			2001	19_19_
	Well			hnician informatio	n			Ministry Use				
Name of Well Co Canital	ntractor L Water S	3110-			ell Contractor's 1558	s Licence No.	Data Source	Cor	tractor	15	55	8
Business Address				•	0001	-	Date Receivent	TYAYY/ A DO Dat	e of Inspe	ction v	YYY	MM DD
Box 490) Stittsv	/il]	le Onta			he Han and A						
Name of Well Tec Miller	chnician (last na "Stephen	me, fil	rst name)	, w	ell Technician' TOO97	's Licence No.	Remarks	We	I Record	Number		
Signature Teo		or		Dai	to Submitted	YY MM DO	<i>:</i>					
X fels for	A-C-S		<u> </u>			07 3 20	L					
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	s for Comple	*	A041981					• •	of .
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 Please p 	print clearly in b	olue or black ink only.	•	MUN		Ministr :ON	y Use Only		
Well Owner	s informatio	n and Location of	Well Information					lluori	1 1
RR#/Street Nu			e-Carleton	<u>Goul</u> City/Town/V	bourn /illage	Site/C	24 ompartment/	Block/Tract et	4 tc.
Ot <u>81, Ki</u> GPS Reading	ngs Grant NAD z	Gardens	Northing	Richm	ond Model Mode	e of Operation:		ed X Aver	
Log of Over	8:3 1 burden and I	Bedrock Materials	50 051 87	Garmin			Differentiated	specify	
General Colour	Most commo		Other Materials	·	Genera	al Description		Depth	Metre
rown	Clay							From	3.6
ray			Stones					3.65	12.8
ray	Limest	F						12.80	51.2
· /	te Sandst	1						51.20	_75.5

								ļ	
									·
Hole [Diameter	<u></u>	Construction Re	cord			Test of We	il Yield	
	etres Diameter		Wail	Depth	Metres	Pumping test me	thod Draw	Down R	ecovery
	To Centimetre	s diam Mate centimetres	erial thickness centimetres		То	submersib	Le min	ater Lavel Time Metres min	
	.62 22.75	┤┟────┴──┉┉───╍	Casing		_ <u></u>	Pump intake set	at - Static		
14.62 75	.58 15.07	15.86 Steel	Fibreglass 48	+ ,45	14.62	(metres) 47 6 Pumping fate - (litres/min) 72 . (5,24
Water	Record	Plastic Galvaniz	Concrete			Duration of pump	ing 2 4	72 2	4.07
Water found at Metres /	Kind of Water	Steet	Fibreglass		+	_4_hrs +30_	_ min	416.6	#.U/
	Fresh 🔲 Sulphur Salty 🗋 Minerals	Plastic	Concrete			Final water level of pumping8.6	and 3 5	.21 3	3.38
Other:	.rested		ed]Fibreglass			Recommended p		64 4	2.98
	Fresh Sulphur Salty Minerals	s Plastic		1		type. Shallow (** Recommended p	Deep -		Г с
Other:		Galvaniz	ed			depth22 <u>.85</u> m	etres		2.88
	Fresh 🔲 Sulphur Salty 🗌 Minerals		Screen			Recommended p rate. (Hipes/min)	ump 10 6 15 7	77 10	2.70
Other:		s Outside Steel		_		I trittowing give rat	e 20 7	2.05 15 34 20	2.64 2.60
After test of well Clear and sec	yield, water was diment free		- !			(litres/min)	25	70 25	2.58-
Other, specify		1	No Casing or Sc	reen	J	If pumping discont ued, give reason.	40 8	07 30 15 40	2.52
Chlorinated 🔀	Yes 🗌 No	15.07 ^{Open hol}	ie	14.62	75.58		50 8	05 50	2.52
	Plugging and S		X Annular space	Abandonment	1 12.20	·	60 8	3.07 60	2,52
Depth set at - Mel	tres Material and h	ype (bentonite slurry, neat o	oment at unit ata	me Placed		w show distances of	ion of Well well from road,	lot line, and bu	ilding.
From To 14.62 0		-Bentoint Slu	·· (cui	nd metres) m3	Indicate north by	arrow.		<u> </u>	-
						1	i	Lot	8)
						Å	<u>ل</u> ا ب		
						Å	^ L		
·		Method of Construct			S S	<u>a</u> – –			
Cable Tool	Rotan			Digging		9	1.00	25 Conde	
Rotary (conver	ntional) 🔣 Air pe	rcussion		Other				provit Le	5
	-, <u>L''</u> loning	Water Use						Con	
Domestic	indust		Public Supply [Not used	Other	Hunth	ey			<.,.
Irrigation		ipal 🗌	Cooling & air conditioning		Audit No7	58710	Date Well C	ampleted	
Water Supply	Recharge	Final Status of We		doneđ, (Other)		UL10C	Date Deliven		11 (<u>8</u> MM (
Observation w	ell 🔲 Abandone	d, insufficient supply 🗍	Dewatering	, (UIBI)	package delivere			⁶⁶ 2006	,11 §
Test Hole		d, poor quality 🗌 ntractor/Technician	Replacement well			Ministr	y Use Only	·	
Name of Well Cor	ntractor		Well Contractor's	Licence No.	Data Source		Contractor		
Capital W Business Address	ater_Suppl	v Litd.	1558		Date Received	_ איזיי	Date of Inspi		MM C
		e Ontario K29 , first name)	S 1A6 Well Technician's	e 1 loence No	JAN 2				
	moleign (last name	. mst name)		a Licence No.	Remarks		Well Record	Number	
			T0097		1.0.1.0				
Name of Wall Tec Miller: Signature of Fach		<u> </u>	Date Submitted yy	∩7, MM DD D6 111110					

🔊 On			e Environi		-	03539 5391				Regulation 903		i		of
For use in	the D	rovince o	E Ontário	only This de	ocume	nt is a perma	anent legal d	ocument. Pl	l ease	retain for future	refer	ence.		
All Section		ei ha comi	slatad in fi	th biove of III	ielave i	in processin	n. Further ins	tructions and	I exc	anations are ava Coordinator at 4	ilabie (on ine pa	ckoft	his form.
All metre	meas	urements	shall be	reported to	1/10 th	of a metre.				Ministry Use				l
		arly in blue		nk only. tion of Wel	i Infor	mation	MUN	00	N		Π		LOT	
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tawa Car	leto	n	·	,			Goulbour City/Town/Villa	n		Site/Compa	25	/Block/Tr	Act etc	
t#/Street Num t 78, Ki S Reading	iber/Na TRE	ame Grant G	ardens			<u> </u>	Richm	ond				•		
S Reading		D Zone	Easting	63104	Northi	ng 152 112	Unit Make/Moo Garain	iel Mode	of C		fferentia rentiate	d, specity_	Avera	ged
	ourde	n and Be	drock Ma	terials (see			1	Canada	L D n	cription		,: L: Dep	th	Metres
neral Colour	Mos	t common r	naterial	. Ott	her Mat	enais		Genera	•			Errc	<u>ш</u>	<u> </u>
0¥11		Cley			• :•	overter Liter All of Cl						3.6	5	12.19
ay	مېر <u>د و</u> تور و	Clay Sand &		ng 1 3 n 1 1 1				·				12.1		12.80
87		<u>Sand &</u> Limesto	•									12.8	1	48,76
ay & What												48.7	16	67.96
						· · · ·								
		<u>.</u>						:		,		-		
Hole D					Const	ruction Rec			Ī	Tes mping test method		el Yield		ecovery
	tres To	Diameter Centimetres	Inside diam	Material	.	Wall	Depth	Metres	I I	mping test method baersible	Time	Waker Leve	Time	Water Level
	.02	22.75	centimetres		•,	centimetres	From	To		mp intake set at -	min Static	Metres	min	Metres
4.02 67		15.07	·	KiSteel DFlb	Vaciace	Casing	· · · · · ·	11 00	愄	etres) 60.95	Level 1	3_30	1	14.61
;			15,86			.48	+ .45	14.02		ration of oumping	2	4.30	2	12.09
Water ater found Metres		rd of Water		Galvanized					Ľŀ	hrs + mir				
	Fresh	Suiphur	1 1			·			Fi	pumping 18,13	3	5.71	3	10.09
Other: not	Salty	Minerals		Galvanized		·		· · · · · · · · · · · · · · · · · · ·		commended pump	4	6.87	4	8.63
m [_]	resh	Sulphur	.	Steel Fit	- 1	N 201 N.			110	commended pump	1 5 1	8.74	5	7.28
Other:		Minerals		Galvanized		· · · ·				epih. 30.47 netres	-	11.87	10	3.78
m [].]Gas [].	Fresh Saity	Sulphur	Outside	Steel E	brealass	Stot No.			- ra	e. (ft. 5 min)	15	13.95	15	2.51
Other: ter test of well	vield v	vater was	diam	Plastic Co	oncrete			• •	Ш.	towing give rate - (litres/mln)		15.09		2.45
Clear and se	dimenti	ree		Gelvanized	÷					pumping discontin-	30 40	16.93	30 40	8.30
Other, specif				Xi Coop hole	NOU	asing or Scr	· · · · · · · · · · · · · · · · · · ·	(7 0)			50	17.55	50	2.37
hiorinated 🖄		□ No		X Open hole			14.02	67.96				18.13	60	2.37
epth set at - Me		ing and Se		sluny, neat ceme	Annula Antsiumv	Volur	bandonment ne Placed (c metres)	In diagram belo	w sh	Location ow distances of well		ad, lot line	and b	uilding.
From T	<u>o</u> _			onite Sl				Indicate north t	y an	w distances of well	20			
19.102 U		LOALES.		/								Kino	5	
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	-+			<u> </u>				l at l					لمعنى	
				Construction				A I				T		
Cable Tool Rotary (conve	entional)	Kotary 🗹 Air pen		Dia Jet	amond ting		Digging Other	4				1 I	•	
Rotary (reven		Boring		Dri er Use	ving					1	·	<u>e</u> 1		Δ
Domestic		Industr	al	_ Pu	blic Sup	ply (Other	1	÷	1.04 -	78	6		$\mathbb{R}^{\mathbb{N}}$
] Stock] Inlgation		Commo	oal		it used	air conditioning		Audit No. Z	4	6982. [°]	ate Wei	Complete		MM DO
Water Supply	(T] Recharge w		utus of Well.	finished	Aban	doned, (Other)	Was the well	owne	ris information	ate Del	vered	206	16 Q KM DD
Observation) Abandoned	, insufficient : , poor quality	supply 🗍 De	watering			package delive	red?			·	206 -	6 113
····		Well Cor		chnician inf	ormati		Licance No	Data Source		Ministry U	se On ontract		منز	0
ame of Well Co apical V usiness Addres	ontracio ate i	Suppl	Ltd.		N	1558	- 2000 (UB 140.		,. <u> </u>		•	15		8
usiness Addres	s (stree	t name, num	ber, city etc.)	rio 175	146			Date Received	'1'	2005		nspection		MM DD
teme of Well To	ichnicla	n (last name,	first namé)	rio K2S		ell Technician's		Remarks		V	Vell Rei	cord Numb	er	
Iller:	chnioph	Contractor	N.		p	ate Submitted yr	MM DD					ļ		
	IN	an	11			2006	6 113			· Cette	form	la est die	nonibl	e en françal

\square		MinIstry of	Well Ta	g Number (Pie	ace sticker and prin	nt number bekwy)	1536	6≠6 Well R
Or Or	ntario	the Enviror	nment <u>A0</u> 4	1898			Regulation 903 Ontan	
Instructions	for Completi	ng Form		A 04	1898	•		page _
 For use in All Section Question 	n the Province ns must be co s regarding cor	of Ontario mpleted in f	full to avoid delays	s in processi be directed to	ng. Further in o the Water	nstructions and	ease retain for future refer d explanations are available o nent Coordinator at 416-23	on the back of t
 Please pl 	int clearly in bl	ue or black	ink only.		;		Ministry Use Only	
Well Owner'	s Information	and Loca	tion of Well Info	rmation	MÚN			· LOT
Ottawa (Carleton				Goulbour		24/25	4
RR#/Street Nur L~82 K	nber/Name Ings Grant	Garden			City/Town/Vil R1cha	lage lond Rd.	Site/Compartment/	Block/Tract etc
GPS Reading		ne Eastin		hing 05177 i	Unit Make/M	odel Mode	of Operation: Undifferentiat	
Log of Over			iterials (see inst		Garmin	l	Dinerenciated	
General Colour	Most commor	n material	Other Ma	iterials		Genera	I Description	Depth From
Brown	clay				pe	icked		0
grey	clay	•						3.65
grey	limesto		badly broke	en & laye	ered		· · · · · · · · · · · · · · · · · · ·	13.41
grey	limeston		·····				· · · · · · · · · · · · · · · · · · ·	14.62
rey & whi	e sandsto	one					· · · · · · · · · · · · · · · · · · ·	48.76
			· · · · ·		-			┼───┤
			<u> </u>			·····		++
	•	· ·					······	
	lameter		Cons	truction Rec	ord		Test of We	
	tres Diameter	Inside 1	Material	Wall thickness	Depth	Metres	TimeW	v Down Re /ater Level Time
		diam centimetres		centimetres	From	То	Submersible min	Metres min
	23 22.75	┨╞┈╾╼┷		Casing			Pump Intake set at - Static (metres) 45.71 Level 2	.07
15,23 75	<u>,58 15,39</u>	11 - 14	Steel Fibreglass				Pumping rate - 1 4 (litres/mln)54.6	.34 1
	Record		Plastic Concrete	.48	+.45	15.23		.92 2
Water found atMetres	Kind of Water		Steel Fibreglass					.24 3
73.49 [] Gas _ []	resh 🗌 Suiphur Salty 🗌 Minerais		Plastic Concrete				of sumpling metres	
	resh Suiphur		Steel Fibreglass				type.	
🗌 Gas 🗍 💭 🤅	Fresh 🛄 Sulphur Salty 🛄 Minerals	;	Plastic Concrete				Recommended pump 5 S deputit - 1 metres	7.45 5
Other:	resh 🗌 Sulphur	<u>ا ا</u>		Screen	!	<u> </u>		3.73 10
Gas	Salty 🗌 Minerals	Outside diam	Steel Fibregiass				rate, 4.3 • 3	7.78 15 20.32 20
After test of well	yieki, water was		Plastic Concrete		1	•	(litres/min) 25	23,12 25
Clear and set			Galvanized		<u> </u>	1	If pumping discontin- 30 2	25.40 30 4 29.92 40
Other, specify		1		Casing or Sci	reen	1	40	33.36 50
Chlorinated 🛃	res 🗌 No	15.39	Open holé		15.23	75.58		36.79 ₆₀
	Plugging and S				Abandonment me Placed		Location of Well	Second States and States
From T	,		luny, neat cement skim	(cub	lic metres)		v show distances of well from road	, iocan e , ano Du
	D Grout	ed Bent	onite Slurry	y;4:	3m3			
15,23							. ── ↓ !	
15,23						·		
15,23							radea Cres)	
15,23					¹			
			Construction					
15,23	Rotary	r (air)			Digging Other			
Cable Tool	Rotary ntional) 🖄 Air pe	r (air) rcussion I	Construction Diamond Jetting					<i>,</i> •
Cable Tool	Rotary ntional) 🖄 Air pe	r (air) rcussion) Wate	Construction Dlamond Jetting Driving r Use Public Supj	[Jumpion	
Cable Tool Rotary (conve Rotary (revers Domestic Stock	Rotary ntional) Air pe e) Boring Indust	r (air) rcussion Wate rial nercial	Construction Diamond Jotting Driving TUse Public Sup Not ased	[Other		Queenston	Completed
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Cable Tool Rotary (conve Rotary (revers Stock Inrigation	Ar per per per per per per per per per pe	r (air) rcussion) Wate rial parcial lpal F(na) Stat 4, insufficient si 1, poor quality	Construction Diamond Jotting Driving Public Sup Not use Cooling: 4 tus of Well Driving Unfinited upply Replacame	ply [air conditioning Abany] Olher	Audit No. Z	47006 Amer's Intropetion Date Deliver d? More No	2006 2006
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Cable Tool	Ar pe Borlog Ar pe Borlog Indust Comr Munic Recharge t Abandonas Well Co Ntractor Water Sup Street name, nun	r (air) rcussion val rial pal Final Stat real , insufficient si d, poor quality ntractor/Tec ply Ltd. ober, city etc.)	Construction Diamond Jetting Dividing Public Supp Not use Cooling 4: Unanistied Unanisti	I conditioning air conditioning Abany Aban	doned (Other)	Audit No. Z Was the well o package deliver Data Scurce Data Received	47006 Amer's information Ministry Use Only Contractor YYYY MM DD Date of Insg	2006 2006
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 For use 	in the Provinc	a of Ontario	only. This docun	nent is a perm	anent leg	al document. I	 Please retain for future refer		
- doesnot	is regarding co	mpleang m	is application can reported to 1/10	be directed to	y. Further the Water	metructions ar Well Manage	d explanations are available ment Coordinator at 416-2	on the back (35-6203,	of this form.
 Please p 	rint clearly in b	lue or black	Ink only.				Ministry Use Only		
Well Owner	"s informatio	n and Loca	ation of Well Inf	ormation	MUN		:ON		
RR#/Street Nu	wa CArleto		· · · ·	[Goul	hourn	24 Site/Compartment/	L Block (Frank	
Lo GPS Reading	t 85 King	s grant	Gardens Nor			chaond			
·	813 1	8 434	s 206 50 aterials (see ins	05158	garni		e of Operation: Undifferentiated		eraged
General Colour	Most commo		Other Ma			Gener	al Description	Depth From	Metres
Brown	clay		stones		I i			0	3.65
grey	clay	-	<u> </u>					3.65	11.88
grey grey & wh	limestor				· · ·	<u> </u>	· ···—	11.88	42.66
					-				
		.	· · · · · · · · · · · · · · · · · · ·						+
	······								
Hole C	Diameter	h	<u> </u>	truction Door			<u> </u>		<u> </u>
Depth M	etres Diameter	Inside		struction Reco	rc . Depth	Metres		Down	Recovery
	To Centimetre: .71 22.75	centimetres	Material	thickness centimetres	From	То	Submersible min	ater Level Tim Metres mir	e Water Level Metres
	<u>.71</u> 22.75			Casing		·	Pump intake set at - Static (metres) 45.71 Level	2.86 5.00 1	9,92
		15686	Steel Fibreglass	.48	+.45	13.71	(iltres/min) 54.0		
Water found at Metres	Record Kind of Water		Gelvanized Steel Fibreglass				2_hrs + min		7.90
73.75	Fresh 🛄 Sulphur Salty 🔲 Minerals		Plastic Concrete				Final water level and 3 in of pumping 13 47	.62 3	6.47
Other: NOT		∦ }+	Steel Fibreglass			<u> </u>	Recommended pump 4 8 type. Shallow Deep		5.55
Gas	Salty 🗍 Minerals		Plastic Concrete				Recommended oump 5 C depth. 30.47 metres	.29 5	4.86
	Fresh Sulphur Salty Minerals	Outside		Screen		· · · · ·	Recommended pump 10 1 rate. 45 557 15 1	1.40 10 2.24 15	3.61
0ther:	yield, water was	diam	Steel Fibregiass	Slot No.			If flowing give rate - 20	2.68 20	
Clear and se	diment free		Galvanized				If pumping discontine 30 1.	.02 30	3.45
Chlorinated K		15.23	Copen hole	Casing or Scre	13.71	75.58	50 13	.40 50	3.44
L	Plugging and S	J L		ar space D Ab	Inemnotion	15150	60 13	, 38 60	B.42
Depth set at - Me From T	tres Material and t	pe (bentonite s	luny, neat cement slum	Volume	Flaced (in diagram belo Indicate north b	w show distances of well from road		uilding.
13.71) Grout	ed Bento	nite Slurry	.84	a		, Ф	C.¥5	
							1. Lot 85	1	2
					•	1:05	n i lunu	<u>}</u>	19
l		Method of (Construction	·		605	× 10	; 1	Queenston
Cable Tool	Rotan ntional) 🕅 Air pe	(air)	Diamond		Dieging Other	60			řú.
Rotary (revers			Driving						lue
Domestic Stock	indust	alal	Public Sup		Other				<u>ح</u>
Irrigation	Munic	ipat		air conditioning		Audit No. Z	47076	2006	[™] 1 [∞]
Water Supply		rell	Unfinished		ned, (Other)		wner's Information Date Delive		ми DD 9- 6-
Test Hole	Abandone	poor quality	Replaceme	nt well			Ministry Use Only		
Name of Well Co	ntractor			/ell Contractor's Li 1558	cence No.	Data Source	Contractor	155	8
. Lan 111 T.S.	Water Sup	nber, city etc.)	rio K2S 1A6	1120	+	Date Rootyd	1 77 2000 Date of Insp	ection yyyy	MM DD
Business Addres] \++++~~	ALTS VILLE	TO VED THO		.1				
Business Addres Box 490	chnician (last name		[v	/ell Techniclan's L 70007	icence No.	Remarks	Well Recon	d Number	
Business Addres Box 490 Name of Well Te Miller	chnician (last name			Vell Technician's L TOO97 ate Submitted 2006	MM DD	Remarks	UVell Recon	d Number	

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ି (କୁ) (କୁ)	ntario	Ministry of		ell Tao Number (Plac	•	int number below)]		Record
	i i con i o	the Enviro		A 041	994	.	_ Regulation 903-Onta	rio Water Res	ources Act
	s for Complet		L	A041994		•			of
 All Section 	ons must be co	propleted in	full to avoid d	ielavs in processin	al Further i	instructions an	lease retain for future refe d explanations are available	on the back o	if this form
 Question 	is regarding co	mpletina thi	s application	can be directed to 1/10 th of a metre.	the Water	Well Manager	ment Coordinator at 416-2	35-6203.	
Please p	print clearly in b	ue or black	ink only.	into of a metre.	· · · · ·		Ministry Use Only		····
Well Owner	's Informatio	n and Loca	ation of Wel	Information	MUN	0	ON -	LOT	
		(đan 1 kao			1	
Ottawa C RR#/Street Nu	mber/Name			I	Goulbou		24 Site/Compartment	4 VBlock/Tract e	tc.
Lot 79 GPS Reading	Kinga gra NAD Z			Northing 1	R1c	<u>:hmond</u> ode Mode	of Operation: Undifferentia	ited X Ave	raced.
	813 1		9 287 aterials (see	Northing	garmin		Differentiate		
General Colour		.	·	er Materials	<u> </u>	Genera	I Description	Depth	Metres
brown	clay			<u>.</u>		pack		6 From	 3.65
grey	clay							3.65	10.66
grey	clay		sto	nes		1005	e	830666	13,71
grey	limeston	-				med		13.71	45.10
grey &wh	ite sandst	ene		· · ·	-	ha	rd	45.10	75.58
				. <u>.</u>		-			
	·····								
			<u>l</u>				· · · · · · · · · · · · · · · · · · ·		
	Diameter etres Diameter	╢┝╴╴╴╸		Construction Reco			Test of W Pumping test method Dra		Recovery
	To Centimetre:	diam	Material	Wall thickness	Depth	Metres	Time	Vater Level Time	e Water Leve
0 15	.23 22.75	centimetres	<i>,</i>	centimetres	From	То	Pump intake set at - Static	Metres min 4.65	Metres
15.23 7	5,58 15,23	∥ ⊢ −−−	Steel Fibre	Casing		T		6.02 1	4.77
		15.86	Plastic Con	·	+.45	15.23		6.29 2	4.77
Water found at Metres /	r Record Kind of Water	TI }	Galvanized	eglass			hrs + min		I
74.07	Fresh 🗌 Sulphur	1	Plastic Con	- 1			Final water level end 3 of pumping 6.19 metres	6.37 ₃	A.75
	Selty Mineral T_TESTED		Galvanized				Recommended nump	6.37 4	4,71
Gas D	Fresh 🛄 Sulphur Salty 🗍 Mineral		Plastic Con				type. Shallow (C)Deep Recommended pump 5	6.37 5	4.70
Other:	· · · · · · · · ·		Galvanized	Screen			depth. 30.47 metres		4.69
🗌 Gas 🔲 🗄	Fresh 🔲 Sulphur Salty 🔲 Mineral	Outside	Steet DFibr				(litres/min) 15	6.31 15	4.69
Other:	yield, water was	diam	Plastic Con	crete			In nowing give rate - 20		4.69 4.69
K Clear and se	diment free		Gelvanized				If oumping discontin- 30	6.15 30	4.69
Other, specif			50 On an hole	No Casing or Scre		1		6.17 50	4.68
Chlorinated 🔀	Yes No	15.25	NOpen hole		15.23	75,58	60	6.17 60	4.69
Depth set at - Me	Plugging and S		iluny, neat cemen		ndonment Placed metres)	In diagram below	Location of Wei w show distances of well from road		uilding.
From T	O	<u> </u>	tite Slur			Indicate north by		à	-
13.23		a Dencon	LLE DIGI	<u>y .0.080</u>					
		ļ							मृ
		Nethod of (Construction	İ			/ 1:03		À
Cable Tool	Rotar	y (air)	Diam		Dinging		X Kinos Generation	. 65	3
Rotary (conve Rotary (revers)			🔲 Jettin	• –	Oher	Lot 79	Gand		K
C Domestic	Indus		or Use Public	n Supply	Other		Goo		4
Stock	Comr	nerclat	🗍 Not u			A	l Date Weil	Completed	
trrigation	Munic	Final Sta	tus of Well				47072	2006	۳ ۱۳
Water Supply Observation w		well c, insufficient si	Unfin Upplý 🗌 Dewa		net, (Other)	Was the well ov package deliver	when's information Date Delive		1917
Test Hole	Abandone	d, poor quality		acement well			Ministry Use Only	,	
Name of Well Co	ontractor	<u>.</u>		Well Contractor's Li	cence No.	Data Source	Contractor		žQ
Business Address	. Water Sup is (street name, nur	rber, city etc.)		1558		Date Received.	7 2006 Date of Ins	pection YYYY	MH DO
Box 49	O Stittevi	11e Onta	ario K2S	1A6 Well Technician's L	cence No.	NUV 1 Normatks7 20		rd Number	
Miller	Stephen								
Signature of Ac	hnician Contractor			2006				·	
0506E (09/03)	/	Coni	tractor's Copy	Ministry's Copy [Well Ow	ner's Copy 🔲	Cette formule	est disponible	ə en français
u				. <u></u>	┥━┽				
		16			• •				

For us All Se	se in the F ctions mu	rovince o rovince o roting comp	f Ontario pleted in f	only. This docum	A 02 A025 nent is a perm s in processin be directed to	nanent legal on ng. Further ins	document. Ple	Regulation 903 of ease retain for future explanations are avail ent Coordinator at 4	reference. able on the back of	ources Act
Please	e print cle	arly in blue	or black	ink only.				Ministry Use		
ell Owr	ner's Info	rmation a	nd Loca	tion of Well Info	ormation	MUN	СО	N	LOT	
R#/Street 3 King PS Readi	8	ame L AD Zone 13 18	43	45 81 5	thing 00 49 63	Gou City/Town/Villa <u>Richr</u> Unit Make/Mo Garmin	nond	of Operation: 📋 Undiff	tment/Block/Tract ef ferentiated entilated, specify	
		and Be	drock Ma	aterials (see ins			Oreneral	Description	Depth	Metres
eneral Col	our Mo	st common r	material	Other M	aterials		General	Description	From	To
rown		Clay		Sto	nes				0	2.4
ray		Clay							2.43	7.3
ray		Lines	tone						7.31	48.7
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										1
	le Diamet			Con	struction Rec				Draw Down	Recovery
Depth From	Metres	Diameter Centimetres	Inside	Material	Wall	Depth	Metres		Time Water Level Tim	e Water Lev
			diam centimetres		centimetres	From	То ·	submersible Pump intake set at -	min Metres mir Static	n Metres
0	8.22	22.75			Casing			(metres) 30.47	Level 1.92	1 2 0
8,22	70.10	15.23	15.86	Steel Fibreglas	.40	+ .76	8.22	Pumping rate - (litres/min) 54.6	1 2,94 1	2.8
w	ater Reco	rd		Plastic Concrete	1			Duration of pumping	2 3.27 2	2.6
Vater found		of Water		Steel Fibreglas	5			Final water level end	3 3.42 3	2.5
69,49	Fresh	Sulphur Minerals	-	Plastic Concrete				of pumping 4 poles	<u> </u>	4.3
Gas Other:	Salty			Galvanized	18			Recommended pump type. Shallow Deep Recommended pump	4 3.49 4	2.4
m	Fresh	Sulphur Minerals		Plastic Concrete		-			5 3.54 5	2.4
Gas Other:	Saity			Galvanized				depth. 30.47 hetres	10 3 66 10	
Gas m		Sulphur Minerals	Outeide		Screen	1	[rate. 45-5min)	10 3.66 10 15 3.71 15	
Other:	Gaity		diam	Steel Fibreglas	ss Slot No.	_		If flowing give rate -	20 3.76 20 25 3.90 25	
	well yield, well sediment			Galvanized				(litres/min) If pumping discontin- ued, give reason.	30 3 83 30	
Other, s	100 - 10 - 10 - 10 - 10 - 10 - 10 - 10	1166		No	Casing or Sc	reen	Luciana a propried a series	· ued, give reason.	40 3.87 40	2.0
Chlorinated	- Nyas	No	15,23	Open hole		8.22	70.10		50 3.90 50 60 3.03 60	
Chioimatec			L		[Abandonment	70.20	Location	3499	2.0
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From	То				(00	bic metres)	Indicate north b	y arrow. Pe	erth St	1
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Stock	2	Comm		Cooling	: & air conditioning	,	Audit No. 🛶	26007	ate Well Completed	MM D
			Final St	atus of Well			2	20031	ate Delivered YYYY	181
Water S	upply [tion well [Recharge v	vell I, insufficient	supply Dewater	ing	ndoned, (Other)	was the well of package delive	WITH S INOTHADOT	2005	
Test H		Abandoned	, poor qualit	y 🗌 Replace	ment well			Ministry Us		
Name of W	ell Contract		ntractor/T	echnician Informa	Well Contractor	's Licence No.	Data Source	C	ontractor 15	58
Canit	al Wat	er Supp	ly Ltd).	1558		Date Received	MM DD D	ate of Inspection YYY	
	Box 40	0 Stit	tsv111	e,Ontario K2	S 146	n's Licence No.		New York Control of the second s	/ell Record Number	Ľ
		an (last name	firet name)		I Well Techniciar	IS LICENCE NO.	Remarks	l.v.		
Name of W		tephen //Contractor	mot name,		Date Submitted					

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1509220 316/4f. "A" UIM 1/18 413 4 61/ 10 F. GROUND WATER BRANCH 5 R 5004740N JANÍT Elev. 41 0300 The Ontorio Water Resources Commission Act, 1957 · . . . Basin 215 RECORD WATER WELL ichmono und. Village, Town or City County or District completed 20 Casing and Screen Record **Pumping Test** 411 N Inside diameter of casing Static level G.P.M. Total length of casing..... $\overline{\mathcal{N}}$ Pumping level 15 Type of screen 2 hrs. Length of screen..... Duration of test pumping Water clear or cloudy at end of test Clean Recommended pumping rate......G.P.M. with pumping level of..... Well Log Water Record Depth(s) at which water(s) Kind of water (fresh, salty, sulphur) To ft. No. of feet water rises From ft. Overburden and Bedrock Record found 2har 0 1 21 62 వా క 43 14 For what purpose(s) is the water to be used? Location of Well hous 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? EvelynDe ur Drilling Firm... Address Licence Number. 5 Name of Driller Tive . Address . Date DougLAS DR 20 50 Form 5 15M-58-4149 K (1.23

	The Ontario Water Reso	ources Commission Act	
	ATER WEL	L RECORD	•
Water management in Ontaria 1. PRINT ONLY IK S	PACES PROVIDED	1510286 10572011 601	
2. CHECK X CORRE	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT 25-27
OWNER (SURNAME FIRST) 28-47	Richmond		ETED 40-53
Star Luslity	Homes Stettore	LLO Unt DAY 21	_NO.07YR.69
	<u>3799 [3704700] [4</u>	<u>0300 57 25 1111</u>	
GENERAL COLOUR MOST	OF OVERBURDEN AND BEDRO	GENERAL DESCRIPTION	DEPTH - FEET
aney sand		LIO	D' 3'
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(31) aaa32ag 1 aan	zidasti I i laazzizinsti I i		
41 WATER RECORD	51 CASING & OPEN HOLE	RECORD Z SIZE(S) OF OPENING 21-33 DIAMETE	75 BO R 34-38 LENGTH 39-40
AT - FEET KIND OF WATER	UNSTORE WALL UNITED AND TRICKNESS FR	DEPTH - FEET	INCHES FEET
075 2 SALTY 4 MINERAL	05 ¹⁰⁻¹¹ 1 XSTEEL 12 2 GALVANIZED 3 3 CONCRETE	0 0019	FEET
1 [] FRESH 3 [] SULPHUR 2 [] SALVY 4 [] MINERAL 20-21 24	17-18 1 D STEEL 19	29 70 61 PLUGGING & SEAL	VDE (CÊMENT GROUT,
2 SULPHUR 2 SALTY 4 MINERAL		0079 10-13 14-17	LEAD PACKER, ETC.)
1 □ FRESH 3 □ SULPHUR * 2 □ SALTY 4 □ MINERAL 30-33 1 □ FRESH 3 □ SULPHUR ³⁴ 80	24-25 1 SYEEL 26 2 GALYANIZED	27-30 19-21 22-25	
2 SALTY 4 MINERAL	4 OPEN HOLE		
TH PUMPING TEST METHOD 10 PUMPING RATE	GPM. 01 15-16 00 17-18 HOURS 00 MINS.	IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM	
LEVEL PUMPING LLI 19-21 22-24 15 MINUTES	1 PUMPING 2 RECOVERY 30 NINUTES 45 MIKUTES 18 22-31	IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROI LOT LINE, INDICATE NORTH BY ARROW.	X
1 011 b20 1	T FEET FEET FEET		ズ
B IF FOOTING. GIVE RATE GIVE RATE A RECONMENDED PUMP INTARE I GPM. RECOMMENDED PUMP TYPE RECOMMENDED PUMP A C SHALLOW ADEEP STTING	FEET 1 CLEAR 2 CLOUDY	martinet	
RECOMMENDED PUMP TYPE RECOMMENDED DIMP CI SHALLOW DEEP SETTING	43-45 RECOMMENDED 45-49 PURPING FEET NATE DO 5 GPM.		ý
50-53	, 		
FINAL ³⁴ 1 WHATER SUPPLY 2 OBSERVATION WEL 3 TEST HOLE	5 ABANDONED, INSUFFICIENT SUPPLY 6 ABANDONED, POOR QUALITY 7 ABANDONED, POOR QUALITY		
OF WELL 4 RECHARGE WELL		l lat and	
	5 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OA AIR CONDITIONING	12 42 5	
	9 🗋 NOT USED		
METHOD 10 CABLE TOOL 2 ROTARY (CONVENT OF 3 ROTARY (REVERSE) 8 🗆 JETTING		
DRILLING 4 ROTARY (AIR) 5 AIR PERCUSSION		DRILLERS REMARKS:	
Lantal Water	upply 3216	DATA SOURCE SO CONTRACTOR SD-82 DATE RECEIVED	1069
4 14 ashlord	Vi attawa		hilling M
A NAME OF DRILLER OR BORE	LICENCE NUMBER	Э REMARKS: // //	//
SIGNATURE OF CONTRACTOR	LIBHISSION DATE		,
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UIM 1/1812 43463012 51R 500476018				15 GROUND WAT	Nº 9222
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Basin 215				. ^	
A A 4	ER W	ELL	RECORI	RECIURCES US	MIMISSION
County or District Curleton	*****		, Village, Town ec	St. Ric	hmond
	lloale	- HTT	pleted 15	Dec	59
		·ss .	Ottan	month	ye2r)
Casing and Screen Record			P	ping Test	
4 m		Statio			<u>.</u>
Total length of casing 27		Test-pu	evel 8 mping rate 3		С.Р.М.
Type of screen		Pumpin	g level	2	······
Length of screen		. Duratic	on of test pumping		15
Depth to top of screen.		1	clear or cloudy at e	·	
Diameter of finished hole	••••••••••••••••••••••••••••••••••••	í	nended pumping r		
	<u> </u>	with	pumping level of	<i>K</i> , 0	
Well Log		· · · · · · · · · · · · · · · · · · ·	Wat	er Record	
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, sulphur)
day & Hardpan	0	20			
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For what purpose(s) is the wajer to be used?			Locati	ion of Well	11-1
house		. .	n diagram below :	show distances o	of well from
Is well on upland, in valley, or on hillside?.			road and lot line.		
Drilling Firm				1	I .
Address Sen Espe	ks				68/
Address					
2,45					EvelynDB
Licence Number		· ``	2		<u> </u>
Name of Driller			5		
Address		•	5		
Date the Ster	0 L	·]	⊬L		ł
(Signature of Licensed Drilling Contractor	parte	2	Doug	LASDR	<u>.</u>
			2	o'	
Form 5 15M-58-4149		ļ	e/50 + ·	K #10.13	

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- clay		21	21	105	fresh
	 		Location	of Well	
For what purpose(s) is the water to be used? Num Mourt Is well on upland, in valley, or on hillside? Drilling or Boring Firm apital Aater Supply Address. 14 Ashford A Address. 14 Ashford A Licence Number. 3216 Name of Driller or Borer. 4 Mains Address. Date Med I & 1969 Malter Annual (Signature of Licensed Drilling or Effring Contractor) Form 7 OWRC COPY		In diagram road and $5-9-12$	n below show lot line. Inc	distances of well distances of well distances of well distances of well s c c c c c c c c c c c c c c c c c c c	arrow.
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County or District		Township Borough/City			Con block tract	survey, etc. Lot
		Address of Well Location		57,	Date comp	ieted day mof
21		Easting Northing		RC Elevation RC	Basin Code	
General colour	LOG C Most common material	OF OVERBURDEN AND BED Other materials	ROCK MATE		ons) description	Depth -
	most common material	THIS	DACH	HENT /	570	From
		THAT	THE	WELL	CASING	HAS
		BEEN	Ext	ENDED	ABOUE	THE
		GROUND	SUR	FACE.	1.81-7	70
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		WHICH N	MAY	OR MAY		= x151-1
	· · ·					
		OVERMI	u	EU PEN	77 39	1'
31			بالبيب			بليللبيب
						ameter 34-36 Length
Water found at - feet	Kind of water Inside diam Sulphur 14		Depth + 1 From	To UI Material	and type	inches Depth at top of s
2 C	Salty e Gas	2 Galvanized 3 Concrete		13-11 US		
2 0	Safty 6 Gas				PLUGGING & SEA	
20	Salty 6 Gas	2 Galvanized 2 Concrete 4 Open hole 5 Plastic		Depth set a From 10-13	t - feet To 14-17	ype (Cement grout, banto
20	3 Salty 6 □ Gas 24-2			27-30 (8-21	22-25	· · ·
1	C Fresh 4 □ Soliphur 34 60 C Minorals C Sally 6 □ Gas			25-29	30-33 60	
71 Pumping test n 1 C Pump 2	🗆 Bailer 🛛 GF	-14 Duration of pumping 15-15 16 M			CATION OF WELL	f = = =
	Vater levels during and of pumping 25 Water levels during 22-24 15 minutes 30 minutes 20-28 25	1 Description 2 Description 1 Pumping 2 Description 45 minutes 32-34 60 minutes 35-37		In diagram below show Indicate north by arrow	W distances of well W.	rrom road and 10t II
T flowing give r	feat teat i	leet feet leet				
High If flowing give r	арм ЗИ ч	Water at and of test 42 eet Clear Cloudy 3-45 Recommended 46-49				
Ct Shabw	Doon pump setting	jest GPM		1		
FINAL STATU			il			
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WATER USE	55-56	_		15 - 206- WE	u	
1 Domestic 2 D Stock	 Commercial Municipal Public supply Conting & all condition 	9 🗆 Not use 10 💭 Other				
3 🗋 Irrigation	▲ □ Cooling & air condition				6 n 1	
< 🗆 Industrial		[●] □ Driving ⁽⁰ □ Digging ⁽¹ G _k Other	,	* (sing st	
Industrial METHOD OF 1 Cable too 2 Rotary (or	onventional) 6 🖸 Boring		11			26110
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A C Industrial METHOD OF Cable too A Cable too Cable too C Rotary (co C Rotary (co	actor	NUL Contractor's Licence No.	Dala Source	e St Contractor		ate received MAY 1 4 200
Industrial METHOD OF 1 Cable too 2 Rotary (or Cable too 2 Rotary (or Construction of the second of the se	Arrentional) Control C	AYNG <u>6×7± MIUL</u> Well Contractor's Licence No.		e 6.9		

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Print only in space Mark correct box	es provided. with a checkmark, where applicat	big. <u>11</u>	153	2547	150031 <u>c</u> Sul lot	ÖNUUUP 30Pati
County or Dialrict	a Carloton	Township/Borough/City/	Town/Village		Con block tract surv	ey, etc. Lot *
		Address		 \ +	Date	21 120
01		Northing		Elevation RC		day month yo id iv
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General colour	Most common material	Other materials	OCK INATERIA		al description	From To
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					of opening 01-03 Diameter	1
Water found at - feet	Kind of water Inside diam	CASING & OPEN HOLE Wall Material thickness	Depth - feet		o.)	inches . le
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17.1518 15	Frish + Minemate	Concrete	0 22	\		
20-22 1	Saity Gas 17-14 Fresh 3 Sulphur 24 O 3 Sulphur 24	1 🗌 Steel 19 7 🔲 Galvanized		20-23 Depth set	PLUGGING & SEALIN Annular space at - feet	Abandonment
		: ☐ Concrete ⊶itr Open hole : ☐ Plastic	0 R		To Material and type (Coment grout, bentarite, et
	Sahy 6 Gas Freeh 3 Sulphur 24 60	1 □ Stee! ²⁵ 2 □ Galvanized 3 □ Concrete	2π)	22-25	<u>y given</u>
2	Salty 6 Gas	<-15 Open hole 5 □ Plastic	20 00	26-29	30-33 80	<u>`````````````````````````````````````</u>
71 Pumping test m				LC	CATION OF WELL	
		Pumping Perfectivery	in di India	agram below sha ate north by arro	bw distances of well from	road and lot line.
LI Towing give r	50 ²²⁻²⁴ 15 minutee 50 / / 28-28 1 / 28-28					
L feet		Water at end of test 42			3- P	1
hacoursenoad b	A second and an and a second as a second a					Benne
50-53						Benne
FINAL STATU	clv 5 🗆 Abandoned, insufficient	supply ⁹ 🗌 Uninished		un	K. Jkm	, \`
2 Observati 3 D Test hole 4 D Recharge	on well 6 Abandoned, poor quality 7 Abandoned (Other)	10 🗖 Replacement well		40	<u>K</u>	
WATER USE	55-58			Dor	siao	
H Domestic 2 □ Stock 3 □ Irrigation	 S Commercial S Municipal T Q Public supply 	s □ Not use 10 □ Other				
4 🗋 Industrial	Cooling & air conditionin	ka				
1 Cable too	CONSTRUCTION 57	* D Driving				
 2 G Rotazy (cc 3 G Rotazy (military (mil	verse) 7 🗋 Diamond	10 Digging 11 Digging 11 Digher				232862
			Data	sa 10 miliani	59 62 [Date /6	
A COC	L Drilliplat	d Wall Contractor's Licence No.		se Contractor	119 JA	
R#R#	2 Jasper, O	オ	Date of Insp	ection	Inspector	
Name of Well Tech	non Purcoll	Well Technician's Licence No.	Remarks			CSS.ES
Signature of Techni	cian/Contractor				`	
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90 T.M 118 43 43 47 50 <th>urces Commission</th> <th></th> <th>\mathcal{L} $\lfloor \frac{1}{3} \rfloor$</th> <th>510066 jp</th>	urces Commission		\mathcal{L} $\lfloor \frac{1}{3} \rfloor$	510066 jp
Con III Lot Z 4 HIN 1-3-19R	ress R.R. H	rown or City(8	Richm Apr ttsville	ond 1969 1 Ort
Casing and Screen Record Inside diameter of casing Total length of casing 3.5 Type of screen Length of screen Depth to top of screen Diameter of finished hole	Static level Test-pumping p Pumping level Duration of test Water clear or o Recommended	pumping	test 5 	G.P.M. G.P.M. w ground surface r Record
Well Log Overburden and Bedrock Record	From ft.	To ft. 32	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
limistore	32	54		
For what purpose(s) is the water to be used? Methodals Is well on upland, in valley, or on hillside? Drilling or Boring Firm Gutan Adar Address. /4 Ashford Licence Number. 32/6 Licence Number. 32/6 Name of Driller or Borer. Mawanagh Address. Date Mar & Marana (Signature of Licensed Drilling or Boring Contractor) Form 7	In diag road ar	Location ram below show nd lot line. Ind	distances of w	ell from arrow.
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For us	e in the P	et he com	f Ontario	only. This docume	ent is a perm	ng Further ins	tructions and	ease retain for future re explanations are availab	e on the back of	this form.
All me	tre meas	rding comp surements arly in blue	shall be	reported to 1/10t	e directed to of a metre			ent Coordinator at 416 Ministry Use On		
				Carall Info			CO	N I I I I I I I I I		
(o)(=1515T0)(IV		onteounty/		nicipanty)		Similarity.		1		
ttawa	Carlet	on				Goulb City/Town/Villa	ge	Site/Compartme	ent/Block/Tract et	22 c.
2 Cock S Reading		AD Zone				Richmo Unit Make/Mod		of Operation: Undiffere	ntiated Aven	aged
g of Ov	8 /erburde	3 18 n and Be	drock Ma	45:05 50 aterials (see inst	0 49 23 tructions)	Garmin				Metres
neral Colo		st common r		Other Ma				Description	Depth From	To
rown		Clay					Pack	ed	0	3.6
ray		_Clay Limest	one	Stone	Lavers		Mediu	10	8.53	29,86
ay										
		1. 1969) 1. 1969)		-	+			<u>~.</u>		
			x						· · ·	
Но	le Diamet	10 (A) (2 4)	Γ.	Con	struction Re	cord			Well Yield	
Depth	Metres	Diameter Centimetres	Inside	Material	Wall thickness	Depth	Metres	Tin	ne Water Level Time	e Water Lev
0	9.44	22.75	diam centimetres		centimetres	From	То	Pump intake set at - Sta	tic 2 00	Metres
	29.86	15.07	15.00	Steel Fibreglass	Casing	+ .60	9.44	(metres) 18_28 Lev Pumping rate -		3.2
			15.86	Plastic Concrete	•40	+ .00	2.44	(litres/min) 54.6	4.26 2	3.2
W ater found Metre	ater Reco	i of Water		Galvanized			-	hrs + min Final water level end		3.2
24 .38	Fresh	Sulphur Minerals		Plastic Concrete				of pumping 4matres		
Other:	not te			Steel Fibreglas	3			type. Shallow Deep		
Gas Other:	Salty	Minerals	-	Plastic Concrete				depth. 15.23 netres	5 4.42 5	
 m		Sulphur	Outside		Screen	1			0 4.44 10 5 4.47 15	
Gas Other:	Salty		diam	Steel Fibreglas		_		If flowing give rate - 2 (litres/min) 2	0 4.51 20 5 4.51 25	
Clear a	f well yield, nd sediment		-	Galvanized				If pumping discontin-	0 4.53 30 0 4.54 40	
Other, a			15 07	No Open hole	Casing or S	9.44	29,86		0 4.55 50	3.1
Chlorinated		No	L		lar space	Abandonment	[Location of		3.1
Depth set a	at - Metres	ging and Se Material and ty		slurry, neat cement slur	Vo	lume Placed ubic metres)	In diagram belo Indicate north b	w show distances of well from a arrow.	road, lot line, and	building.
From	то О	Grouted	- Ben	tomite Slurr	у .	22m3			-+	
							27		5	
								K OWHERS G	Cockburn	
			U. the dia	f Construction					- 3	
Cable T		Rotary	(air)	Diamond		Digging			3	
Rotary (conventiona reverse)	al) X Air per Boring	1	Jetting			-			
Domest	ic	Indust		ter Use	pply	Other		Perth Str	cet	
Stock		Comm	pal .		k air conditionin	g	Audit No. 7	26132 Date	Well Completed	9 2
Water S	Supply [Recharge v	vell	atus of Well	id 🗌 Aba	andoned, (Other)	Was the well	owner's information Date	Delivered YYYY	ММ
	ation well	Abandoned Abandoned	d, insufficient d, poor qualit	y Replacer	nent well		package delive	Ministry Use	2205 Only	9 2
	ell Contract		ntractor/T	echnician Informa	Weil Contracto	or's Licence No.	Data Source		ractor	58
		er Supplet name, nun	ber, city etc	.)	1558		Date Received	YYYY MM DD Date	of Inspection YYYY	/ MM
Box 4	90 St	ittsvill ian (last name	first name)	ario K2S 1A	Well Technicia	n's Licence No.	Remarks	Well	Record Number	
Mille	r: Ste	phen in/Contractor			10097	YYYY MM DD				
					20		L			

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UNTY OR DISTRICT		TOWNSHIP, BORDUGH,		3	CON., BLOCK, TRACT	SURVEY. ETC		22 23 74
Contoho				chmond		DATE COMP		
		iav	age Dr. St.	ittaville. (ntario	DA 03		<u> </u>
		Ő	4700 4	0302	4 26		┉	
		OG OF OVERBURD	EN AND BEDR	OCK MATERIAL	S (SEE INSTRUCTION	51		
ENERAL COLOUR	MOST COMMON NATERIAL	OTHER	MATERIALS		GENERAL DESCRIPT		DEPTH FROM	+ FECT
brown	sand	gravel & b	oulders	pac	ked		0	3
brown	clay			pac			3	10_
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FINAL STATUS OF WELL WATER USE METHOD OF DRILLING	** **	Image: Constraint of the second sec	CONDITIONING		Not June 1			
	LL CONTRACTOR ital Water Supp 49D Stittsvill ILLER OR BORGA Kavanagh pf fontractor CA CALLA	ly Ltd.	LICENCE NUMBER 1558 LICENCE NUMBER DATE MO. 8 YET		5 CONTRACTOR	Bare Pore Reference Mar L	4097	7 7 WI

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Ontario	S. FRINT ONLY IN	ATER			L R 15169			CON	, , , , ,	
COUNTY OF PISTRIC	ton	TOWNSHIP, BOROUG	CITY, TOWN, VILE	AGE.		CON	. BLOCK. TRACT. SURV	. V.T.	124	12 11 10T 21.1
OWNER COURNAME FIL	Contanation	ADORESS /-	<u>(mora</u>	h	7. h			DATE COMPLET	° o	<u>-)-) \</u> "" 7
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25-24 1 0 25-24 1 0 25-25 10 0 25-25	2 D BAILER WATER LEVEL THU D'AN PLURPING 22-46 33-46 34-46 FULT 02 5 FALT 04 5 FALT 7 FAL	сти 2/ сти 2		7-37 1201 42	15-16 39 20-23 27-30 1N DIAC LOT LIT	ГНОМ 10 18 28-	5LT A1 - FELT 70 -103 -21 -21 -22 -21 -22 -23	G & SEALIN MATERIAL AND TYP	E ICEMEN	T GROUT XER. ETC
FINAL STATUS OF WELL WATER USE	1 COMESTIC	7 DUNFINISHED 3 CONNERCIAL 4 NUNICIPAL 7 DUBLIC SUPPLY 8 COOLING OR AIR CO	OOR QUALITY				2005 1	Renth	 S#	
METHOD OF 5 DRILLING		BORIN DIANC	IG NAD NG		AILLEAS REMARKS		Carkber			
ADDRESS NAME OF OFFICE	F THE ENVIRONM		LICENCE NUMBER 3644 Om LICENCE NUMBER MO			1	INSPECTOR	280 Kin	р W	

	The Ontario Water Re	esources Commission Act
Water monogement in Ontarie 1. PRINT ONL		
COUNTY-OR DISTRICT	TOWNSHIP BOROUGH, CITY, TOWN, VILLA	3 5 LOCK, TAACT, SURVEY, ETC. LOT 23-27
OWNER (SURNAME FIRST) 28-4	ADDRESS CAMOR	DATE COMPLETED 48-53
		$\begin{array}{c c} \hline \begin{array}{c} \hline \begin{array}{c} \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \begin{array}{c} \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \begin{array}{c} \hline \end{array} \\ \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \\ \hline \end{array} \\ \\ \hline \end{array} \\ \hline \end{array} \\ \\ \hline \end{array} \\ \\ \hline \end{array} \\ \\ \hline \end{array} \\ \\ \end{array} \\ \hline \end{array} \\ \\ \end{array} \\ \\ \end{array} \\ \\ \end{array} \\ \hline \end{array} \\ \\ \\ \end{array} \\ \\ \end{array} \\ \\ \end{array} \\ \\ \end{array} \\ \\ \\ \end{array} \\ $
MOST	LOG OF OVERBURDEN AND BED	DROCK MATERIALS (SEE INSTRUCTIONS)
GENERAL COLOUR CONMON MATERIA	L OTHER MATERIALS	GENERAL DESCRIPTION DEFTH - FEET
apen class	boulders	hand 0 25
Olice limes	tone	hard 27 60
	perzestit laceltistili	
32 (41) WATER RECORD		
AT - FELT KIND OF WATER	51 CASING & OPEN HOI	DEPTH - FEET INCHES FEET
2 SALTY 4 MINERAL	19 05 1941 1 05 STEEL 12 / 88	
10-10 1 GRESH 3 G SULPHUR 2 SALTY 4 G MINERAL 20-23 1 G FRESH 3 G SULPHUR	24 3 ⁹⁴ 16 1 STEEL 19	30- 60 10 PLUGGING & SEALING RECORD
25-28 1 FRESH 3 SULPBUR	29 4 CONCRETE	0060 10-13 14-17
2 SALTY 4 I MINERAL 30-33 1 FRESH 3 SULPHUR 2 SALTY 4 MINERAL	34 aa 2 🗆 GALVANIZED 3 🗆 CONCRETE	27-30 28-29 26-29 30-33 60
71 PUNPING TEST METHOD 10 PUMPING	RATE 11-14 DURATION OF PUMPING	
11 PUNP 2 BAILER	O O GPN Q IS-16 O HOURS O MINSMATER LEVELS DURING I D PUMPING	IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE, INDICATE NORTH BY ARROW.
	26-28 29-31 32-34 35-33	× ×
	FEET FEET FEET FEET FEET FEET AT WATER AT END OF TEST 42	Porth It
RECOMMENDED PUMP TYPE RECOMME C SHALLOW DEEP SETTING		
50-53 GPM./FT. 5/	PECIFIC CAPACITY	₹
FINAL Z BERVATION STATUS 3 TEST HOLE	WELL 6 ABANDONED, POOR OUALITY 7 UNFINISHED	h mar.
	5 COMMERCIAL	13 - 3 - 52
USE 0	6 MUNICIPAL 7 PUBLIC SUPPLY 8 COOLING OR AIR CONDITIONING	X 18 X
OF 3C ROTARY (REVE DRILLING 5D AIR PERCLOSSIC	RSEI B JETTING	
BANE OF WELL CONTRACTON		DATLLERS REMARKS: DATA 58 CONTRACTOR 59-62 DATE RECEIVED 53-68 60
a antal hater	Supply Ja3216	
A NAME OF DRILLER OR SCHER		BREMARKS:
SIGNATURE OF CONTRACTOR		OFFICE
OWRC COPY		

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		The Ontario W		- —	ECORD	сон.	
	2. CHECK CORRECT I	TOWNSHIP, BOROUGH, CITY,	TOWN, VILLAGE		CON., BLOCK, TRACT, SURVE		22_23_24 LOT 25-27
	<u>/18 4345</u>	17 18	h m On 8.80 14	ELEVATION CALIBICISI	$\begin{array}{c} 4\\ \hline \\ RC \\ \hline \\ \frac{1}{24}\\ \hline \\ \frac{1}{30}\\ 31 \end{array}$		
GENERAL COLOUR	MOST	OF OVERBURDEN			GENERAL DESCRIPTION		- FEET
	COMMON MATERIAL		lders		l . 0	FROM	<u> </u>
rown	clay	<i>NP</i> Q	eaura_				
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-grey	line		·····		soft	43	56
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WATE FOUND HII MT - FEET HII MT - FEET 1 SAU 1 10-13 1 20-5 10-13 15-16 1 20-53 1 20-23 1 20-23 1 20-33 1 20-33 1 10 PUMP 12 20-33 1 11 PUMP 2 20-34 10 11 PUMP 2 12 SALTIC 13 PUMP 2 14 PUMP 2 15 TLOWING TEST METHOD 17 TLOWING 18 TRECONVERSORD PUMP TO 19 RECONVERSORD PUMP TO	S 21 RECORD 21 ND OF WATER Imineral SH 3 SULPHUR 14 I	1 32 31 CASING & OI 10 ASING & OI 11 STEEL 20 GALVANIZED 20 GALVANIZED 20 CONCRETE 40 OPEN HOLE 20 CALVANIZED 30 CONCRETE 40 OPEN HOLE 21 STEEL 20 CALVANIZED 30 CONCRETE 40 OPEN HOLE 21 STEEL 20 CALVANIZED 30 CONCRETE 40 OPEN HOLE 10 STEEL 20 CALVANIZED 30 MINUTES 30 MINUTES 30 NINUTES 30 MATER AT END O 90 FEET 43 RECOMMENDED 90 PUMPHO 60 FEET	WALL THICKNESS PROM INCHESS PROM INCHESS PROM INCHESS INCHESS INCHESS INCHESS INCHESS INCHESSION IN	TH - FEET 10 20-23 0052 27-30	Z (SLOT KC.) W HATERIAL AND TYPE U U 61 PLUGGING 0 CEPTU STLAT - FET	SEALING R SEALING R VERIAL AND TYPE (CCC CCC VERIAL AND TYPE (CCC CCC CCC CCC CCC CCC CCC CCC CCC CC	
FINAL STATUS OF WELL SS-S4 WATER USE		S ABANDONED, INSUFI G ABANDONED, POOR 7 UNFINISHED 5 COMMERCIAL 6 MUNICIPAL 7 FUELIC SUPPLY 8 COOLING OR AIR CONDI 9 NOT	QUALITY		- 71	6 63 6	XH2
METHOD OF DRILLING	1 CASLE TOOL 2 ROTARY (CONVENTION 3 ROTARY (REVERSE) 4 ROTARY (AIR) 5 AIR PERCUSSION	6 D BORING		DRILLERS REMAR			
ADDRESS	l Hater h ford S icres i Xava	Supply to			1 1503	DATE RECEIVED 28116	9 2

4.f. "A" Ų GROUPLY WATER BRAN 15092 7 UIM 1182 434350 P 61527N9.3 925 R 510 04 74 15 N Ontario Water Resources Commission Act 4 R 0 3 0 2 Elev. RECO R F Basin 215 County or District 215 Township, Village Town or City.... Con..... .Lot... Date completed..... lress... **Casing and Screen Record Pumping Test** Inside diameter of casing..... 5 10 Static level . X. Test-pumping rateG.P.M. 40 Type of screen Pumping level Length of screen Duration of test pumping. Depth to top of screen.... Water clear or cloudy at end of test... Diameter of finished hole Recommended pumping rate G.P.M. with pump setting of 3^{-5} ... feet below ground surface Well Log Water Record Depth(s) at Kind of water From ft. To ft. Overburden and Bedrock Record (fresh, salty, sulphur) which water(s) found Ô ٥ З Ч 4 For what purpose(s) is the water to be used?.... Location of Well NEW In diagram below show distances of well from 10 road and opt line. Indicate north by arrow. Is well on upland, in valley, or on hillside? Drilling or Boring Firm ... Ŝ DE Address.... 35⁰ 7 Licence Number 6 Name of Driller or Borer. Address ... Date (Signature of Licensed Drilling or Boring Contractor) Form 7 15M-60-4138 OWRC COPY

JTM [/18= 14 314 31 STO] 14: 15-101014750 CODED	1509	7401		P
Elev. 4 20 30 2 The Ontario Water Res	tent in Onterio 3			÷.
Cosin 22 WATER WE	LL REC	ORD		
$\bigcap \cap \mathcal{X}$	Township, Village, T		Rich	iand.
$\frac{1}{24}$	Date completed	22	7,00-	1968
	Idress Sti	ttsvil	le b	$\mathcal{L}^{\text{year})}$
Casing and Screen Record		Pumpin	a Test	
Inside diameter of casing	Static level			18 1000
Total length of casing 20	Test-pumping ra	· · · ·	, <i>'</i>	
Type of screen	Pumping level	101	р ^ь	
Length of screen	Duration of test p	umping	the	••••••
Depth to top of screen	Water clear or clo	udy at end of	test	• • • • • • • • • • • • • • • • • • • •
Diameter of finished hole	Recommended p			
	with pump settin	g of <u>3</u>	feet belo	ow ground surfac
Well Log				r Record
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur),
clay	0	17'	45	fresh
	/7		•	0
umesione	//	<u>-76</u>		
			· · · · · ·	·
				······································
For what purpose(s) is the water to be used?	l I	Location	of Well	<u> </u>
new louse			distances of we	
Is well on upland, in valley, or on hillside?	road and	lot line. Ind	licate north by	arrow.
Drilling or Boring Firm Capital Hater				
suppor stat.			8	•
Address / (ishford Da				
allaura 6			F	· - · · · · · · · · · · · · · · · · · ·
Licence Number 283				· OT
Name of Driller or Borer			1 15	ton
Address 1968				1,-,2
Iralty, Lavanagh			h	113 .
(Signature of Licensed Drilling or Boring Contractor)			ľ.	
Form 7				
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UIM 1/18 2 41314131410 F. 5 R 21014171610 N	Afaf. IV	rces Commi	ission Act, 1957	CROOKD WITER 15 May 25	
KIGHAI QND	ER WE	LL F	ECORD	Ri	chmonol
Come I of		"Date comp	Rich mu	n.cl	<u>1960</u> year) nt:
Casing and Screen Record Inside diameter of casing. H" Total length of casing. 30' Type of screen.		Test-pun Pumping Duration Water cl Recomm	Pum rel pping rate d of test pumping lear or cloudy at e ended pumping p pumping level of	5 15 2 kr end of test	C.Itan
Well Log Overburden and Bedrock Record	From ft.	To ft.	Wer Depth(s) at which water(s) found	No. of feet water trises	Kind of water (fresh, salty, sulphur)
Bive Clay Gray lime stone	0 30*	30'	60'		Fresh
For what purpose(s) is the water to be used house.			Loca In diagram below	tion of Well	of well from
Is well on upland, in valley, or on hillside Ualley Drilling Firm <u>FP</u> <u>Sparks</u> Address <u>Stittsuille</u> Licence Number Name of Driller <u>Claytors</u> <u>H</u> Address <u>Stittsuille</u> Date <u>Pec</u> <u>9</u> <u>1960</u> <u>F</u> <u>P</u> <u>Sparks</u> (Signature of Heensed Drilling Contract	Ont. Spart Cnt	is	road and lot line		

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UTM 1/18 4 3 4 3 30 CODED Weter manager 14 55 0 0 4 7 7 25 Weter manager The Ontario Water Res	ment in Onterio	15097 3 mission		н Н. А. а	B
Tev. 4 . 0303 WATER WE Basin 2151 Darleton County or District arleton	LL R Township, V	ECC illage, To	ORD	JAMS 1 Richm Dec	ond 1968
Con	dress 49 DTTAW	,	ONT.	DR, AP.	year) 18,
Casing and Screen Record			Pumping	Test	
Inside diameter of casing	1	nping rat ; level 1 of test p	te 10 18 umping	1.hr	
Depth to top of screen	1	-		A DESCRIPTION OF THE OWNER	
Diameter of finished hole				. feet below	G.P.M w ground surface
Well Log	··		·····		Record
Overburden and Bedrock Record		rom ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
clair	(0'	27'	581	fresh
<u></u>					_0
limestore			60		
					off. 5
			· · · · · · · · · · · · · · · · · · ·		
			ļ		
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			Location	of Well	
For what purpose(s) is the water to be used?	III	n diagrar oad and	n below show	distances of we icate north by	ll from arrow.
Drilling or Boring Firm Address. /4 Autoura 6 Licence Number Name of Driller or Borer. Address. Datef. Mattura Cignature of Licensed Drilling or Boring Contractor)	···	, , , , ,	Careburn St	54 1 x	lavel 1
Form 7 OWRC COPY			71	$C^{S^{N-1}}$	

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Ontario Ministry of the Environment		The	e Ontario Water H WATER WEL	
Print only in spaces provided. Mark correct box with a checkmark, where applica OTTAWA-CARLETC	ble. <u>11</u> N ', 1	532630	Municipality Con	
County or Disulct. Kichmand	Township/Borough/City/Town/Villa	uent P	Can block tract survey	- 0960
	9 Cock Bur	N st. Rich	mondotion	Stay Month Val
			Basin Code ii	
LOG O General colour Most common material	FOVERBURDEN AND BEDROCK MA		ions)	Depth - feet
BROWN CLAY		Thick		From To 0 15
GREY CLAY	· · · · · · · · · · · · · · · · · · ·	thic	κ	15 30
Grey Claye s	tones	Hart	s Pan	30 34
GREY Limest	one	MED	HAKD	34 51
	5% oF 64 C	sing		
	1 DKIVE 31	D	· · · · ·	
		1		
32 1	CASING & OPEN HOLE RECORD		r	1 1 1 1 1 73 10 34-35 Length 39-43
Water found Kind of water linside at - feet inches	Material Wall Dep Material thickness From	h-feet 22 (Slot No To 355 21 22 Material		nches feel Depth at top of screen 30
444 ¹² 1 □ Fresh 2 □ Sulphur 14 2 □ Salty 2 □ Gas	I Bisteel I Galvanized I Concrete		איז	het
15-18 1 □ Fresh 2 □ Sulphur 19 2 □ Salty 5 □ Gas 17/18	4 € Open hole 35 1 5 □ P(asto 19	5 7027 61		RECORD
23-23 1 □ Fresh 3 □ Sulphur 24 2 □ Salty 6 □ Gas	2 Gelvanized 3 Concrete 4 Open hole	Depth set a	at - feat	ment grout, bentonite, etc.)
25-28 1 □ Fresh 3 □ Sulphur 23 2 □ Salty 6 □ Gas 24-29	5 □ Plastic	27-30	25 Cemer	<i>t</i> GROWT
30-33 1 □ Fresh 3 □ Sulphur 34 60 2 □ Selty 6 □ Gas	3 □ Concrete 4 □ Open hole 5 □ Plastic	26-29	30-33 80	
71 Pumping test method 10 Pumping rate 30 GP			CATION OF WELL	N
Static level Water level 25 Water levels during	Pumping 2 - Recovery	Indicate porth by arro		ad and lot line.
20 15 minutes 20 10 10 10 10 10 10 10 10 10 10 10 10 10		040	Perth St.	1
If flowing give rate JE-41 Pump intake set at	Water at end of test	at of a		8
Recommended pump type Recommended pump setting	+45 Recommended 45-49 Pump rate // GPM			2015
FINAL STATUS OF WELL 4				(BURN
1 2 Observation well 3 2 Observation well 6 Abandoned, Insufficient 3 Test hole 7 Abandoned (Other)		• • •		Z
4 🗅 Recharge well 8 🖯 Dewatering	Pur	nped well For RS until Clea Here	2	-==+2
WATER USE 56-56 1 Domestic 5 Commercial 2 Stock 6 Municipal	10 Other 21	rs until clea	че ^ј [
3 🗍 Infgation 7 🗍 Public supply 4 🗌 Industrial 6 🖸 Cooling & air condition	ing We	ter. Hh sub.pum	· !	Terr
METHOD OF CONSTRUCTION 37	* D Driving	IN BUD. PUM	Τ'	
2 Rotary (conventional) 8 Boring 3 Rotary (reverse) 7 Diamond Rotary (alr) 8 Diamond	10 Digging 11 Dother			227634
Name of Weil Contractor	Well Contractor's Licence No.	ta se Contractor		wed 83-64 AQ
B. MOORE Well DRILL		ite of inspection	155 JAN	0 7 2002
Box 436 (5600) Name of Well Technician	E ON KON-240 H	marks		S ES2
Signature of Technician Chitractor	Weil Technician's Licence No. 7-0319 Subplating data Subplating data		03	0.202
2 - MINISTRY OF THE ENVIRON				0506 (07/00) Front Form

1509244 319/4 f. A UTIM 12 18 12 14 13 14 13 12 10 18. GROUND WATER BRAN 5 R 5101014171910 N MAY 25 1951 Elev. 4 R 0 3 0 2 The Onterio Water Resources Commission Act, 1957 ONTARIO WATER Basin |2|5|WATER WELL RECORD RESOURCES CLOSEDESION . Village County or District..... 61 ompleted 10 Date (da Rick ress **Pumping Test** Casing and Screen Record 8 41 Static level Inside diameter of casing..... Pumping level 14 Type of screen..... Duration of test pumping Length of screen..... Water clear or cloudy at end of test. Depth to top of screen 4 C.P.M. Recommended pumping rate Diameter of finished hole Water Record Well Log Depth(s) at which water(s) found Kind of water (fresh, salty, sulphur) No. of feet water rises From ft. To ít. Overburden and Bedrock Record 29 42 33 41 29 men Location of Well For what purpose(s) is the water to be used? In diagram below show distances of well from house road and lot line. Indicate north by arrow. Is well on upland, in valley, or on hillside?...... un Ban Drilling Firm..... Address PEGTHST 1960 200 Licence Number... Name of Driller. Address Date Form 5

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Cesing and Screen Record			vel		
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Overburden and Badrock Record	ft.	ft.	water(s) found	water rises	sulphur)
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Con. TV Lot 24			MAY	1968
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Casing and Screen Record			ng Test	<u> </u>
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For what purpose(s) is the water to be used?	.	Locatio diagram below sho	n of Well	ll from
DP	roa	d and lot line. I	ndicate north by	arrow.
Is well on upland, in valley, or on hillside?			- 1	
Drilling or Boring Firm		2		
C. SPARKS		~		/
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Licence Number		Peer # 51	11000	
Name of Driller or Borer.				
Address				
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(Signature of Licensed Wrilling or Boring Contractor)			I	
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Casing diameter(s) Length(s)	***************************************		Static level		
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Well ID Well ID Number: 1509108 Well Audit Number: Well Tag Number: This table contains information from the original well record and any subsequent updates

Well Location

Township	RICHMOND VILLAGE
Lot	
Concession	
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
	NAD83 Zone 18
UTM Coordinates	Easting: 434520.60
	Northing: 5005117.00

Municipal Plan and Sublot Number

Overburden and Bedrock Materials Interval

Genoral Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
GLUE	CLAY			0 ft	25 ft
BLUE	LMSN			25 ft	48 ft
Annular	Space/Aba	andonment Se	aling Record	ł	
Depth	Depth	Type of Sealant Used		Volume	
From	То	(Material and Type)		Placed	

Method of Construction & Well Use

Method of Construction	Well Use
Cable Tool	Domestic

Status of Well

Water Supply

Construction Record - Casing

Inside Diameter	Open Hole or material		Depth From	Depth To
4 inch	STEEL			26 R
4 inch Construc	open HOLE	Screen		48 ft
Outside Diameter	Material	Depth From		Depth To

Well Contractor Licence Number: 4824

After test of well yield, water was	CLEAR
If pumping discontinued, give reason	
Pump intake sot at	
Pumping Rate	5 GPM
Duration of Pumping	0 h;30 m
Final water level	8 A
If flowing give rate	
Recommended pump depth	
Recommended pump rate	
Well Production	PUMP
Disinfected?	

Water Details

Water Found at Depth	Kind
35 tt	Fresh

APPENDIX 3

- Report No PE1623-1 Phase I-II ESA
- Soil Laboratory Test Results
- Water Laboratory Test Results
- Homeowner Interview Logs
- Pumping Test Field Parameters

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Prepared For

Talos Custom Homes Limited

July 15, 2009

Report: PE1623-1

Paterson Group Inc.

Consulting Engineers 28 Concourse Gate - Unit 1 Ottawa (Nepean), Ontario Canada K2E 7T7

Tel: (613) 226-7381 Fax: (613) 226-6344 www.patersongroup.ca

patersongroup

Phase I-II Environmental Site Assessment

10 King Street Richmond (Ottawa), Ontario

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EXECUTIVE SUMMARY

<u>Assessment</u>

A Phase I-II - Environmental Site Assessment was carried out at 10 King Street, in the City of Richmond (Ottawa), Ontario. The purpose of this investigation was to research the past and current uses of the site and adjacent lands to identify any potential environmental concerns associated with the subject or adjacent properties.

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Based on the findings of the historical research and site inspection, concerns were identified regarding the past use of the neighbouring property to the north as a retail fuel outlet. Five (5) boreholes were placed on site to assess this potential concern.

Soil

Two (2) soil samples were analysed for the following parameters: petroleum hydrocarbons (PHCs F_1 to F_4) and benzene, ethylbenzene, toluene and xylenes (BTEX). The soil samples analysed were from boreholes placed adjacent to the former retail fuel outlet on the neighbouring property to the north. The analytical test results did not identify any of the parameters analysed in excess of the MOE Table 2 standards.

Groundwater

A groundwater sample was recovered from the groundwater monitoring well installed in BH5. The sample was submitted for analytical testing of volatile organic compounds (VOCs) and PHCs (F_1 to F_4). The groundwater analytical test results did not identify any detectable concentrations of the parameters analysed.

Based on our findings, it is our opinion that the subject site has not been significantly impacted by former retail fuel outlet on the neighbouring property to the north. No further investigation is recommended at this time.

Recommendations

Potable and Monitoring Water Wells

It is our understanding that the subject property will undergo future re-development. It is recommended that the one (1) drilled water well on the subject property be properly decommissioned by licenced well drillers if it is not going to be used as part of the future development. Similarly, the groundwater monitoring well installed in BH5 should be properly abandoned by a licensed well driller, if it is not going to be used in the future, or it should be registered with the MOE.

1.0 INTRODUCTION

At the request of Talos Custom Homes, Paterson conducted a Phase I-II -Environmental Site Assessment (ESA) for the vacant property located at 10 King Street in the Village of Richmond (Ottawa), Ontario.

This report has been prepared specifically and solely for the above noted project which is described herein. It contains all of our findings and results of the environmental conditions at this site.

2.0 SITE INFORMATION

Address: 10 King Street, Richmond (Ottawa), Ontario.

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Legal Description:

Location:

The subject property is located on the west side of King Street approximately 60 m south of Perth Street, in the Village of Richmond (Ottawa), Ontario. Refer to Figure 1 -Key Plan in Appendix 2 for the site location.

Registered Plan D-13 Unit 59 REF Plans; 4R5234, Parts

1 and 2 Less 4R11108; PTS 2, 4, Ottawa, Ontario.

Site Description:

Configuration: Total Site Area: Current Use: Services: Irregular 15, 927 m² (approximate) The subject site is currently vacant. The properties in the area of the site are serviced with private wells and municipal sewers at this time. patersongroup

3.0 SCOPE OF WORK

The scope of work for this Phase I-II - Environmental Site Assessment was as follows:

- □ Investigate the existing conditions present at the subject property by carrying out a field study and historical review in accordance with CSA Z768-01.
- □ Conduct a Phase II ESA, according to CSA Z769-00, to assess potential impacts from the presence of a former fuel dispensing facility on the neighbouring property to the north.
- Present the results of our findings in a comprehensive report.
- Provide a preliminary environmental site evaluation based on our findings.
- Provide preliminary remediation recommendations and further investigative work if contamination is encountered or suspected.

4.0 PHASE I - ENVIRONMENTAL SITE ASSESSMENT

4.1 <u>Historical Research</u>

The methodology for the Phase I - Environmental Site Assessment program was carried out in two segments. The first consisted of a historical review which included a brief research of the past use of the site. This portion of the program was carried out by personnel from our environmental division. The following is a list of the key information sources reviewed by this firm.

Federal Records

- Maps and photographs (Geological Survey of Canada surficial and subsurface mapping).
- Air photos at the Energy Mines and Resources Air Photo Library.
- National Archives.

Provincial Records

- MOE document titled "Waste Disposal Site Inventory in Ontario".
- Office of Technical Standards and Safety Authority, Fuels Safety Branch.

Municipal Records

- The Corporation of the City of Ottawa.
- Intera Technologies Limited Report "Mapping and Assessment of Former Industrial Sites, City of Ottawa".
- City of Ottawa document entitled "Old Landfill Management Strategy; Phase 1 -Identification of Sites, City of Ottawa, Ontario"; finalised October, 2004.

Local Information Sources

Previous engineering report.

4.2 Field Assessment

The second segment of the assessment consisted of a field investigation which included a walk-through inspection and detailed visual assessment of the environmental conditions of the subject property. The field investigation was carried out on July 7, 2009 by personnel from our Environmental Division.

As part of the field assessment, the site was inspected for signs of the following:

- Evidence of previous or existing fuel storage tanks.
- On-site use or storage of hazardous materials.
- On-site handling or disposal of liquid or solid waste materials.
- Aboveground piping systems, including pumps, valves, and joints.
- Truck or rail loading or unloading areas.
- Electrical conduits, abandoned pipelines or pumping stations.
- Remnants of old buildings.
- Signs of surficial contamination (ie: staining, distressed vegetation).
- Unnaturally discoloured, ponded, or flowing waters.
- Surficial drainage, wetlands, natural waterways, or watercourses through the property (ie: ditches, creeks, ponds, poor drainage).
- Any evidence of potable water supply wells or groundwater monitoring wells (such as leak detection monitoring wells for underground storage tank systems or abandoned systems).
- Any abnormal odours associated with the site, whether from on-site or off-site sources.
- The presence of any recent soil disturbances such as soil removal, filling, tilling, grading, etc.
- Asbestos containing materials (ACMs).
- Urea formaldehyde foam insulation (UFFI).
- Products containing Polychlorinated Biphenyls (PCBs).
- Ozone depleting substances (ODS).
- Lead-containing materials.
- Current use of neighbouring properties.

4.3 <u>Historical Review</u>

Air Photo Research

Historical air photos of the subject property were reviewed at the National Air Photo Library. Based on the review, the following observations have been made:

- 1950 The subject site and adjacent properties are agricultural fields. King Street to the east and Perth Street to the north have been developed. The Village of Richmond is present west of the subject site.
- 1963 The site remains vacant/agricultural land. A drainage ditch has been constructed on the property south of the site, leading to the Jock River further to the south. Two (2) properties have been or are being developed north of the subject site, on the south side of Perth Street. Residential development has continued in the area, specifically east of King Street.
- 1980 The property north of the subject site, in the southwest corner of the Perth Street and King Street intersection, is occupied by a retail fuel outlet. Another structure has been developed north of the site, west of the gas station. The subject property and the remainder of the adjacent lands remain primarily unchanged.
- 2001 The subject site and neighbouring properties are relatively unchanged from the previous photo.

Laser copies of the aerial photographs taken in the above years are included in Appendix 2 of this report.

National Archives

No city directories or fire insurance plans were available for the area of the subject or neighbouring properties.

Ontario Ministry of Environment (MOE)

The Ontario Ministry of Environment document entitled "Waste Disposal Site Inventory in Ontario, 1991" was reviewed as part of the historical research. This document includes all recorded active and closed waste disposal sites, industrial manufactured gas plants, and coal tar distillation plants in the Province of Ontario. Based on this document, there are no former or current waste disposal sites or above mentioned industrial sites in the vicinity of the subject property.

A search of the MOE brownfields environmental site registry was conducted electronically on July 14, 2009. No Record of Site Conditions (RSC) have been filed for any properties within 1 km of the subject site.

Technical Standards and Safety Authority (TSSA)

The TSSA, Fuels Safety Branch in Toronto, was contacted on November 20, 2008. There are no underground storage tanks recorded in the TSSA registry for the subject property and the subject property is not registered with the TSSA as a private fuel outlet. Properties immediately adjacent to the site are also not registered with the TSSA with one exception. The property to the north is registered with the TSSA as a private fuel outlet. According to their records, this property (6044 Perth Street) is a full serve gasoline station and currently has a total of four (4) single wall fibreglass underground gasoline storage tanks. The tanks were installed in 1979 and are 22,700 L capacity. The TSSA registry is not up to date regarding this property as the above noted tanks were removed from this property when the retail fuel outlet was decommissioned in 2000. There were no infractions or spills recorded in the TSSA registry with regards to this property.

City of Ottawa

The document prepared by Golder Associates entitled "Old Landfill Management Strategy, Phase 1- Identification of Sites, City of Ottawa, Ontario", was reviewed. The document identified no former landfill sites within the immediate vicinity of the subject site.

PCB Inventory

A search of national PCB waste storage sites was conducted. No PCB waste storage sites are located in the immediate vicinity of the subject property.

Previous Environmental Report

In 2002 Aqua Terre conducted soil and groundwater investigations on the former gas station located north of the subject site. The document entitled "Summary of Soil and Groundwater Investigations, 6044 Perth Street and Vicinity Richmond, Ontario (Former Petro-Canada Outlet No. 00654)", dated May 14, 2002 was provided to Paterson for review.

According to the document, the property located at 6044 Perth Street operated as a retail fuel outlet between 1955 and 2000. Between 2000 and 2002 a total of six (6) boreholes, four (4) of which were instrumented with monitoring wells were drilled. Two (2) of the holes were placed on the former retail fuel outlet site immediately north of the subject property line, two (2) boreholes, with wells, were placed on the subject site (MW-29 and MW-30). One (1) borehole was placed east of the site on the east side of King Street and one (1) was placed in the western portion of the gas station property, southwest of the fuelling equipment. See attached Test Hole Location Plan for approximate borehole locations.

Following a vapour screening program, one (1) soil sample from each borehole was submitted for analytical testing of BTEX and total petroleum hydrocarbons (TPH). The samples from the two (2) boreholes placed on the subject site were obtained from depths of 3.0 m below the measured groundwater table. None of the analysed parameters were detected above the laboratory method detection limit in the six (6) soil samples submitted.

Groundwater samples from the four (4) monitoring wells were obtained on two or three separate occasions. BTEX parameters were detected on two (2) of three (3) occasions in MW13 (located on the former gas station site, southwest of the former fuelling equipment) in concentrations below the MOE Table 2 potable water standards. TPH parameters were detected in MW 29, located on the subject site on one (1) of two (2) occasions. The detected concentration of 155 μ g/L was below the MOE standard of 1000 μ g/L. The report indicated that additional boreholes were being proposed, two of which were to be located along the property line between the former gas station and the subject site. However, we do not believe that these were ever drilled.

4.4 <u>Exterior Assessment</u>

The property is predominantly grass covered and is flat. Drainage on site consists of infiltration and ditches along the adjacent roadways. The topography of the area is relatively flat with a slight slope downward towards the Jock River located approximately 500 m southeast of the subject property. The subject site is approximately at grade with the neighbouring roadways and properties. No ponded water or signs of surficial staining were observed at the time of our site visit.

Potential Environmental Concerns

G Fuels and Chemical Storage

There were no above ground storage tanks or signs of underground storage tanks observed on the exterior of the subject property at the time of the investigation. There were no hazardous chemicals, spills, or stains observed at the time of the site inspection.

Waste Management

There is no waste currently generated on the subject property.

Polychlorinated Biphenyls (PCBs)

No concerns with respect to PCBs were noted on the exterior of the subject property at the time of the site inspection.

U Wastewater Discharges

There is no wastewater currently generated on site.

□ Fill Material

A pile of fill was observed on the southern side of the subject property at the time our inspection. This fill was likely placed on the property during the construction of the neighbouring residential lands to the south. No apparent concerns were noted with the fill material at the time of our field work. No fill was observed in any of the boreholes drilled as part of our field program.

Potable Groundwater Well

A drilled potable groundwater well was observed in the western portion of the subject site.

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4.5 Adjacent Properties

Land use adjacent to the subject property was as follows:

North -	Commercial and residential (former retail fuel outlet located at
	6044 Perth Street);
South -	Vacant and residential;
Foot	King Street followed by residential land:

East - King Street followed by residential land;

□ West - Cockburn Street followed by residential land.

The environmental impact of the current use of the adjacent properties to the south, east and west upon the subject site was considered to be low. The potential environmental impact from the adjacent property to the north (former retail fuel outlet) was considered to be moderate to high. Land use adjacent to the subject property is illustrated on Drawing PE1623-1 - Test Hole Location Plan in Appendix 2.

4.6 <u>Phase I - Environmental Assessment</u>

The purpose of this Phase I-ESA was to research the past use of the subject property and identify any potential environmental concerns associated with the subject site or adjacent properties.

Based on the former use of neighbouring property to the north (former retail fuel outlet), a Phase II - ESA was recommended for the subject property.

5.0 PHASE II - ENVIRONMENTAL SITE ASSESSMENT

5.1 <u>Subsurface Investigation</u>

Field Program

The subsurface investigation was conducted in July 3, 2009 and consisted of the placement of five (5) boreholes in the subject property. The test holes were placed along the northern portion of the property adjacent to the former retail fuel outlet. The test hole locations are illustrated on Drawing No. PE1623-1 - Test Hole Location Plan in Appendix 2. All boreholes were completed using a track mounted power auger drill rig.

The test holes were completed to depths ranging from 5.2 to 6.1 m below grade. A total of twenty-eight (28) soil samples were recovered by means of split spoon sampling, from the auger flight or grab sampling. Upon recovery, all samples were immediately sealed in appropriate containers to facilitate the preliminary screening procedure. The depths at which the auger and split-spoon samples were recovered from the test holes are shown as "AU" and "SS", respectively on the Soil Profile and Test Data sheets in Appendix 1.

All samples recovered as part of this investigation will be stored in the laboratory for a period of one (1) month after issuance of this report. All samples will then be discarded unless this firm is otherwise directed.

Monitoring Well Installation

A groundwater monitoring well was installed in BH5. Typical monitoring well construction details are described below:

- Slotted 50 mm diameter PVC screen at base of borehole.
- 50 mm diameter PVC riser pipe from the top of the screen to the ground surface.
- No.3 silica sand backfill within annular space around screen.
- 300 mm thick bentonite hole plug directly above PVC slotted screen.

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Clean backfill from top of bentonite plug to the ground surface.

Refer to the Soil Profile and Test Data sheets in Appendix 1 for the actual well construction in BH5.

Soil Sampling Protocol

Soil sampling protocols were followed using the MOE document titled "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario", dated May 1996.

The soil samples from the split spoon or augers were recovered using a stainless steel spoon, using a shovel or by hand, using protective gloves (changed after each sample). The samples were placed into plastic bags. If significant contamination was encountered, the samples were placed into glass jars. Sampling equipment was washed in soapy water after each split spoon to prevent cross contamination of the samples. Samples were stored in coolers to reduce analyte volatilization during transportation.

Groundwater Sampling Protocol

The groundwater sample was taken using a dedicated footvalve and polytubing. Prior to sampling, the well was purged of three (3) times the well volume, if adequate water was available. Samples were stored in bottles prepared by Paracel Laboratories.

Analytical Testing

Paracel Laboratories (Paracel), of Ottawa, performed the laboratory analysis of the soil and groundwater samples submitted for analytical testing. Paracel is a member of the Standards Council of Canada/Canadian Association for Environmental Analytical Laboratories (SCC/CAEAL). Paracel is accredited and certified by SCC/CAEAL for specific tests registered with the association.

5.2 <u>Subsurface Profile</u>

In general, the soil profile consisted of a layer of topsoil underlain by native silty clay. Specific details of the soil profile at each test hole location can be seen on the Soil Profile and Test Data sheets in Appendix 1.

5.3 <u>Groundwater</u>

The groundwater level was measured in BH5 on July 7, 2009. The water level was approximately 1.9 m below ground surface. It should be noted that groundwater levels fluctuate seasonally.

5.4 Soil Sample Headspace Analysis

A Gastechtor with methane elimination and calibrated to hexane was used to measure the combustible vapour concentrations in the headspace of the soil samples recovered from the test holes.

The technical protocol was obtained from Appendix C of the MOE document entitled "Interim Guidelines for the Remediation of Petroleum Contamination at Operating Retail and Private Fuel Outlets in Ontario", dated March 1992.

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples.

To measure soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. A Gastech Tanktechtor with methane elimination and calibrated to hexane were used for this purpose. The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement.

The combustible vapour readings (gastech readings) for all soil samples were found to be less than 10 ppm. These readings were not considered to be indicative of the presence significant levels of volatile substances (such as gasoline or diesel, to a lessor extent). It should be noted that the combustible vapour results can not be used to identify the presence of heavier petroleum hydrocarbons such as heavy oil. The results of the vapour survey are presented on the Soil Profile and Test Data sheets in Appendix 1.

5.5 Analytical Test Results

Remediation Criteria

The remediation criteria for the subject property were obtained from Table 2 of the document entitled "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", prepared by the Ontario Ministry of Environment (MOE), March, 2004. The MOE Cleanup Standards are based on the following considerations:

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- Coarse grained soil conditions.
- Surface soil and groundwater conditions.
- Potable groundwater situation.
- Residential land use.

Soil and Groundwater Analysis

Two (2) soil samples were submitted for petroleum hydrocarbons PHC (fractions 1 to 4), and benzene, ethylbenzene, toluene and xylene (BTEX) analysis. One (1) water sample was submitted for analytical testing of PHCs and volatile organic compounds (VOCs). The results of the analytical testing are presented in Tables 1, 2 and 3 along with the applicable remediation criteria. The laboratory reports are included in Appendix 1 of this report.

BTE			1 Results - Soil drocarbons (F	1 to F4)
Parameters	MDL	Soil San	nple (ug/g)	MOE Table 2 (Residential)
	(µg/g)	BH1 SS6	BH2 SS5	(ug/g)
Benzene	0.03	nd	nd	0.24
Ethylbenzene	0.05	nd	nd	0.28
Toluene	0.05	nd	nd	2.1
Xylenes (total)	0.1	nd	nd	25
PHCs - F1 (C ₆ - C ₁₀)	10	nd	nd .	180
PHCs - F2 (>C ₁₀ - C ₁₆)	10	nd	nd	250
PHCs - F3 (>C ₁₆ - C ₃₄)	10	127	nd	800
PHCs - F4 (>C ₃₄)	10	136	nd	5,600
Notes: MDL - Method nd - Not De nt - Not te	etected (i.e <		•	

The analytical test results did not identify any BTEX or petroleum hydrocarbon concentrations in the soil samples analysed with the following exceptions. Sample BH1-SS6 identified detectable concentrations of petroleum hydrocarbons (F3 and F4), which were below the MOE Table 2 standards.

Groundwater Analysis

A groundwater sample recovered from the monitoring well installed in BH5 and was submitted for volatile organic compounds (VOCs) and PHCs (F_1 to F_4) analysis. The results are presented in Tables 2 and 3. The laboratory report is included in Appendix 1 of this report.

	Ana	Table 2 alytical Test Results - G PHCs (Fractions 1 1	
Parameter	MDL	Groundwater Samples (ug/L)	Residential Land Use
	(ug/Ļ)	BH5 - MW1	MOE Table 2 (ug/L)
F1 PHCs (C ₆ -C ₁₀)	200	nd	1.000
F2 PHCs (C ₁₀ -C ₁₆)	100	ndʻ	1,000
F3 PHCs (C ₁₆ -C ₃₄)	100	nd	1.000
F4 PHCs (C ₃₄ -C ₅₀)	100	nd	1,000
		Detection Limit ted (< MDL)	

No detectable PHC concentrations were identified in the groundwater sample analysed.

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Parameters	MDL	Groundwater Samples (ug/L)	MOE Table 2 (Residential)	
	(µg/L)	BH5 - MW1	(ug/L)	
Benzene	0.5	nd	5.0	
Foluene	0.5	nd	24	
Ethylbenzene	0.5	nd	2.4	
Total Xylenes	0.5	nd		
Bromodichloromethane	0.4	nd	5.0	
Bromoform	0.5	nd	5.0	
Bromomethane	0.7	nd	3.7	
Carbon Tetrachloride	0.5	nd	5.0	
Chlorobenzene	0.4	nđ	30	
Chloroethane	1.0	nd	- nv	
Chloroform	0.5	nd	5.0	
Chloromethane	3.0	nd	nv	
Dibromochloromethane	0.5	r nd	5.0	
,2 - Dibromoethane	1.0	nd	nv	
,2 - Dichlorobenzene	0.4	nd	3.0	
1,3 - Dichlorobenzene	0.4	nd	630	
,4 - Dichlorobenzene	0.4	nd	1.0	
I,1-Dichloroethane	0.5	nd	70	
,2-Dichoroethane	0.5	nd	5.0	
1,1-Dichloroethylene	0.5	nd	0.66	
-1,2-Dichloroethylene	0.4	nd	70	
-1,2-Dichloroethylene	1.0	nd	100	
1,2-Dichloropropane	0.5	nd	5.0	
:-1,3-Dichloropropylene	0.4	nd	nv	
-1,3-Dichloropropylene	0.5	nd	nv	
Vethylene Chloride	4.0	, nd	50	
Styrene	0.4	nd	100	
1,1,1,2-tetrachloroethane	0.5	nd nd	5.0	
1,1,2,2-tetrachloroethane	0.6	" nd	1.0	
Tetrachioroethylene	0.5	nd	5.0	
1,1,1-Trichloroethane	0.4	nd	200	
1,1,2-Trichloroethane	0.6	nd	5.0	
richloroethylene	0.4	nd	50	
richlorofluoromethane	1.0	nđ	nv	
,3,5-Trimethylbenzene	0.5	nd	nv	
/inyl Chloride	0.4	nd	0.5	

No detectable VOC concentrations were identified in the groundwater sample analysed.

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5.6 Phase II - Environmental Assessment

A Phase II - ESA was recommended and conducted for the subject property in order to address potential concerns from the former use of the adjacent property to the north as a retail fuel outlet.

<u>Soil</u>

A total of twenty-eight (28) soil samples were recovered from the five (5) boreholes placed on the subject site. No visual or olfactory signs indicating the possible presence of petroleum hydrocarbons were noted in the recovered samples. Furthermore, the results of the combustible vapour survey did not indicate the potential for significant concern. Two (2) soil samples were submitted for analytical testing for PHCs (Fractions 1 to 4) and BTEX parameters.

The analytical test results did not identify any BTEX or petroleum hydrocarbon concentrations in the soil samples analysed with the following exceptions. Sample BH1-SS6 identified detectable concentrations of petroleum hydrocarbons (F3 and F4), which were below the MOE Table 2 standards. It should be noted that the petroleum hydrocarbon fractions identified in this sample (F3 and F4) are representative of a heavy oil (such as lubricating oil or grease), as opposed to gasoline.

<u>Water</u>

No detectable VOCs or PHC concentrations were identified in the groundwater sample analysed from BH5.

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6.0 ASSESSMENT AND RECOMMENDATIONS

6.1 <u>Assessment</u>

The purpose of the Phase I - ESA was to research the past use of the subject property and identify any potential environmental concerns associated with the subject or neighbouring sites with the potential to impact the subject lands.

No significant environmental concerns were identified with the current or former use of the subject property or the adjacent properties to the south, east and west. Based on our findings, a Phase II - ESA was recommended for the subject property to address potential concerns from the former retail fuel outlet located on the neighbouring property to the north.

Soil

Two (2) soil samples were analysed for the following parameters: petroleum hydrocarbons (PHCs F_1 to F_4) and benzene, ethylbenzene, toluene and xylenes (BTEX). The soil samples analysed were from two (2) of the boreholes placed adjacent to the former retail fuel outlet on the neighbouring property to the north. The analytical test results did not identify any of the parameters analysed in excess of the MOE Table 2 standards.

Groundwater

A groundwater sample was recovered from the groundwater monitoring well installed in BH5. The sample was submitted for analytical testing of volatile organic compounds (VOCs) and PHCs (F_1 to F_4). The groundwater analytical test results did not identify any detectable concentrations of the parameters analysed.

Based on our findings, it is our opinion that the subject site has not been significantly impacted by former retail fuel outlet on the neighbouring property to the north. No further investigation is recommended at this time.

6.2 <u>Recommendations</u>

It is our understanding that the subject property will undergo future re-development. It is recommended that the one (1) drilled water well on the subject property be properly decommissioned by licenced well drillers, if it is not going to be used as part of the future development. Similarly, the groundwater monitoring well installed in BH5 should be properly abandoned by a licensed well driller, if it is not going to be used in the future, or it should be registered with the MOE. Detersongroup

7.0 STATEMENT OF LIMITATIONS

This Phase I-II - Environmental Site Assessment (ESA) report has been prepared in general accordance with the agreed scope-of-work and the requirements of CSA Z768-01 and CSA Z769-00. The conclusions presented herein are based on information gathered from a limited historical review, field inspection, and testing program. The findings of the Phase I-II - ESA 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 others, such as local, provincial, and federal 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 Talos Custom Homes Ltd. Permission from Talos Custom Homes Ltd. and our firm will be required to release this report to any other party.

Paterson Group Inc.

Eric Leveque, B.A.

Mark S. D'Arcy, P. Eng.

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- Talos Custom Homes Ltd. (3 copies)
- Paterson Group Inc. (1 copy)



APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TEST RESULTS

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28 Concourse Gate, Unit 1, Ottawa, Of		-	' Engi	ineers	10) King Str	reet	ental Site	e Assessme	ent	
DATUM TBM - Top of grate located 93.71m.	l on s	outh si	ide of	subjec		•			FILE NO.	PE1623	3
REMARKS									HOLE NO.	BH 1	
BORINGS BY CME 45 Power Auger	1				ATE	3 Jul 09					r <u> </u>
SOIL DESCRIPTION	PLOT		SAN	г <u>. </u>		DEPTH (m)	ELEV. (m)		esist. Blow 0 mm Dia. (ng Wel uction
	STRATA	TYPE	NUMBER	* RECOVERY	N VALUE or ROD				er Explosive		Monitoring Well Construction
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		§ AU ∏	1				2	· · · · · · · · · · · · · · · · · · ·			
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Brown SILTY CLAY		ss]]	3	58	3	2-	-91.80				
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- grey by 3.7m depth		ss	6	100	1	4-	-89.80				¥
5.18		ss	7	100	1	5-	88.80				•
End of Borehole											
(Open hole GWL @ 3.7m depth)											
								1	200 300 ch 1314 Rd Gas Resp. △ M	g. (ppm)	

natoreonar		in	Con	sultin	g	SOIL	. PRO	FILE A	ND TEST DATA	\
patersongr 28 Concourse Gate, Unit 1, Ottawa, ON		-	Eng	ineers	10	King Str	eet	ental Site	e Assessment	
DATUM TBM - Top of grate located 93.71m.	l on so	outh si	de of	subje	ct site	. Geodeti	c elevatio	on =	FILE NO. PE1623	3
REMARKS BORINGS BY CME 45 Power Auger				Đ,	ATE 3	3 Jul 09			HOLE NO. BH 2	
	PLOT		SAN	IPLE		DEPTH	ELEV.		esist, Blows/0.3m	Well
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0.13		§ AU ∫ SS	1 2	75	3		-93.90			
Brown SILTY CLAY		ss	3	100	4	2-	-91.90			
		ss	5	100	2	3-	-90.90			¥
- grey by 3.7m depth		ss	6	100	1	4	-89.90			¥
End of Borehole	8	ss	7	100	1	5	88.90			
(Open hole GWL @ 3.7m depth)									200 300 400 € ch 1314 Rdg. (ppm) Gas Resp. △ Methane Elim	500

natoreonar		In	Con	sultin	a	SOIL	- PRO	FILE A	ND TEST DATA	۰ I
patersongr 28 Concourse Gate, Unit 1, Ottawa, ON		-	Eng	ineers	10	King Str	eet	ental Site	e Assessment	
DATUM TBM - Top of grate located 93.71m.	l on so	outh si	de of	subje	ct site	. Geodeti	c elevatio	on =	FILE NO. PE1623	}
REMARKS BORINGS BY CME 45 Power Auger				D,	ATE	3 Jul 09			HOLE NO. BH 3	
	PLOT		SAN	IPLE		DEPTH	ELEV.		esist. Blows/0.3m	Veli on
SOIL DESCRIPTION	1	63	ER.	ERY	Ëĝ	(m)	(m)	• 5	50 mm Dia. Cone	Monitoring Well Construction
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		∐ ∏ ss	3	83	4					
		SS	4	100	3	2-	-92.00			
Brown SILTY CLAY			4	100	5	3-	91.00			
- grey by 3.5m depth		ss	5	100	2					Ā
		ss	6	100	1	4	90.00	4		
		ss	7	100	1	5	-89.00	4		
6.1						6	-88.00			
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28 Concourse Gate, Unit 1, Ottawa, ON	K2E	7 7 7				King Sti tawa (Ri		, Ontario	1	
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					A 77 FT 4	3 Jul 09			HOLE NO. BH 4	
BORINGS BY CME 45 Power Auger		.						Den D	L	_
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	STRATA	TYPE	NUMBER	* RECOVERY	N VALUE of RQD			O Lowe	er Explosive Limit %	Aonitor
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		§ AU	1			1				
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Brown SILTY CLAY						2	31.00			
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28 Concourse Gate, Unit 1, Ottawa,	ON K2E	7T7				King Str tawa (Rie), Ontario)		
DATUM TBM - Top of grate loca 93:71m. REMARKS	ated on so	outh s	ide of	subje					FILE NO.	PE162	3
				n	ATE (3 Jul 09			HOLE NO.	BH 5	
BORINGS BY CME 45 Power Auger						5 501 05			Laint Diau		Т
SOIL DESCRIPTION	TOTT	·	SAN		Ë o	DEPTH (m)	ELEV. (m)		esist. Blow 60 mm Dia. C		
	STRATA	луры	NUMBER	* RECOVERY	N VALUE or RQD			1	er Explosive		
GROUND SURFACE			••	<u> </u>	4	0-	-93.80	20	40 60	80	
<u>,TOPSOIL 0</u>	0.10	:									
						1-	-92.80				
						2-	-91.80				•
Inferred SILTY CLAY						3-	90.80				
						4	-89.80				
						5	-88.80				
End of Borehole	<u>6.10</u>					6	- 87.80				• • • •
(GWL @ 1.90m-July 7/09)							-				
		1							200 300 ch 1314 Rdg Gas Resp. △ M	g. (ppm)	5

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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 sllt 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.

'N' Value	
<2	
2-4	
4-8	
8-15	
15-30	
>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

TW

SS	-	Split spoon sample (obtained in conjunction with the performing of the
		Standard Penetration Test (SPT))

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% LL	-	Natural moisture content or water content of sample, % Liquid limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
Pl	-	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
Cc	-	Concavity coefficient = $(D30)^2 / (D10 \times D60)$
Cu	-	Uniformity coefficient = $D60 / D10$

Cc and Cu are used to assess the grading of sands and gravels: Well-graded gravels have: 1 < Cc < 3 and Cu > 4Well-graded sands have: 1 < Cc < 3 and Cu > 6Sand 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

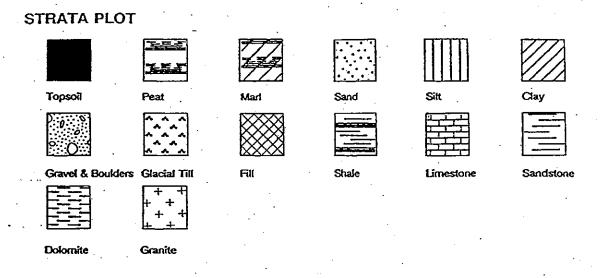
p' -	Present effective overburden pressure at sample depth
p'	Preconsolidation pressure of (maximum past pressure on) sample
Ccr -	Recompression index (in effect at pressures below p'_)
Cc -	Compression index (in effect at pressures above p'c)
OC Ratio	Overconsolidation ratio = p'_{0} / p'_{0}
Void Ratio	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)

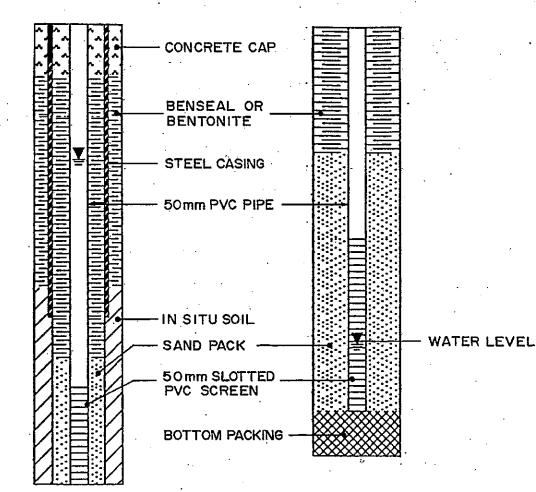


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Monitoring Well Construction

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Certificate of Analysis

Paterson Group Consulting Engineers

28 Concourse Gate, Unit 1 Nepean, ON K2E 7T7 Attn: Eric Leveque

Client PO: 8093 Project: PE1623 Custody: 62523 Phone: (613) 226-7381 Fax: (613) 226-6344

Report Date: 9-Jul-2009 Order Date: 3-Jul-2009

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

Paracel ID	Client ID	
0928003-01	BH1-SS6	•
0928003-02	BH2-SS5	

Approved By:

ant

Mark Foto, M.Sc. For Dale Robertson, BSc Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work



Client: Paterson Group Consulting Engineers Client PO: 8093 Project Description: PE1623

Analysis Summary Table

Analysis Method Reference/Description		Extraction Date A	nalysis Date
BTEX	EPA 8260 - P&T GC-MS	6-jul-09	8-Jul-09
CCME PHC F1	CWS Tier 1 - P&T GC-FID	6-Jul-09	8-Jul-09
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	7-Jul-09	7-Jul-09
Solids, %	Gravimetric, calculation	6-Jul-09	6-Jul-09

-

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SARN JA 123 Christena Sh. N. Saraia, ON N2T ST7

Page 2 of 7

Order # 0928003

Report Date: 09-Jul-2009 Order Date:3-Jul-2009



Client: Paterson Group Consulting Engineers

1. (Diden#10928008)

Report Date: 09-Jul-2009 Order Date:3-Jul-2009

Client PO: 8093					
	Client ID: Sampie Date: Sample ID:	BH1-SS6 03-Jul-09 0928003-01	BH2-SS5 03-Jul-09 0928003-02	-	-
Physical Characteristics	MDL/Units	Soil	Soil	•	*
% Solids	0.1 % by Wt.	70.6	70.0		-
Volatiles			<u>.</u>		
Benzene	0.03 ug/g dry	<0.03	<0.03	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	*
m,p-Xylenes	0.05 µg/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	102%	103%	-	
Hydrocarbons		•			
F1 PHCs (C6-C10)	10 ug/g dry	<10	<10	-	-
F2 PHCs (C10-C16)	10 ug/g dry	<10	<10	-	-
F3 PHCs (C16-C34)	10 ug/g dry	127	<10	-	-
F4 PHCs (C34-C50)	10 ug/g dry	136	<10	- ·	-

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Page 3 of 7



Client: Paterson Group Consulting Engineers Project Description: PE1623

Client PO: 8093

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	10	ug/g						
F2 PHCs (C10-C16)	ND	10	ug/g						
F3 PHCs (C16-C34)	ND	10	ug/g						
F4 PHCs (C34-C50)	ND	10	ug/g						
Volatiles			-						
Benzene	· ND	0.03	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	uğ/ğ						
o-Xylene	ND	0.05	uğ/ğ						
Surrogate: Toluene-d8	8.09		ug/g		101	76-118			

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Order# 0928003

Report Date: 09-Jul-2009 Order Date:3-Jul-2009

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Page 4 of 7



Client: Paterson Group Consulting Engineers Project Description: PE1623

Client PO: 8093

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	. ND	10	ug/g dry	ND				32	
F2 PHCs (C10-C16)	ND	10	ug/g dry	ND				50	
F3 PHCs (C16-C34)	. 28	10	ug/g dry	25			11.3	50	
F4 PHCs (C34-C50)	116	10	ug/g dry	97			18,2	50	
Physical Characteristics % Solids	95,4	0.1	0/ 5 18/4	00.0				25	
Volatiles	90.4	0.1	% by Wt.	96.0			0.6	25	
Benzene	ND	0.03	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				34	
Toluene	ND	0.05	ug/g dry	ND				32	
m,p-Xylenes	ND	0.05	ug/g dry	ND				35	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	10.5		ug/g dry	ND	106	76-118			

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N LAGARA FALLS 5416 Morning Glary Crt. Niagara Felis, CN L2J DAG

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Page 5 of 7

Order # 0928003

Report Date: 09-Jul-2009 Order Date:3-Jul-2009



Client: Paterson Group Consulting Engineers Project Description: PE1623

Client PO: 8093

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	94	10	ug/g	ND	94.2	80-120			
F2 PHCs (C10-C16)	80	10	ug/g	ND	100	61-129			
F3 PHCs (C16-C34)	180	10	ug/g	ND	90.0	61-129			
F4 PHCs (C34-C50)	132	10	ug/g	ND	110	61-129			
Volatiles									
Benzene	0.799	0.03	ug/g	ND	85.6	55-141			
Ethylbenzene	1.80	0.05	ug/g	ND	80.9	61-139			
Toluene	14.3	0.05	ug/g	ND	132	54-136			
m,p-Xylenes	6.14	0.05	ug/g	ND	91.2	61-139			
o-Xylene	2,42	0.05	ug/g	ND	89.6	60-142			
Surrogate: Toluene-d8	8.42		ug/g		105	7 6-11 8			

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Report Date: 09-Jul-2009 Order Date:3-Jul-2009

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Page 6 of 7



Sample Data Revisions

MDL: Method Detection Limit

CCME PHC additional information:

- F1 range corrected for BTEX.

%REC: Percent recovery. RPD: Relative percent difference.

None

None Other Report Notes: n/a: not applicable

Certificate of Analysis

Work Order Revisions/Comments:

Client: Paterson Group Consulting Engineers Client PO: 8093 Project Description: PE1623

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

Soil results are reported on a dry weight basis when the units are denoted with 'dry'. Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

- F2 to F3 ranges corrected for appropriate PAHs where available.

laboratory. All prescribed quality criteria identified in the method has been met.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

Onlein#0928008

Report Date: 09-Jul-2009 Order Date:3-Jul-2009

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Tel 226 3201 (H-2-	Que)te #				L	INot Qi	101011	Han A		tory:Ouidel			NC2180
Email: Blangue & putors prof. a	Pres	servatî	e to	be added by	Para	cel? [IY(s)	JNo						
Matrix Types: S-Soil/Sol GW-Ground Water SW-	I. Surfae	e Water	\$ <u>5-</u> \$	Storm/Sanitary	Sewe	r A·Ai	r Ö-Öthe	ar RDN	V-Regul	aled Dri	inking W	aler		
Sample Information									nalysis	Require	ed			
Paracel Order # 0978003	Matrix	Air Volume	# Containers	Date Sampled dd/mm/yy	「下第二次									Hazardous? (Y/N)
Sample Identification					918 8								ļ	5
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Please refer to the back page for Locations and Sample Preservation, Container and Hold Time Requirements.

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Certificate of Analysis

Paterson Group Consulting Engineers

28 Concourse Gate, Unit 1 Nepean, ON K2E 7T7 Attn: Eric Leveque

Client PO: 8088 Project: PE1623 Custody: 62549 Phone: (613) 226-7381 Fax: (613) 226-6344

Report Date: 8-Jul-2009 Order Date: 7-Jul-2009

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

Paracel IDClient ID0928057-01BH5-MW1

Approved By:

ank

Mark Foto, M.Sc. For Dale Robertson, BSc Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Page 1 of 8



Client: Paterson Group Consulting Engineers Client PO: 8088 Project Description: PE1623

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date Ar	nalysis Date
CCME PHC F1	CWS Tier 1 - P&T GC-FID	7-Jul-09	8-Jul-09
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	7-Jul-09	8-Jul-09
VOCs	EPA 624 - P&T GC-MS	7-Jui-09	8-Jul-09

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Page 2 of 8

Order # 0928057

Report Date: 08-Jul-2009 Order Date:7-Jul-2009



Client: Paterson Group Consulting Engineers Client PO: 8088 Proje

0 OTCET# 0923057

Report Date: 08-Jul-2009 Order Date:7-Jul-2009

	Client ID:	BH5-MW1	-	- · ·	
	Sample Date:	07/07/2009 09:00	-	-	-
	Sample ID:	0928057-01	-	-	-
Volatiles	MDL/Units	Water	-	-	-
Benzene	0.5 ug/L	<0.5			-
Bromodichloromethane	0.4 ug/L	<0.4			
	0.5 ug/L	<0.4			······································
Bromoform	0:7 ug/L		-		
Bromomethane	0.5 ug/L	<0.7	-		
Carbon Tetrachloride	0.4 ug/L	<0.5	· -	-	•
Chlorobenzene	1.0 ug/L	<0.4	-	-	
Chloroethane	0.5 ug/L	<1.0	-		-
Chloroform	-	<0.5	-	-	
Chloromethane	3.0 ug/L	<3.0		-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	
1,2-Dibromoethane	1.0 ug/L	<1.0	-	-	•
1,2-Dichlorobenzene	0.4 ug/L	<0.4	-		
1,3-Dichlorobenzene	0.4 ug/L	<0,4	-	- ·	-
1,4-Dichlorobenzene	0.4 ug/L	<0.4	-		
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5		-	-
cis-1,2-Dichloroethylene	0.4 ug/L	<0.4	-	-	-
trans-1,2-Dichloroethylene	1.0 ug/L.	<1.0	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.4 ug/L	<0.4	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	
Ethylbenzene	0.5 ug/L	<0.5		-	-
Methylene Chloride	4.0 ug/L	<4.0	-	-	-
Styrene	0.4 ug/L	<0.4	-		-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-		-
1,1,2,2-Tetrachloroethane	0.6 ug/L	<0.6	-		
Tetrachloroethylene	0.5 ug/L	<0.5	-	• .	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.4 ug/L	<0.4	_	<u> </u>	*
1,1,2-Trichloroethane	0.6 ug/L	<0.6	-	-	

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Page 3 of 8



Client: Paterson Group Consulting Engineers Client PO: 8088 Proje

0928057

Report Date: 08-Jul-2009 Order Date:7-Jul-2009

Client PO: 8088		Project Description:	PE1623		
	Client ID: Sample Date: Sample ID: MDL/Units	BH5-MW1 07/07/2009 09:00 0928057-01 Water		-	-
Trichloroethylene	0.4 ug/L	<0.4	-	_	
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	-	-	-
Vinyl chloride	0.4 ug/L	<0.4	_	-	-
m,p-Xylenes	0.5 ug/L	<0.5		-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	101%	-	-	-
Dibromofluoromethane	Surrogate	95.1%	-	-	· · · · ·
Toluene-d8	Surrogate	97.1%	-		-
Hydrocarbons	I	· · · · · · · · · · · · · · · · · · ·		·······	
F1 PHCs (C6-C10)	200 ug/L	<200	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	· -	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	. .	•	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

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N LAGARA FALLS 6416 Monsing Glory Dr. Niagara Polis, OK £2J 0A3

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Page 4 of 8



Client: Paterson Group Consulting Engineers

Client PO: 8088

ers Project Description: PE1623

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**OTCLEF# 0.92-201574

Report Date: 08-Jul-2009 Order Date:7-Jul-2009

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons				-					
F1 PHCs (C6-C10)	ND	200	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles	115	100	ugi L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.4	ug/L						
	ND	0.4							
Bromoform			ug/L						
Bromomethane	ND	0.7	ug/L						
Carbon Tetrachloride	ND	0.5	ug/L						
Chlorobenzene	ND	0.4	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
1,2-Dibromoethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.4	ug/L						
1,3-Dichlorobenzene	ND	. 0.4	. ug/L						
1,4-Dichlorobenzene	ND	0.4	ug/L		· ·				
1,1-Dichloroethane	ND	0.5	∽ ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.4	ug/L						
trans-1,2-Dichloroethylene	ND	1.0	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.4	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Methylene Chloride	ND	4.0	ug/L						
Styrene	ND	0.4	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.6	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.4	ug/L						
1,1,2-Trichloroethane	ND	0.6	ug/L						
Trichloroethylene	ND	0.4	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L					•	
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.4	ug/L						
o-Xylene	ND	0.5							
		0.5	ug/L		402	02 124			
Surrogate: 4-Bromofluorobenzene	81.7		ug/L		102	83-134			
Surrogate: Dibromofluoromethane	72.0		ug/L		90.1	78-124			
Surrogate: Toluene-d8	78.6		ug/L		98.2	76-118			

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Page 5 of 8



Client: Paterson Group Consulting Engineers Client PO: 8088 Proje

Project Description: PE1623

Method Quality Control: Duplicate

Hydrocarbons			Units	Result	%REC	Limit	RPD	Limit	Notes
F1 PHCs (C6-C10)	ND	200	ug/L	ND				32	
Volatiles									
Benzene	ND	0.5	ug/L	ND				20	
Bromodichloromethane	ND	0.4	uġ/L	ND				25	
Bromoform	ND	0.5	ug/L	ND				25	
Bromomethane	ND	0.7	ug/L	ND				25	
Carbon Tetrachloride	ND	0.5	ug/L	ND				25	
Chlorobenzene	ND	0.4	ug/L	ND				25	
Chloroethane	ND	1.0	ug/L	ND				25	
Chloroform	ND	0.5	ug/L	ND				19	
Chloromethane	ND	3.0	ug/L	ND				25	
Dibromochloromethane	ND	0.5	ug/L	ND				25	
1.2-Dibromoethane	ND	1.0	ug/L	ND				25	
1,2-Dichlorobenzene	ND	0.4	ug/L	ND				25	
1.3-Dichlorobenzene	ND	0.4	ug/L	ND				25	
1.4-Dichlorobenzene	ND	0,4	ug/L	ND				25	
1.1-Dichloroethane	ND	0.5	ug/L	ND				21	
1,2-Dichloroethane	ND	0.5	ug/L	ND				25	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				21	
cis-1,2-Dichloroethylene	ND	0.4	ug/L	ND				20	
irans-1,2-Dichloroethylene	ND	1.0	ug/L	ND				25	
1,2-Dichloropropane	ND	0.5	ug/L	ND				25	
cis-1,3-Dichloropropylene	ND	0.4	ug/L	ND				25	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				25	
Ethylbenzene	ND	0.5	ug/L	ND				35	
Methylene Chloride	ND .	4.0	ug/L	ND				25	
Styrene	ND	0.4	ug/L	ND				25	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				25	
1,1,2,2-Tetrachloroethane	ND	0.6	ug/L	ND				25	
Tetrachloroethylene	ND	0.5	ug/L	ND				31	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.4	ug/L	ND				25	
1,1,2-Trichloroethane	ND	0.6	ug/L	ND				25	
Trichloroethylene	ND	0.4	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	uģ/L	ND				25	
1.3.5-Trimethylbenzene	ND	0.5	ug/L	ND				20	
Vinyl chloride	ND	0.4	ug/L	ND				25	
m.p-Xylenes	ND	0.5	ug/L	ND				34	
o-Xylene	ND	0.5	ug/L	ND				32	
Surrogate: 4-Bromofluorobenzene	82.1	<i></i>	ug/L	ND	103	83-134			
Surrogate: Dibromofluoromethane	77.2		ug/L	ND	96.5	78-124			
Surrogate: Toluene-d8	78.4		ug/L	ND	98.0	76-124			

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0.6076209260576

Report Date: 08-Jul-2009 Order Date:7-Jul-2009



Client: Paterson Group Consulting Engineers
Project Description: PE1623

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
				i veanir					
Hydrocarbons									
F1 PHCs (C6-C10)	1540	200	ug/L	ND	77.1	68-117			
F2 PHCs (C10-C16)	1200	100	uğ/L	ND	75.0	61-129			
F3 PHCs (C16-C34)	2860	100	ug/L	ND	71.4	61-129			
F4 PHCs (C34-C50)	2020	100	ug/L	ND	84.4	61-129			
Volatiles			•						
Benzene	30.3	0.5	ug/L	ND	75.7	55-141			
Bromodichloromethane	30.3	0.4	ug/L	ND	75.7	52-139			
Bromoform	38.9	0.5	ug/L	ND	97.2	52-170			
Bromomethane	70.6	0.7	ug/L	ND	177	32-138			QS-02
Carbon Tetrachloride	21.9	0.5	ug/L	ND	54.8	49-149			~~ • •
Chlorobenzene	37.1	0.4	ug/L	ND	92.7	64-137			
Chloroethane	25.5	1.0	ug/L	ND	63,7	39-152			
Chloroform	30.2	0.5	ug/L	ND	75.6	58-138			
Chloromethane	27.8	3.0	ug/L	ND	69.6	24-163			
Dibromochloromethane	38.4	0.5	∴ug/L	ND	96.0	61-153			
1,2-Dibromoethane	38.5	1.0	ug/L	ND	96.2	61-145			
1,2-Dichlorobenzene	38.4	0.4	ug/L	ND	96.0	60-150			
1,3-Dichlorobenzene	38.0	0.4	ug/L	ND	95.0	62-149			
I.4-Dichlorobenzene	38.5	0.4	ug/L	ND	96.4	63-132			
1,1-Dichloroethane	27.8	0.5	ug/L	ND	69.6	51-156			
I,2-Dichloroethane	34.1	0.5	ug/L	ND	85,4	50-140			
I,1-Dichloroethylene	31.6	0.5	ug/L	ND	78.9	43-153			
sis-1,2-Dichloroethylene	30,4	0.5	ug/L ug/L	ND	76.0	43-155 58-145			
rans-1,2-Dichloroethylene	29,4	1.0	ug/L	ND	73.5	51-145			
I,2-Dichloropropane	30.2	0.5		ND	75.6	56-136			
sis-1,3-Dichloropropylene	37.5	0.3	ug/L ug/L	ND	93.7	54-141			
rans-1,3-Dichloropropylene	43.2	0.4		ND	108	61-140			
	45.2 36.8	0.5	ug/L						
Ethylbenzene Methylene Chloride	36.0	0.5 4.0	ug/L	ND ND	92.1 90.2	61-139 58-149			
Styrene	39.2	4.0 0.4	ug/L	ND	90.2 98.0	63-149 63-143			
1,1,1,2-Tetrachloroethane	39.2 36.0	0.4	ug/L ug/L	ND ND	98.0 90.0	63-143 61-148			
i,1,2,2-Tetrachloroethane	47.7	0.5		ND	90.0 119	50-157			
Tetrachloroethylene		0.6	ug/L						
Toluene	40.4 36.6	0.5	ug/L	ND	101	51-145			
1,1,1-Trichloroethane	30.0	0.5 0.4	ug/L	ND	91.6 75 1	54-136 55-140			
1,1,2-Trichloroethane	31.5	0.4 0.6	ug/L	ND	75.1 78.7				
Trichloroethylene	31.5 27.0	0.6	ug/L	ND	78.7 67.6	63-144 52 125			
Trichlorofluoromethane	27.0	0.4 1.0	ug/L	ND	83.6	52-135 37-155			
	33.4 32.5		ug/L	ND					
1,3,5-Trimethylbenzene	32.5 30.0	0.5	ug/L	ND	81.2	61-151			
Vinyl chloride		0.4	ug/L	ND	75.0	31-159			
m,p-Xylenes	74.4	0.5	ug/L	ND	93.0	61-139			•
o-Xylene	37.1	0.5	ug/L	ND	92.7	60-142			
Surrogate: 4-Bromofluorobenzene	79.4		ug/L		99.3	83-134			
Surrogate: Dibromofluoromethane	74.9		ug/L		93.6	78-124			
Surrogate: Toluene-d8	79.8		ug/L		99.7	76-118			

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SARNIA 123 Christina St. N. Silvais, ON NYT 517

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076107629.09280577

Report Date: 08-Jul-2009 Order Date:7-Jul-2009



Client: Paterson Group Consulting Engineers

Client PO: 8088 Project Description: PE1623

Sample and QC Qualifiers Notes

1- QS-02 : Spike level outside of control limits. Analysis batch accepted based on other QC included in the batch.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.

- F1 range corrected for BTEX.

- F2 to F3 ranges corrected for appropriate PAHs where available.

- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.

- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Page 8 of 8

Conden#20928057#

Report Date: 08-Jul-2009 Order Date:7-Jul-2009

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Conta Addro Tel:	pany Name: <u>PATERSON GROUP</u> not Name: <u>ERIG LEUGIUE</u> 255: <u>23 CONCOURSE GALE O HAUM</u> 2 26-73 81 Cell: 1: <u>Elegore E leurque (à posleuongragura</u>	PO#	1 <u>5</u> ste #	<u> 308</u>				□Not Quoted □Yes EKo	Ten Am	quired: und time: Regularary/		j šedaş	N B	`
	Matrix Types: S-Soil/Sed GW-Ground Water SV	W-Surfac	e Water	SS-	Storm/Sanitary	Sew	r A-	Air O-Other RD	W-Regulat	ed Drinkin	g Water			
	Sample Information								Analysis R	equired				
	Order #	Matrix	Air Volume	# Cuntainers	Date Sampled dd/mm/yy	PHCCR-AN	VOCS							Hazardons? (Y/N)
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Please refer to the back page for Locations and Sample Preservation, Container and Hold Time Requirements.

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WHITE - Lab Copy, PINK - Client Copy

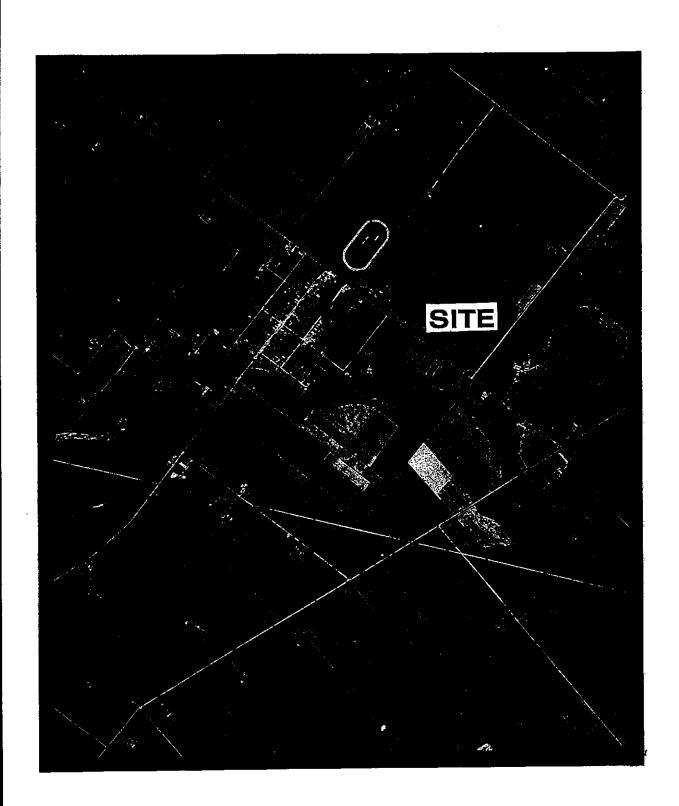
APPENDIX 2

AERIAL PHOTOGRAPHS

FIGURE 1 - KEY PLAN

DRAWING NO. PE1623-1 - TEST HOLE LOCATION PLAN

.



AERIAL PHOTOGRAPH 1950

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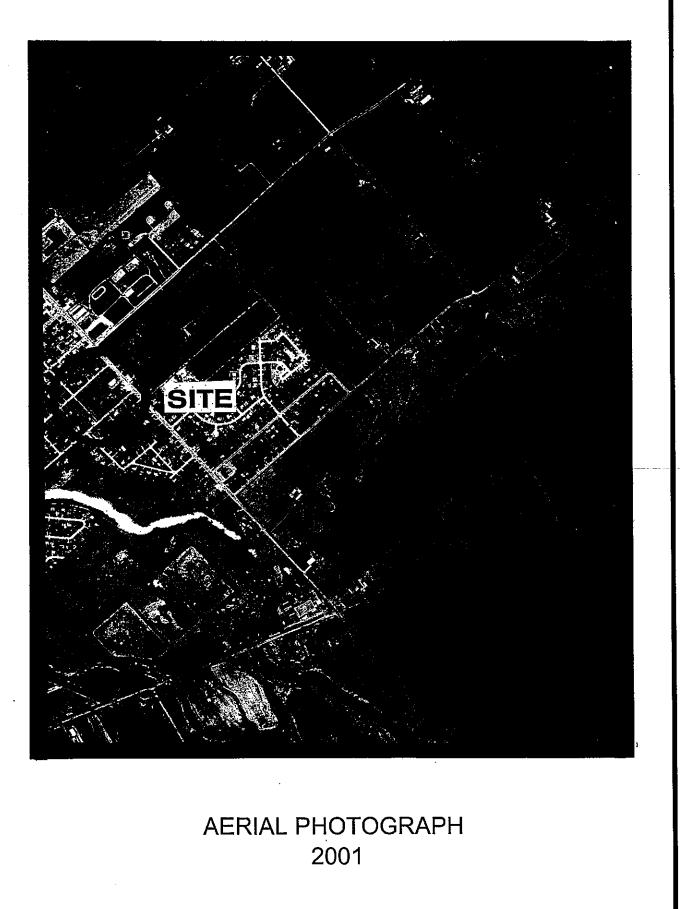
AERIAL PHOTOGRAPH 1963

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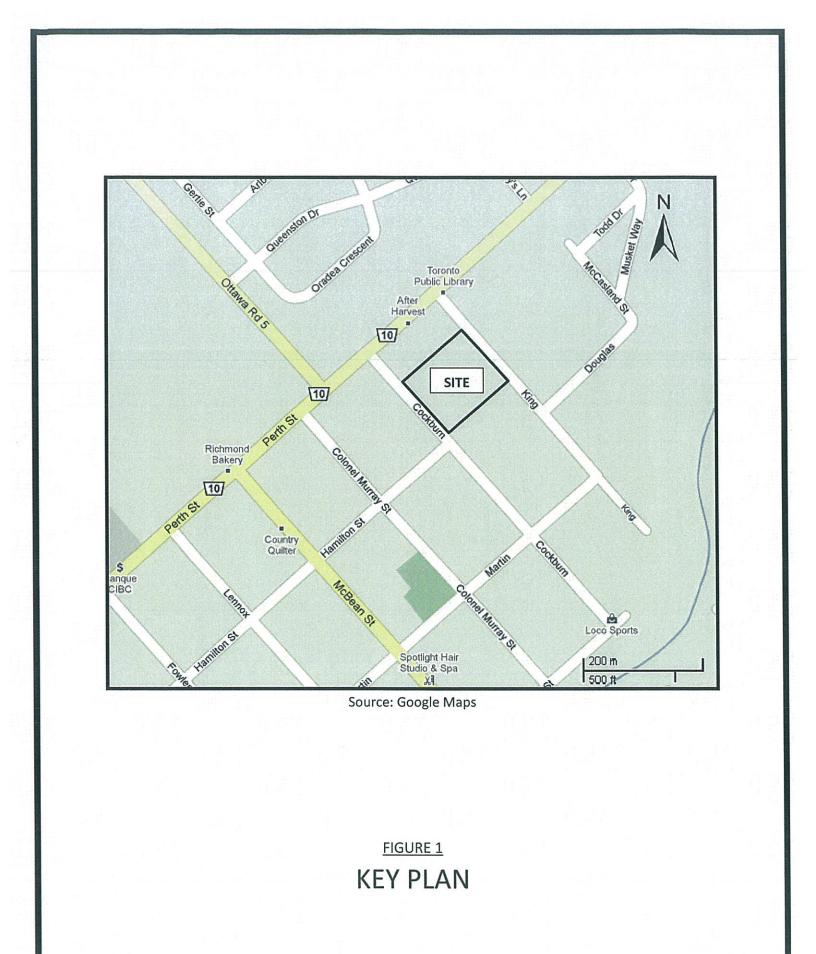


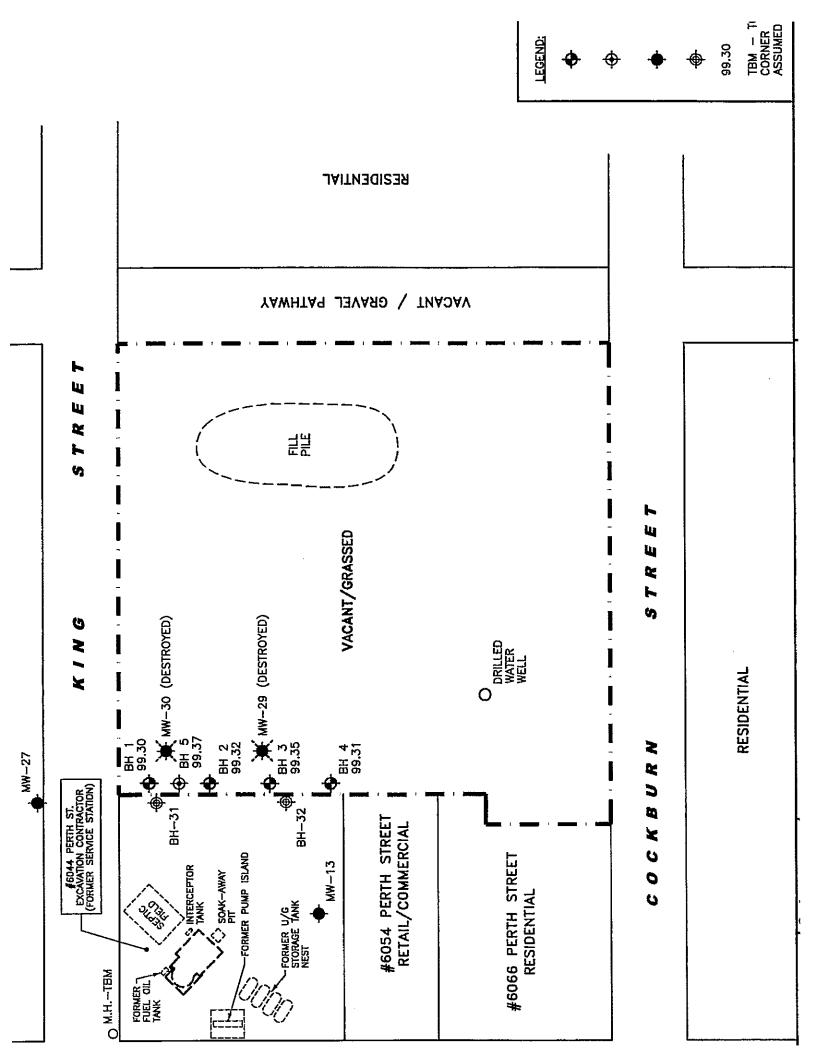
AERIAL PHOTOGRAPH 1980

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WATER LABORATORY TEST RESULTS

Client: Paterson Group 28 Concourse Gate, Unit 1		Repor	Report Number: Date:	Accutest H.T. 1000779 2010-01-18 2010-01-18	
Nepean, UN K2E 7T7 Attention: Mr. Robert Passmore		Project:	ject:	PH1292	
INVOICE: Paterson Group Inc. Chain of Custody Number: 105597		P.O. Nu Matrix:	P.O. Number: Matrix:	8794 Water	
	LAB ID: 771127 Sample Date: 2010-01-13 Sample ID: TW1-WS1			GUIDELINE	ша
Tolal Coliforms Escherichia Coli Heterotrophic Plate Count Faecal Streptococcus Faecal Streptococcus	UNITS MRL 0 CFU/100mL 0 CFU/100mL 0 CFU/100mL 0 CFU/100mL 0 CFU/100mL 0		MAC		UNITS CFU/100mL CFU/100mL
MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration Comment:	DG = Operational Guideline MAC = Maximum All	lowable Concentration IMAC = Interim Maximum Allo	lowabis Concentratio		
8-148 Colonnade Road, Ottawa, ON, K2E 7Y1	f of 1	Results 1	APPROVAL Dragana Dzeletovic Microbiology Analyst Results relate only to the parameters tested on the samples submitted	DVAL Dragana Dzeletovic Microbiology Analyst neters tested on the samples subm	zeletovic / Analyst imples submitted.

EXOVA ACCUTEST		REPO	REPORT OF ANALYSIS	L YSIS				Шĕ	EXOVO Accutest	臺
Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON							Report Number: Date: Date Submitted:		1000787 2010-01-22 2010-01-14	
KZE 717 Attantion: Mr. Robert Passmore							Project:		PH 1292	
INVOICE: Paterson Group Inc. Chain of Custody Nember: 105597							P.O. Number: Matrix:		8794 Water	
		LAB ID:	771142	_					GUIDELINE	
	Sam Sam	Sample Date: Sample ID:	2010-01-13 TW1-WS1						ODWSOG	
PARAMETER	UNITS	MRL		_				TYPE	TIMIT	UNITS
Alkalinity as CaCO3	mg/L	5	258	-				00	500	mg/L
Chloride	шg/L	۲	50					AO	250	mg/L
Colour	TCU	2	8					AO	£	TCU
Conductivity	uS/cm	ο Έ	202					MAC	4 F	
rruonue Hvdraden Sulbhide	ma/L	3 2	-0- 					AO AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	0.07							•
N-NO2 (Nitrite)		0.1	<0.10					MAC	1.0	т <u>а</u> л
N-NO3 (Nitrate)	mg/L	1.0	01.0> 7.97					MAC	6.5-8.5	mg/L
Phenois	mg/L	0.001	<0.001							
Suiphate	mg/L	~	46					, AO	500	mg/L
	mg/L	<u> </u>	<0.1					¢	END.	ų e in
I otal Dissolved Solids (CUNU - CALC) Taiat Kiakiahi Mironan	mg/L mo/i	۰ آ	400 40.10					R	000	(III)/L
Total Nervani Mirogen Trirbidity		0	52.3					MAC	1.0	NTU
Hardness as CaCO3	mg/L	***	292					ဗ္ဂ	100	mg/L
lon Balance		0.01	0.94							
Calcium	mg/L	* ,	74							
Magnesium	mg/L		97							
Potassium	mg/L	- 0	о к				•	V	200	mail
Sublum Iron	ma/L	0.03	0.99					A A	0.3	mg/L
Manganese	ц mg/L	0.01	0.02			•		AO	0.05	-V6m
								-		
									-	
MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective	OG = Operati	onal Guidelin	OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration	able Concent	ation IMAC=1	nterim Maximi	im Allowable Co	ncentration		
Comment:										
H2S MRL elevated due to sample turbidity.									\langle	

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APPROVAL:

1 of 1

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

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

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REPORT OF ANALYSIS



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Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON K2F 777							Report Number: Date: Date Submitted:		1000780 2010-01-18 2010-01-14	
Attention: Mr. Robert Passmore							Project:		PH1292	
INVOICE: Paterson Group Inc. Chain of Custody Number: 105597							P.O. Number: Matrix:		8794 Water	
		LAB ID:	771128						GUIDELINE	
	Sam	Sample Date:	2010-01-13							
	Sa	Sample ID:	TW1-WS2	-					ODWSOG	
PARAMETER	UNITS	MRL		-				TYPE	TIMIT	LINITS
	CFU/100ml		0							
	CFU/100mL		00					MAC	> c	
ate Count	CFU/1mL		- 00		_			2	>	
	CFU/100mL		0							
SCUS	CFU/100mL		0							
		•								
	-									
									-	
MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration	OG = Operatio	nal Guideline	e MAC = Maximu	im Alfowable Co	incentration IMAC	= Interim Maxim	num Allowable Con	centration		
Comment:										

APPROVAL Dragana Dzeletovic Microbiology Analyst Results relate only to the parameters tested on the samples submitted.

1 of 1

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

EXOVA ACCUTEST	



Clert: Paterson Group 28 Concourse Gale, Unit 1 28 Concourse Gale, Unit 1 28 Concourse Gale, Unit 1 Atention: Mr. Robert Passmore NVOICE: Paterson Group Inc. Chain of Custooly Number: 105597 Atention: Mr. Robert Passmore Chain of Custooly Number: 105597 Chain of Custooly Number: 105597 Number 105 Chain of Custooly Number: 105597 Chain of Custooly Number: 105597 Chain of Custooly Number: 105597 Number 1055 Chain of Custooly Number: 105597 Number 1055 Number 10557 Number 10	Report Number:		
28 Concourse Gale, Unit 1 Xie Erry I Xie Erry I Xie Erry I Xie Erry I Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample ID: I Custody Number: 105597 LaBID: Sample Date: Sample Date: Sample ID: I Supplies MRL 0:	•	1000789	
KZE TTT : Mr. Robert Passmore : Paterson Group Inc. Custody Number: 105597 LaBD: Sample Date: Sample Date:	Date: Date Submitted:	2010-01-26 2010-01-14	
: Mr. Robert Passmore : Paterson Group Inc. Custody Number: 105597 . Custody Number: 105597			
Paterson Group Inc. LaB ID: Custody Number: 105S97 LaB ID: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Suphic mg/L Nity mg/L Suphide mg/L Itrite) mg	Project:	PH 1292	
LAB ID: LAB ID: Sample Date: Mail Mit Mail Mail Molicitie Mail	P.O. Number: Matrix:	8794 Water	
Sample Date: Suphride mg/L 011 mg/L 1 TCU 2 UNITS MRL 1 TCU 2 UNITS UNACTION TO UNITS MRL 1 TCU 2 UNITS UNACTION TO UNACTION TO UNACTION TO UNAC		GUIDELINE	
Rampe LD: as CaCO3 PARAMETER UNITS MRL as CaCO3 mg/L 5 as CaCO3 mg/L 6 fily US/cm 5 mg/L 0.1 itritie) mg/L c 0.1 as CaCO3 mg/L mg/L 0.1 </th <th></th> <th></th> <th></th>			
PARAMETER UNITS MRL as CaCO3 mg/L 1 fty mg/L 1 fty u/NiTS mg/L 1 fty u/S/cm 5 mg/L 1 fty u/S/cm 5 mg/L 1 ify u/S/cm 5 mg/L 0.1 mmonia) mg/L mg/L 0.1 0.1 itrite) mg/L 0.1 mg/L 0.1 itrate) mg/L 0.1 mg/L 0.1 fitrate) mg/L 0.1 mg/L 0.1 itrate) mg/L 0.1 mg/L 0.1 itrate) mg/L 0.1 mg/L 0.1 itrate) mg/L mg/L 0.1 0.1 <tr< td=""><td></td><td>ODWSOG</td><td></td></tr<>		ODWSOG	
as CaCO3 mg/L 5 mg/L 5 mg/L 5 mg/L 0.5 mg/L 0.5 mg/L 0.5 mg/L 0.1 mg/L 1 mg/L 1 mg/L 0.1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 0.0 mg/L 1 mg/L 2 mg/L 1 mg/L 1 mg/L 2 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 2 mg/L 1 mg/L 1 mg/L 2 mg/L 1 mg/L 1 mg/L 2 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 2 mg/L 2 mg/L 2 mg/L 2 mg/L 2 mg/L 2 mg/L 1 mg/L 2 mg/L 2		TYPE LIMIT	UNITS
Afty mg/L 1 Afty US/cm 5 I Organic Carbon mg/L 0.5 Sulphide mg/L 0.5 mmonia) ittrite) mg/L 0.1 Ammonia) mg/L 0.1 0.1 Amonia) mg/L 0.1 0.1 Addition mg/L 0.1 0.1 Addition mg/L 0.1 0.1 Solved Solids (COND - CALC) mg/L 0.1 Addition mg/L 1 1 Addition mg/L 0.1 0.1 Addition mg/L 0.1			ma/L
<i>ity</i> TCU 2 <i>ity</i> uS/cm 5 I Organic Carbon mg/L 0.5 mg/L 0.1 mg/L 0.1 Sulphide mg/L 0.1 mg/L 0.1 mmonia) itritie) mg/L 0.1 0.1 Itrate) mg/L 0.1 mg/L 0.1 solved Solids (COND - CALC) mg/L 0.1 0.01 introgen mg/L 0.1 0.01 mg/L n ng/L 1 1 ce mg/L 0.1 0.01 mg/L n mg/L 1 1 mg/L n n 0.01 0.01 mg/L n n 0.1 1 intropen n n 0.1 1 mg/L n n 0.1 1 intropen n n 0.1 1 n n		AO 250	mg/L
/ity //rganic Carbon uS/em 5 //rganic Carbon mg/L 0.5 mg/L 0.1 //rate) mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 1 mg/L 2 mg/L 2 m			TCU
Organic Carbon mg/L 0.5 Sulphide mg/L 0.1 mmonia) mg/L 0.1 mmonia) mg/L 0.1 itrate) mg/L 0.1 mg/L 0.1 mg/L 1 itrate) mg/L 0.1 0.01 itrate) mg/L 0.1 0.01 itrate) mg/L 0.1 0.01 itrate) mg/L 0.1 0.01 itrate mg/L 0.1 0.01 itrate mg/L 1 1 itrate mg/L 1 1 itrate mg/L 0.01 0.01 itrate mg/L 0.01 0.01 itrate mg/L 1 1 itrate mg/L 1 1 itrate mg/L 0.01 0.01			
Sulphide mg/L 0.1 mmonia) mg/L 0.1 itrate) mg/L 0.1 mg/L 0.1 mg/L 0.1 itrate) mg/L 0.1 0.1 mg/L mg/L 0.1 0.1 solved Solids (COND - CALC) mg/L 0.1 0.1 ias CaCO3 mg/L 0.1 0.1 0.1 ias CaCO3 ce mg/L 1 1 mg/L mg/L 1 1 1 1 mg/L mg/L 1 1 1 1 ce mg/L mg/L 1 1 1 1 mg/L mg/L mg/L 1 1 1 1 1 mg/L mg/L mg/L 1 1 1 1 1 1 1 1 1 1 1 </td <td></td> <td></td> <td>mg/L</td>			mg/L
Naupride mg/L 0.1 itirite) mg/L 0.02 itirate) mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 ng/L 0.1 mg/L 0.1 solved Solids (COND - CALC) mg/L 0.1 0.1 as caco3 mg/L 0.1 0.1 i as Caco3 mg/L 1 1 mg/L n 0.1 0.01 i as Caco3 mg/L 1 1 mg/L n 0.01 0.01 i as Caco3 mg/L 1 1 mg/L n 0.01 0.01 i n mg/L 1 1		MAC 1.5	mg/L
Itrate) mg/L 0.1 Itrate NTU 0.1 Itrate mg/L 0.1 Itrate mg/L 0.1 Itrate mg/L 0.01			шg/г
litrate) mg/L 0.001 Lignin mg/L 0.001 solved Solids (COND - CALC) mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 2 mg/L 2 mg/L 2 mg/L 2			ma/l
Lignin mg/L 0.001 solved Solids (COND - CALC) mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 NTU 0.1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 0.01 mg/L 1 0.01		MAC 10.0	- mg/L
Lignin Lignin solved Solids (COND - CALC) dahl Nitrogen as CaCO3 as CaCO3 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 0.01 mg/L 1 0.01 mg/L 1 0.01 mg/L 1 0.01 mg/L 2 mg/L 2 0.03			
Lignin Lignin mg/L 1 solved Solids (COND - CALC) mg/L 5 dahl Nitrogen mg/L 0.1 . as CaCO3 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 2 mg/L 2 0.03			
тус 0.1 тус 0.1 тус 0.1 тус 0.1 тус 0.1 тус 0.1 тус 1 тус 1 тус 1 тус 1 тус 2 тус 3 тус 3		AO 500	mg/L
твус 5 твус 0.1 мдус 0.1 мдус 1 твус 1 твус 1 твус 1 твус 1 твус 1 твус 2 твус 0.03			
mg/L 0.1 NTU 0.1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 2 mg/L 2.003		AU 500	mg/L
mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 2 mg/L 2 0.03			ITIN
mg/L 1 mg/L 1 mg/L 1 mg/L 2 mg/L 2.		100) put
mg/L 1 mg/L 1 mg/L 1 mg/L 2 mg/L 2 mg/L 2003			1 7
mg/L 1 mg/L 1 mg/L 2 mg/L 0.03			
mg/L 1 mg/L 2 mg/L 0.03			
mg/L 2 mg/L 0.03			
mg/L 0.03			mg/L
•		AO 0.3	mg/L
0.01			mg/L
		,	

APPROVAL: Ewan McBabbie Ewan McBabbie Joorganic Lab Supervisor Results relate only to the paragrees tested on the samples submitted.

Comment: 771144: H2S MRL elevated due to sample turbidity. 1 of 1

EXOVA ACCUTEST		REPC	REPORT OF ANALYSIS	ANALYSIS		Шŏ	EXOVO Accutest	
Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON	-				Report Number: Date: Date Submitted:	0 0 -	1000789 2010-01-26 2010-01-14	
NZE / 1 / Attention: Mr. Robert Passmore					Project:	đ.	PH 1292	
INVOICE: Paterson Group Inc. Chain of Custody Number: 105597					P.O. Number: Matrix:	60 5	8794 Water	
		LAB ID:	771144				GUIDELINE	
	Sam Sam	Sample Date: Sample ID:	2010-01-13 TW1-WS2				ODWSOG	
PARAMETER	UNITS	MRI		-		TYPE	IMIT	INITS
VOLATILE ORGANIC COMPOUNDS - VOCs								
1,1,1,2-tetrachioroethane	ng/L	7	₽					
1,1,1-trichloroethane	ng/L	7	₽ '					
1,1,2,2-tetrachloroethane	ng/L	2 10	9 0					
1,1-dichloroethane	ug/L ug/L	10	4 0					
1,2-dibromoethane	ng/L	4	<4.0					
1,2-dichloropropane	ng/L	2	42					
1,3,5-trimethylbenzene	ng/L	- c	<u>ک</u> ر		<u> </u>			
i,o-dicritoroperizerre Promomethane	ng/L	20	2 0					
c-1,2-Dichloroethylene	ug/L	10	4 Q					
c-1,3-Dichloropropylene	ng/L	0.8	<0.8					
Chloroethane	ng/L	4	<4.0					
Chloromethane	" ng/L	4 (<4.0					
Ethylbenzene	ug/L	~ ~	5			A0	2.4	ng/L
oryrerie t-1.2-Dichloroethylene	ug/L ua/L	2 0	2 8			•		
t-1,3-Dichloropropylene	ng/L	0.8	<0.8		 			
Toluene	ng/L	2	Ŷ			AO	24	',/βn
Trichlorofluoromethane	ng/L	0	V		 			
1,1-dichloroethylene	ng/L	~ ~	8			MAC	14	ng/L
1,2-dichlorobenzene	ug/L	2	8 °			MAC	200	ng/L
1,2-dichloroethane	ng/L	2	₽ 9			IMAC		ng/L
1,4-dicritoropenzene	ug/L	2	2 2				n u	ug/L
Carbon Tetrachloride	ugir IIQ/L	10	۶ V			MAC	> 10	uo/L
Dichloromethane	ng/L	16	<16			MAC	20	ng/L
Monochlorobenzene	ug/L	0.8	<0.8			MAC	80	ng/L
Tetrachlomethylene		-	v		 	MAC	30	ug/L

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APPROVAL: Mine Nastrai Mina Nastrai Organic Lab Supervisor Results relate only to the parameters tested on the samples submitted.

1 of 2

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

Clert: Paterson Group 2.8 Concourse Gate, Unit 1 Nepean, ON X2E.TT7 Attention: Mr. Robert Passmore NVOICE: Paterson Group Inc. Trittel Paterson Group Inc. Trittel December 105897 Attention: Mr. Robert Passmore NVOICE: Paterson Group Inc. Chain of Custody Number: 105697 Trittel December Passmore NVOICE: Paterson Group Inc. Chain of Custody Number: 105697 Trittel December Passmore NVOICE: Paterson Group Inc. Chain of Custody Number: 105697 Trittel December Passmore NVOICE: Paterson Group Inc. Chain of Custody Number: 105697 Trittel December Passmore NVOICE: Paterson Group Inc. Chain of Custody Number: 105697 Trittel December Passmore December Passmore Chain of Custody Number: 105597 Trittel Paterson Group Inc. Trittel Patroleum Hydrocarbons Trittel Patroleum Hydrocarbons Trittel Patroleum Hydrocarbons Paterson Monthoner Passmore Second: Trittel Patroleum Hydrocarbons F1 (C34-C60) F1 (C34-C50) F1 (C34-C50) Trittel Patroleum Hydrocarbons F1 (C34-C50) Trittel Patroleum Hydrocarbons Trittel Patroleum Hydrocarbons Trittel Patroleum Hydrocarbons Trittel Patroleum Hydrocarbons F1 (C34-C50) Trittel Patroleum Hydrocarbons Trittel Pa	AC	Accutest II
Cup Inc. Cup Inc. nber: 105597 LAB ID: Sample Date: Sample Date: Sample ID: UNITS MRL 1 Ug/L 1 Ug/L 2 Ug/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.2 mg/L 0.2	Report Number: Date: Date Submitted: Project:	1000789 2010-01-26 2010-01-14 PH 1292
LABID: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: ug/L 1 ug/L 2 ug/L 2 ug/L 2 ug/L 2 ug/L 2 wg/L 2 wg/L 2 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1	P.O. Number: Matrix:	8794 Water
PARAMETER UNITS MRL ug/L 1 ug/L 1 ug/L 2 ug/L 1 ug/L 2 ug/L 2 ug/L 2 ug/L 2 ug/L 2 ug/L 2 ug/L 2 ug/L 2 nHydrocarbons mg/L 0.1 0.1 mg/L 0.1 mg/L 0.2		GUIDELINE
ug/L 1 ug/L 2 ug/L 2 ug/L 2 ug/L 2 ug/L 2 % % % mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.2 mg/L 0.2	TYPE	LIMIT UNITS
	MAC	2 ug/L

APPROVAL: MALK Mina Nasfrai Organic Lab Supervisor

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

2 of 2

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

EXOVA ACCUTEST CC	CCME METHOD VERIFICATION REPORT	EPORT		Exova IIII
Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON K2E 7T7 Attention: Mr. Robert Passmore			Report Number: Date: Date Submitted: Project:	1000789 2010-01-26 2010-01-14 PH 1292
INVOICE: Paterson Group Inc.			P.O. Number: Matrix:	8794 Water
Samples were analysed by Accutest Method AMCCME2, "Petroleurn Hydrocarbons in Water and Soil, CCME/TPH" This method complies with the reference method for the CCME CWS PHC and is validated for use in the laboratory. Accutest is accredited by CAEAL (ISO 17025) for all CCME F1-F4 fractions as listed in this report. Data for QC samples (blank, duplicate, spike) are available on request.	Hydrocarbons in Water and Soil, CCME/TPH" PHC and is validated for use in the laboratory. ctions as listed in this report.			
Fractions Analysed Within Acceptable Holding/Analysis Times		-YSIS 7	If No then Reasons	
F1 (C6-C10) F2 (C10-C16) F3 (C16-C34) F4 (C34-C50) F4 (C34-C50) gravimetric (when applicable)				
Fraction Specific Information				
FI				
nC6 and nC10 response factors within 30% of Toluene				
BTEX subtracted from F1 fraction				
If YES was F1-BTEX (C6-C10) reported				
nC10, nC16 and nC34 response factors within 10% of their average (F2-F4)	3 🖸			
Linearity within 15 % (F2-F4)	D			
Naphthalene subtracted from F2 fraction			Naphthalene (PAH) not requested/analysed	quested/analysed
If YES was F2-Napthalene reported				
F3 PAH (selected compounds) subtracted from F3 fraction	YES NO		PAH not requested/analysed	pa
If YES was F3-PAH reported				
F4	YES NO			
C50 response factor within 70% of nC10 + nC16 + nC34 average				
Chromatogram descended to baseline by retention time of C50	3			
If NO was F4 (C34-C50) gravimetric reported				
			APPROVAL:	AL: Mina Nasiyai Mina Nasiyai Organic Lab Supervisor

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

1 of 1

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

						Ľ₹		B
Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON K2E 717 Attention: Mr Robert Passmore				200 è	Report Number: Date: Date Submitted: Proiser:		1003171 2010-02-22 2010-02-17 PH1292	
INVOICE: Paterson Group Inc. Chain of Custody Number: 105022				A W	P.O. Number: Matrix:		8808 Water	
		777417	777418				GUIDELINE	
	sample uzte: Sample ID:	TW2-WS1	TW2-WS2				ODWSOG	
PARAMETER	UNITS MRL			_		TYPE	LIMIT	
Tatal Califorme		6	c					CELINOL
Escherichianon Heterorphic Plate Count Faecal Streptococcus	CFU/100mL CFU/100mL CFU/100mL CFU/100mL	0000	0000	 		N N N N N N N N N N N N N N N N N N N		CFU100mL

APPROVAL: Dragana Dzeletovic Microbiology Analysi Results rolate only to the parameters tested on the samples subrikted.

8-146 Colonnade Road, Otzwa, ON, K2E 7Y1

1 of 1

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							Ac	Accutest	
Client: Paterson Group						Report Number:		1003170	
28 Concourse Gate, Unit 1 Nepean, ON						Date: Date Submitted:		2010-02-25 2010-02-17	
k∠E_/ / / Attention: Mr. Robert Passmore						Project:	ι.	PH1292	
INVOICE: Paterson Group Inc. Chain of Custody Number: 105022						P.O. Number; Matrix:	~ ~	8808 Water	
	[]	LAB ID:	777415	777416				GUIDELINE	Ì
	Sample Date:		2010-02-17	2010-02-17	-				
	Sam	Sample ID:	TW2-WS1	TW2-WS2				ODWSOG	
PARAMETER	UNITS	MRL		-			TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5	254	255			90	500	mg/L
Chloride	mg/L	-	56	55			ÅÖ	250	mg/L
Colour	TCU	2	ũ	2			AO	ŝ	Ĥ
Conductivity	uS/cm	ω i	722	718			(Ŀ	1
Dissolved Organic Carbon	mg/L	0.0	1.4 0.29	520		d	MAC	о ф	mg/L mg/L
Hydrogen Sulphide	mg/L	0.01	0.03	0.02			ð	0.05	1/6w
V-NH3 (Ammonia)	mg/L	0.02	0.03	0.03					
N-NO2 (Nitrite)	mg/L	5-5	<0.10	-0.10 			MAC	0.1	, mg/L
N-NO3 (Nitrate)	mg/L		<0.10 7 03	7 94			MAC	10.U 6.5-8.5	ng/L
Phenols		0.001	<0.001	40.00				2	
Sulphate	mg/L	-	47	47			AO	500	mg/L
Tannin & Lignin	-	0.1	0.1	<0.1					
Total Dissolved Solids (COND - CALC)			469	467			Q.	009	mg/L
Total Kjeldahi Nitrogen Turkiditu	mg/L NTU		-0.10 16.7	<0.10 17.2			MAC	0	NTU
terology Hardness as CaCO3			288	297			00	2 2	ma/L
		0.01	0.92	0.95			ł	:	
Calcium	mg/L		74	76			•		
Magnesium			25	26				-	
Potassium			4	4					
Sodium		2	28	29			A0	500	ng/L
iron	mg/L	0.03	0.58	0.59			AO AO	0.3	ε
Manganese		0.01	0.01	L0.0			AO	cn:n	лби
								-	

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WAL: Eward McRobbie Ingrganic Lab Supervisor Results relate only to the parametery tested on the samples submitted.

APPROVAC:

1 of 1

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

Clatri: Paterson Group 26 Concourse Gale, Unit 1 Kiegen, ON Kiegen, ON Kiegen, ON Kiegen, ON Kiegen, ON Kiegen, ON Kiegen, ON Manuer: 103024 Table Clostody Number: 103024 Sample Date: 2010-03-18 Sample Date: 2	REPORT OF ANALYSIS			
LAB ID: T33872 Sample Date: 2010-03-18 Sample Date: 2010-03-18 CFU/100mL 0 CFU/100mL 0 CFU/100mL 0 CFU/100mL 0 CFU/100mL 0		Report Number: Date: Date Submitted: Project:	1005516 2010-03-22 2010-03-18 PH1292	
LAB ID: 128812: Sample Date: 38372 Sample iD: 2010-03-18 Sample iD: 2010-03-18 CFU/100mL 0 CFU/100mL 0 CFU/100mL 0 CFU/100mL 0		P.O. Number: Matrix:	8811 Water	
PARAMETER UNITS MRL Unit CFU/100mL 0 CFU/100mL 0 0 CFU/100mL 0 0	783872 783873 783873 2010-03-18 2010-03-18 2010-03-18 7W3-WS2 7W3-WS2		GUIDELINE ODWSOG	
Unt CFU/100mL 0 CFU/100mL 3 CFU/100mL 0 CFU/100mL 0 CFU/100mL 0	┝	Түрд		UNITS
	00m00	MAC	00	CFU/100mL CFU/100mL

Comment:

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APPROVAL: The Date of Control of Krista Quantrill Brinking Water Coordinator

8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

1 of 1

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

LAB ID: LAB ID: Sample Date: 5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	783870 2010-03-18 7W3-WS1 7W3-WS1 7W3-WS2			
Ar. Robert Passmore Paterson Group Inc. LAB ID: Paterson Group Inc. LAB ID: Sample Date: Sample Date: Sampl		Report Number: Date: Date Submitted:	1005515 2010-03-29 2010-03-18	* *
E: Paterson Group Inc. of Custody Number: 105024 LAB ID: Sample Date: Sample Date:		Project:	PH1292	
PARAMETER LAB ID: Sample Date: Sample Date: Sample Date: Sample Date: yas CaCO3 PARAMETER UNITS iy as CaCO3 mg/L 5 mg/L 1 1 citvity us/cm 5 mg/L 0.1 2 citvity us/cm 5 mg/L 0.1 2 ed Organic Carbon mg/L 0.1 ed Organic Carbon mg/L 0.1 ef Organic Carbon mg/L 0.1 ef Supplide mg/L 0.1 ef Supplide mg/L 0.1 ef Supplide mg/L 0.1 f (Nitrate) mg/L 0.1 struttel) mg/L 0.1 f (State) mg/L 0.1 f (State) mg/L 0.1		P.O. Number: Matriv:	8811 Water	
Sample Date: Sample Date: Sample ID: Sample			GUIDELINE	u
PARAMETER UNITS MRL by as CaCO3 mg/L 5 ang/L 1 7 citvity uS/cm 5 ed Organic Carbon uS/cm 5 ed Organic Carbon uS/cm 6 ed Organic Carbon ug/L 0.1 en Sulphide ug/L 0.1 en Sulphide mg/L 0.1 (Ammonia) mg/L 0.1 (Nitrite) mg/L 0.1 (Nitrate) mg/L 0.1 s Lignin a Lignin 0.1 festoved Solids (COND - CALC) mg/L 0.1			ODWSOG	
ty as CaCO3 mg/L 5 mg/L 5 mg/L 1 TCU 2 TCU 2 TCU 2 tivity uS/cm 5 mg/L 0.1			TYPE LIMIT	UNITS
wg/L 1 wg/L 1 stivity TCU ed Organic Carbon mg/L 1 ed Organic Carbon mg/L 0.5 mg/L 0.1 mg/L 0.1 en Sulphide mg/L 0.1 mg/L 0.1 en Sulphide mg/L 0.1 mg/L 0.1 (Nitrite) mg/L 0.1 mg/L 0.1 stivity mg/L 0.1 mg/L 0.1 stational mg/L 0.1 mg/L 0.1 stational mg/L 0.1 mg/L 0.1 stational mg/L 0.1 0.1 0.1 stational mg/L 0.1 0.1 0.1 0.1 stational mg/L 0.1 0.1 0.1 0.1 0.1 stational mg/L 0.1 mg/L 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1			+	jour l
tivity TCU 2 tivity uS/cm 5 ed Organic Carbon mg/L 0.5 mg/L 0.1 mg/L 0.1 (Ninte) mg/L 0.1 (Ninte) mg/L 0.1 mg/L 0.1 s lightn k Lightn (Scord Solids (COND - CALC) mg/L 0.1 (Scord mg/L 0.1)	52 202 52 52		AO 250	тд/г шg/г
US/cm 5 uS/cm 5 mg/L 0.5 mg/L 0.01 mg/L 0.02 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1			A0 5	TcU
ндн. 0.1 тди. 0.1 тди. 0.01 тди. 0.02 тди. 0.1 тди. 0.1 тди				
mg/L 0.01 mg/L 0.02 mg/L 0.02 mg/L 0.1 mg/L 0.1 mg/L 1 mg/L 0.1 mg/L 0.1			MAC 1.5	- //GW
mg/L 0.02 mg/L 0.1 mg/L 0.1 mg/L 1 mg/L 1 mg/L 0.1 mg/L 5 mg/L 5			AO 0.05	- mg/L
litrate) mg/L 0.1 litrate) mg/L 0.1 mg/L 0.1 Lignin mg/L 1 hg/L 0.1 solved Solids (COND - CALC) mg/L 5 mg/L 0.1				
litrate) mg/L 0.1 mg/L 0.001 mg/L 1 mg/L 2 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1				 mg/L
Lignin mg/L 0.001 mg/L 1 mg/L 0.1 mg/L 0.1 mg/L 5			MAC 10.0	<u></u> ш9/Г
Lignin mg/L 1 adved Solids (COND - CALC) mg/L 5 mg/L 5				
Solids (COND - CALC) mg/L 0.1 5 mg/L 5			AO 500.	mg/L
mo/ 2				;
			AO 500	mg/L
dahi Nitrogen mg/L 0.1	<0.10 <0.10		10 10	NTIN
5 -			00 100	nu/l
0.01				
mg/L 1				
ng/L 1				
Im mg/L 1				
2	29 30 058 040		AO 200	ng/L
qanese mg/L 0.01				ng/L

REPORT OF ANALYSIS

APPROVAL: LEVEROLOGIE Ewap McRoubole Ingrantic Lab Supervisor Results relate only to the parameters fested on the samples submitted.

R-146 Colonnade Road Ottawa ON K2F 7Y1

1 of 1

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EXOVA ACCUTEST	REPO	ORT OF A	REPORT OF ANALYSIS	Twit P	Twy-Bact 3-9hr	-16-		
Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON					Report Number: Date: Date Submitted:	mber: nitted:	1119873 2011-08-29 2011-08-29	
K2E 7T7 Attention: Mr. Robert Passmore					Project:		PH1292	
INVOICE: Paterson Group Inc. Chain of Custody Number: 146205					P.O. Number: Matrix:	50	Water	
	LAB ID: Sample Date:	906781 2011-08-26	906782 2011-08-26 71014 VAE Ob-				GUIDELINE	
	Sample IU:	8/11	26/08/11				ODWSOG	
PARAMETER	UNITS MRL					TYPE		UNITS
Total Coliforms Escherichia Coli	CFU/100mL CFU/100mL	9 O	0 0			MAC	00	CFU/100mL CFU/100mL
bunt	CFU/1mL CFU/100mL	234	490					
scus	CFU/100mL	4 6	182					
						<u>., ,,.</u>		
						<u></u>		
								<u></u>
		· ·			<u>.</u>			
	00 - Constitued International Matter Managementation - Matter Enterim Maximum Allmarche Concentration	ttan - ttanimu	m Alourable Concentr	otion MAC = Interim	Msvimum Allnushle	Concentration		
MRL = Method Reporting Limit INC = Incomplete AU = Aesthetic Ubjective O Comment:	וושטוש ופווטווש ה- <i>כור</i>							

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

APPROVAL: Krista Quantifil Microbiology Lab Supervisor Results relate only to the parameters tested on the samples submitted.

1 of 1

ALYSIS
LOF AN
REPORT

EXOVA ACCUTEST

Client: Paterson Group 28 Concourse Gate, Unit 1

FROM EXOVA OTTAWA 813-727-5222

Client: Paterson Group 28 Concourse Gate. Unit 1							Report Number:	X	1122788	
				-			Date:		2011-10-12	
Nepean, ON							Date Submitted:		2011-09-30	
_							-ttC	•	M1203	
Attention: Mr. Robert Passmore							rroject:			
							P.O. Number:		11627	
Chain of Custody Number: 141371							Matrix:		Water	
		LAB ID:	914267						GUIDELINE	
	Sam	Sample Date:	2011-09-30							
	Ø	Sample ID:	TW5-						SUSWED	
			WS09/2930/1			.*				
DARAKETER	INITS	MRI						TYPE	LIMIT	UNITS
Altralinity as CarO3	l/om	L.	266					90	200	mg/L
	- Don		45					AO	250	mg/L
Codour	TCU	~	\$					AO	S	TCU
Conductivity	uS/cm	ю	691							
Dissolved Organic Carbon	l mg/L	0.5	1.0					¥0	S	-Tigm
Fluoride	mg/L	0.1	0.28					MAC	1- 2	mg/L
Hydrogen Sulphide	mg/L	0.01	40.0 1					A O	0.05	т/бш
N-NH3 (Ammonia)	с Шоңг	0.02	<0.02						1	
N-NO2 (Nitrite)	mg/L	0.1	<0.10					MAC	0.1	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10					MAC	10.0	шôл.
<u>×</u>			19.7					-	0.9-0.0	
Phenols	mg/L	0.001	<0.001				•	Q,	22	1000
Sutphate	mg/L	- 2						2	2	1
langin & Ligner Train Decoluted Conde (COND - CA) C	1/6m	5 -	449		•.			Q	85	mg/L
Toda Dasarred Joine (Vorus - Ont-O)	1.8.	- c	<0.10							
Turkidity	NTU	5 6	6.5					MAC	1.0	NTU
Handness as CaCO3	mor	~	285					ဗ္ဂ	<u>8</u>	mg/L
fon Balance	· .	0.01	0.91		••					
Calcium		-	73							
Magnesîum	- mg/L	-	25	`````		:				
Potassium	-Thôm	.	ę					!	1	
Sodium	Jon Jon	~	26		•			Q :	200	- " mg/L
Iron	ng/L	0.03	0.66		•			90	0.3	mg/L
Manganese	mg/L	0.01	0.01			ی		Ŷ	0.05	mg/L
	• •					•				
							•			
					-					-
					-					
MRL = Method Reporting Limit INC = Incomplete $AQ = Aesthetic Objective$	0G = Operat	ional Guidelin	e MAC = Maxin	rum Allowable Co	ncentration 1MA	(C = Interim Maxi	OG = Operational Guideline MAC = Maximum Alowable Concentration 1MAC = Interim Maximum Alowable Concentration	Sentration		
Commant:			•					•		ç
Sample was succontracted for LCCC atkayes.								•		7
-									1	11

(THU) OCT 13 2011 11:08/ST. 11:05/No. 7525148171 P

> Results relate only to the parameters tested on the samples submitted. APPROVAL: Lorna Wilson Ironganic Lab Supervisor

1 of 1

B-145 Colonnade Road, Ottawa, ON, K2E 7Y1

Methods references and/or additional QAVQC information available on request

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REPORT OF ANALYSIS

Twy- 3h- 4h- Exova

1119874 2011-09-08 2011-08-27

Report Number: Date: Date Submitted:

PH1292

Project:

	e. Unit 1
Paterson Group	28 Concourse Gate. Unit 1
Client:	

28 Concourse Gate, Unit 1

Attention: Mr. Robert Passmore Nepean, ON K2E 717

PARAMETER Akalinity as CaCO3 Chloride Colour Conductivity Dissolved Organic Carboon Dissolved Organic Carboon Dissolved Organic Carboon Dissolved Organic Carboon Dissolved Organic Carboon Dissolved Organic Carboon Dissolved Solids N-NO2 (Nitrate) N-NO2 (Nitrate) Di Ammonia) N-NO2 (Nitrate) Di Ammonia) Di Ammonia Di Ammonia) Di Ammonia Di Ammonia D	Sam ang/L mg/L	Sample Date: Sample Date: Sample Date: MRL 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	2011-08-26 TW4-WS 26/08/11 26/08/11 2687 2687 2687 2687 2687 2687 2687 2687	2011-08-26 2011-08-26 7W44WS 9hr 2668/11 2668/11 2668/11 2667 44 686 686 686 686 686 686 6.05 0.26 0.05 0.26			ODWSOG 500 550 550 550 6.5-8.5 500 6.5-8.5 500 100 100 100
	ng/L mg/L	0.03	0.32 <0.01	0.32 <0.01	 	0 0 0	0.05

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

Comment: Samples were subcontracted for DOC analysis.

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

Inorganic Lab Supervisor Lorna Wilson

APPROVAL:

1 of 1

28 Concourse Gate, Unit 1 28 Concourse Gate, Unit 1 Nepean, ON K2E 717 : Mr. Robart Passmore : Paterson Group Inc. Custody Number: 141372 Custody Number: 141372 Custody Number: 141372 Custody Number: 141372 Custody Number: 141372 Custody Number: 141372 Custody Number: 141372 Intre intre	Report Number: Date Submitted: Project: Matrix: Matrix: TYPE	1122839 2011-10-14 2011-10-03 PH1292 11627 Water Water GUIDELINE Provincial Water Quality Objectives - MOE 1999 TYPE LIMIT UNITS	Dbjectives - UNITS mg/L
Pean, ON E 717 Mr. Robert Passmore aterson Group Inc. LAB ID: stoody Number: 141372 LAB ID: Sample Date: Sample ID: Sample ID: CaCO3 ngAL 5 ng/L 0.01 mg/L 0.1 mg/L 0.1	omitteed:	2011-10-03 PH1292 11627 Water Water GuitpELINE MOE 1999	Dhjectives - UNITS mg/L
Partner Sample Date: "aterson Group Inc. "aterson Group Inc. "aterson Group Inc. "aterson Group Inc. Istody Number: 141372 LAB ID: Sample Date: Sample Date: Sample Date: Barnoli Date: Sample Date: CaCO3 Intervention MRL Intervention MRL </td <td></td> <td>PH1292 11627 Water Guilip C MOE 1999 LIMIT</td> <td>Dbjectives - UNITS mg/L</td>		PH1292 11627 Water Guilip C MOE 1999 LIMIT	Dbjectives - UNITS mg/L
E. Paterson Group Inc. E. Paterson Group Inc. E. Paterson Group Inc. E. Paterson Group Inc. Sample Data: Sample Data: Samp		11627 Water Guideline MOE 1999 LIMIT	Dbjectives - UNITS mg/L
Accuration, model LAB ID: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: PARAMETER UNITS PARAMETER UNITS PARAMETER UNITS Parameter Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Sample Date: Date: Sance Date:		GUIDELINE al Water Quality C MOE 1999 LIMIT	Dbjectives - UNITS mg/L
PARAMETER UNITS MRL ty as CaCO3 PARAMETER UNITS MRL e mg/L 5 mg/L 0.1 ed Organic Carbon mg/L 1 ed Organic Carbon mg/L 0.1 ed Organic Carbon mg/L 0.1 mg/L 0.01 mg/L 0.1 ef Organic Carbon mg/L 0.1 f (Nitrite) mg/L 0.1 (Nitrate) mg/L 0.1 (Nitrate) mg/L 0.1 f (Nitrate) mg/L 0.1 s Lignin mg/L 0.1 mg/L 1 mg/L 1 f (Strate) mg/L 0.1 mg/L 0.1 mg/L 0.1 f (Strate) mg/L 0.1	Provincia Provincia Provincia	al Water Quality C MOE 1999 LIMIT	Dbjectives - UNITS mg/L
PARAMETER UNITS MRL 5 ty as CaCO3 mg/L 5 mg/L 1 filvity us/cm us/cm 5 mg/L 5 filvity us/cm us/cm 5 mg/L 1 1 ed Organic Carbon us/cm us/cm 5 mg/L 0.1 1 ed Organic Carbon mg/L us/cm 0.01 0.01 0.01 ed Organic Carbon mg/L us/cm 0.01 0.01 0.01 f(Nitrie) (Nitrie) mg/L 0.01 0.01 0.01 (Nitrie) mg/L 0.01 mg/L 0.1 0.1 (Nitrate) mg/L mg/L 0.1 0.001 s Lignin as cacco3 mg/L 0.1 0.1 stassolved Solids (COND - CALC) mg/L 0.1 0.1 0.1 stassolved Solids (COND - CALC) mg/L 0.1 0.1 0.1			UNITS
y as CaCO3 mg/L 5 mg/L 5 mg/L 1 TCU 2 TCU 2 TCU 2 TCU 2 Mg/L 0.1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 0.1 mg/L 0.1 mg/L 1 mg/L 0.1 mg/L 0	PWQO		ר שניר
a mg/L 1 tivity mg/L 1 tivity trcu 2 ad Organic Carbon mg/L 0.5 mg/L 0.1 mg/L 0.1 mg/L 0.1 (Nitrie) mg/L 0.1 mg/L 0.1	Pwdo		IJдm
tivity ed Organic Carbon ed Organic Carbon en Sulphide (Ammonia) (Nitrite) (Nitrite) (Nitrat			ŊĜŴ
тел 0.5 тел 1 тел 0.01 тел 0.01 тел 0.01 тел 0.02 тел 0.02 тел 0.01 тел 0.001 тел 0.1 тел 0.1 тел 0.1 тел 0.1 тел 0.1 тел 0.1	PWQO		7/6w
mg/L 0.1 mg/L 0.01 mg/L 0.02 mg/L 0.02 mg/L 0.1 mg/L 1 mg/L 1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1	PWQO	_	T/6m
нди 0.02 лди 0.02 лди 0.02 лди 0.1 лди 0.1		0.002	
mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 1 mg/L 1 mg/L 1 mg/L 0.1 mg/L 1 mg/L 1 0.1 mg/L 1 0.1 mg/L 1 0.1 mg/L 1 0.1 mg/L 0.1 0.1 mg/L 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1			
(O3 (Nitrate) mg/L 0.1 anols mg/L 0.001 phate mg/L 1 nin & Lignin mg/L 1 al Dissolved Solids (COND - CALC) mg/L 1 al Kjeldahl Nitrogen mg/L 0.1 hidty nmg/L 0.1 al Kjeldahl Nitrogen 0.1 Balance 0.01			
mols phate min & Lignin al Dissolved Solids (COND - CALC) al Kjeldahi Nitrogen MTU 0.1 MTU 0.1 MTU 0.1 MTU 0.1 MTU 0.1 MTU 0.1 MTU 0.1 MTU 0.1 MTU 0.1 MTU 0.1		65.85	
mg/L 1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1 mg/L 0.1	PWQO	0.001	л¦дт
mg/L 0.1 mg/L 1 mg/L 0.1 NTU 0.1 mg/L 1 0.01			
mg/L 1 mg/L 0.1 NTU 0.1 mg/L 1 0.01			
mg/L 0.1 mg/L 1 0.01			
mg/L 1			
0.01			
0.03	PWQO	0.30	mg/l.
ganese mg/L 0.01			

MRL = Method Reporting Limit INC = Incomplete AO: Comment: Holding time for turbidity analysis was exceeded.

Methods references and/or additional QA/QC information available on request. B-146 Colonnade Road, Ottawa, ON, K2E 7Y1

APPROVAL: Lorna Wilson trorganic Lab Supervisor

1 of 1

EXOVA ACCUTEST	REI	REPORT OF ANALYSIS	SIS	tes	Tus Bud echieva III	C (1.	EXO Accutest	₹ Z
Client: Paterson Group 28 Concourse Gate, Unit 1				Repor Date:	Report Number: Date:	ਲ →	1122782 2011-10-03	
Nepean, ON K2E TT7				Date	Date Submitted:	7	2011-09-30	
Attention: Mr. Robert Passmore				Project:	act:	۵.	PH292	
INVOICE: Paterson Group Inc. Chain of Custody Number: 141371				P.O. Nu Matrix:	P.O. Number: Matrix:	5	Water	
	LAB ID:	\vdash				0	GUIDELINE	
	Sample Date: Sampte ID:	e: 2011-09-30 5: TW5 - WS09				0	DOSMGO	
PARAMETER	UNITS MRL			-		TYPE	LIMIT	UNITS
						MAC	0	CFU/100mL
Total Collionms Escherichia Coli Heterotrophic Plate Count Faecal Streptococcus	CFU/100mL CFU/100mL CFU/100mL CFU/100mL	ာဝက်ပြာလ				MAC	2 0	CFU/100mL
MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective Comment:		OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration	Concentration IMAC = Int	lerim Maximum All	owable Concentr	ation		

APPROVAL: Krista Quantrili Microbiology Lab Supervisor Resulis relato only to the parameters tested on the samples submitted.

1 of 1

B-146 Colonnade Road. Ollawa. ON. K2E 7Y1

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

EXOVA ACCUTEST		REPC	RT OF A	REPORT OF ANALYSIS				EXOVO Accutest	a
Client: Paterson Group 28 Concourse Gate, Unit 1						Report Number: Date:	Le	1122788 2011-10-12	
Nepean, ON						Date Submitted:	:5	2011-09-30	
KZE / / / Attention: Mr. Robert Passmore						Project:		PH1292	
						P.O. Number: Matrix:		11627 Water	
Chain of Custody Number: 1415/1		I AR ID:	914267					GUIDELINE	
	Кан С	Sample Date: Sample ID:	2011-09-30 TW5- WS09/2930/1					ODWSOG	
			-					1 1101	111170
PARAMETER	UNITS	MRL		-			HYPE		
Alkalinity as CaCO3	mg/L	، م	266 AF			÷	å q	220 50	נוופור נוופור
Colour	TCU	- 6	\$ 7				ð	ъ	rcu
Conductivity	uS/cm	5	691				(ı	5
Dissolved Organic Carbon	лол Тот	0.5	1.0 82 n				MAC	° 1.5	mg/L mg/L
Fluoride	- Igur	50	0.01 A0.01				Q	0.05	mg/L
Hydrogen Supnice N-NH3 (Ammonia)	mg/L	0.02	-0.02 -0.02						I
N-NO2 (Nitrite)	щg/L	0.1	<0.10				MAC	1.0	тgЛ
N-NO3 (Nitrate)	Шg/Г	0.1	<0.10 7 97				אואר	6.5-8.5	Шġл
Dhands	ma/L	0.001	<0.001						
Suphate	mg/L	-	49				AO	500	шg/L
Tannin & Lignin	mg/L	5,	55				۵0	200	mo/l
Total Dissolved Solids (COND - CALC)	mg/L	- 5	449 2010			<u></u>	2	2	1
Total Kjedani Nitrogen Truchicity		5 6	6.5				MAC	1.0	NTU
Hardness as CaCO3	J/Gu	-	285				g	190	mg/L
ion Balance		0.01	0.91				-		
Calcium	шgл шd		25						-
Magnesium	mo/l.		3 ო						
Potassum	ug/L	. 01	26				AO	200	mg/L
lion	mg/L	0.03	0.66		_		Q i	0.3	mg/L mg/L
Manganese	mg/L	0.01	0.01			<u> </u>	Q.	 60'0	шârг
									-
MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective Comment:		ional Guideli	ne MAC = Maxim	OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration	AAC = Interim Max	kimum Alkowable Co	ncentration		
Sample was subcontracted for DOC analysis.									

Results relate only to the parameters (ested on the samples submitted. Inorganic Lab Supervisor APPROVAL: Loma Wilson --- 1 ab Supe

1 of 1

Methods references and/or additional QAVQC information available on request.

B-145 Colonnade Road, Ottawa, ON, K2E 771

				÷					at	scific tests		ided for
Exova	1423579 2014-11-04 2014-11-06 PH 1292 177452			sitate to call (613-727-5692)					of accreditation. It can be found a	Licensed by Ontario MOE for spe		ues listed on this report are provi
	Report Number: Date Submitted: Date Reported: Project: COC #:			ort, please do not he					ear on our CALA scope	Affairs (for farm soils).		oses only. Guideline va
Certificate of Analysis		Page 1 of 2		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).			APPROVAL: Krista Quantrill Laboratory Supervisor, Microbiology	rwise 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.
EXOVA ENVIRONMENTAL ONTARIO	Paterson Group 154 Colonnade Rd. South Nepean, ON K2E 7T7 Mr. Robert Passmore	Paterson Group	Dear Robert Passmore:	d attached the analytical results for yo	ments:			All analysis is completed in Ottawa, Ontario (unless otherwise indicated).	Exova Ottawa is accredited by CALA, Canadian Associa http://www.cala.ca/scopes/2602.pdf.	wa) is certified and accredited for specific pa vater.	sissauga) is accredited for specific parameter	: Field data, where presented on the report, l (informational purposes) only. Exova recomi
EXOV	Client: Attention:	PO#: Invoice to:	Dear Robe	Please fin	Report Comments:			All analysis	Exova Ottav http://www.c	Exova (Ottawa) is in drinking water.	Exova (Mist	Please note ease of use

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis



1144197 Water	2014-11-04 TW6 - WS2		0	0	0	7	0
1144196 Water	2014-11-03 TW6 - WS1		0	0	0	Э	0
Lab I.D. Sample Matrix	sample Type Sampling Date Sample I.D.	Guideline	MAC-0				MAC-0
		Units	ct/100mL	ct/100mL	ct/100mL	ct/1mL	ct/100mL
		MRL	0	0	0	0	0
		Analyte	Escherichia Coli	Faecal Coliforms	Faecal Streptococcus	Heterotrophic Plate Count	Total Coliforms
		Group	Microbiology				

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

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

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EXOVA ENVIRONMENTAL ONTARIO	Exova
Client: Paterson Group 154 Colonnade Rd. South Nepean, ON K2E 7T7 Attention: Mr. Robert Passmore PO#: Project: Project: COC #: Poge 1 of 8	
Dear Robert Passmore:	
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).	nesitate to call (613-727-5692).
Report Comments:	
APPROVAL	
Laboratory Supervisor, 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.cala.ca/scopes/2602.pdf .	e of accreditation. It can be found at
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.	. Licensed by Ontario MOE for specific tests
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.	alues listed on this report are provided for

EXOVA ENVIRONMENTAL ONTARIO

154 Colonnade Rd. South

Nepean, ON

Paterson Group

Client:

K2E 7T7 Mr. Robert Passmore

Attention:

PO#:

Paterson Group

Invoice to:

Certificate of Analysis

Exova

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

PH1292 177452

2014-11-04 2014-11-05

1423554

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

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

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

154 Colonnade Rd. South

Nepean, ON K2E 7T7

Paterson Group

Client:

Mr. Robert Passmore

Attention:

PO#:

Paterson Group

Invoice to:

Certificate of Analysis

Exova

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

1423554 2014-11-04 2014-11-05 PH1292 177452

		Group Analyte	Metals Cr	Cu	Fe	×	Mg	Mn	Mo	Na	Z	Pb	Sb	Se	Sr	T	C	>	Zn	Nutrients N-NH3	Phenols	Tannin & Lignin	
		MRL	0.001	0.001	0.03	-	~	0.01	0.005	2	0.005	0.001	0.0005	0.001	0.001	0.0001	0.001	0.001	0.01	0.02	0.001	0.1	
		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	mg/L	Second and a second sec
Lab I.D. Sample Matrix	Sample Type Sampling Date Sample I.D.	Guideline	MAC-0.05	AO-1.0	AO-0.3			AO-0.05		AO-200		MAC-0.010	IMAC-0.006	MAC-0.01			MAC-0.02		AO-5.0				
1144094 Water	2014-11-02 TW6 Metals 1		<0.001	<0.001					<0.005		<0.005	<0.001	<0.0005	<0.001	1.84	<0.0001	0.001	<0.001	<0.01				
1144095 Water	2014-11-03 TW6 - WS1				0.32*	ß	29	<0.01		32										0.14	<0.001	<0.1	0.0
1144096 Water	2014-11-04 TW6 - WS2				0.31*	4	29	<0.01		33										0.02	<0.001	<0.1	

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 = 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 and/or additional QA/QC information available on request.

Certificate of Analysis



2014-11-04 2014-11-05

Date Submitted: Report Number:

Date Reported:

Project: COC #:

PH1292 177452

1423554

Client:	Paterson Group	
	154 Colonnade Rd. South	
	Nepean, ON	
	K2E 7T7	
Attention:	Mr. Robert Passmore	
:#Od		

Paterson Group Invoice to:

QC Summary

Analyte		Blank	QC % Rec	QC Limits
Run No 0	Analysis Date 2014-11-05	Method	C SM2340B	
Hardness as CaCO3				
Ion Balance				
TDS (COND - CALC)				
Run No 279114	Analysis Date 2014-11-04	Method	C SM2130B	
Turbidity		0.1 NTU	97	70-130
Run No 279117	Analysis Date 2014-11-04	Method	C SM4500-CNC	
Cyanide (free)		<0.005 mg/L	97	75-125
Run No 279126	Analysis Date 2014-11-04	Method	C SM4500-S2-D	
S2-		<0.01 mg/L	107	
Run No 279142	Analysis Date 2014-11-04	Method	C SM5530D	
Phenols		<0.001 mg/L	92	73-127
Run No 279169	Analysis Date 2014-11-04	Method	C SM4500-NO3-F	
N-NO2		<0.10 mg/L	93	80-120
N-NO3		<0.10 mg/L	97	80-120

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

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THE LOSI INC

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Certificate of Analysis

Exova

2014-11-05 2014-11-04 1423554

Report Number: Date Submitted: Date Reported:

PH1292 177452

Project: COC #:

154 Colonnade Rd. South Mr. Robert Passmore Paterson Group Nepean, ON K2E 7T7 Attention: Client: PO#:

Paterson Group Invoice to: QC Summary

t si		110	110		115		80-120		77-123		116		94-106	93-106	88-112	
QC Limits		90-110	90-110		85-115		80-		-77-		84-116		94-	-63-	88-	
QC % Rec	SM 4110	100	105	C SM4500-NH3D	66	C SM5550B	89	C SM4500-Norg-C	102	C SM5310C	100	EPA 200.8	101	98	106	
Blank	Method	<1 mg/L	<1 mg/L	Method	<0.02 mg/L	Method	<0.1 mg/L	Method	<0.10 mg/L	Method	<0.5 mg/L	Method	<0.0001 mg/L	<0.001 mg/L	<0.01 mg/L	
	Analysis Date 2014-11-05			Analysis Date 2014-11-05		Analysis Date 2014-11-05		Analysis Date 2014-11-05		Analysis Date 2014-11-04		Analysis Date 2014-11-05				
Analyte	Run No 279170		S04	Run No 279173	N-NH3	Run No 279174	Tannin & Lignin	Run No 279187	Total Kjeldahl Nitrogen	Run No 279193	DOC	Run No 279224	Ag	As		

Guideline = ODWSOG

All analysis completed in Ottawa, Ontario (unless otherwise indicated by ** which indicates * = Guideline Exceedence analysis was completed in Mississauga, Ontario). Results relate only to the parameters tested on the samples submitted. Methods references and/or additional QA/QC information available on request.

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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

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Certificate of Analysis



2014-11-04 2014-11-05

PH1292 177452

Date Submitted: Date Reported: Project: COC #:

1423554

Report Number:

154 Colonnade Rd. South Mr. Robert Passmore Paterson Group Nepean, ON K2E 7T7

Paterson Group Invoice to:

Attention:

PO#:

Client:

QC Summary

			-			-				1				1 Section			
QC Limits	93-107	94-106	94-106	93-106	92-107	94-106	94-106	94-106	70-130	90-110	91-108	89-110	95-105	94-106	93-107	94-106	
QC % Rec	97	103	100	104	95	97	66	104	107	94	97	96	101	102	97	102	M SM3112B-3500B
Blank	<0.0001 mg/L	<0.0002 mg/L	<0.001 mg/L	<0.001 mg/L	<0.03 mg/L	<0.01 mg/L	<0.005 mg/L	<0.005 mg/L	<0.001 mg/L	<0.0005 mg/L	<0.001 mg/L	<0.001 mg/L	<0.0001 mg/L	<0.001 mg/L	<0.001 mg/L	<0.01 mg/L	Method
																	Analysis Date 2014-11-04
Analyte	Cd	Co	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Sb	Se	Sr	П	D	Λ	Zn	Run No 279233

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

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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

Certificate of Analysis

Exova

2014-11-04 2014-11-05

Report Number: Date Submitted: Date Reported:

PH1292 177452

Project: COC #:

1423554

Client: Paterson Group 154 Colonnade Rd. South Nepean, ON K2E 7T7 Mttention: Mr. Robert Passmore

Attention: Mr. Robert Passi PO#: Invoice to: Paterson Group

QC Summary

			% Rec	Limits
Hg		<0.0001 mg/L	100	70-130
Run No 279244	Analysis Date 2014-11-05	Method	C SM2120C	
Colour		<2 TCU	105	90-110
Run No 279251	Analysis Date 2014-11-05	Method	M SM3120B-3500C	
Ca		<1 mg/L	100	80-120
K		<1 mg/L	106	80-120
Mg		<1 mg/L	66	80-120
Na		<2 mg/L	106	80-120
Run No 279256	Analysis Date 2014-11-05	Method	SM 2320B	
Alkalinity as CaCO3		<5 mg/L	98	95-105
Conductivity		<5 uS/cm	66	95-105
ш		<0.10 mg/L	66	90-110
pH		5.76	66	90-110
Run No 279260	Analysis Date 2014-11-05	Method	M US EPA	
Cr(VI)				80-120

Guideline = ODWSOG

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

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* = Guideline Exceedence

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

Certificate of Analysis Report Number: Date Submitted: Date Submitted: Project: COC # 2014-11-05 PH1292 COC #		
OVA ENVIRONMENTAL ONTARIO Paterson Group 154 Colonnade Rd. South Nepean, ON K2E 7T7 ion: Mr. Robert Passmore	PO#: Invoice to: Paterson Group Sample C Sample ID: 1144094 TW6 Metals 1 Sample was subcontracted for CrVI analysis.	

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Clift: Partner: Control Report Number: Control 2 2 Concourse Gale, Unit 1 Deale Submitter: 2000-01-38 Nettor: XET Proper: Proper: Proper: Attent: XET Proper: Proper: Proper: Mind: Prover: Proper: Proper: Proper: Mind: Prover: Prover: Proper: Proper: Mind: Prover: Prover: Prove: Prove: Prove: Mind: Prove: Prove: Prove: Prove: Prove: Prove: Prove: Prove: Prove: Prove: Prove: Mind: Prove: Prove: Prove: Prove:							Accures	
E.O. Number: Lue ID: 77387 Attraction Sample Dat: 77387 77387 Mater. CUIVIDIS Math. 2010-01-28 2010-01-28 Sample Dat: EW-WS1 EW-WS2 2010-01-28 CUIVIDIS Math. 0 0 0 CUVIONIL 0 0 0 0 CEU/100mil 0 0 0 0						Report Numb Date: Data Submitte Project:	1001797 2010-02-01 2010-01-28 PH1292	•
Lue ID: 773874 773875 Lue ID: 773874 773875 GUIDELINE Sample Dave: 2010-1/28	INVOICE: Paterson Group Inc. Chain of Custody Number: 105018					P.O. Number: Matrix	Water	
PARAMETER UNITS MRL O			├ - {{{	773875 2010-01-28 EW-WS2			GUIDELINE	
			0000	0000	· · · · · · · · · · · · · · · · · · ·		00	CFU/100mL CFU/100mL

B-146 Colonnade Road, Ottawa, UN, K2E 7Y1

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Results relets only to the parameters tested on the same

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REPORT OF ANALYSIS

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Nepean. ON K2E 7T7 Attention: Mr. Robert Passmore INVOKE: Paterson Group Ac. Chain of Custody Number: 105018							Date:		2010-02-04	
intion: Mr. Robert Passmore OKCE: Paterson Group Inc. ain of Custody Number: 105018		÷					Date Submitted:	ted:	2010-01-28	
OKCE: Paterson Group hc. ain of Custody Number: 105018							Project:		PH1292	
							P.O. Number:	2	Water	
	LAB ID:		773876	773877					GUIDELINE	
	Sample Date:		2010-01-28	2010-01-28						
	Sample ID:		EW-WS1	EW-WS2					ODWSOG	
								2074		
	+	-	000	c.ec						5
as cacos			ē.	ŝ				39	000	line in the second s
	- ~ 		F \$	₽ ∿				2	60	
livity			202	702				2) 	2
gamic Carbon			.1	12				Ŷ	ۍ ۲	δW
	لا 10		0.38	0.38	-			MAC	1.5	mg/L
			<0.01	6,01				Q	0.05	ηβμ
N-NH3 (Ammonia) mg/L			0.03 4	0.08					,	
			5.9							
			-U. IU 8.12	8,16 0,15) 5	6.5-8.5	Ê.
Phends			<0.001	<0.001						
			49	6 1				Ŷ	500	mg/L
			. .	<0.1						
(COND - CALC)			456	456				Ŷ	200	mg/L
Total Kjeldahi Nitrogen			11.0	<0.10					-	
Lurboly Hambess as CarO3			280	283				ן געניין איניין געניין	2 8	
		5	76.0	0.95						
Calcium			70	69						
Magnesium			28	27					•	
. E			; مە	ŝ						
			34	ह (=		Q (500	Ê
Iron mg/L	ML 0.03		127	0.23						
								2	•	
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8-146 Colonnade Road, Ottawa, ON, K2E 7Y1

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Evrant (CRO Inorganic Lab

APPROVAL:

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

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EXOVA ACCUTEST		REP(REPORT OF ANALYSIS	ANALYS	SIS			¥ LLI	EXOVO Accutesť	Ξ
Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON K2E 7T7 Attention: Mr. Robert Passmore		•					Report Number: Date: Date Submitted: Project:		1000782 2010-01-18 2010-01-14 PH1292	
INVOICE: Paterson Group Inc. Chain of Custody Number: 105597							P.O. Number: Matrix :	Ľ	8794 Water	
		LAB IO							GUIDELINE	
	E B S	Sample Date: Sample ID:	2010-01-13 20 King-WS1						ODWSOG	
PARAMETER	UNITS	MRL						TYPE	TIMIT	UNITS
Total Coliforms Escherichia Coli Heterotrophic Plate Count Faecal Streplococcus Faecal Streplococcus	CFU/100mL CFU/100mL CFU/100mL CFU/100mL		00N00				· · · · · · · · · · · · · · · · · · ·	MAC	80	CFU/100mL
MRL = Method Reporting Limit INC = Incomplete AO = Aesthetic Objective OG Comment:		mal Guidelin	e MAC = Maxim	um Allowable C	oncentration	IMAC = Interim M	= Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration	oncentration		

8-146 Colonnade Road, Onava, ON, X2E 7Y1

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Results relate only to the parameters tested on the samples surface

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EXOVA ACCUTEST		REP(REPORT OF ANALYSIS	NALYSI	0	· · · · · · · · · · · · · · · · · · ·		EXOVO Accutest		
Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON K2E 717						Report Number: Date: Date Submitted:	ther: tted:	1000794 2010-01-27 2010-01-14		1
Attention: Mr. Robert Passmore						Project:		PH 1292		
INVOICE: Paterson Group inc. Chain of Custody Number: 105597						P.O. Number: Matrix:	Ľ	8794 Water		
		LAB JO:	771149					GUIDELINE		
	ŝa	Sample Date:	2010-01-13							
		Sample ID:	20 King-WS1					ODWSOG		
PARAMETER	UNITS	MRL					TVPE		INTS	
Akalinity as CaCO3	mg/L	5	328				8	200	moA	
Chloride	цби		13				2	520	mo/L	
Colour	TCU	54	₽				Ŷ	າກ	TCU	
Conductivity	uS/cm	ъ	654						2	
Dissolved Organic Carbon	mg/L	0.5	1.5				AO	 גע	mg⁄L	
Fluoride	mg/L	0.1	0.36				MAC	1.5	moA	
Hydrogen Sulphide	mg/L	0.01	<0.01			 	ð	0.05	- Jom	
N-NH3 (Ammonia)	mg/L	0.02	<0.02						•	
N-NO2 (Nitrite)	mg/L	0.1	<0.10				MAC	<u>,</u>	mg/L	
(N-NJ3 (Nitrate)	ר ש מקר	0.1	0.13	-			MAC	10.0	шgЛL	
Phenois	ma/L	0.001	<0.001 2001					6.5-8.5		
Suiphate	mg/L	*-	19				Ą	200	ma'L	
Tannin & Lignin	mg/L	0.1	0.1						-	
Total Dissolved Solids (COND - CALC)	mg/L	ŝ	425				Q	200	mg/L	
Total Kjeldahl Nitrogen	mg/L		<0.10							
		L.U	70				MAC	0	DIN	
Hardness as CaCO3	mg/L	- 3	296 256	<u></u>			8	0	mg/L	
ton batance		-0 ⁻⁰	0.92							
Cactum Manuscium	7/6E		47					-		
Polassium			20							
Sodium	ma/L	- Ñ	↓ €				•	Jun	hom	
kon	- JVDW	0.03	<0.03					ZUU ZUU	mg/L	
Manganese	Jon H	0.0	<0.01				2 2	0.05	mg/L	
	,									

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

RVUK ULTAWA 813-727-52

1 of 1

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

Inoppanic Lab Supervisor

Ewan, MoB

APPROVAL;

EXOVA ACCUTEST	REPO	ort of /	REPORT OF ANALYSIS		:	EX Accut	No.	
Client: Paterson Group 28 Concourse Gate, Unit 1 Nepean, ON				Report I Date: Date Su	Report Number: Date: Date Submitted:	1127 2011 2011	1127252 2011-11-25 2011-11-23	
K2E 717 Attention: Mr. Robert Passmore				Project:		PH1292	292	
INVOICE: Paterson Group Inc. Chain of Custody Number: 141378				P.O. Number: Matrìx:	mber:	Water	Ļ	
	LAB ID: Sample Date: Sample ID:	927122 2011-11-22 10 Cockbum - WS 22/11/11	927123 2011-11-22 6 Klng-WS 22/11/11			OD CIL	GUIDELINE	
DADANETED	I INITS MRI				TYPE	-	LIMIT	UNITS
Escherichia Coli Heterotrophic Plate Count Faecal Streptococcus Faecal Streptococcus	CFU/100mL CFU/100mL CFU/100mL	0000	0000	- <u></u>	WAC			CFU100mL

APPROVAL: Kisia Quantifi Kisia Quantifi Microbiology Lab Supervisor

1 of 1

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

B-146 Colonnade Road, Oliawa, ON, K2E 7Y1

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

)				Accu		
Client: Paterson Group 28 Concourse Gate, Unit 1 Monean ON					Repo Date: Date:	Report Numbor: Date: Date Submitted:	112 201 201	1127271 2011-11-25 2011-11-23	
RSE 7TY K2E 7TY Attention: Mr. Robert Passmore					Project:	et:	Η̈́	PH1292	
					P.O. Nu Matrix:	P.O. Number: Matrix:	Water	ter	
Chain of Custody Number: 1413/8		LAB ID:	927147	927148			G	GUIDELINE	
	Samp Sanp	Sample Date: Sample ID:	2011-11-22 10 Cockbum- WS 22/11/11	2011-11-22 6 King-WS 22/11/11			ō	SOSWOO	
		MDI		-			TYPE	LIMIT	UNITS
PARAMETER	CNIC		260	260			2	500	mg/L
Alkalinity as CaCO3	mg/L mg/l	n -	46	46			AO	250	тgл
Chionale	TCU	. 01	4	2			AO	ഗ	ц Ц
Conductivity	uS/cm	5	694	698				ı	1
Dissolved Organic Carbon	mg/L	0.5	1.1	1.2			MAC	n 4	ugh molt
Fluoride	J/Gm	0.1	0.36	0.36 <0.01			Por Por	0.05	-Jon
Hydrogen Sulphide	mg/L mañ	0.0	0.06	0.09					
N-NH3 (Ammonia) N-NO2 (Nihite)	1/6m	50	<0.10	<0.10		2 : 	MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10 7.00	40.10		2		6.5-8.5	
PH	Į Den	0 001	08.7 200.0>	<0.001					
Prenois Suichate	¶/8u	-	47	47			AO	200	шgЛ
Tannin & Lignin		0.1	0 .	-0.1				EUD.	μu
Total Dissofted Solids (COND - CALC)	mg/L	- 2	451	434			 2	8	'n
Total Kjeldahl Nitrogen	mg/L NTU	5 6	6.5	3.4		2	MAC	1.0	NTU
lurbiolity Hardnoss as CaCO3	-1/6m	-	303	298		_	90	00	mg/L
Induces as cacoo on Balance	,	0.01	1.02	1.01					
Calcium	mg/L	-	75	73					
Magnesium	-mg/L	~	58	28					
Potassium	mg/L	~-	4	4 5			Q	200	mañ
Sodium	mg/L	2 2	R S	ې د د				0.3	- 1/6ш
Iron	mg/L	0.03	24 G	000			AO	0.05	Ē
Mangarese	mg/L	0.0	-0.0						•
						;			

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

APPROVAL: OW Lorna Wilson Inorganic Lab Supervisor

1 of 1

8-146 Colormade Road, Ottawa, ON, K2E 7Y1

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

Exova	mber: 1423579 nitted: 2014-11-04 orted: 2014-11-06 PH 1292 177452	not hesitate to call (613-727-5692).				A scope of accreditation. It can be found at	n soils). Licensed by Ontario MOE for specific tests		eline values listed on this report are provided for
IO <u>Certificate of Analysis</u>	Report Number: Date Submitted: Date Reported: Project: COC #:	Dear Robert Passmore: 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).		APPROVAL: Krista Quantrill APPROVAL: Krista Quantrill Laboratory Supervisor, Microbiology	s 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 .	sific 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)	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.
EXOVA ENVIRONMENTAL ONTARIO	Client: Paterson Group 154 Colonnade Rd. South Nepean, ON K2E 717 Attention: Mr. Robert Passmore PO#: Invoice to: Paterson Group	Dear Robert Passmore: Please find attached the analytical results	Report Comments:		All analysis is completed in Ottawa, Ontario (unless otherwise indicated).	Exova Ottawa is accredited by CALA, Canadian A http://www.cala.ca/scopes/2602.pdf	Exova (Ottawa) is certified and accredited for specific parameters by in drinking water.	Exova (Mississauga) is accredited for specific para	Please note: Field data, where presented on the re ease of use (informational purposes) only. Exova r

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Certificate of Analysis



2014-11-04 2014-11-06 PH 1292

Report Number: Date Submitted: Date Reported: 177452

Project: COC #:

1423579

Client: Attention: PO#:	Paterson Group 154 Colonnade Rd. South Nepean, ON K2E 7T7 Mr. Robert Passmore		
Invoice to:	Paterson Group		

ab I.D. 1144196 1144197 Sample Matrix Water Water	Sample 1 ype 2014-11-03 2014-11-04 Sample 1.D. TW6 - WS1 TW6 - WS1	Guideline	MAC-0 0 0	0	0	3 7	MAC-0 0 0
Sa	S Sa S	Units G	ct/100mL	ct/100mL	ct/100mL	ct/1mL	ct/100mL
		MRL	0	0	0	0	0
		Analyte	Escherichia Coli	Faecal Coliforms	Faecal Streptococcus	Heterotrophic Plate Count	Total Coliforms
		Group	Microbiology				

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 = 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 and/or additional QA/QC information available on request.

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

paterson Consulting Engineers 28 Concourse Gate, Unit 1, Nepean, Ontario, K2E 7T7

Well Inspection

T

No.

Tel: (613) 226-7381 Fax: (613) 226-6344

-

Client: TALOS					
Project: PHIZGZ					
Location to kind ST.					
Address: 2 couching	Field Supervisor:				
Homeowner Interviewed? Y/N	Date: Ser 201				
Well Inspected? (Y)N					
Quality Comments:					
Taste: IRow Oc	dour: No				
Colour: No issues H	ardness: 1/55				
Bacteria Testing: <u>YES - 0/0</u>					
Quantity Comments: (No ISSUES - No					
Flow Rate: Pu Pump Depth: Pr					
- amp Bopun					
Well Details:					
Type of Well: 6" Depth of Well: 100 ft-					
Age of Well: Mumo 2009/2011 Dri	ler: AIR Rock.				
Well Record Available: Yes more Sig	El				
Environmental Concerns: No Concorns					
Surface Water:					
Septic System: Land Use:					
Neighbouring Properties:					
Sketch:					
	*				
2					
TE					
(inter					
1					
TAG NO. A 028775	suburt				

Well Inspection

Manager

Description of the second seco

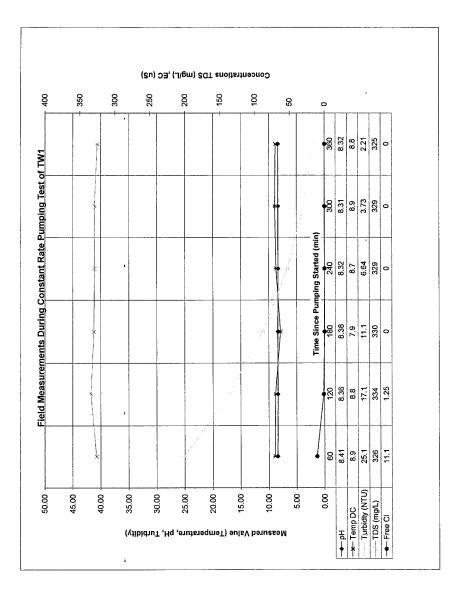
Client: TALos	
Project: PHIZ92	Construction of the Constr
Location 12 CareBorris	
Address: <u>/2 Courses</u> Homeowner Interviewed?(Y)/ N	Field Supervisor: LAP Date: Sept. 28/11
Well Inspected? Y/N	Date. Soft a III
Wein inspected?	
Quality Comments:	
Taste: No 15505 Oc	our: Now
Colour: No issues Ha	ardness: Tes
Bacteria Testing: <u>Yes</u> Au O/o.	
Quantity Comments:	
Flow Rate: NO ISSUES - GODD SUPPLY PL	IMP: SUBMERSIBLE IN GUOD SHAPE
Flow Rate: NO ISSUES - GOOD SUMMY PU Pump Depth: No IDEA Pr	oblems: Nove
Well Details:	
Type of Well: 6" Druco Der	oth of Well: <u>+80fl. (MEASUREDC 60 ft</u> +
Age of Well: #30 4. Druco IN GO' Dril	ler: N/A
Well Record Available: No	
Environmental Concerns: (NO Con con	NS RASOD)
Surface Water:	
Septic System: ABSENT	
Land Use:	
Neighbouring Properties:	
Sketch:	
causer	au

patersongroup

Well Inspection

Consulting Engineers 28 Concourse Gate, Unit 1, Nepean, Ontario, K2E 7T7 Tel: (613) 226-7381 Fax: (613) 226-6344

Client: TALOS	
Project: <u>PH1292</u>	
Location 10 King ST Richmon	>
Address: 6 KING ST	Field Supervisor: DAC
Homeowner Interviewed? Y/ N	Date: Sept. 28/11
Well Inspected? Y N	
	1
Quality Comments:	
laste: <u>hne</u>	ardness: Mio
Colour: N	lardness: <u>Mro</u>
Bacteria Testing: Yes Au ofc	1
Quantity Comments:	
FIOW KATE: NOISSIES F	unip. the halfnetire preson
	roblems: - Jucture of well such air
	spinger was promit
Well Details:	onth of Well:
Type of Well: 6 0 Druco De	epth of Well:
Age of Well. 20 4/05 DI	
Well Record Available: 105	
Environmental Concerns:	
Surface Water: Nove Septic System: Absent	
Land Use: No concrete S	
Neighbouring Properties:	
Sketch:	1
	AN, TA BOTHERAM
	613 -839 - 4909
·)	
Lan Lan	
	USED AS OBSERVATION
	WELL FOR TESTINK
the second secon	-> CONECTED RAN
	WATER SAMPLE
KING ST.	
MING 2	



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TW NO. 1 PH1292

Free CI	11.1 0 0 0 0	
_	326 329 329 329 329 329 329	
(NTU) TDS	25.1 17.1 11.1 6.64 3.73 2.21	
rations Temp DC Turbidity (NTU) TDS (mg/L)	8 8 7 7 8 8 9 7 8 8 8 7 8	
Field Concentrations DH Temp ⊡	8.41 8.38 8.33 8.33 8.33	
Field Time since pH pump start (min)	60 61 240 300 360	

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	u.	4	Ω	88	340	g	2	35
	TDS (mg/L)							
	ations Temp DC Turbidty (NTU) TDS (mg/L)	50	10.7	8.73	14.7	6.42	10.7	3.64
	Temp DC				6			8.8
PH1292	Field Concentrations pH Temp [8.19	8.15	8.15	8.00	8.05	7.96	8.05
٩	μσ	15	60	120	180	240	300	360
TW NO. 2	Time since pump start (min)							

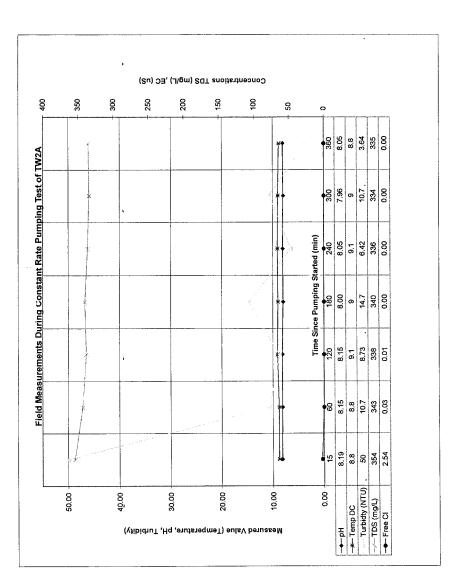
Free CI

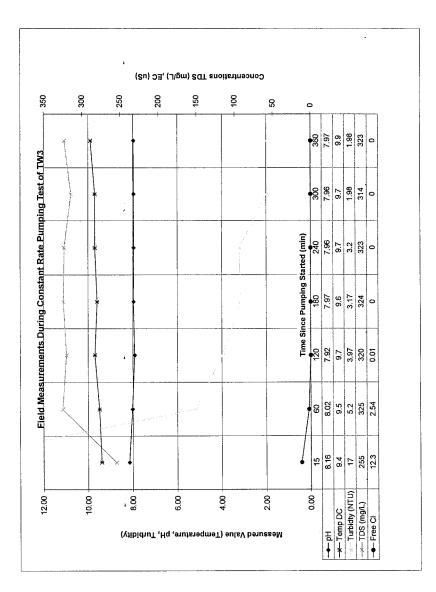
2.54 0.03 0.00 0.00 0.00

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TW NO. 3 PH1292

 Field Concentrations
 Free Cl

 Time since pH
 Temp DC
 Turbidy (NTU)
 TDS (mg/L)
 Free Cl

 pump start (min)
 15
 8.16
 9.4
 17
 255
 12.3

 15
 8.16
 9.4
 17
 255
 12.3

 16
 8.16
 9.4
 17
 255
 12.3

 15
 8.16
 9.4
 17
 255
 12.3

 16
 8.02
 9.7
 3.97
 324
 0

 180
 7.97
 9.6
 3.17
 324
 0

 200
 7.96
 9.7
 1.98
 314
 0

 300
 7.97
 9.9
 1.98
 323
 0

i

TW NO. 4 PH1292

 Field Concentrations
 Field Concentrations

 Time since
 pH
 Temp DC
 Turbidty (NTU)
 TDS (mg/L)
 free cl

 pump start (min)
 60
 8.50
 11.5
 1.33
 319
 3.51

 120
 8.43
 11.3
 0.79
 3.22
 0
 0

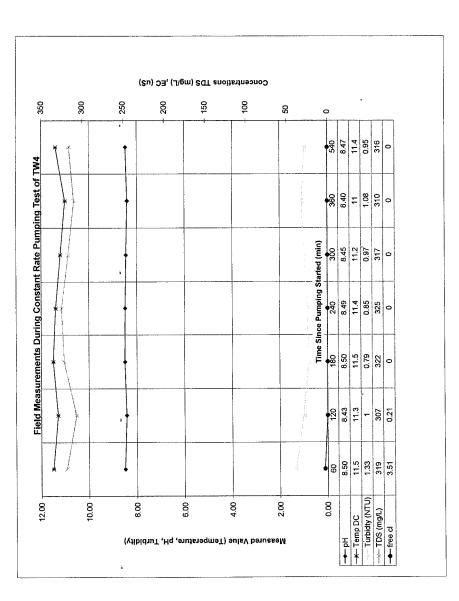
 240
 8.45
 11.4
 0.85
 3.17
 0
 0

 300
 8.46
 11.4
 0.86
 3.10
 0
 0

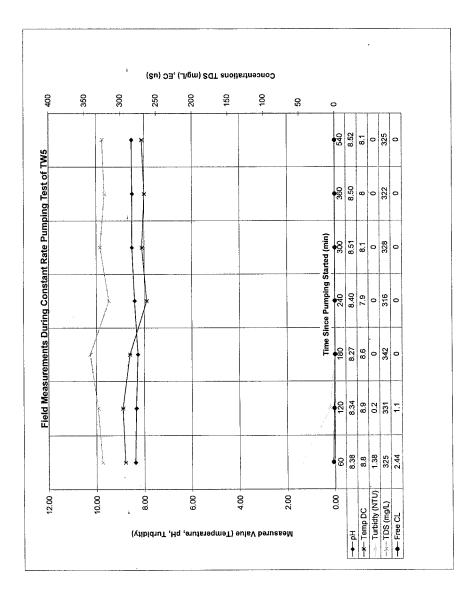
 300
 8.46
 11.2
 0.79
 3.22
 0
 0

 300
 8.47
 11.4
 0.95
 3.10
 0
 0
 0

 300
 8.47
 11.4
 0.95
 3.10
 0
 0



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TW NO. 5 PH1292

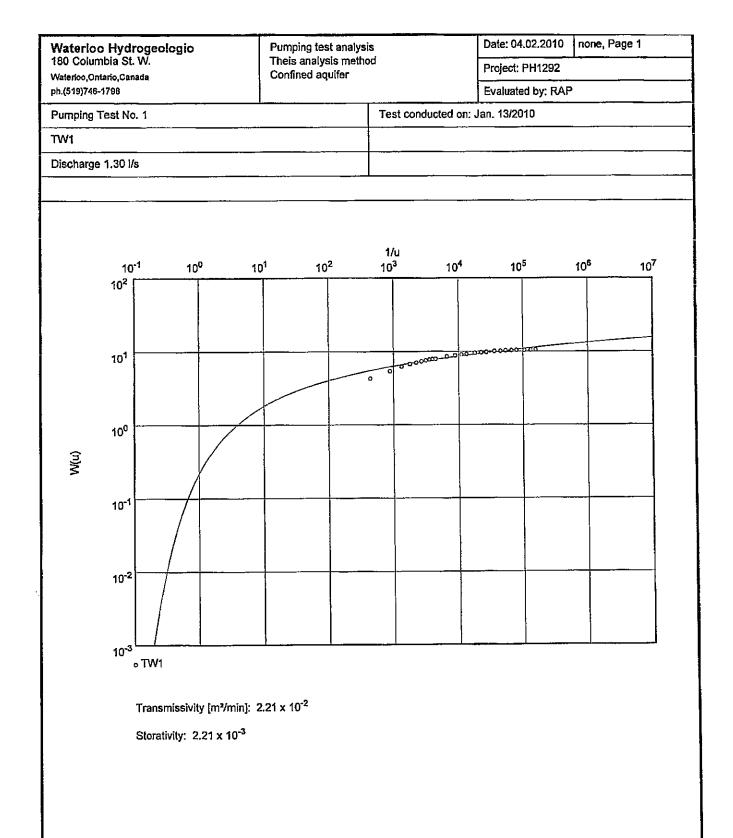
2, 1,1 0 0 0 0 0 0 Field Concentrations Time since pH Temp DC Turbidty (NTU) TDS (mg/L) Free CL pump start (min) 325 331 342 316 328 328 328 328 1.38 0.0 0 0 0 0 0 2 8 8.9 8.9 8.1 8.1 8.1 8.1 8.38 8.34 8.27 8.50 8.50 8.50 60 240 360 360 540 540 540

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APPENDIX 4

- Aquifer Analysis Data
- Potential Well Interference Calculation
- Hydrographic Logs Simultaneous and Extended Pumping



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Waterloo Hydrogeologic Pumping test a 180 Columbia St. W. Theis analysis		Pumping test analysi Theis analysis metho	s xol	Date: 04.02.2010	none, Page 2		
Waterloo,Onta	rio,Canada	Confined aquifer		Project: PH1292			
ph.(519)746-17	'98		Evaluated by: RAP				
Pumping Te	est No. 1		Test conducted on:	Jan. 13/2010			
TW1			TW1				
Discharge 1	.30 l/s		Distance from the p	umping weil 0.300 m			
Static water	level: 2.090 m below datum						
P	umping test duration	Water level	Drawdo	מאכ			
	[min]	[m]	<u>[m]</u>				
2	1.00	3,290		1.200			
3	2.00	3.610		1.520			
4	3.00	3.830		1.740			
5	4.00	3.980		1.890			
6	5.00	4.070	annual an	1.980			
7	6.00	4.140		2.050			
8	7.00	4.210 4.270		2.120 2.180			
9	9.00	4.270		2.180			
11	10.00	4.310		2.230	<u> </u>		
12	15.00	4.480		2.390			
13	20.00	4.570		2.480			
14	25.00	4.640	,	2.550			
15	30.00	4.680		2,590			
16	40.00	4.760		2.670			
17	50.00	4.810		2.720			
18	60.00	4.840		2.750			
19	80.00	4.920		2,830 2.850			
20 21	120.00	4,940		2.880			
21	150.00	4.980		2.890			
23	180.00	5.010		2.920			
24	240.00	5.020	and the second	2.930			
25	300,00	5,030		2.940			
26	360.00	5.040		2.950			
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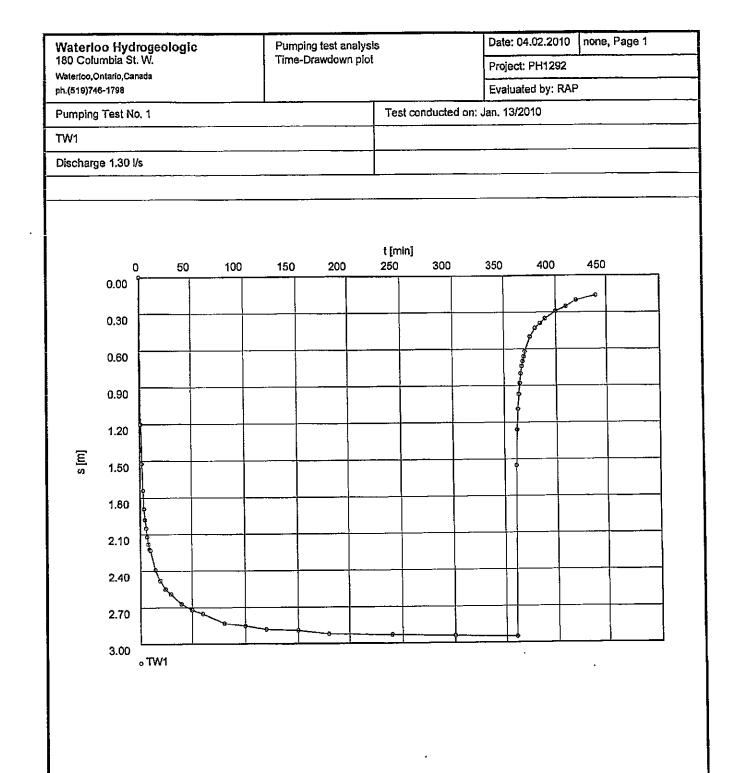
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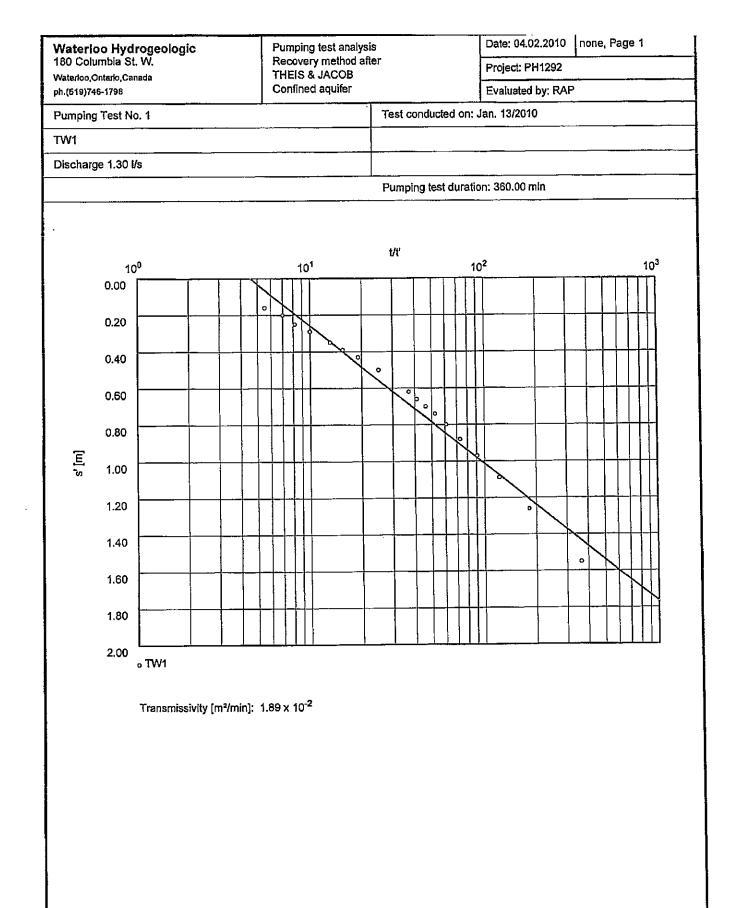
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Waterioo Hydrogeologic 180 Columbia St. W. Waterioo,Ontario,Canada		Pumping test analysis Time-Drawdown plot		Date: 04.02.2010 none, Page 2		
				Project: PH1292		
ph.(519)7				Evaluated by: RA	P	
Pumpin	g Test No. 1		Test conducted or	: Jan. 13/2010	<u></u> .	
TW1			TW1			
Dischar	ge 1.30 l/s		Distance from the	pumping well 0.300 i	m	
Static w	vater level: 2.090 m below datum	,,				
	Pumping test duration	Water level	Drawe	nwob		
1	[min]	[m]	[n			
1	0.00	2.090		0,000	·	
2	1.00	3.290		1.200		
3	2.00	3.610		1.520		
4	3.00	3.830		1.740		
5	4.00	3.980		1.980		
6	5.00	4.070		2.050	<u> </u>	
8	7.00	4.140		2.120		
	8.00	4.270		2.180		
10	9.00	4.310		2.220		
11	10.00	4.320		2,230		
12	15.00	4.480		2.390		
13	20.00	4.570		2,480		
14	25.00	4.640		2.550		
15	30.00	4.680		. 2.670		
16	40.00	4.780		2.720		
17	50.00 60.00	4.840		2.750		
10	80.00	4.920		2.830		
20	100.00	4.940	<u> </u>	2.850		
21	120.00	4.97)	2.880		
22	150.00	4,980		2.890		
23	180.00	5.010		2.920	<u></u>	
24	240.00	5.020		2.930	. <u> </u>	
25	300.00	5.030		2,940		
26	360.00	5,040	second	1.550		
27	361.00 362.00	3.35	and the second se	1.260	<u> </u>	
28 29	363.00	3.18		1.090		
30	364.00	3.06		0.970		
- 31	365.00	2.97	and the second se	0.880		
32	366.00	2.89		0.800	·	
33	367.00	2.83		0.740		
34	368.00	2.79		0.700		
35	369.00	2.75		0.620		
36	370.00	2.71		0.500		
37	375.00 380.00	2.59	the second se	0.430		
38 39	385.00	2.32		0.390		
- 39 - 40	390.00	2.44		0.350		
40 41	400.00	2,38		0.290		
42	410.00	2.34		0.250		
43	420.00	2.29		0.200		
44	440.00	2.25	50	0.160		
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Waterloo Hydrogeologic 180 Columbia St. W.		Pumping test analysis Recovery method after		Date: 04.02.201	· · · · · · · · · · · · · · · · · · ·		
Waterloo,On	tario,Canada	THEIS & JACOB Confined aquifer		Project: PH1292			
ph.(519)746-			Evaluated by: RAP				
Pumping 1	Test No. 1		Test conducted on: Jan. 13/2010				
TW1			TW1				
Discharge	1.30 l/s		Distance from the pu		i m		
Static wate	er level: 2.090 m below datum		Pumping test duration				
	Time from	Water level	Residu				
	end of pumping		drawdow	wn			
	[min]	[m]	[m]	1.550			
1	1.00	3.640 3.350		1.260			
3	3.00	3.180		1.090			
4	4.00	3.060		0.970	,		
5	5.00	2.970		0.880			
6	6.00	2.890		0.800			
7	7.00	2,830		0.740			
8	8.00	2.790		0.700			
9	9.00	2.750		0.660			
10	10.00 15.00	2.710		0.500			
11 12	20.00	2.590		0.430			
13	25.00	2.320		0.390			
14	30.00	2.440		0.350			
15	40.00	2.380		0.290			
16	50,00	2.340		0.250			
17	60.00	2.290		0.200			
18	80.00	2.250		0.160			
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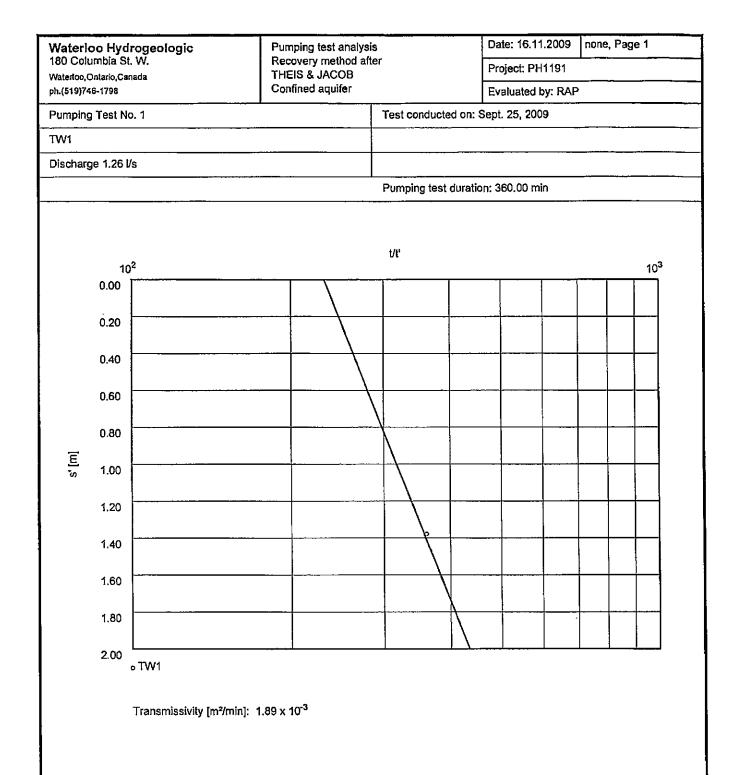
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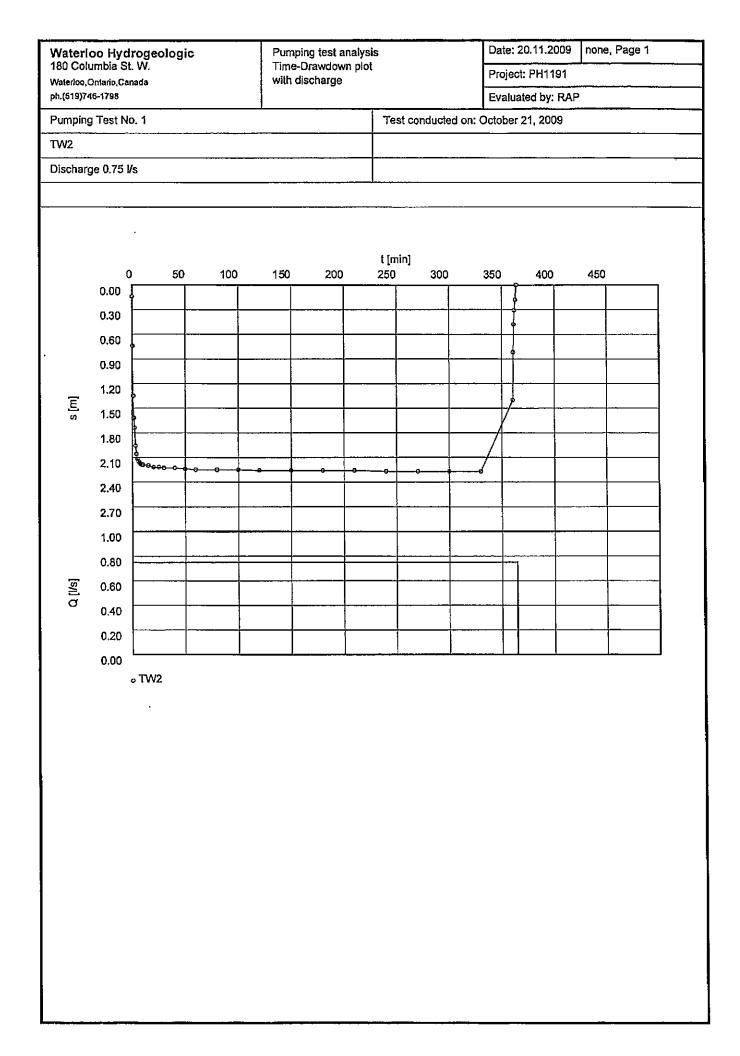
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Waterloo 180 Columb	Hydrogeologic	Pumping test analysi Time-Drawdown plot		Date: 16.11.2009	none, Page 2
Waterloo,Onta	rio,Canada	with discharge		Project: PH1191	
ph.(519)746-17	798			Evaluated by: RA	\P
Pumping Te	est No. 1		Test conducted	on: Sept. 25, 2009	
TW1			TW1		
Discharge 1	1.26 l/s				
Static water	level: 2.575 m below datum				
P	umping test duration	Water level	Drav	wdown	
1	[min] 0.00	[m] 0.000		[m] -2.575	
2	1.00	2.575		0.000	
3	2.00	3.885		1.310	
4	3.00	4.845		2.270	
5	4.00	5.645		3.070	·
6 7	5.00 6.00	6.185 6.645		3.610	
8	7.00	7.050		4.070	
9	8.00	7.030		4.655	
10	9.00	7.455		4.880	· · · · · · · · · · · · · · · · · · ·
11	10.00	7.755		5.180	
12	15.00	8.290		5.715	
13 14	20.00	8.520 8.640		5.945	
14	30.00	8.700		6.065 6.125	
16	40.00	8.745		6.170	
17	50.00	8.780		6.205	
18	60.00	8.790		6.215	
19	90.00	8.795		6.220	
20	120.00	8.780		6.205	
21 22	150.00 180.00	8.775		6.200 6.160	
23	210.00	8.690		6.115	
24	240.00	8.705		6.130	
25	270.00	8.690		6.115	
26	300.00	8.660		6.085	
27 28	330.00 360.00	8.675		6.100 6.075	
28	361.00	3.955		1.380	••
30	362.00	1.870		-0.705	·····-
31	363.00	0.505	; [-2.070	· · · ·
32	363.50	0.000		-2.575	
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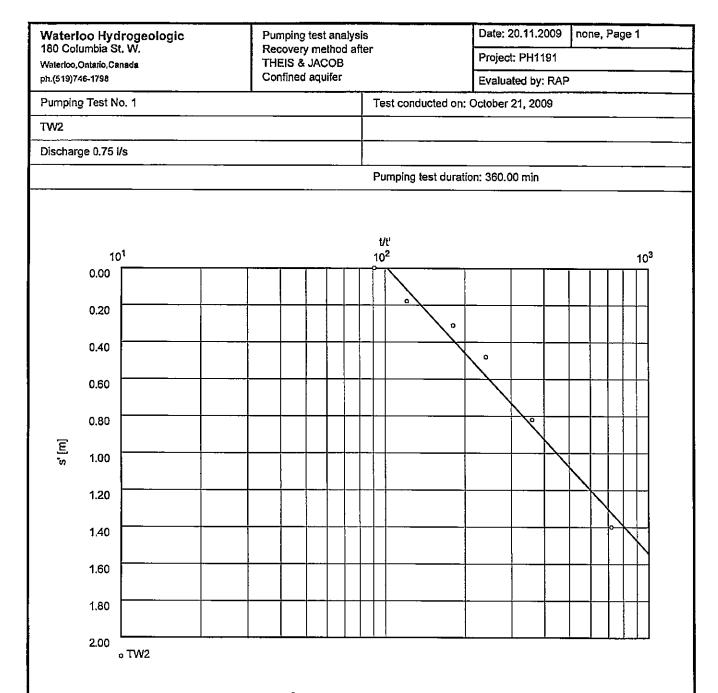
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Waterloo Hy 180 Columbia	drogeologic	Pumping test analysi	is	Date: 16.11.2009	none, Page 2	
Waterloo,Ontario,C		Recovery method aft THEIS & JACOB		Project: PH1191		
ph.(519)746-1798		Confined aquifer		Evaluated by: RAP		
Pumping Test I	nping Test No. 1 Test conducted on: Sept. 25, 2009					
TW1			TW1	1		
Discharge 1.26	i 1/s			- <u>-</u>	· · · · · · · · · · · · · · · · · · ·	
Static water lev	vel: 2.575 m below datum		Pumping test durat	ion: 360.00 min		
en	Time from ad of pumping	Water level	Resid drawdd	חשט		
1	[min] 1.00	[m] 3.955	[m]	1.380		
2	2.00	1.870		-0.705		
3 4	3.00 3.50	0.505		-2.070 -2.575	·····	
			·····	-2.010		
		,,,,,,,,			·····	
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		<u>.</u>		····-		
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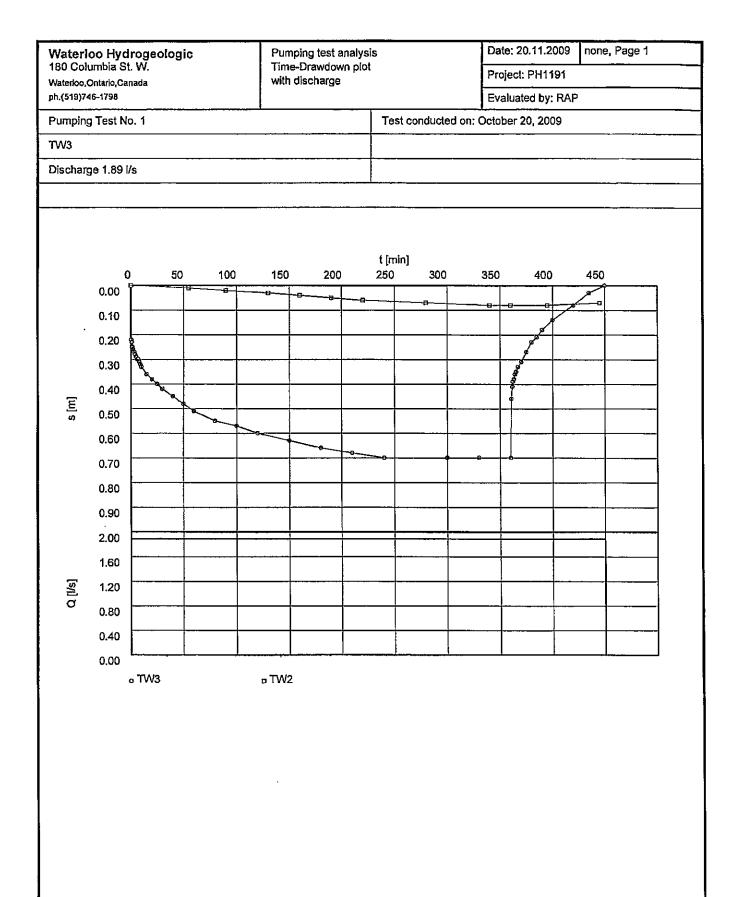


Waterloo, C ph. (519)74 Pumping TVV2		Time-Drawdown plot with discharge		Project: PH1191			
Pumping					Project: PH1191		
TW2					Evaluated by: RAP		
	Pumping Test No. 1		Test conducted on: October 21, 2009				
Discharg			TW2				
Discharg	e 0.75 l/s		<u></u>				
	iter level: 0.000 m below datum						
	Pumping test duration	Water level	Drawo	down			
	r emping test duration	ANGICI JEACI	Diawo				
	[min]	[m]	[m]	1			
1	0.00	0.140		0.140			
2 3	0.50	0.740		0.740			
3 4	<u> </u>	1.350		1.350			
5	2.00	1.740		1.740			
6	3.00	1.960		1.960	<u> </u>		
7	4.00	2.060		2.060	······································		
8	5.00	2.120		2.120			
9 10	6.00 7.00	<u>2.150</u> 2.170		2.150	-•		
11	8.00	2.170		2.170 2.180			
12	9.00	2.190		2.190			
13	10.00	2.190		2.190			
14	15.00	2.200		2.200			
15	20.00	2.220		2.220			
16 17	25.00	2.220		2.220			
18	30.00 40.00	2.230		2.230 2.230			
19	50.00	2.240		2.240			
20	60.00	2.250		2.250			
21	80.00	2.250		2.250			
22	100.00	2.250		2.250			
23 24	120.00 150.00	2.260		2.260			
25	180.00	2.260		2.260	<u> </u>		
26	210.00	2.260		2.260			
27	240.00	2.270		2.270	·····		
28	270.00	2.270		2.270			
29	300.00	2.270		2.270	· · · · · · · · · · · · · · · · · · ·		
30 31	330.00 360.50	2.270	[2.270	<u> </u>		
32	361.00	0.820		1.400 0.820			
33	361.50	0.480		0.480			
34	362.00	0.310		0.310			
35	363.00	0.180		0.180			
36	364.00	0.000		0.000	<u> </u>		
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	·····	<u> </u>					
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Transmissivity [m²/min]: 5.29 x 10-3

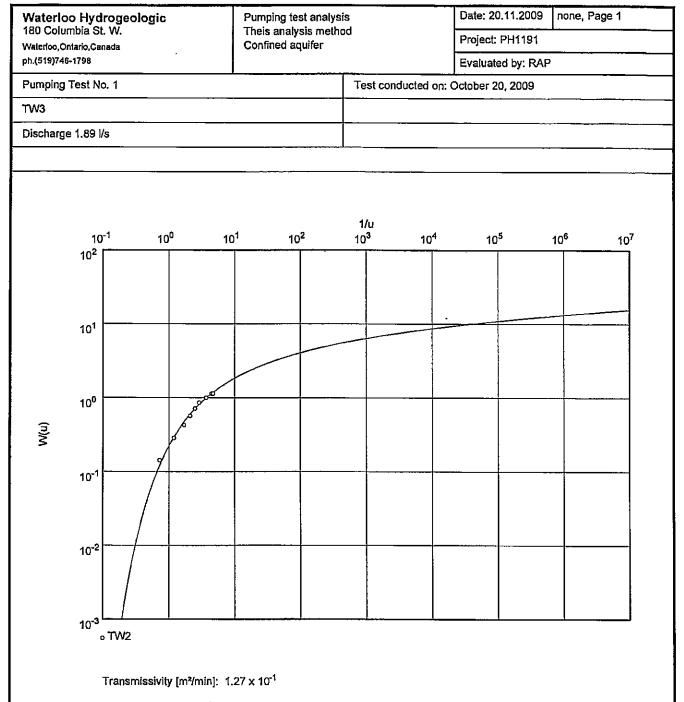
Water	loo Hydrogeologic Pumping test analysis lumbia St. W. Recovery method after		S	Date: 20.11.2009	none, Page 2
Waterloo	o,Ontario,Canada	Recovery method aft THEIS & JACOB Confined aquifer	er	Project: PH1191	· · · · · · · · · · · · · · · · · · ·
	746-1798			Evaluated by: RAI	
	ng Test No. 1	Test conducted on:	October 21, 2009		
TW2					
	rge 0.75 l/s				
Static v	water level: 0.000 m below datum		Pumping test durati		
	Time from	Water level	Resid		
	end of pumping	[m]	drawdo		
1	[min] 0.50	[m] 1.400	(m)	1.400	······································
2	1.00	0.820		0.820	
3	1.50 2.00	0.480		0.480	
4	3.00	0.310		0.310 0.180	
6	4.00	0.000		0.000	
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Waterloo Hydrogeologic		Pumping test analysis		Date: 20.11.2009	none, Page 2		
	olumbia St. W. o,Ontario,Canada	Time-Drawdown plot with discharge	Project: PH1191				
	746-1798			Evaluated by: RAP			
Pumpi	ng Test No. 1	· · · · · · · · · · · · · · · · · · ·	Test conducted on: October 20, 2009				
TW3			TW3				
	arge 1.89 l/s		<u></u>	, <u>, ann</u>			
Static	water level: 0.000 m below datum				· · · · · · · · · · · · · · · · · · ·		
	Pumping test duration	Water level	Drawdo	wn			
	(min)	[m]	[m]				
1	0.00	0.000		0.000			
2	0.50	0.220		0.220			
3	1.00 1.50	0.230		0.230	······		
	2.00	0.260		0.260			
6	3.00	0.270		0.270	,		
7	4.00	0.280		0.280			
8	5.00	0.290		0.290			
9 10	6.00 7.00	0.300		0.300			
11	8.00	0.310		0.310			
12	9.00	0.320		0.320			
13	10.00	0.330		0.330			
14	15,00	0.360		0.360			
15 16	20.00	0.380		0.380			
17	30.00	0.420		0.400			
18	40.00	0.450		0.450			
19	50.00	0.480		0.480			
20	60.00	0.510		0.510			
21 22	80.00 100.00	0.550		0.550			
23	120.00	0.600		0.600			
24	150.00	0.630		0.630			
25	180.00	0.660		0.660			
26	210.00	0.680		0.680			
27 28	240.00 300.00	0.700		0.700			
20	330.00	0.700		0.700			
30	360.00	0.700		0.700			
31	360.50	0.460		0.460			
32	361.50	0.410		0.410			
33 34	362.00	0.390		0.390			
34	364.00	0.360		0.360	·· · · ·		
36	365.00	0.350		0,350			
37	367.00	0.330	D	0.330			
38	370.00	0.310		0.310			
39 40	375.00 380.00	0.270		0.270			
40	385.00	0.230		0.230			
42	390.00	0.180		0.180	- <u>mtuu</u>		
43	400.00	0.140		0.140			
44	420.00	0.080		0.080			
45	435.00	0.030		0.030	····		
46	450.00	0.00	, <u> </u>	0.000			
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			·····		·		

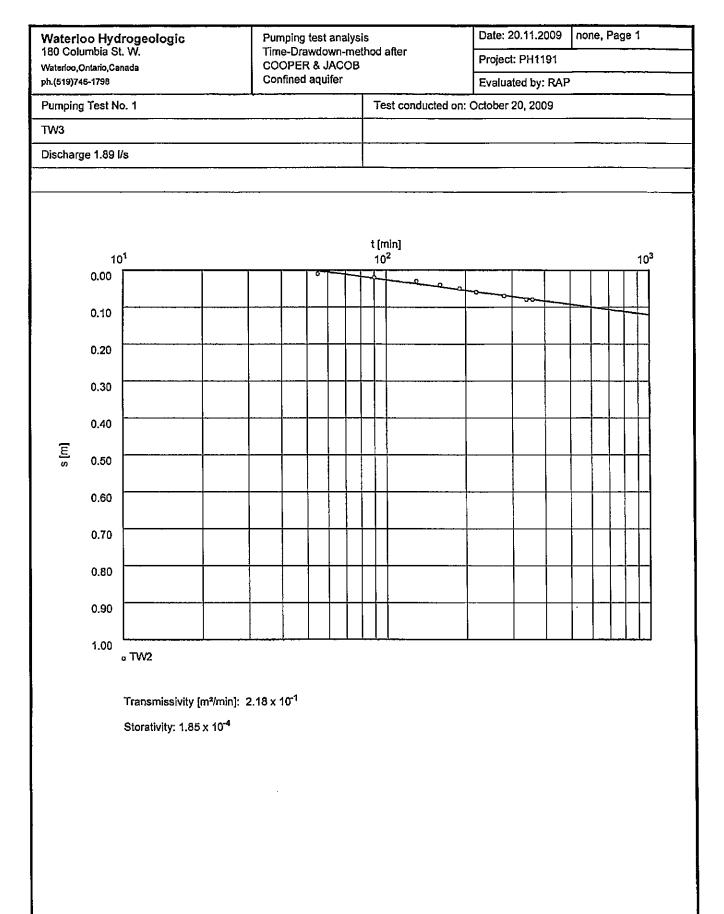
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Wateric	oo Hydrogeologic Imbia St. W.	Pumping test analysis		Date: 20.11.2009	none, Page 3		
	Impla St. VV. Intario,Canada	Time-Drawdown plot with discharge		Project: PH1191			
ph.(519)74	6-1798		Evaluated by: RAP				
Pumping	Test No. 1		Test conducted on: October 20, 2009				
TW3			TW2				
Discharg	e 1.89 l/s		Distance from the pu	mping well 376.000	m		
Static wa	ater level: 0,100 m below datum	I_					
	Pumping test duration	Water level	Drawdov	พก			
	[min]	[m]	[m]				
1	0.00	0.100		0.000			
2	55.00 90.00	0.110		0.010			
4	130.00	0.120		0.020			
5	160.00	0.140	_	0.040			
6	190.00	0,150		0.050			
7	220.00	0.160		0.060			
8	280.00 340.00	0.170 0.180		0.070			
10	360.00	0.180		0.080	· · · · · · · · · · · · · · · · · · ·		
11	395.00	0.180		0.080			
12	445.00	0.170		0.070			
							
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Wate	rloo Hydrogeologic olumbia St. W.	Pumping test analysis		Date: 20.11.2009	none, Page 2		
	olumbia St. W. xx,Onterio,Ceneda	Theis analysis methor Confined aquifer	đ	Project: PH1191	roject: PH1191		
)746-1798			Evaluated by: RAP	<u></u>		
Pump	ing Test No. 1	•	Test conducted on: (Dctober 20, 2009			
TW3			TW3				
Disch	arge 1.89 l/s						
Static	water level; 0.000 m below datum	<u></u>			, <u></u>		
	Pumping test duration	Water level	Drawdov	vn			
	[nin]	[m]	[m]				
2	0.50	0.220		0.220			
3	1.00	0.230		0.230			
4	1.50	0.250		0.250			
5	2.00	0.260		0.260			
6 7	3.00	0.270		0.270			
8	5.00	0.200		0.290			
9	6.00	0.300		0.300			
10	7.00	0.300		0.300			
11	8.00	0.310		0.310			
12 13	9.00	0.320		0.320			
13	10.00	0.330		0.330			
15	20.00	0.380		0.380			
16	25.00	0.400		0.400			
17	30.00	0.420	····	0.420			
18	40.00	0.450		0.450	¥		
19	50.00	0.480		0.480			
20 21	60.00 80.00	0.510		0.510			
21	100.00	0.550		0.550			
23	120.00	0.600	·	0.600	·····		
24	150.00	0.630	-	0.630			
25	180.00	0.660		0.660			
26	210.00	0.680		0.680	· · ·		
27 28	240.00 300.00	0.700		0.700			
20	330.00	0.700		0.700			
30	360.00	0.700		0.700			
							
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	Hydrogeologic ia St. W.	Pumping test analysi Theis analysis metho	is od	Date: 20.11.2009 none, Page 3 Project: PH1191	
Waterloo,Ontar ph.(519)746-17		Confined aquifer		Evaluated by:	
Pumping Te			Test conducted	on: October 20, 200	·
TW3		· · · ·	TW2		
Discharge 1	.89 l/s		Distance from th	ne pumping well 376.	.000 m
Static water	level: 0.100 m below datum				
Pu	umping test duration	Water level	Dra	wdown	
	[min]	[m]		[m]	
2	55.00	0.110		0.010	· .
3	90.00	0.120		0.020	
4	130.00	0.130		0.030	
5	160.00	0.140		0.040	
6	190.00	0.150		0.050	
7	220.00	0.160		0.060	<u>.</u>
8	280.00	0.170		0.070	
9	340.00	0.180		0.080	
10	360.00	0.160		0.080	·····
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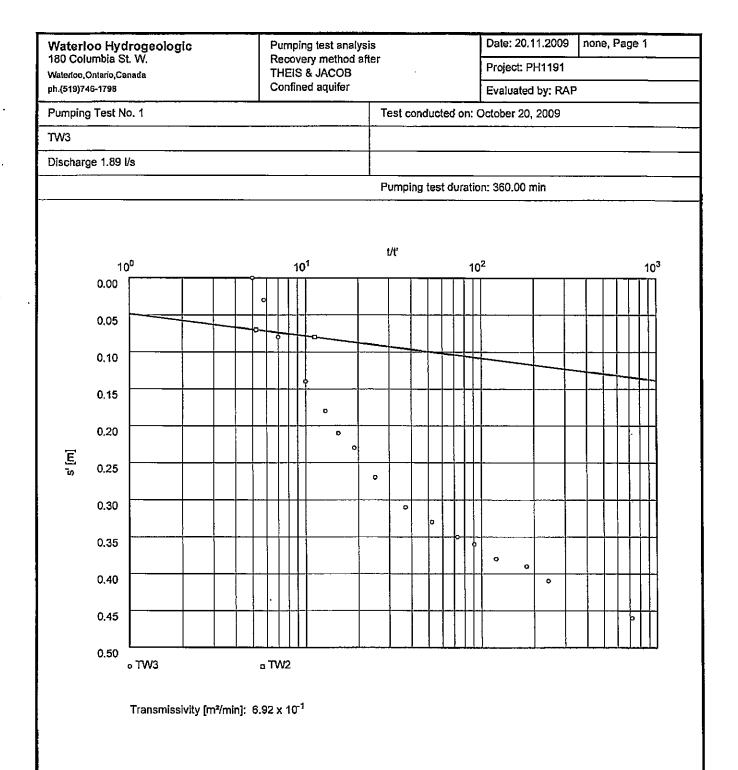
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	Wateric	o o Hydrogeologic Imbia St. W.	Pumping test analysi Time-Drawdown-met	s hod after	Date: 20,11.200	
		Impla St. vv. Intario,Canada	COOPER & JACOB	nou aner	Project: PH119	1
	ph.(519)74	6-1798	Confined aquifer		Evaluated by: F	RAP
•	Pumping	Test No. 1		Test conducted	d on: October 20, 2009)
	түүз			TW3		
-						
	Discharg	e 1.89 l/s				· ·
	Stațic wa	ater level: 0.000 m below datum				
		Pumping test duration	Water level	Dr	awdown	
	•					
		[min]	[m]		[m]	
. '	2	0.50	0.220		0.220	
	3	1.00	0.230		0.230	
	• 4	1.50	0.250		0.250	
•.	5	2.00 3.00	0.260		0,260	· ·
	7	4.00	0.280		0.280	
	8	5.00	0.290		0.290	
	9	6.00	0.300		0.300	
	10 11 .	7,00	0.300		0.300	
	12	9.00	0.310	-	0.310	
	13	10.00	0.330		0.330	
	14	15.00	0,360		0.360	
	15	20.00	0.380		0.380	
	16 17	25.00	0.400		0.400	
	18	40.00	0.450		0.450	
	19	50.00	0.480		0.480	
	20	60.00	0.510		0.510	
	21 22	80.00	0.550 0.570		0.550	
	22	120.00	0.600		0.600	
	24	150.00	0.630		0.630	· · · · · · · · · · · · · · · · · · ·
	25	180.00	0.660		0.660	
	26 27	<u>210.00</u> 240.00	0,680		0.680	
	28	300.00	0.700		0.700	
	29	330.00	0.700		0.700	
	30	360.00	0.700		0.700	
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Waterl	oo Hydrogeologic umbia St. W.	Pumping test analysis	S	Date: 20.11.2009	none, Page 3		
Waterioo,	Ontario,Canada	Time-Drawdown-met COOPER & JACOB	hod after	Project: PH1191			
pn.(519)7	46-1798	Confined aquifer		Evaluated by: RAP	, 		
Pumpin	g Test No. 1		Test conducted on: October 20, 2009				
TW3	<u></u>		TW2				
Dischar	ge 1.89 l/s		Distance from the p	umping well 376.000	m		
Static w	rater level: 0.100 m below datum						
	Pumping test duration	Water level	Drawdo	wn			
	[ກ(ກ]	[m]	·[m]				
2	55.00	0.110		0.010			
3	90.00	0.120		0.020			
4	130.00 160.00	0.130		0.030			
	190.00	0.140		0.040			
7	220.00	0.160		0.060	······································		
8	280.00	0.170		0.070			
9	340.00	0.180		0.080			
10	360.00	0.180		0.080			
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Wate	rioo Hydrogeologic olumbia St. W.	Pumping test analysi	s	Date: 20.11.2009	none, Page 2		
Waterlo	o,Ontario,Canada	Recovery method after THEIS & JACOB	er	Project: PH1191			
ph.(519)746-1798	Confined aquifer		Evaluated by: RAP	· · · · ·		
Pumpi	ing Test No. 1		Test conducted on: October 20, 2009				
TW3		_	TW3				
Discha	arge 1.89 l/s			"			
Static	water level: 0.000 m below datum		Pumping test duration	n: 360.00 min			
	Time from	Water level	Residua	al			
ľ	end of pumping		drawdov	vn			
	[min]	[m]	[m]		····		
1	0.50	0.460		0.460			
3	2.00	0.390		0.390			
4	3.00	0.380		0.380			
5	4.00	0.360		0.360			
6	5.00 · 7.00	0.350		0.350			
	10.00	0.330		0.330 0.310			
9	15.00	0.270		0.270			
10	20.00	0.230		0.230	<u> </u>		
11	25.00	0.210		0.210			
12 13	30.00 40.00	0.180		0.180			
14.	60.00	0.140		0.140			
15	75.00	0.030		0.030			
16	90.00	0.000		0.000			
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ſ	Wate	erloo Hydrogeologic olumbia St. W.		Pumping test analysis	5		Date: 20.11.	2009	none, Page 3
		olumbia St. W. xx,Ontario,Canada		Recovery method after THEIS & JACOB	er		Project: PH1	191	· · · · · · · · · · · · · · · · · · ·
)746–1798		Confined aquifer			Evaluated by	: RAP	,
	Pump	ing Test No. 1			Те	est conducted on: (October 20, 20	09	
	TW3				T۷	₩2			
·	Disch	arge 1.89 l/s			Distance from the pumping well 376.000 m				
	Static	water level: 0.100 m below datum	1		Pumping test duration: 360.00 min				
ľ		Time from		Water level		Residua			
		end of pumping		f1		drawdov [1	vn		
ŀ	1	[min] 35.00		[m] 0.180		[m]	0.080		<u></u>
	. 2	. 85.00		0.170			0.070		
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	•	P Ti	umping Test: Pump est Date: 8/26/201 tatic Water Level [r	Number: PH12 Client: ping Test 1	Pumping Well: TW4	
Location: Test Conduc Observation	ted by: Well: TW4 Time [min] 0 1 2 3	Transformed Provide American Strand S	est Date: 8/26/201	Client: ping Test 1	Pumping Well: TW4	
Test Conduc Observation	Well: TW4 Time [min] 0 1 2 3	Ti S Water Level	est Date: 8/26/201	bing Test 1		
Test Conduc Observation	Well: TW4 Time [min] 0 1 2 3	Ti S Water Level	est Date: 8/26/201			
Observation	Well: TW4 Time [min] 0 1 2 3	S Water Level		1		
Observation	Well: TW4 Time [min] 0 1 2 3	S Water Level			Discharge Rate: 1.26 [l	/s]
1 2 3 4 5 6 7 8 9	Time [min] 0 1 2 3	Water Level	сель: хувоет селет (Radial Distance to PW	
2 3 4 5 6 7 8 9	0 1 2 3	[m]	Drawdown			[,,,],
2 3 4 5 6 7 8 9	1 2 3		[m]			
3 4 5 6 7 8 9	2	2.09	0.00			
4 5 6 7 8 9	3	4.49	2.40	_		
5 6 7 8 9		5.97	3.88			
6 7 8 9		6.16	4.07			
7 8 9		6.57	4.48	_		
8 9	5 6	6.86 7.04	4.77 4.95			
9	7	7.04	5.08			
	8	7.17	5.08			
	9	7.30	5.21	_		
11	10	7.33	5.24	_		
12	15	7.43	5.34	-		
13	20	7.46	5.37			
10	25	7.47	5.38			
15	30	7.47	5.38	_		
16	40	7.495	5.405	-		
17	50	7.525	5.435			
18	60	7.535	5.445			
19	80	7.54	5.45	\neg		
20	100	7.57	5.48			
21	120	7.55	5.46	-		
22	180	7.49	5.40	-		
23	240	7.45	5.36			
24	300	7.415	5.325			
25	360	7.43	5.34			
	420	7.37	5.28			
	480	7.36	5.27			
	540	7.38	5.29			
29	541	3.89	1.80			
30	542	2.91	0.82	·		
31	543	2.63	0.54			
	544	2.55	0.46	_		
	545	2.52	0.43			
	546	2.51	0.42	_		
	550	2.46	0.37	_		
	555	2.44	0.35	_		
	560	2.41	0.32	_		
	565 580	2.40	0.31			

	on Group Inc.	_		Pumping Test - Water Level Data Pa			
	olonnade Road Sout a, Ontario K2E 7J5	h		Project: Talos-	Deep Well Analysis		
				Number: PH129	92		
				Client:			
Locatio	en:		Pumping Test: Pump	bing Test 1	Pumping Well: TW4		
Test Co	onducted by:		Test Date: 8/26/2011		Discharge Rate: 1.26 [l/s]		
Observ	vation Well: TW1		Static Water Level [r	n]: 2.38	Radial Distance to PW [m]: 56.26	
	Time (min)	Water Level [m]	Drawdown (m)				
- 1	0	2.38	0.00				
2	60	2.705	0.325				
3	120	2.75	0.37	-			
4	180	2.75	0.37				
5	240	2.75	0.37				
6	300	2.75	0.37				
7	360	2.75	0.37				
8	420	2.81	0.43				
9	480	2.83	0.45				
10	540	2.85	0.47				
11	580	2.59	0.21				

	on Group Inc.			Pumping Test - Water Level Data Page 1 of				
	olonnade Road Sout a, Ontario K2E 7J5	h		Project: Talos- Deep Well Analysis				
				Number: PH129	92			
				Client:		· · · · ·		
Locatio	on:		Pumping Test: Pump	ing Test 1	Pumping Well: TW4			
Test Co	onducted by:	-	Test Date: 8/26/2011		Discharge Rate: 1.26	l/s]		
Observ	ation Well: TW2		Static Water Level [n	n]: 2.38	Radial Distance to PW	/ [m]: 55.54		
	Time [min]	Water Level [m]	Drawdown [m]					
1	0	2.38	0.00	-				
2	60	2.75	0.37	-				
3	120	2.82	0.44					
4	180	2.81	0.43					
5	240	2.80	0.42					
6	300	2.80	0.42					
7	360	2.83	0.45					
8	420	2.85	0.47					
9	480	2.87	0.49					
10	540	2.89	0.51					
11	580	2.59	0.21					

	son Group Inc.			Pumping Test	- Water Level Data	Page 1 of 1	
	Colonnade Road South awa, Ontario K2E 7J5			Project: Talos-	Deep Well Analysis		
					Number: PH1292		
				Client:			
Locati	on:		Pumping Test: Pum	ping Test 1	Pumping Well: TW4		
Test C	Conducted by:		Test Date: 8/26/201	1	Discharge Rate: 1.26 [l/s]		
Obser	servation Well: TW3 Static Water Level [m		m]: 2.14	Radial Distance to PW [n	n]: 29.27		
	Time [min]	Water Level [m]	Drawdown [m]		I		
1	0	2.14	0.00				
2	60	2.53	0.39				
3	120	2.59	0.45	_			
4	180	2.59	0.45				
5	240	2.58	0.44				
6	300	2.58	0.44				
7	362	2.62	0.48				
8	420	2.65	0.51				
9	480	2.69	0.55				
10	540	2.73	0.59				
11	580	2.38	0.24				

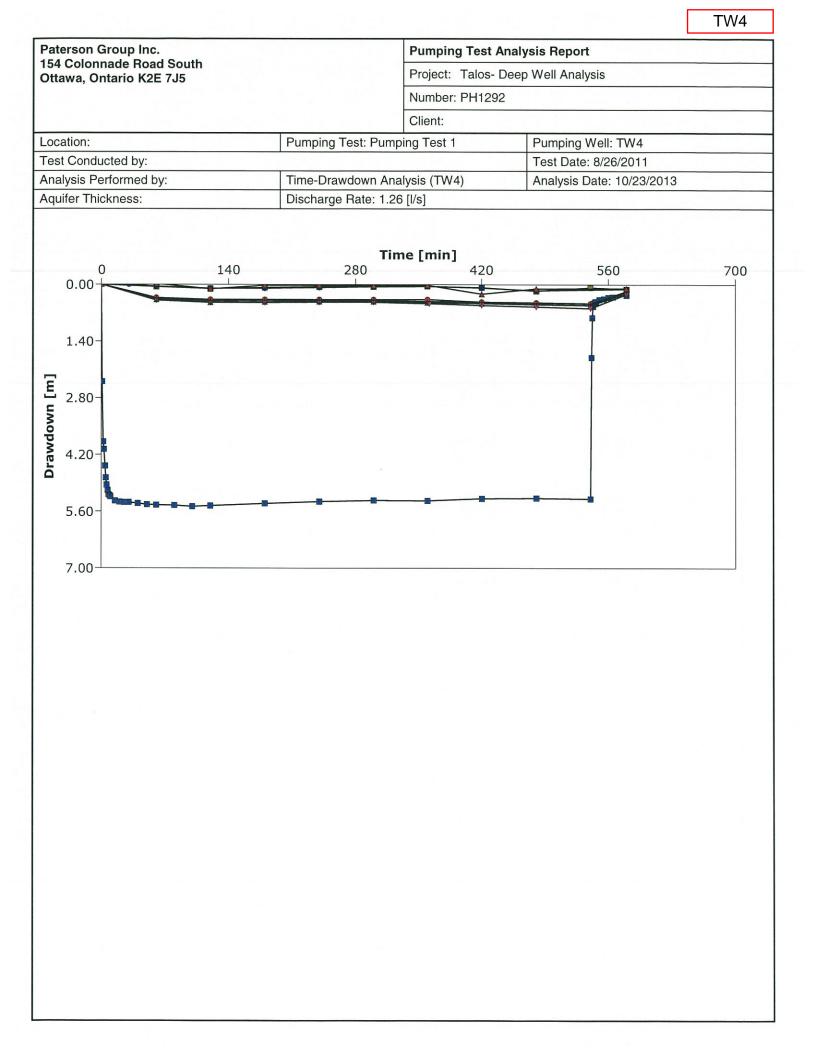
Paterson Group Inc. 154 Colonnade Road South Ottawa, Ontario K2E 7J5			Pumping Test	- Water Level Data	Page 1 of 1		
			Project: Talos-	- Deep Well Analysis			
	,			Number: PH129	92		
				Client:			
Locatio	on:	• 13	Pumping Test: Pump	, bing Test 1	Pumping Well: TW4		
Test Conducted by: Test Date: 8/26/2			Test Date: 8/26/2011		Discharge Rate: 1.26 [l/s]		
Observation Well: TW5			Static Water Level [n	n]: 2.20	Radial Distance to PW [m]: 97.19		
	Time [min]	Water Level [m]	Drawdown [m]			<u>.</u>	
	0	2.20	0.00	-			
2	60	2.55	0.35				
3	120	2.60	0.40				
4	180	2.59	0.39				
5	240	2.59	0.39				
6	300	2.59	0.39				
7	360	2.62	0.42				
8	420	2.64	0.44				
9	480	2.66	0.46				
10	540	2.68	0.48				
	580	2.37	0.17				

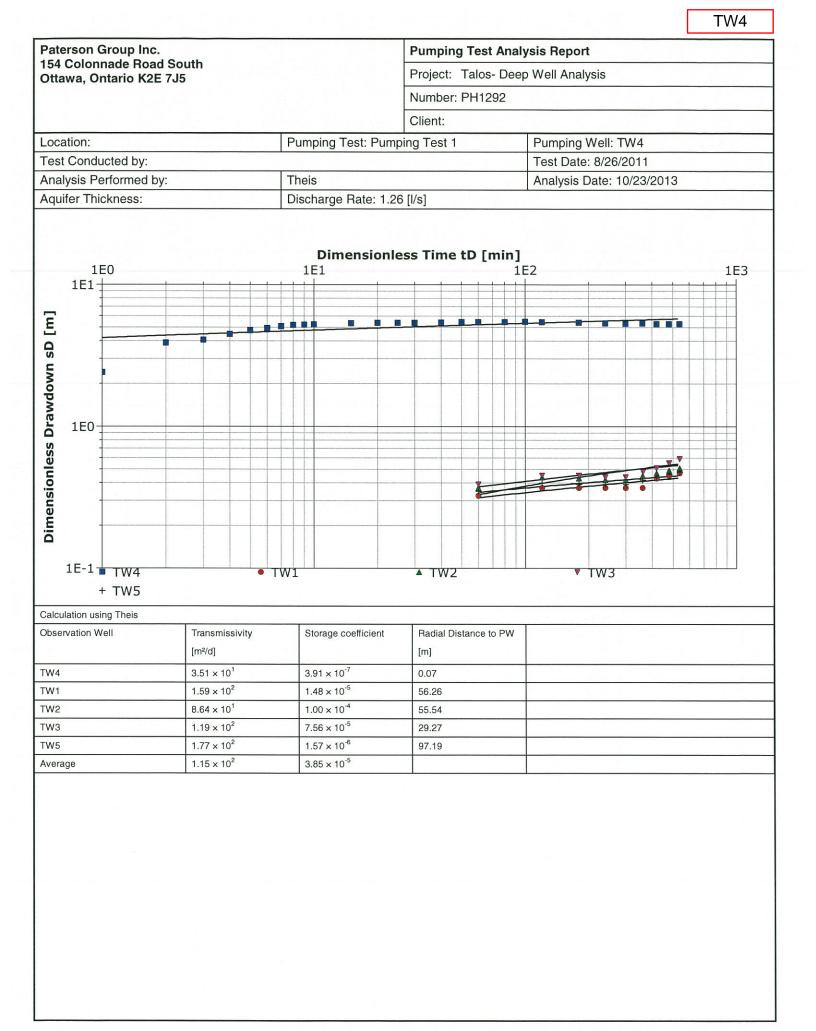
							TW4
	son Group Inc.	uth Desired Table Day Mult And the		Page 1 of 1			
	154 Colonnade Road South Ottawa, Ontario K2E 7J5		Project: Talos- Deep Well Analysis				
-					Number: PH12	92	· · · · · · · · · · · · · · · · · · ·
					Client:		·
Locati	on:		Pu	umping Test: Pumpi	ing Test 1	Pumping Well: TW4	
Test C	Conducted by:		Те	est Date: 8/26/2011		Discharge Rate: 1.26 [l/s]	
Obser	vation Well: EW		St	atic Water Level [m	ı]: 2.11	Radial Distance to PW [m]: 82.16
	Time [min]	Water Level [m]	1	Drawdown [m]			
1	0	2.11		0.00			
2	60	2.17		0.06			
3	120	2.21		0.10			
4	180	2.18		0.07			
5	240	2.17		0.06	1		
6	300	2.17		0.06	7		
7	360	2.16		0.05	7		
8	420	2.18		0.07	1		
9	480	2,265		0.155			
10	540	2.18		0.07	1		
11	580	2.22		0.11	-1		

Paterson Group Inc. 154 Colonnade Road South Ottawa, Ontario K2E 7J5			Pumping Test - Water Level Data Page 1 of 1					
				Project: Talos- Deep Well Analysis				
				Number: PH12	92	· · ·		
				Client:				
Locati	on:	· · · ·	Pumping Test: Pump	ing Test 1	Pumping Well: TW4			
Test C	Conducted by:		Test Date: 8/26/2011		Discharge Rate: 1.26 [I/s]			
Obser	vation Well: 13Cock		Static Water Level [m]: 3.29		Radial Distance to PW [n	n]: 137.07		
	Time (min)	Water Level [m]	Drawdown [m]					
1	30	3.29	0.00	-				
2	60	3.34	0.05	-				
3	120	3.385	0.095					
4	180	3.38	0.09					
5	240	3.369	0.079					
6	300	3.348	0.058					
7	360	3.34	0.05					
8	420	3.37	0.08					
9	480	3.44	0.15	_				
10	580	3.40	0.11					

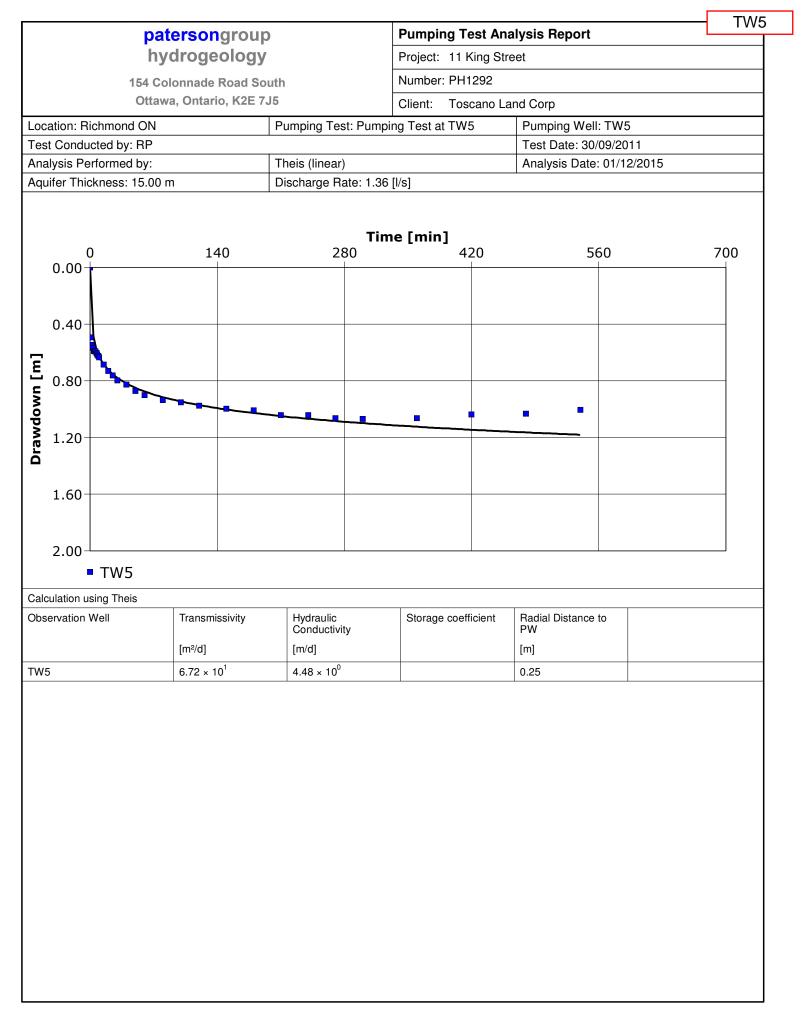
TW4	
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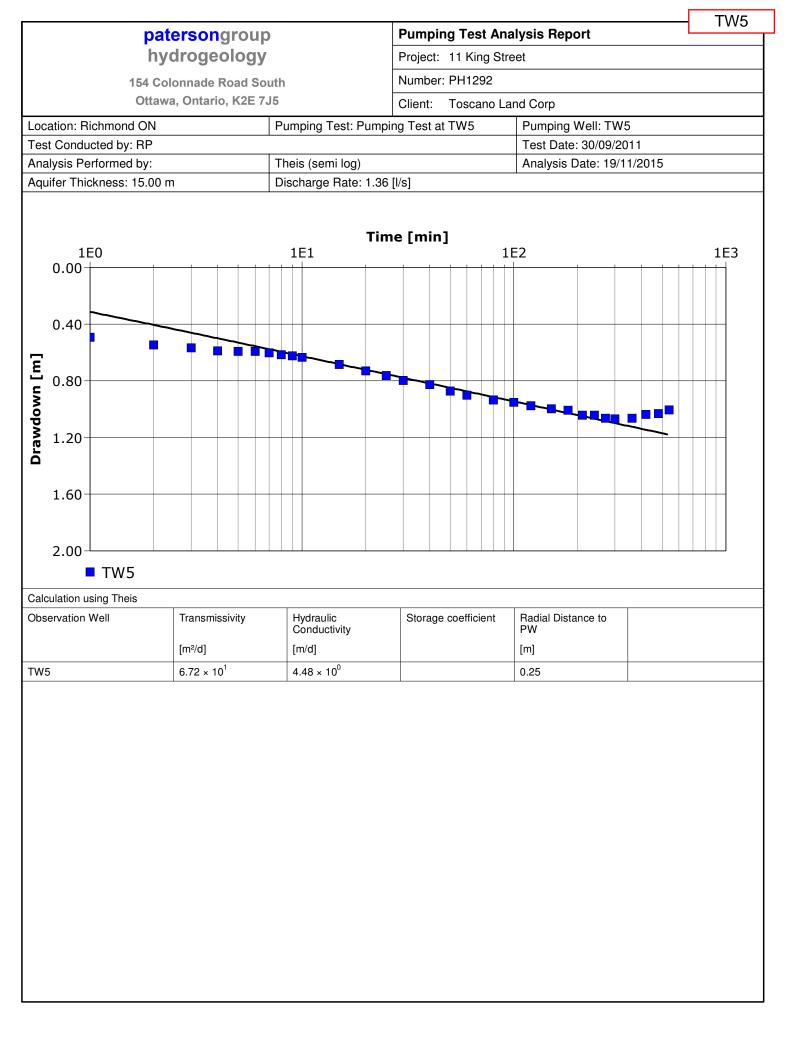
Paterson Group Inc. 154 Colonnade Road South		Pumping Test	Page 1 of 1					
154 Colonnade Road South Ottawa, Ontario K2E 7J5				Project: Talos- Deep Well Analysis				
	,			Number: PH12	92			
				Client:				
Location	n:		Pumping Test: Pump	ing Test 1	Pumping Well: TW4			
Test Conducted by: Test Date			Test Date: 8/26/2011	1 Discharge Rate: 1.26 [l/s]				
Observation Well: 6King Static Water Leve			Static Water Level [n	n]: 4.06	Radial Distance to PW [m]: 95.71			
	Time [min]	Water Level [m]	Drawdown [m]					
1	0	4.06	0.00					
2	60	4.04	-0.02					
3	120	4.17	0.11					
4	180	4.08	0.02					
5	240	4.08	0.02					
6	300	4.09	0.03					
7	360	4.08	0.02					
8	420	4.29	0.23					
9	480	4.16	0.10					
10	580	4.15	0.09					

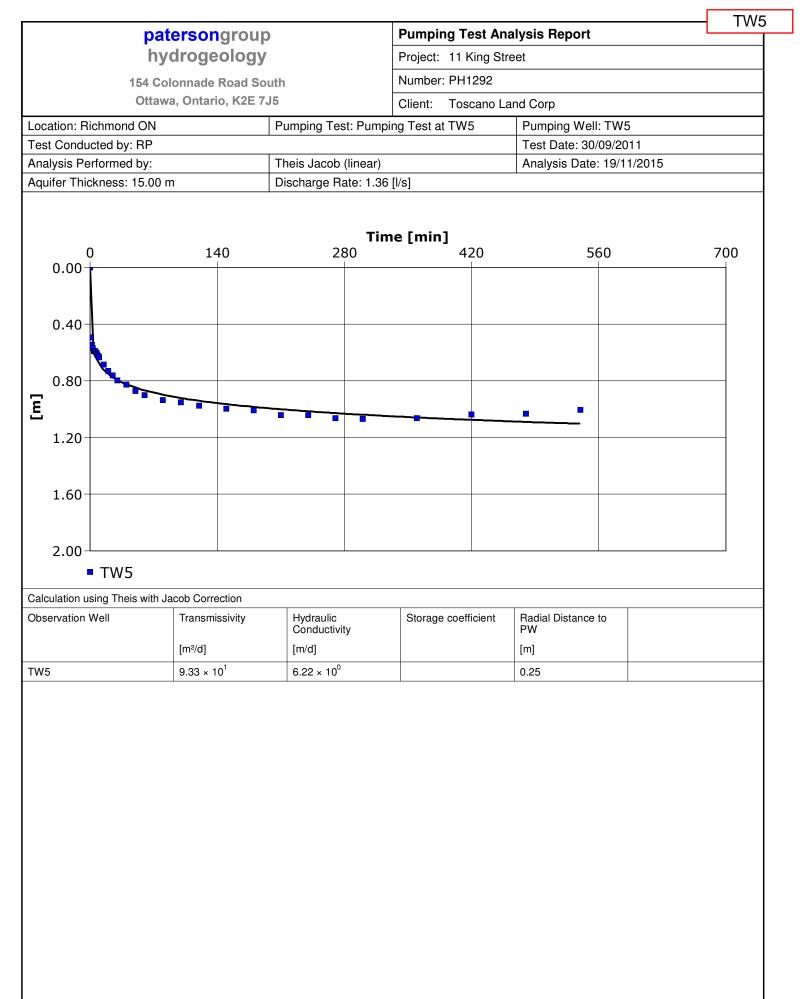


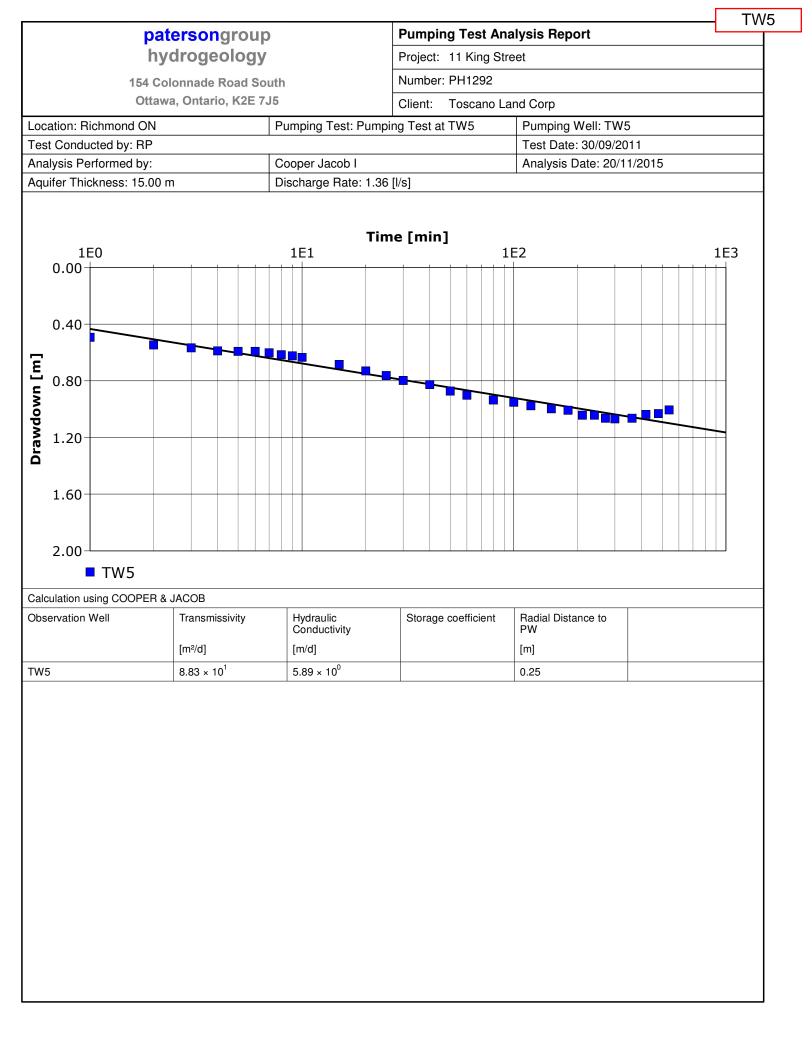


								TW4	
Paterson Group Inc. 154 Colonnade Road South			Pumping Test Analysis Report						
	154 Colonnade Road South Ottawa, Ontario K2E 7J5				Project: Talos- Dee	ep Well Analysis			
					Number: PH1292		-		
					Client:		<u> </u>		
Loc	ation:		Pumpi	ng Test: Purr	ping Test 1	Pumping Well: TW4			
Tes	t Conducted by:					Test Date: 8/26/2011			
Aq	uifer Thickness:		Discha	arge Rate: 1.2	26 [l/s]	· · · · ·			
	Analysis Name	Analysis Performed	by	Analysis Date	Method name	Well	T [m²/d]	s	
	• • • • • • • • • • • • • • • • • • •							•	
ł									
3	Theis			10/23/2013	Theis	TW4	3.51 × 10 ¹	3.91 × 10 ⁻⁷	
4	Theis			10/23/2013	Theis	TW1	1.59×10^{2}	1.48 × 10 ⁻⁵	
5	Theis			10/23/2013	Theis	TW2	8.64 × 10 ¹	1.00 × 10 ⁻⁴	
6	Theis			10/23/2013	Theis	TW3	1.19 × 10 ²	7.56 × 10 ⁻⁵	
7	Theis			10/23/2013	Theis	TW5	1.77 × 10 ²	1.57 × 10 ⁻⁶	
	• • • • • • • •	•••				Average	8.92 × 10 ¹	9.19 × 10 ⁻⁵	

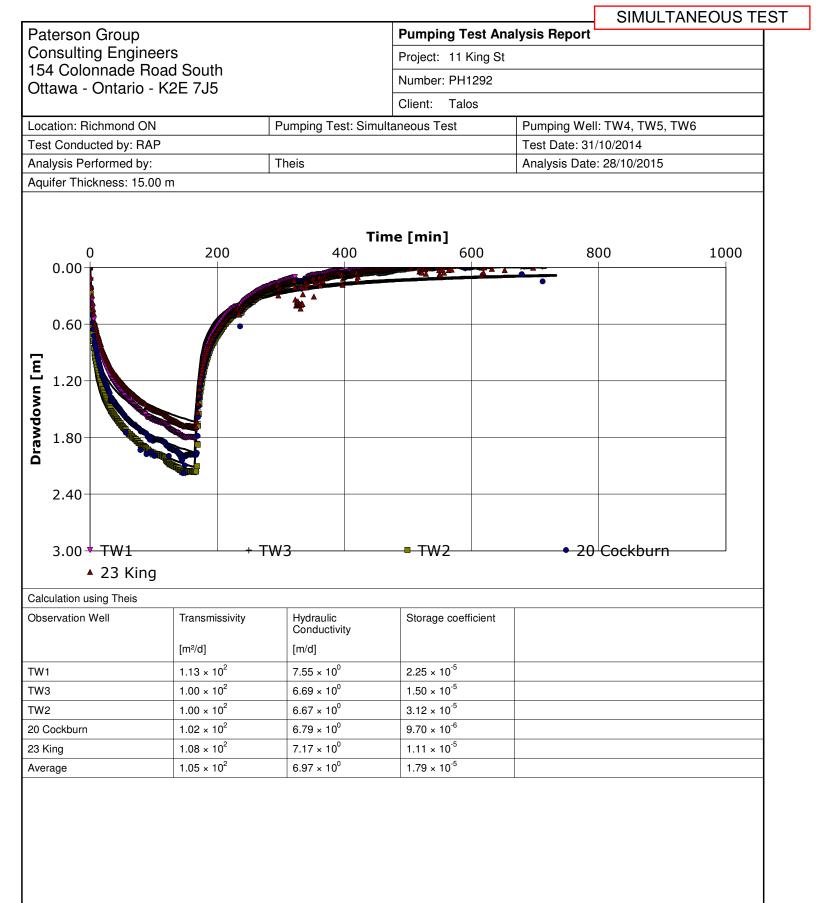




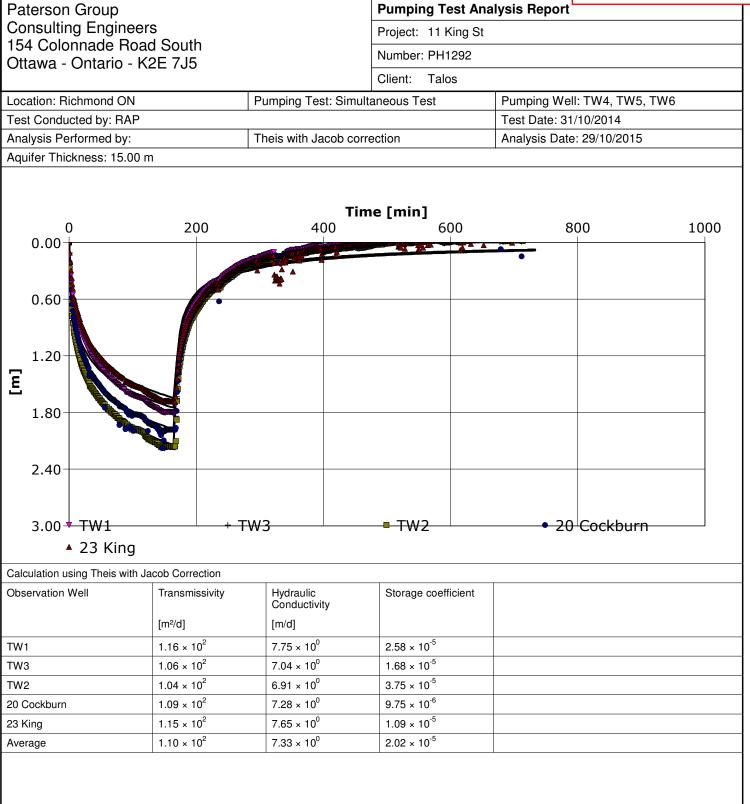




	Da	atersongroup			Pumping	Test Ana	lysis Rep	port		TW5		
	hydrogeology					Project: 11 King Street						
154 Colonnade Road South					Number: P	H1292						
Ottawa, Ontario, K2E 7J5					Client: T	oscano Lar	nd Corp					
Loc	ation: Richmond ON		Pumping Tes	t: Pumpi	ng Test at T	W5	Pumping Well: TW5					
Tes	Test Conducted by: RP Test Date: 30/09/2011					11						
Αqι	uifer Thickness: 15.00) m	Discharge Ra	ate: 1.36	[l/s]							
	Analysis Name	Analysis Performed by	Analysis Date	Method I	name	Well		T [m²/d]	K [m/d]	S		
1	Theis (semi log)		19/11/2015	Theis		TW5		6.72 × 10 ¹	4.48×10^{0}	NAN		
2	Theis Jacob (linear)		19/11/2015	Theis wit	th Jacob Corre	ecTW5		9.33 × 10 ¹	6.22 × 10 ⁰	NAN		
3	Cooper Jacob I		20/11/2015	Cooper &	& Jacob I	TW5		8.83 × 10 ¹	5.89 × 10 ⁰	NAN		
4	Theis (linear)		01/12/2015	Theis		TW5		6.72 × 10 ¹	4.48 × 10 ⁰	NAN		
5	Theis Jacob (semi log)		01/12/2015	Theis wit	th Jacob Corre	ecTW5		9.33 × 10 ¹	6.22 × 10 ⁰	NAN		
							Average	8.19 × 10 ¹	5.46×10^{0}	NAN		



SIMULTANEOUS TEST

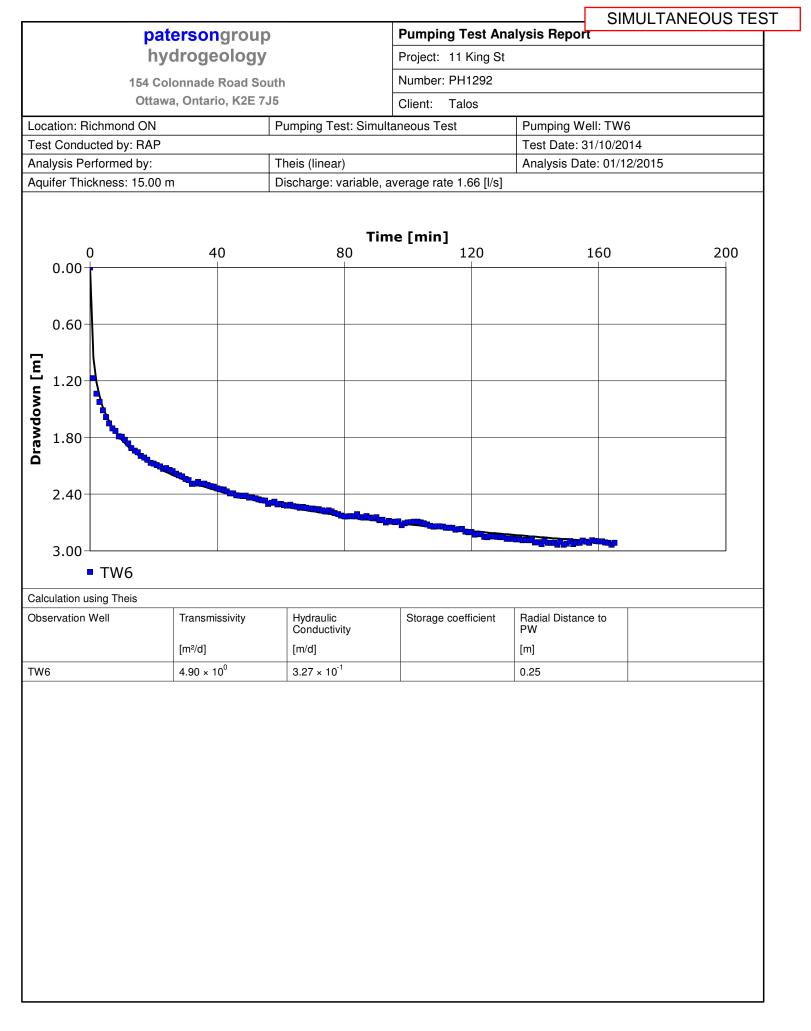


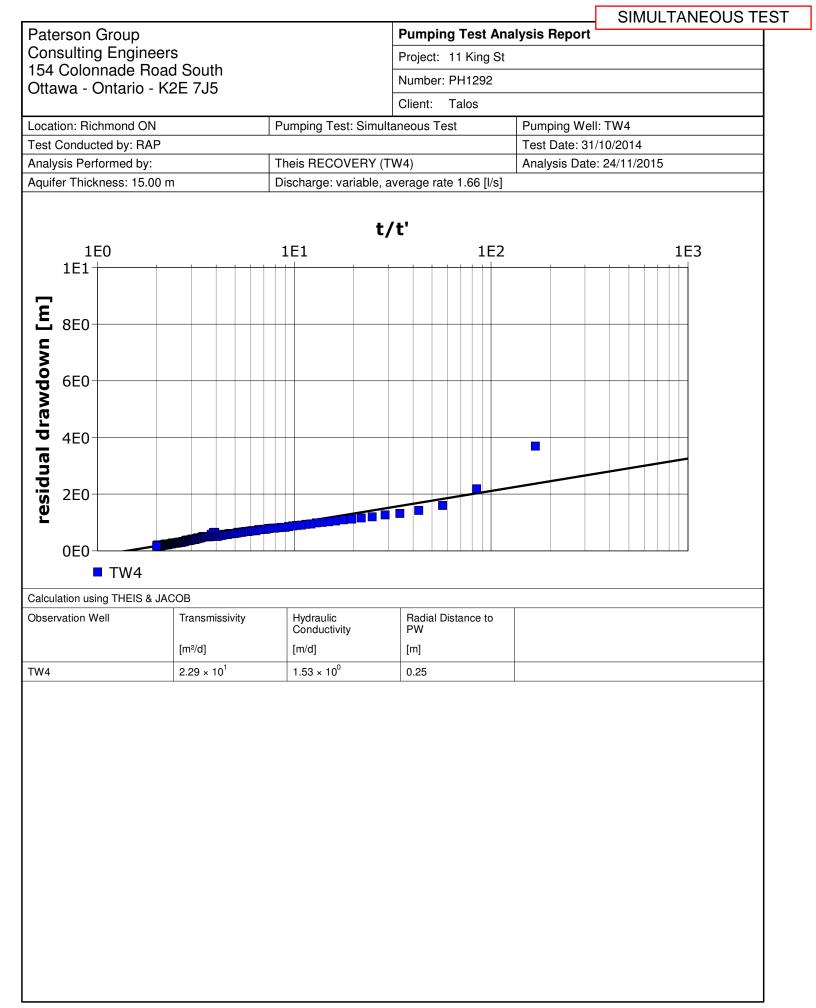
SIMULTANEOUS TEST Paterson Group **Pumping Test Analysis Report Consulting Engineers** Project: 11 King St 154 Colonnade Road South Number: PH1292 Ottawa - Ontario - K2E 7J5 Client: Talos Location: Richmond ON Pumping Test: Simultaneous Test Pumping Well: TW4, TW5, TW6 Test Conducted by: RAP Test Date: 31/10/2014 Analysis Performed by: Theis Jacob (TW4, TW5, TW6) Analysis Date: 24/11/2015 Aquifer Thickness: 15.00 m Time [min] 400 600 1000 200 800 0 0.00 2.00 4.00 Ε 6.00 8.00 10.00 TW4 • TW5 ▲ TW6

Calculation using Theis with Jacob Correction

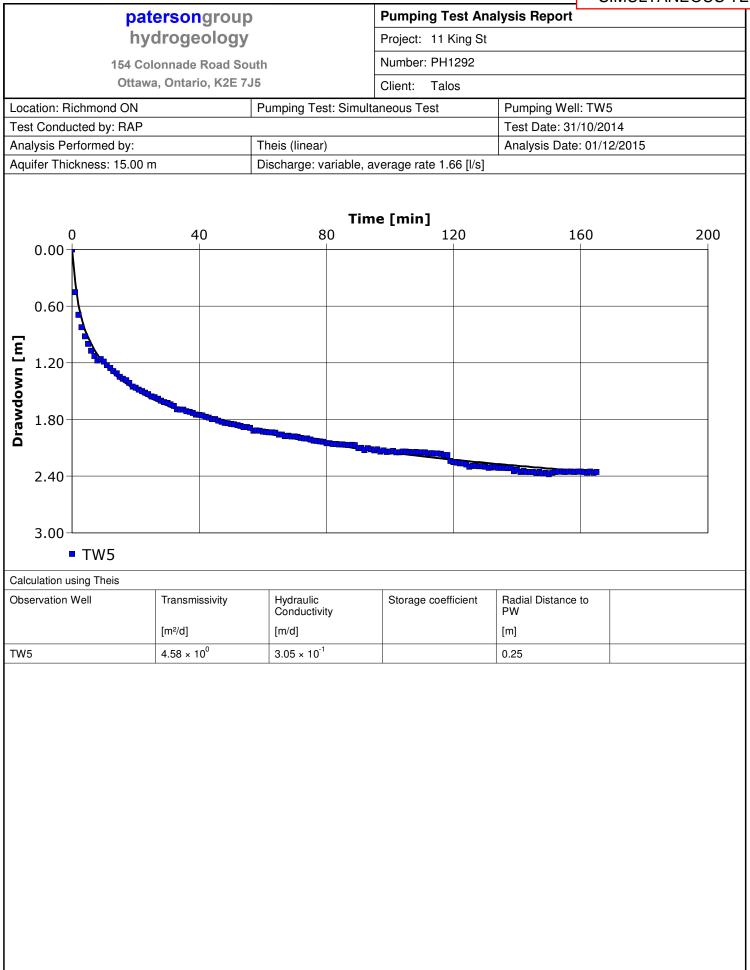
Observation Well	Transmissivity	Hydraulic Conductivity	Storage coefficient	
	[m²/d]	[m/d]		
TW4	8.17 × 10 ¹	5.45×10^{0}		
TW5	3.35 × 10 ¹	2.24 × 10 ⁰		
TW6	9.08 × 10 ¹	6.05×10^{0}		
Average	6.87 × 10 ¹	4.58 × 10 ⁰		

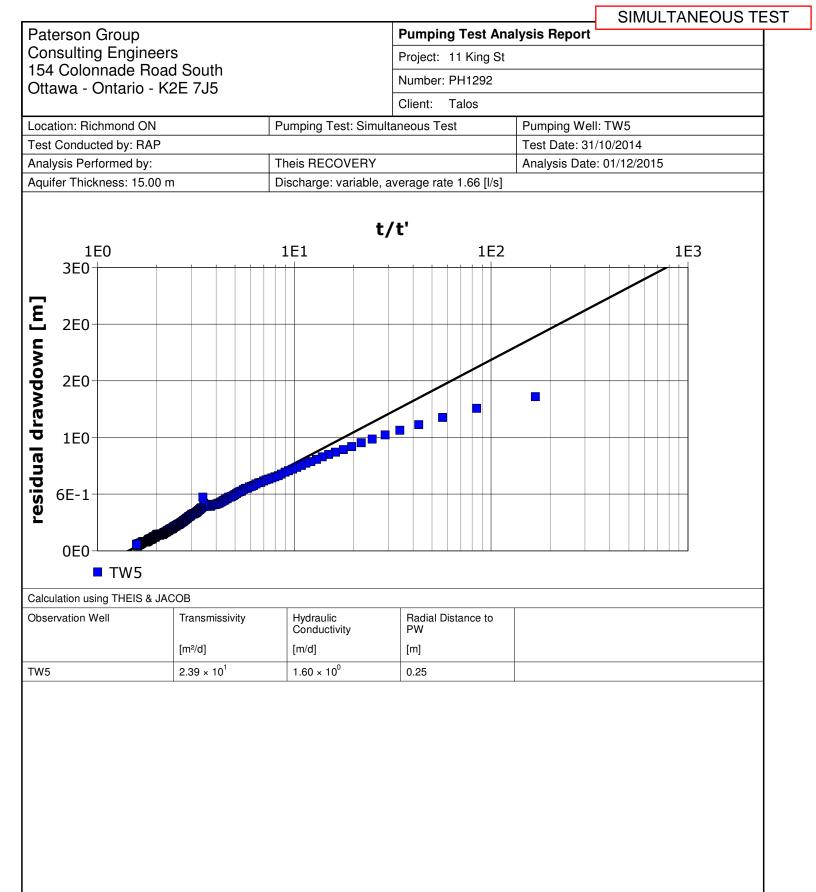
					1				MULTAN	IEOUS TI
	terson Group	Pumping Test Analysis Report								
Consulting Engineers 154 Colonnade Road South					Project: 1	1 King St				
	tawa - Ontario -				Number: P	H1292				
01		Client: T	alos							
Loc	ation: Richmond ON		Pumping Tes	t: Simult	aneous Test	t	Pumping	Well: TW4	, TW5, TW6	
Tes	t Conducted by: RAF)					Test Dat	e: 31/10/20	14	
Αqι	uifer Thickness: 15.00) m								
	Analysis Name	Analysis Performed by	Analysis Date	Method name		Well		T [m²/d]	K [m/d]	S
1	Theis		28/10/2015	Theis		TW1		1.13 × 10 ²	7.55 × 10 ⁰	2.25 × 10 ⁻⁵
2	Theis		28/10/2015	Theis		TW3		1.00 × 10 ²	6.69 × 10 ⁰	1.50 × 10 ⁻⁵
3	Theis		28/10/2015	Theis		TW2		1.00 × 10 ²	6.67 × 10 ⁰	3.12 × 10 ⁻⁵
4	Theis		28/10/2015	Theis		20 Cockburn		1.02 × 10 ²	6.79 × 10 ⁰	9.70 × 10 ⁻⁶
5	Theis		28/10/2015	Theis		23 King		1.08 × 10 ²	7.17×10^{0}	1.11 × 10 ⁻⁵
6	Theis with Jacob corre	ction	29/10/2015	Theis wi	th Jacob Corre	₽cTW1		1.16 × 10 ²	7.75 × 10 ⁰	2.58 × 10 ⁻⁵
7	Theis with Jacob corre	ction	29/10/2015	Theis wi	h Jacob CorrecTW3		1.06 × 10 ²	7.04×10^{0}	1.68 × 10 ⁻⁵	
8	Theis with Jacob corre	ction	29/10/2015	Theis wi	h Jacob CorrecTW2		1.04 × 10 ²	6.91 × 10 ⁰	3.75 × 10 ⁻⁵	
9	Theis with Jacob corre	ction	29/10/2015	Theis wi	th Jacob Corre	c20 Cockbu	'n	1.09 × 10 ²	7.28 × 10 ⁰	9.75 × 10 ⁻⁶
10	Theis with Jacob corre	ction	29/10/2015	Theis wi	th Jacob Corre	c23 King		1.15 × 10 ²	7.65 × 10 ⁰	1.09 × 10 ⁻⁵
11	Theis Jacob (TW4, TV	(5, TW6)	24/11/2015	Theis wi	th Jacob Corre	€(TW4		8.17 × 10 ¹	5.45 × 10 ⁰	NAN
12	Theis Jacob (TW4, TV	(5, TW6)	24/11/2015	Theis wi	th Jacob Corre	€(TW5		3.35 × 10 ¹	2.24 × 10 ⁰	NAN
13	Theis Jacob (TW4, TV	(5, TW6)	24/11/2015	Theis wi	th Jacob Corre	€(TW6		9.08 × 10 ¹	6.05 × 10 ⁰	NAN
							Average	9.84 × 10 ¹	6.56 × 10 ⁰	NAN

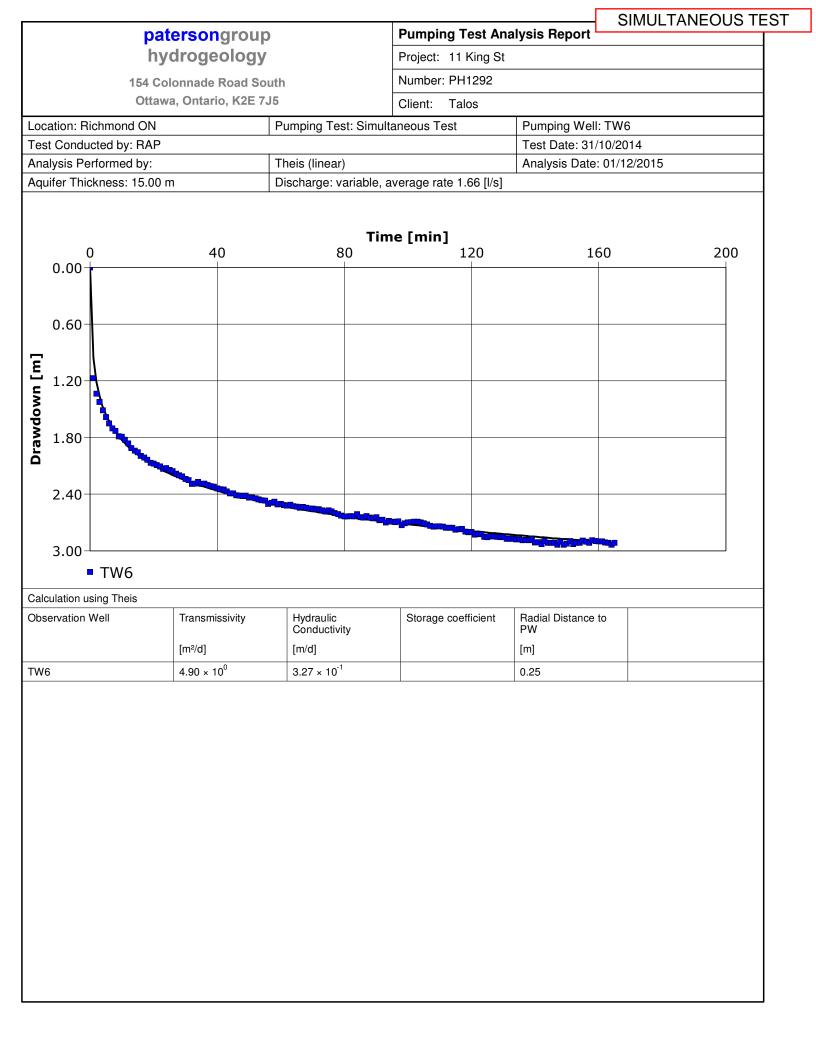


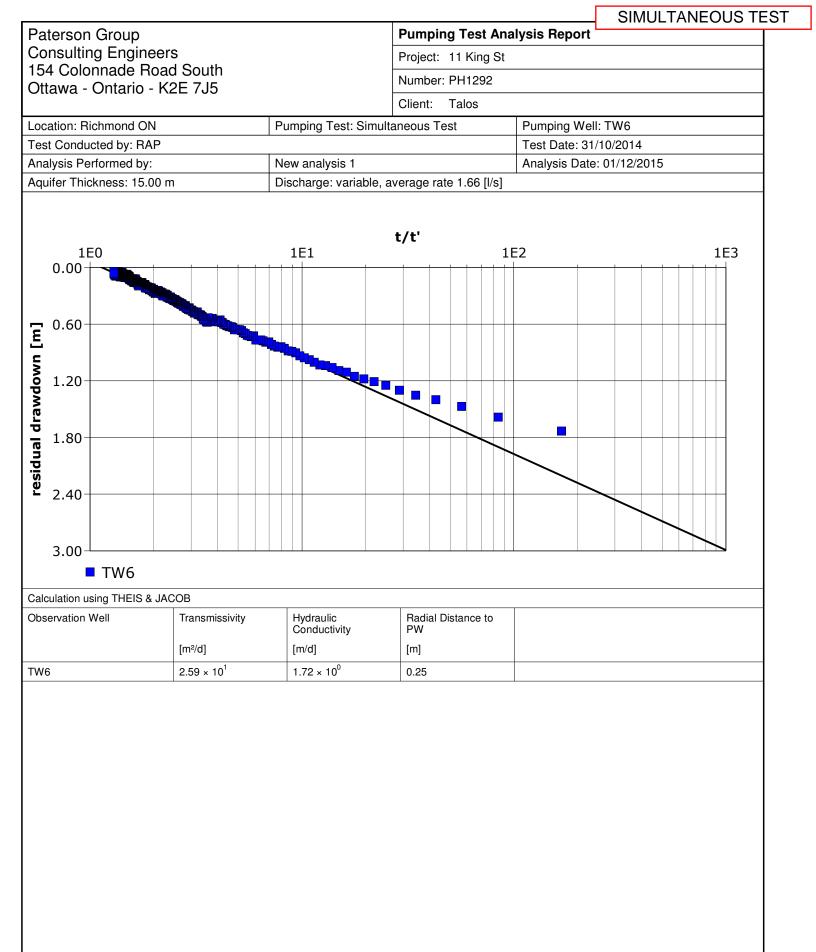


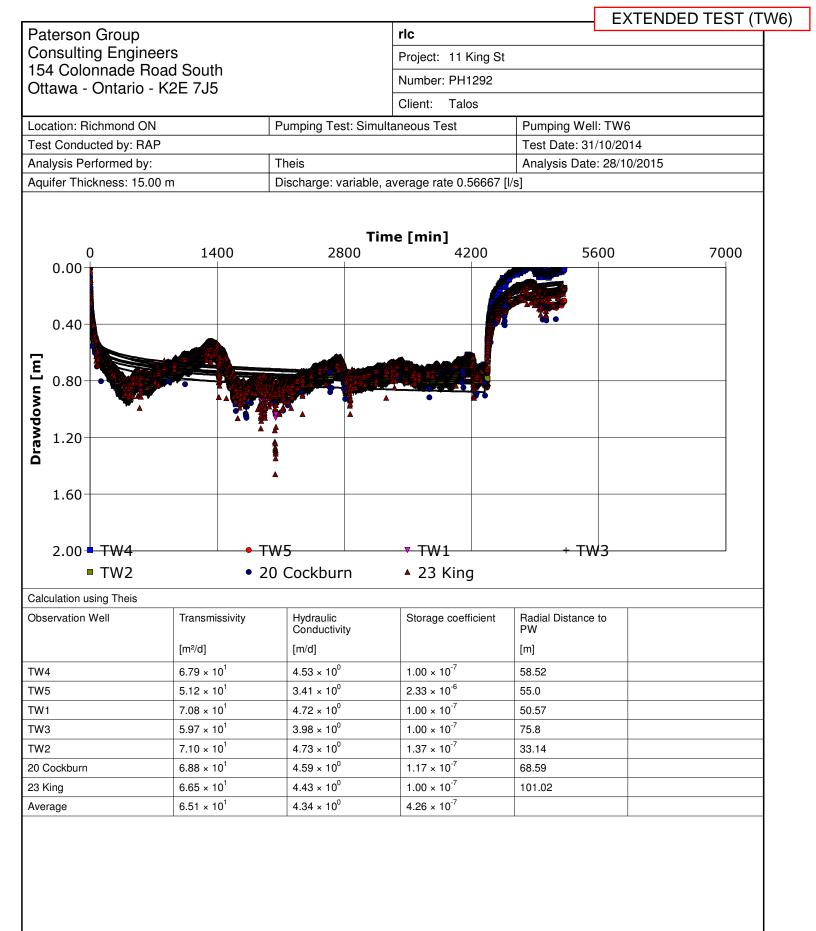
SIMULTANEOUS TEST

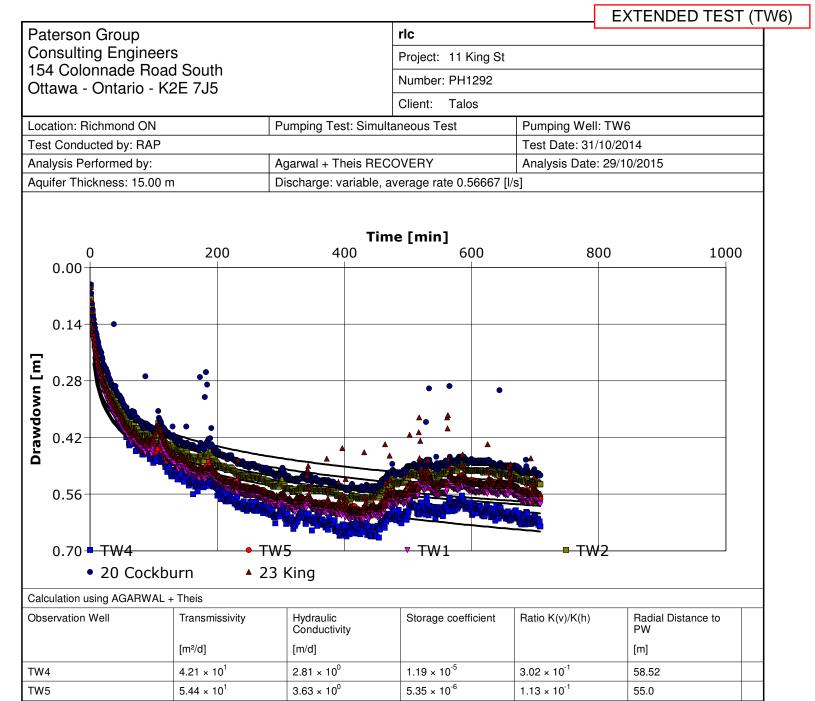












 7.20×10^{-6}

 2.57×10^{-5}

 8.04×10^{-6}

 2.10×10^{-6}

 1.00×10^{-5}

 3.15×10^{-1}

 1.19×10^{-1}

 1.58×10^{-1}

 1.22×10^{-1}

 1.88×10^{-1}

50.57

33.14

68.59

101.02

TW1

TW2

23 King

Average

20 Cockburn

 5.16×10^{1}

 5.32×10^{1}

 5.38×10^{1}

 5.31×10^{1}

 5.13×10^{1}

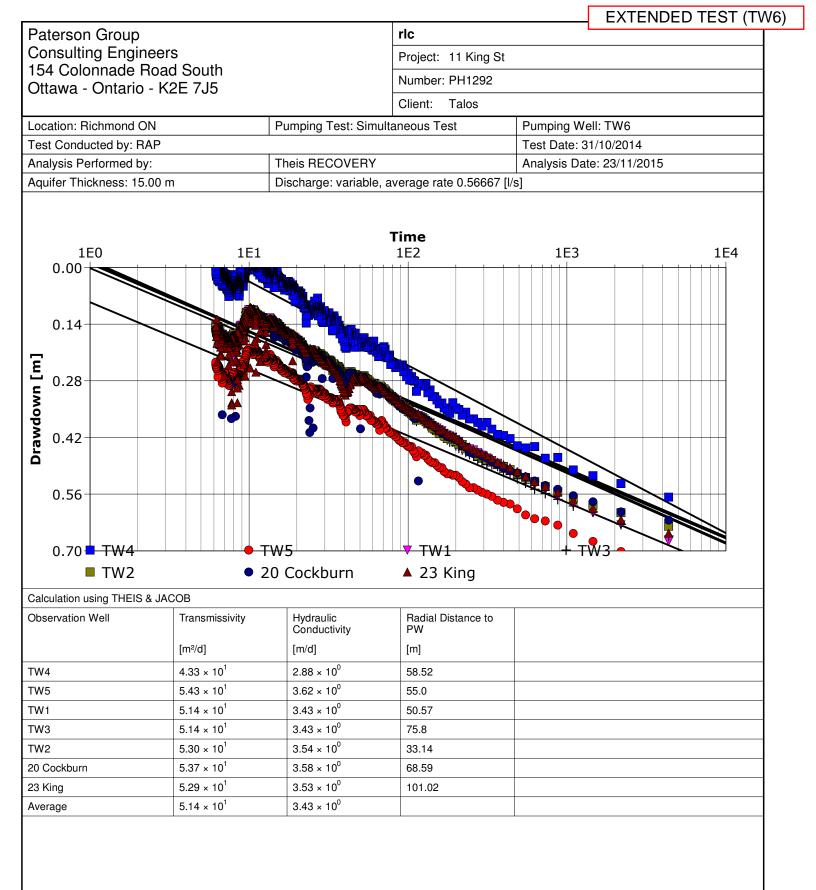
 3.44×10^{0}

 $3.54 \times 10^{\circ}$

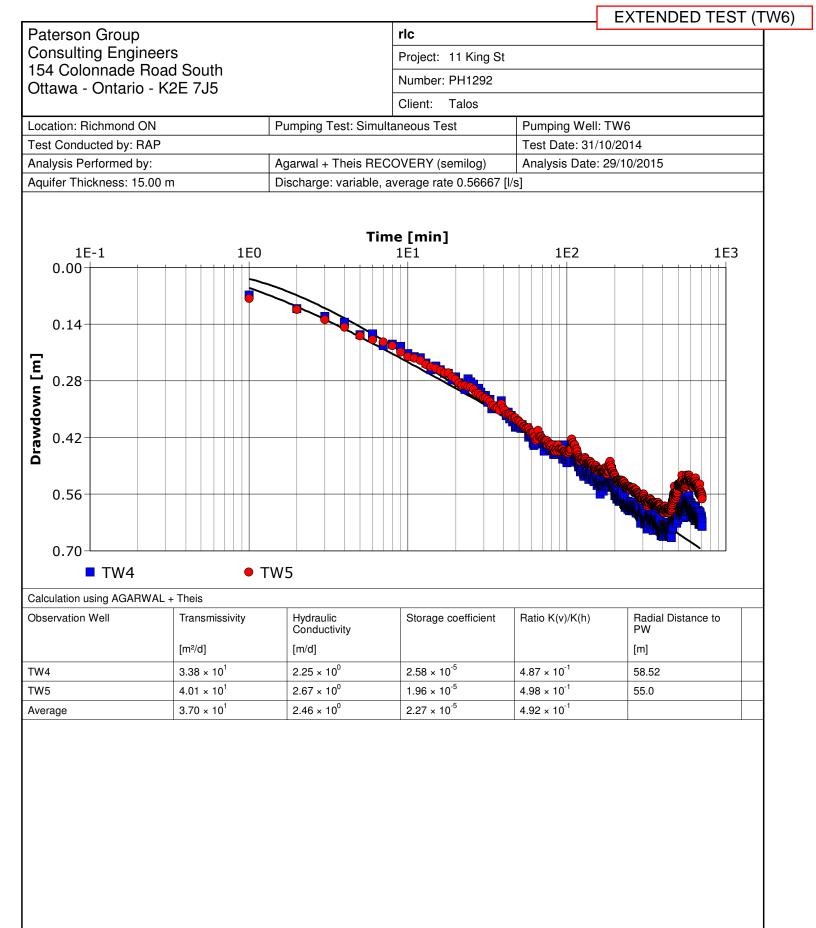
 3.58×10^{0}

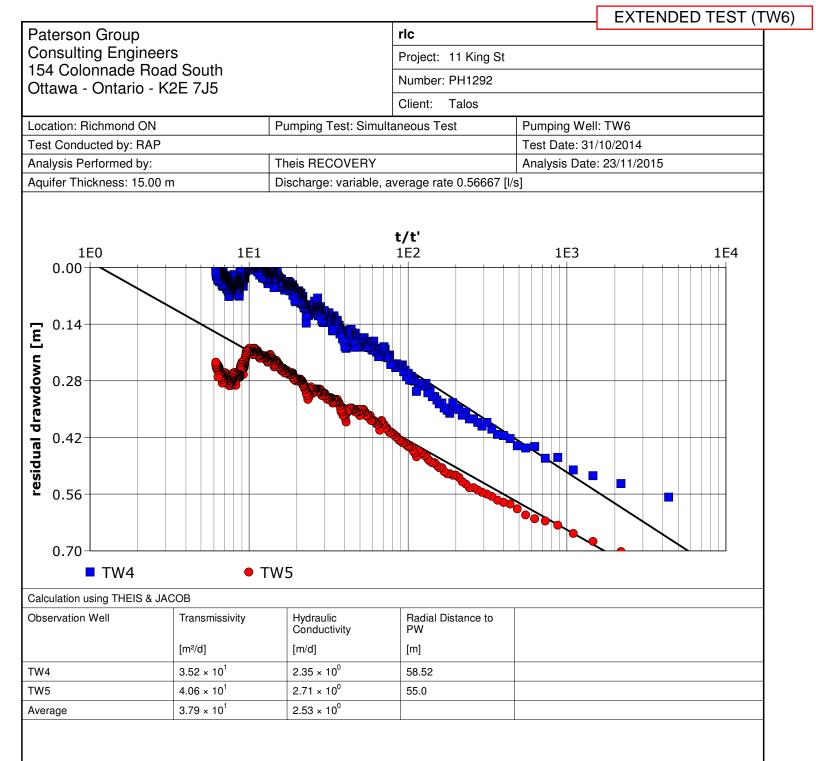
 $3.54 \times 10^{\circ}$

 3.42×10^{0}



					1				XTENDE	D TEST (T
	terson Group				Pumping	Test Ana	lysis Repor	ť		-
	onsulting Engine 4 Colonnade Ro				Project: 1	1 King St				
	tawa - Ontario -				Number: F	PH1292				
0.					Client: T	alos				
Loc	ation: Richmond ON		Pumping Tes	t: Simult	aneous Tes	t	Pumping W	ell: TW6	6	
Tes	t Conducted by: RAF)					Test Date: 3	31/10/20	14	
Αqι	uifer Thickness: 15.00) m	Discharge: va	ariable, a	verage rate	0.56667 [l/s	s]			
	Analysis Name	Analysis Performed by	Analysis Date	Method I	name	Well	Т	[m²/d]	K [m/d]	S
1	Theis		28/10/2015	Theis		TW4	6.	79 × 10 ¹	4.53×10^{0}	1.00 × 10 ⁻⁷
2	Theis		28/10/2015	Theis		TW5	5.	12 × 10 ¹	3.41 × 10 ⁰	2.33 × 10 ⁻⁶
3	Theis		28/10/2015	Theis		TW1	7.0	08 × 10 ¹	4.72×10^{0}	1.00 × 10 ⁻⁷
4	Theis		28/10/2015	Theis		TW3	5.9	97 × 10 ¹	3.98 × 10 ⁰	1.00 × 10 ⁻⁷
5	Theis		28/10/2015	Theis		TW2	7.	10 × 10 ¹	4.73×10^{0}	1.37 × 10 ⁻⁷
6	Theis		28/10/2015	Theis		20 Cockbur	rn 6.8	88 × 10 ¹	4.59×10^{0}	1.17 × 10 ⁻⁷
7	Theis		28/10/2015	Theis		23 King	6.0	65 × 10 ¹	4.43×10^{0}	1.00 × 10 ⁻⁷
8	Agarwal + Theis RECO	VERY	29/10/2015	AGARW	AL + Theis	TW4	5.	11 × 10 ¹	3.41 × 10 ⁰	1.19 × 10 ⁻⁵
9	Agarwal + Theis RECO	VERY	29/10/2015	AGARW	AL + Theis	TW5	5.4	44 × 10 ¹	3.63×10^{0}	5.35 × 10 ⁻⁶
10	Agarwal + Theis RECO	VERY	29/10/2015	AGARW	AL + Theis	TW1	5.	16 × 10 ¹	3.44×10^{0}	7.20 × 10 ⁻⁶
11	Agarwal + Theis RECO	VERY	29/10/2015	AGARW	AL + Theis	TW2	5.3	32 × 10 ¹	3.54 × 10 ⁰	2.57 × 10 ⁻⁵
12	Agarwal + Theis RECO	VERY	29/10/2015	AGARW	AL + Theis	20 Cockbur	rn 5.:	38 × 10 ¹	3.58 × 10 ⁰	8.04 × 10 ⁻⁶
13	Agarwal + Theis RECO	VERY	29/10/2015	AGARW	AL + Theis	23 King	4.3	33×10^{1}	3.54×10^{0}	2.10 × 10 ⁻⁶
14	Theis RECOVERY		23/11/2015	Theis Re	ecovery	TW4	5.3	33 × 10 ¹	3.55 × 10 ⁰	NAN
15	Theis RECOVERY		23/11/2015	Theis Re	ecovery	TW5	5.4	43 × 10 ¹	3.62×10^{0}	NAN
16	Theis RECOVERY		23/11/2015	Theis Re	ecovery	TW1	5.	14 × 10 ¹	3.43×10^{0}	NAN
17	Theis RECOVERY		23/11/2015	Theis Re	ecovery	TW3	5.	14 × 10 ¹	3.43×10^{0}	NAN
18	Theis RECOVERY		23/11/2015	Theis Re	ecovery	TW2	5.3	30 × 10 ¹	3.54×10^{0}	NAN
19	Theis RECOVERY		23/11/2015	Theis Re	ecovery	20 Cockbur	rn 5.3	37 × 10 ¹	3.58×10^{0}	NAN
20	Theis RECOVERY		23/11/2015	Theis Re	ecovery	23 King	5.2	29 × 10 ¹	3.53×10^{0}	NAN
							Average		3.81 × 10 ⁰	NAN

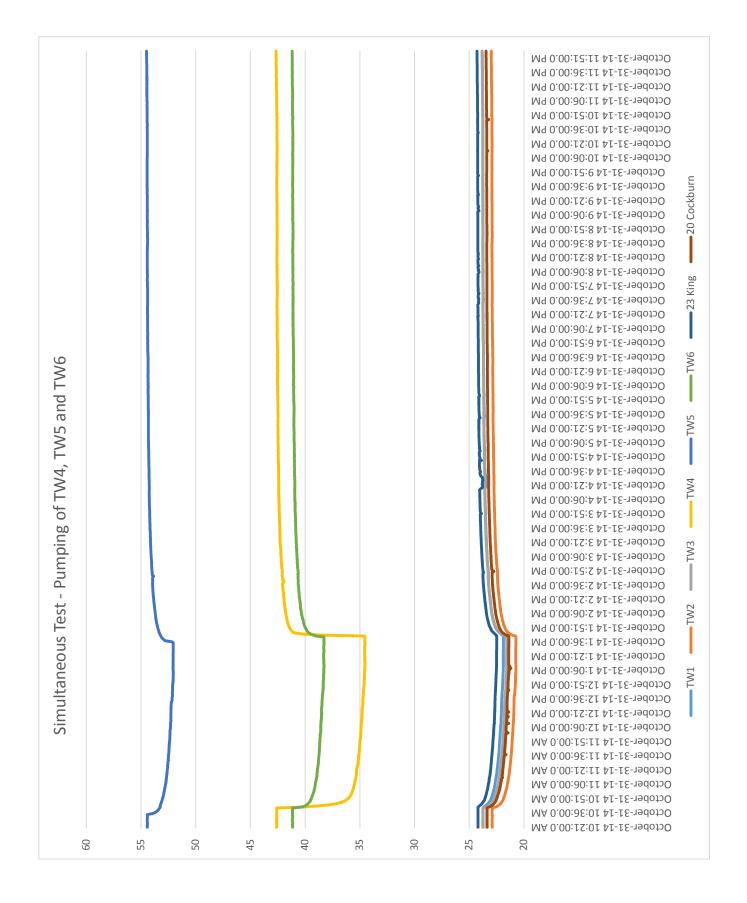




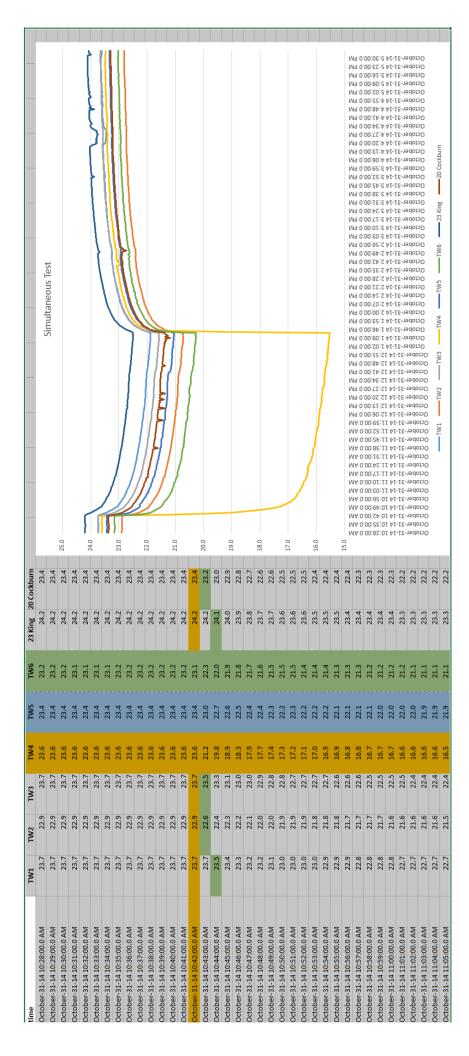
				1			E	XTENDED) TEST (T
Paterson Group				Pumping	Test Ana	lysis Rej	oort		,
Consulting Engin				Project: 1	1 King St				
154 Colonnade F Ottawa - Ontario				Number: F	H1292				
Ollawa - Ollano				Client: T	alos				
Location: Richmond C	N	Pumping Tes	t: Simult	aneous Tes	t	Pumping	g Well: TWe	6	
Test Conducted by: R	٩P					Test Dat	e: 31/10/20)14	
Aquifer Thickness: 15	00 m	Discharge: va	ariable, a	verage rate	0.56667 [l/:	s]			
Analysis Name	Analysis Performed by	Analysis Date	Method	name	Well		T [m²/d]	K [m/d]	S
1 Agarwal + Theis RE	COVERY (semilog)	29/10/2015	AGARW	AL + Theis	TW4		3.38 × 10 ¹	2.25×10^{0}	2.58 × 10 ⁻⁵
2 Agarwal + Theis RE	COVERY (semilog)	29/10/2015	AGARW	AL + Theis	TW5		4.01 × 10 ¹	2.67×10^{0}	1.96 × 10 ⁻⁵
3 Theis RECOVERY		23/11/2015	Theis Re	ecovery	TW4		3.52 × 10 ¹	2.35×10^{0}	NAN
4 Theis RECOVERY		23/11/2015	Theis Re	ecovery	TW5		4.06 × 10 ¹	2.71 × 10 ⁰	NAN
						Average	3.74 × 10 ¹	2.49 × 10 ⁰	NAN

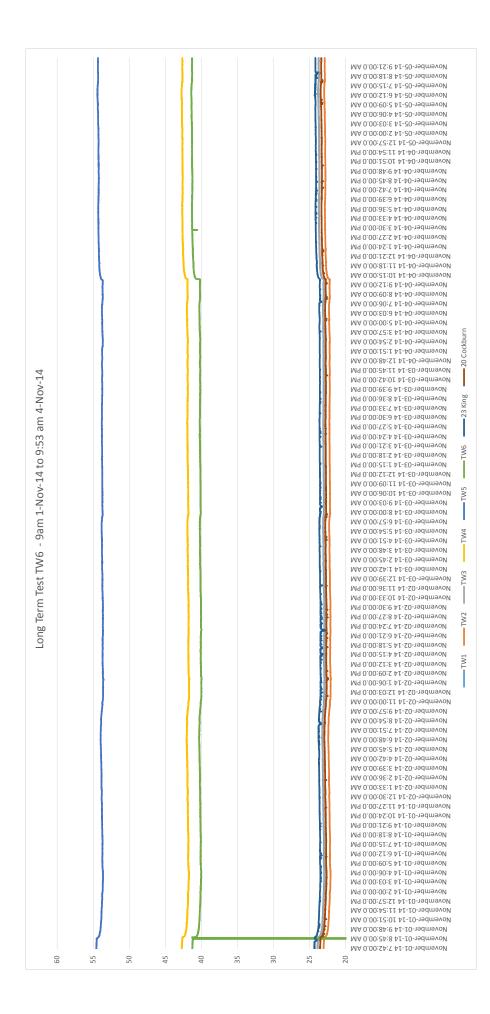
PH1292

Oriedity 10 2 10 10 <th10< th=""> 10 10</th10<>	(b) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1										
Analysis Assumes Continuous Pumping of GO Well 18 Well Grouping 2nd	Analysis Assumes Continuous Purpring of SO Weil Add Weil Couping	(Q) m3/day (T) m2/day Spacing (m) r Storage S	2 37 15 2.27E-05								
Ist Weil Grouping 2rd Weil Grouping 3rd Weil Grouping 4rd Weil Grouping M(u) u W(u) Diamadon 1 W(u) u W(u) u W(u) u W(u) u W(u) U W(u) Diamadon 223 224 233 234 246 167 246 163 363 313 235 236 313 236 313 236 313 236 313 313 313 313 313 313 313 313 313 313 313 313	Ist Weil Grouping u Ist Weil Grouping w(u) Ist Weil Grouping w(u) <t< th=""><th>A</th><th>nalysis Assumes Contii</th><th>nuous Pumping c</th><th>of 50 Wells</th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	A	nalysis Assumes Contii	nuous Pumping c	of 50 Wells						
u W(u) u W(u) u W(u) u W(u) u W(u) Denotonin 3.4E-06 12.01 1.0E-05 1320 5.E-06 11.09 1.2E-05 10.06 2.37 6.EE-07 13.20 5.E-06 11.02 1.2E-06 12.37 2.27 6.EE-07 13.20 5.EE-06 13.21 1.EE-06 12.37 2.27 1.7E-07 15.01 1.2E-06 12.01 1.2E-06 13.05 2.27 1.7E-08 1.340 1.2E-01 1.4E-07 13.20 2.EE-06 13.05 2.23 1.7E-08 1.340 1.2E-08 1.340 1.2E-08 13.05 2.28 1.7E-08 1.520 2.EE-06 15.20 2.EE-06 13.05 2.28 1.7E-08 1.520 2.EE-08 1.520 2.EE-08 13.05 2.86 1.7E-08 1.620 3.86.07 1.440 7.791 1.435 3.82 3.82 1.6E-08	u W(u) u W(u) u W(u) u W(u) u W(u) Demonstration 3.4E-06 12.01 1.4E-05 10.31 1.7E-06 12.01 1.2E-05 10.36 2.37 6.EE-07 13.82 5.EE-06 11.82 5.EE-06 11.67 2.37 6.EE-07 13.81 1.6E-06 12.21 1.7E-06 12.01 1.2E-06 10.36 2.37 3.4E-07 13.82 5.EE-06 14.83 3.8E-06 11.67 2.37 2.27 3.4E-07 13.82 5.EE-06 13.21 1.7E-06 12.01 1.8E-06 13.05 2.27 3.4E-07 13.80 1.4E-07 13.82 2.8E-06 11.67 2.37 2.26 1.7E-07 15.00 1.8E-07 14.89 3.8E-06 11.67 2.36 3.8E 1.6E-08 1.740 1.8E-08 15.20 1.8E-08 1.57 3.8E 1.6E-08 1.740 M M		1st Well Grou	oing	2nd Well Gr	ouping	3rd Well G	rouping	4th Well Gro	uping	
34E-06 72.01 1.0E-05 1031 1.7E-05 1036 2247 1.7E-06 12.70 1.0E-06 12.20 1.0E-06 12.27 2.27 6.607 13.61 1.0E-06 13.21 1.7E-06 13.27 2.27 3.4E-07 13.01 1.1E-06 12.70 2.4E-06 13.27 2.27 3.4E-07 13.01 1.1E-06 12.70 2.4E-06 13.27 2.28 1.7E-08 17.40 1.7E-08 15.79 1.4E-07 13.06 2.38 1.7E-08 17.40 1.7E-08 15.79 1.4E-07 13.06 2.38 1.7E-08 17.40 1.7E-08 16.20 14.89 3.26-07 13.06 3.38 1.7E-08 17.40 1.7E-08 15.79 1.4E-07 13.06 3.38 1.9E-09 15.20 1.8E-07 13.21 1.7E-06 12.57 3.88 1.9E-09 15.20 1.8E-07 14.86 1.757 3.82 1.9E-09 15.20 1.8E-07 14.93 1.757 3.82 1.9E-09 15.20 3.00 0.00 2.00 2.00 1.000 2.00 2.00 2.00 2.00 2.0	34E-06 72.01 1.0E-05 1031 1.7E-05 1030 24E-05 1006 2237 61E-07 1322 21E-06 1320 34E-06 1167 237 237 61E-07 1320 51E-06 1321 17E-06 1270 12E-05 1306 237 34E-07 1501 15201 16E-07 1321 17E-06 1277 24E-06 1277 15E-08 1740 1459 1326 1469 16E-07 1306 236 15E-09 1501 1520 28E-07 1340 12E-06 1305 216 15E-08 1540 1520 28E-07 1340 12E-06 1305 285 15E-08 1560 1076 237 23E-08 155 385 15E-08 1520 28E-07 1520 28E-07 1306 235 15E-08 157 28E-08 1579 38E-07 156 385 15E-09 156 360 1791 157 28E-08 1556 386	me (days)	Ъ	W(u)	Þ	W(u)	D	W(u)	с		Drawdown
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1.7E-06 1.270 5.1E-06 11.60 1.250 3.450 11.67 2.37 3.6E-07 13.82 2.0E-06 12.32 3.460 12.01 4.46-06 11.67 2.37 3.6E-07 13.01 5.1E-07 13.91 5.6E-07 13.91 5.6E-06 12.97 2.4E-06 13.90 2.87 3.6E-07 15.00 5.1E-07 13.91 5.6E-07 13.91 5.72 2.4E-06 13.95 2.86 1.7E-08 17.40 1.7E-08 17.73 1.7E-08 15.97 14.60 15.97 2.85 3.86 3.81 1.7E-08 1.860 17.40 15.20 2.86 16.66 2.37 3.82 1.7E-08 1.750 1.86 1.750 1.86 1.760 1.760 3.83 1.7E-08 1.750 1.86 1.750 2.86 1.66 3.83 1.7E-08 1.750 1.760 3.00 1.700 3.00 3.66 1.00 2.00 2.00 5.00 5.00 3.60 3.66 3.66	S	3.4E-06	12.01	1.0E-05	10.91	1.7E-05	10.40	2.4E-05	10.06	2.23
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	6EE/07 3325 2EE/06 1257 3257 125/06 1377 2257 1.7E-07 1311 1.0E-06 1321 1.2E-06 1237 2267 1.7E-07 1431 1.0E-06 1321 1.2E-06 1237 225 1.7E-07 1431 1.0E-06 1321 1.2E-06 1237 235 1.7E-07 1531 2.8E-07 1469 1750 2.8E-07 1469 337 1.7E-09 1860 1474 132 1.8E-09 1750 337 1.6E-09 1860 1750 2.8E-09 1750 326-09 337 1.6E-09 1860 146 1750 2.8E-09 1757 382 1.6E-09 1800 146-00 1750 2.8E-08 1757 382 1.90 2000 2000 5000 5000 5000 5000 1000 2000 2000 2000 2000 2000 000 100	10	1.7E-06	12.70	5.1E-06	11.60	8.5E-06	11.09	1.2E-05	10.76	2.37
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	34E-07 1431 10E-06 1321 17E-00 224E-07 1391 226E-07 1300 236 4.7E-08 15.01 1.4E-07 15.01 5.1E-07 15.00 3.2E-07 1430 3.2E 3.2E 1.6E-08 1.4E-07 15.01 5.1E-07 15.00 3.2E-07 1430 3.2E 3.2E 3.2E-08 3.2E 3.2E-08 3.2	25	6.8E-07	13.62	2.0E-06	12.52	3.4E-06	12.01	4.8E-06	11.67	2.57
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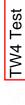
Start of Simultaneous Pumping Test

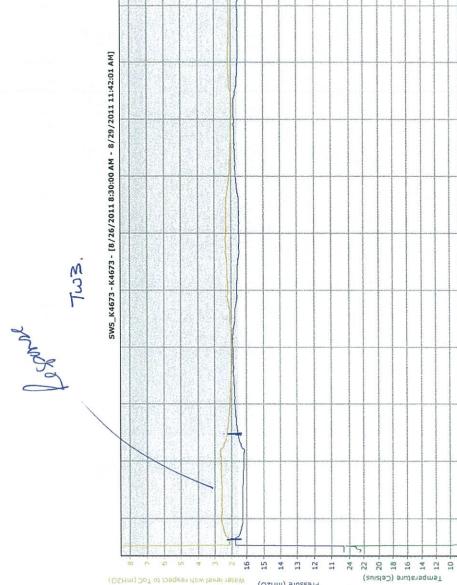




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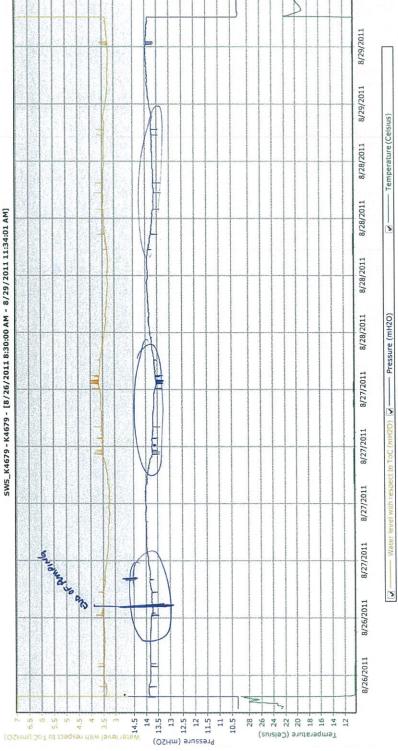
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SWS_K4683 - K4683 - [8/26/2011 8:30:00 AM - 8/29/2011 11:32:00 AM]

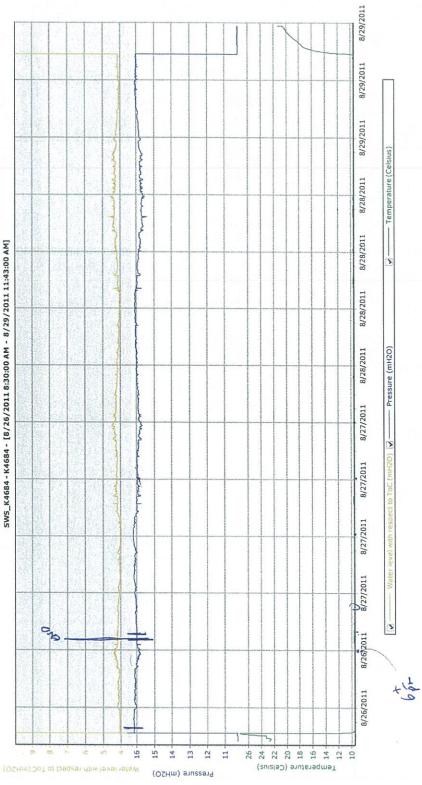
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SWS_K4679 - K4679 - [8/26/2011 8:30:00 AM - 8/29/2011 11:34:01 AM]

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SWS_K4684 - K4684 - [8/26/2011 8:30:00 AM - 8/29/2011 11:43:00 AM]

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Temperature (Celsius)

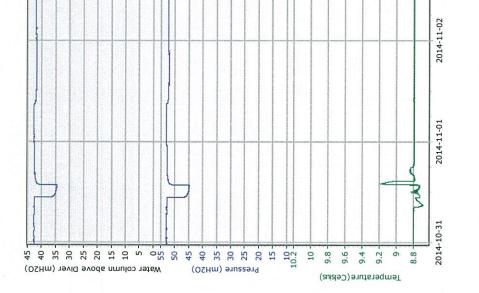
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Pressure (mH20)

🗷 ------ Water column above Diver (mH2O) 🗹 -

SWS_L1671 - L1671 - [2014-10-29 6:00:00 PM - 2014-11-15 9:59:00 AM]

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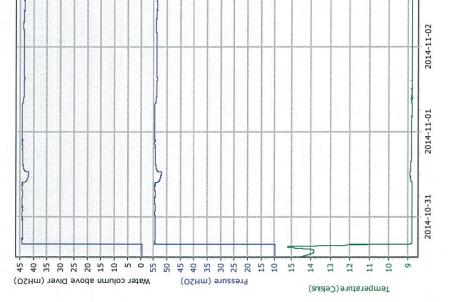


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SWS_S1744 - S1744 - [2014-10-29 6:00:00 PM - 2014-12-02 1:59:00 AM]	

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🖌 ------ Water column above Diver (mH2O)

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SWS_D6676 - D6676 - [2014-10-29 6:00:00 PM - 2014-12-021:59:00 AM]

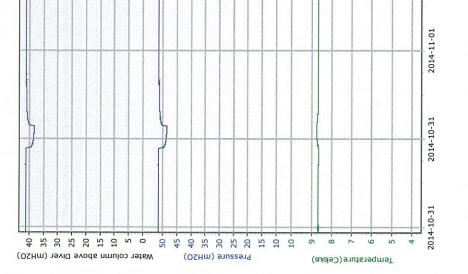
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- Temperature (Celsius)

--- Pressure (mH20)

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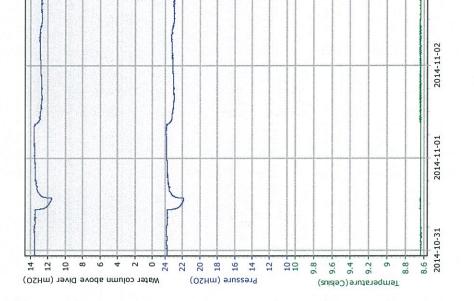
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SWS_J2172 - J2172 - [2014-10-29 6:00:00 PM - 2014-12-02 1:59:00 AM]

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SWS_J2155 - J2155 - [2014-10-29 6:00:00 PM - 2014-12-02 1:59:00 AM]

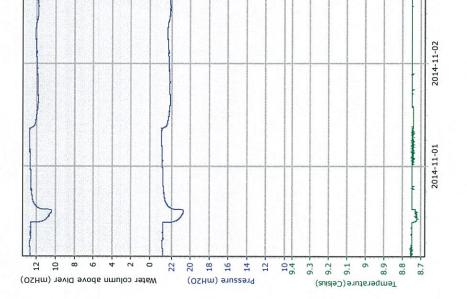
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Temperature (Celsius)

---- Pressure (mH20)

🖌 — Water column above Diver (mH2O) 🛛 —

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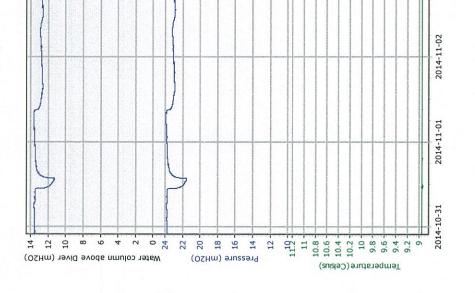
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🐱 ------ Water column above Diver (mH2O) 🐷 ------ Pressure (mH2O)

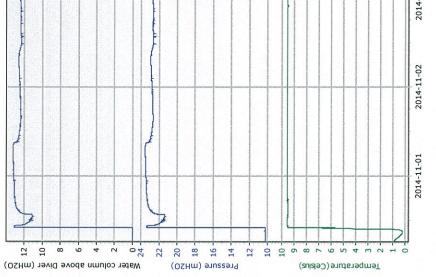
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SWS_S3092 - S3092 - [2014-10-29 6:00:00 PM - 2014-12-02 1:59:00 AM]

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SWS_N0218 - N0218 - [2014-10-29 6:00:00 PM - 2014-11-15 9:59:00 AM]

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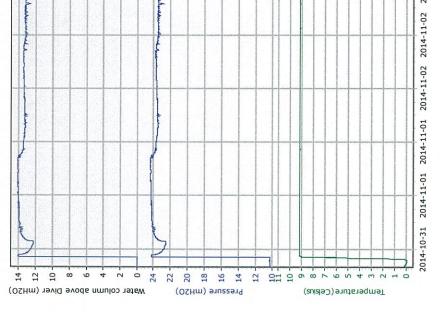
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- Pressure (mH20)

🖌 — — Water column above Diver (mH2O) 🗹 —

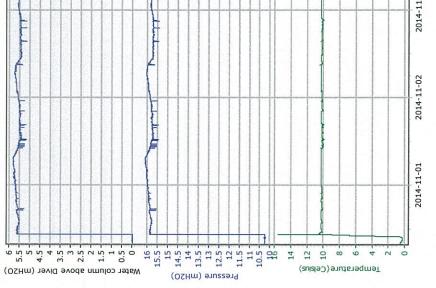
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SWS_S3089 - S3089 - [2014-10-29 6:00:00 PM - 2014-12-02 1:59:00 AM]

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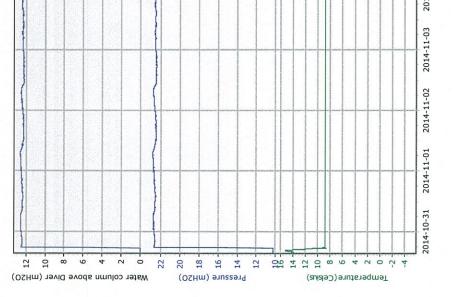
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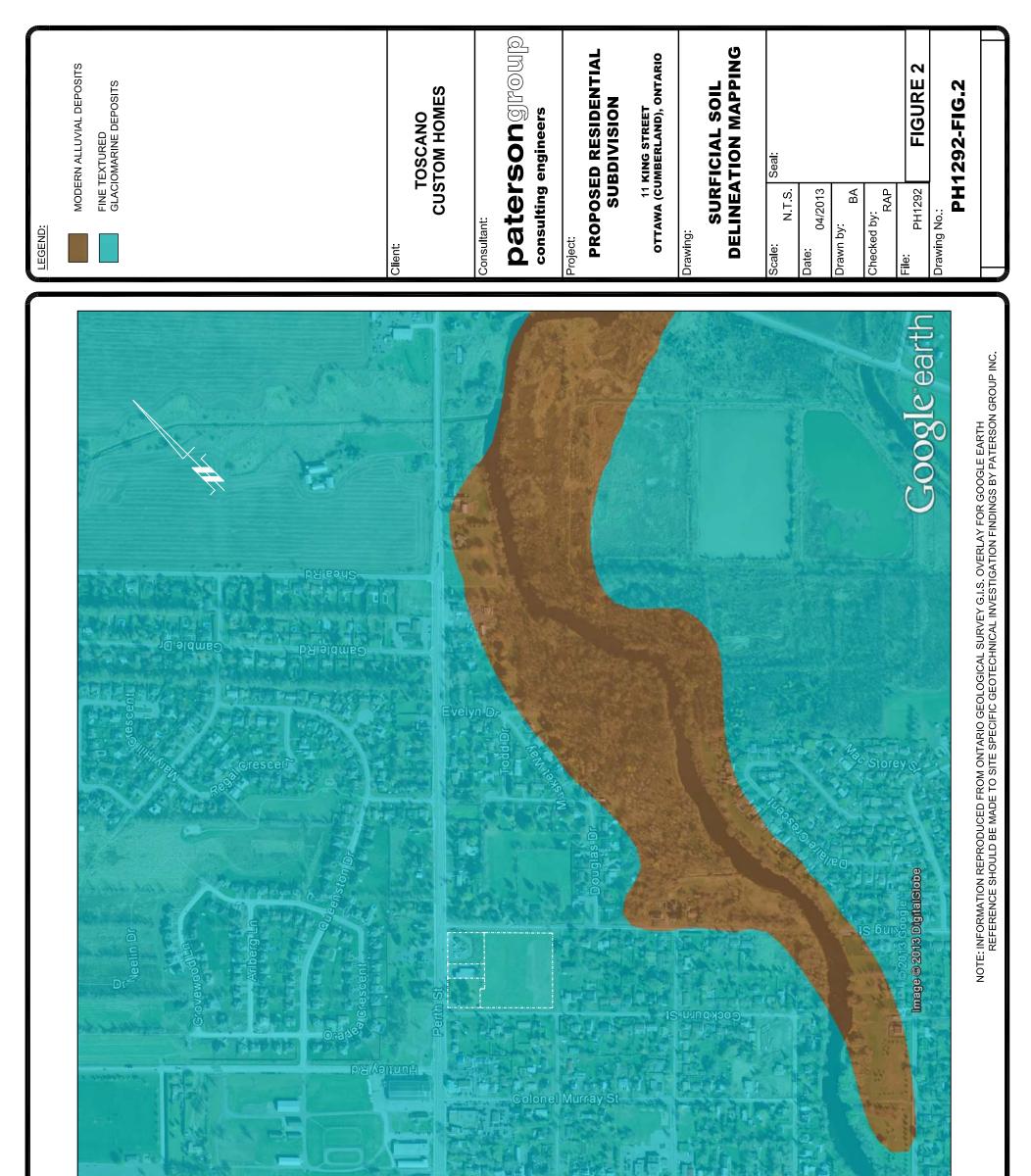
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APPENDIX 5

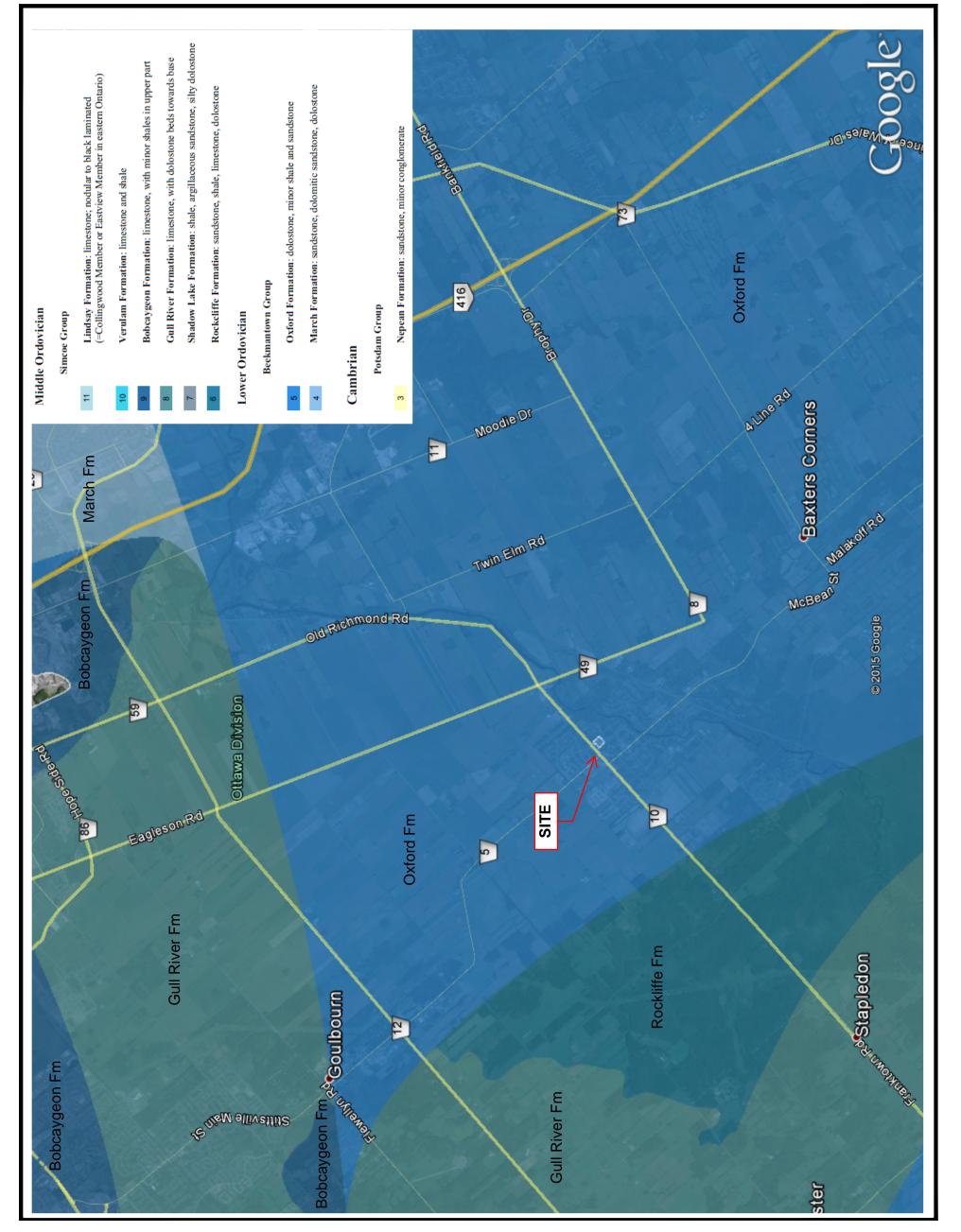
- Figure 1 Site Location Plan
- Figure 2 Surficial Soil Delineation Mapping
- Figure 3 Regional Bedrock Mapping
- Figure 4 Surrounding Well Information Plan
- Figure 5 Regional Wells Plan
- Figure 6 Geotechnical Investigation
- Figure 7 Lot Development Plan (Novatech)
- Figure 8 Conceptual Hydrogeological Model
- Figure 9 Schematic Geological Cross Sections (Golder)
- Figure 10 Test Well and Observation Well Location Plan
- Figure 11 Drawdown during Simultaneous and Extended Pumping Tests
- Figure 12 Well Construction Detail

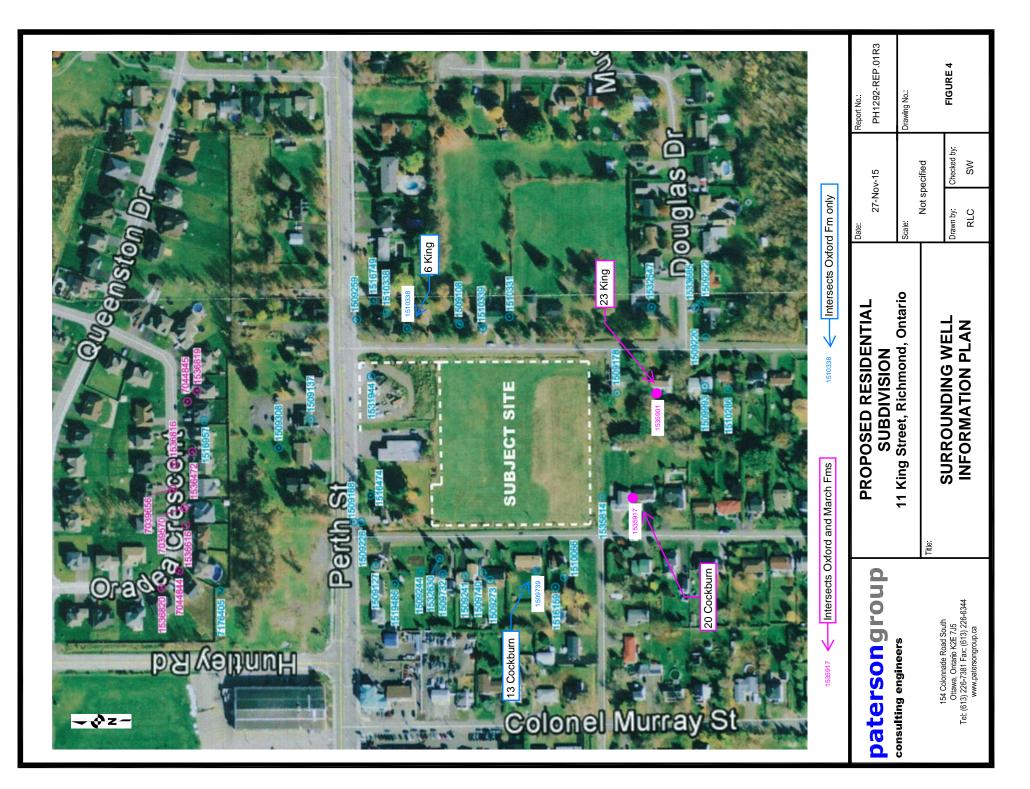


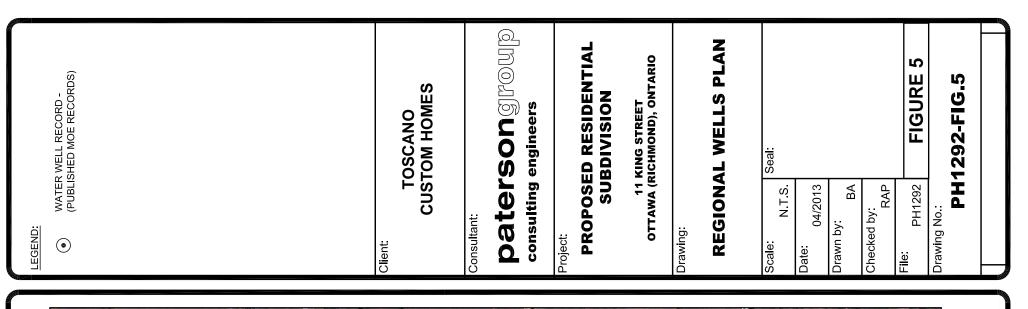


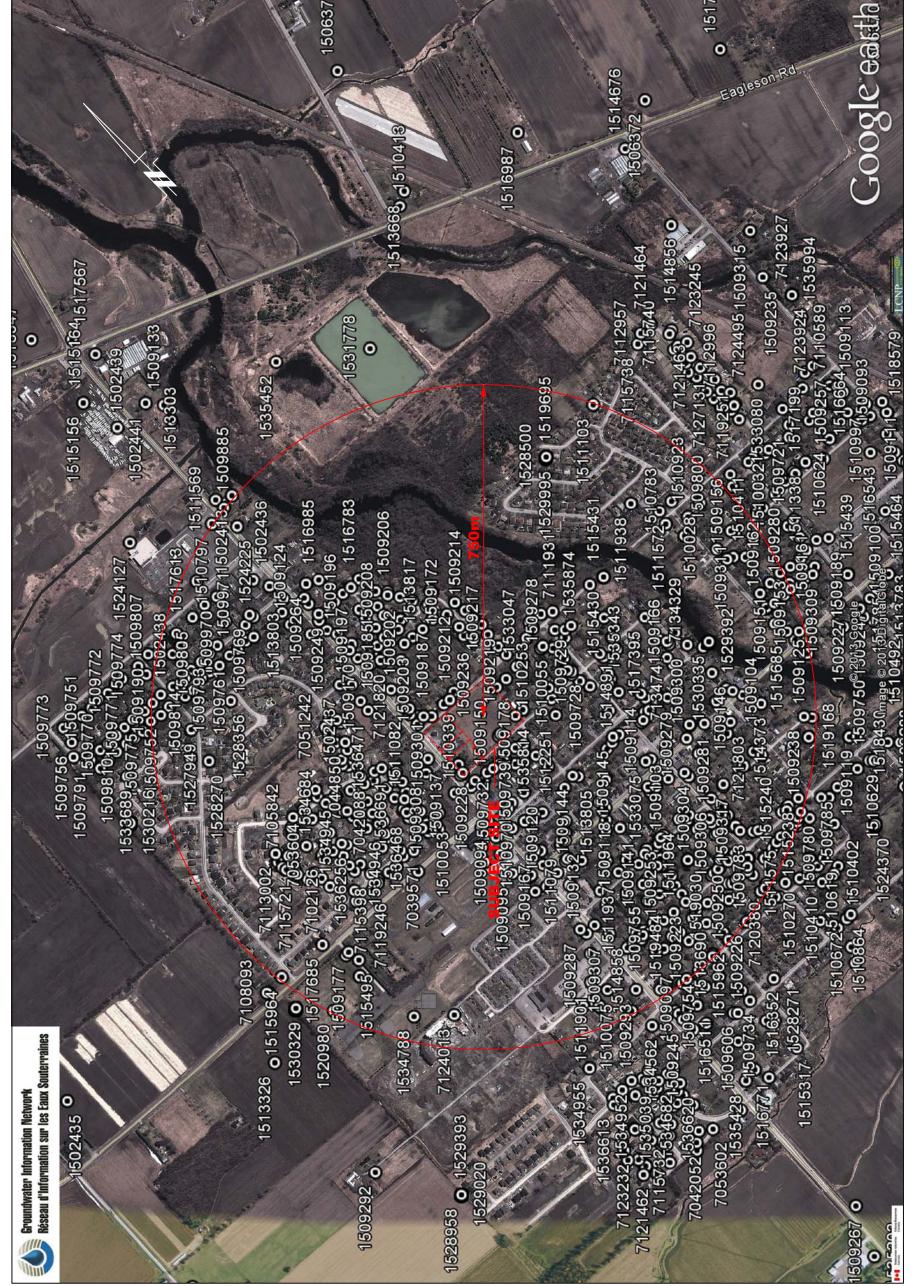


Bedrock information is from Ontario Geological Survey, OGS Earth Website (http:// www.mndm.gov.on.ca/en/mines-and-minerals/ applications/ogsearth (Amstrong, D.K. and Dodge, J.E.P. Paleozoic Geology Map of Southern Ontario; Ontario Geo- logical Survey, Miscellaneous ReleaseData 21, 2007) Bedrock information is displayed on Google Earth (http://www.google.com/earth/), 2015.
SO .
Consulting engineers Client: TOSCANO CUSTOM HOMES
Project: PROPOSED RESIDENTIAL SUBDIVISION 11 King Street, Richmond, Ontario
REGIONAL BEDROCK MAPPING
Scale: Drawn by: RLC Not specified Drawn by: SW File: PH1292 Checked by:
FIGURE 3

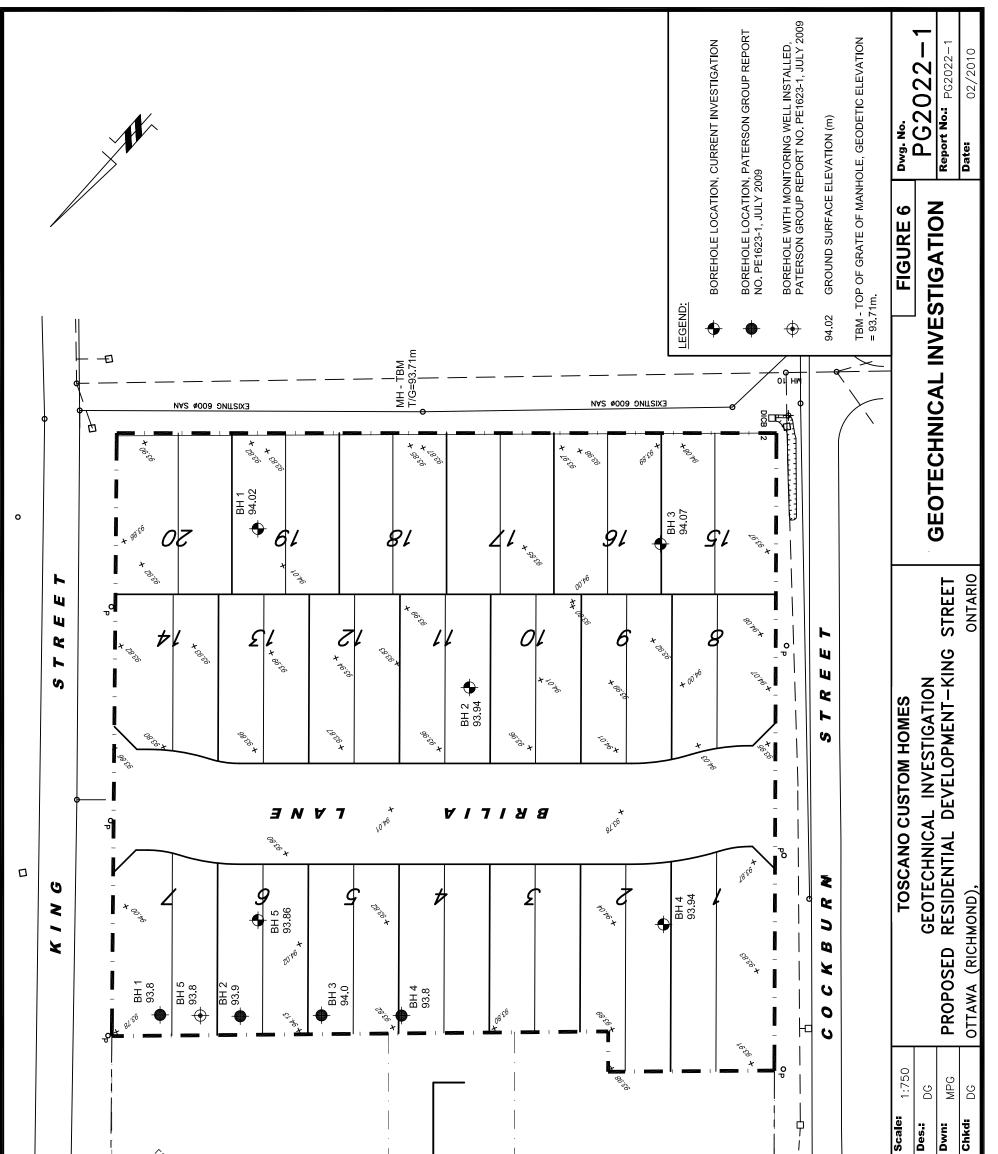




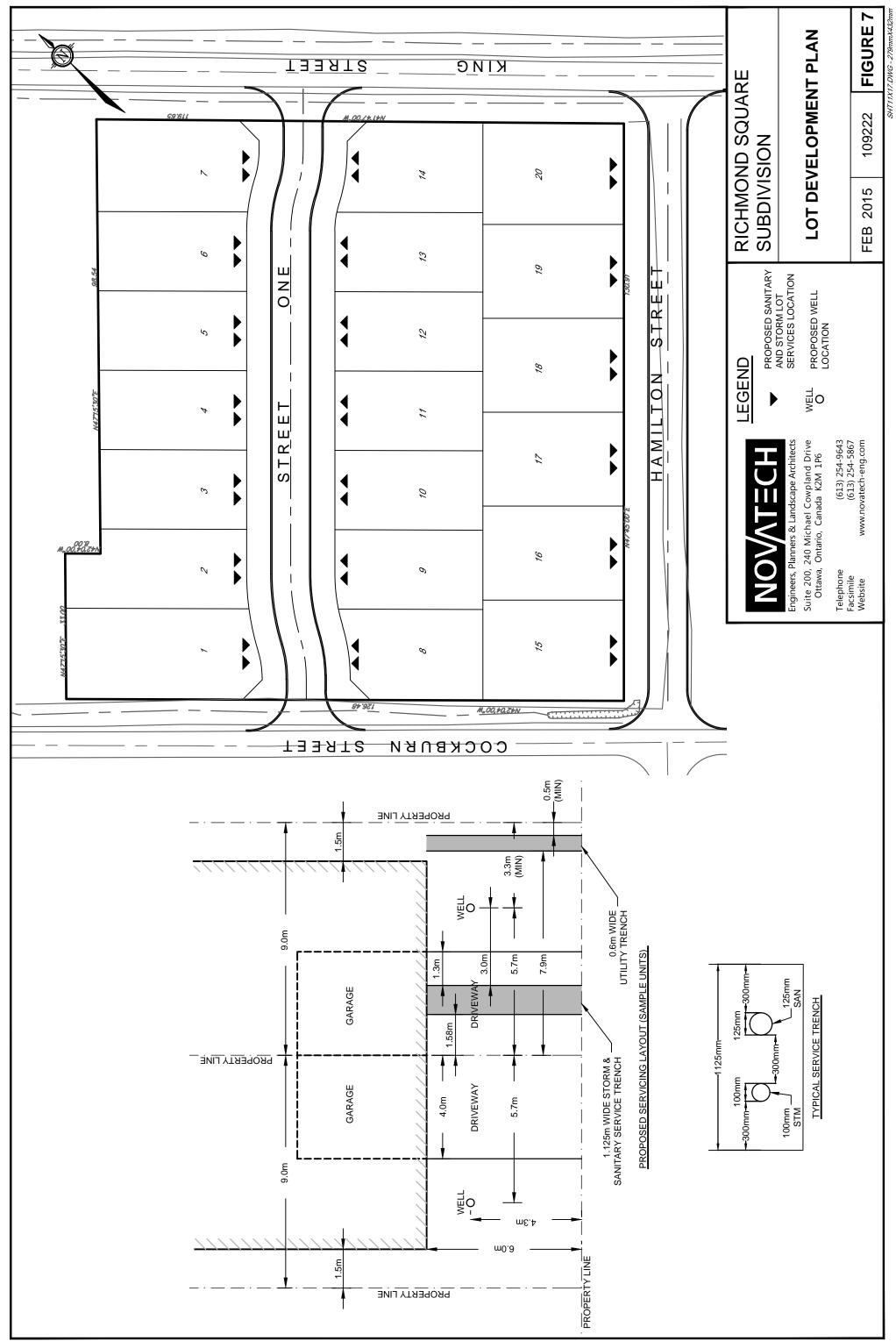




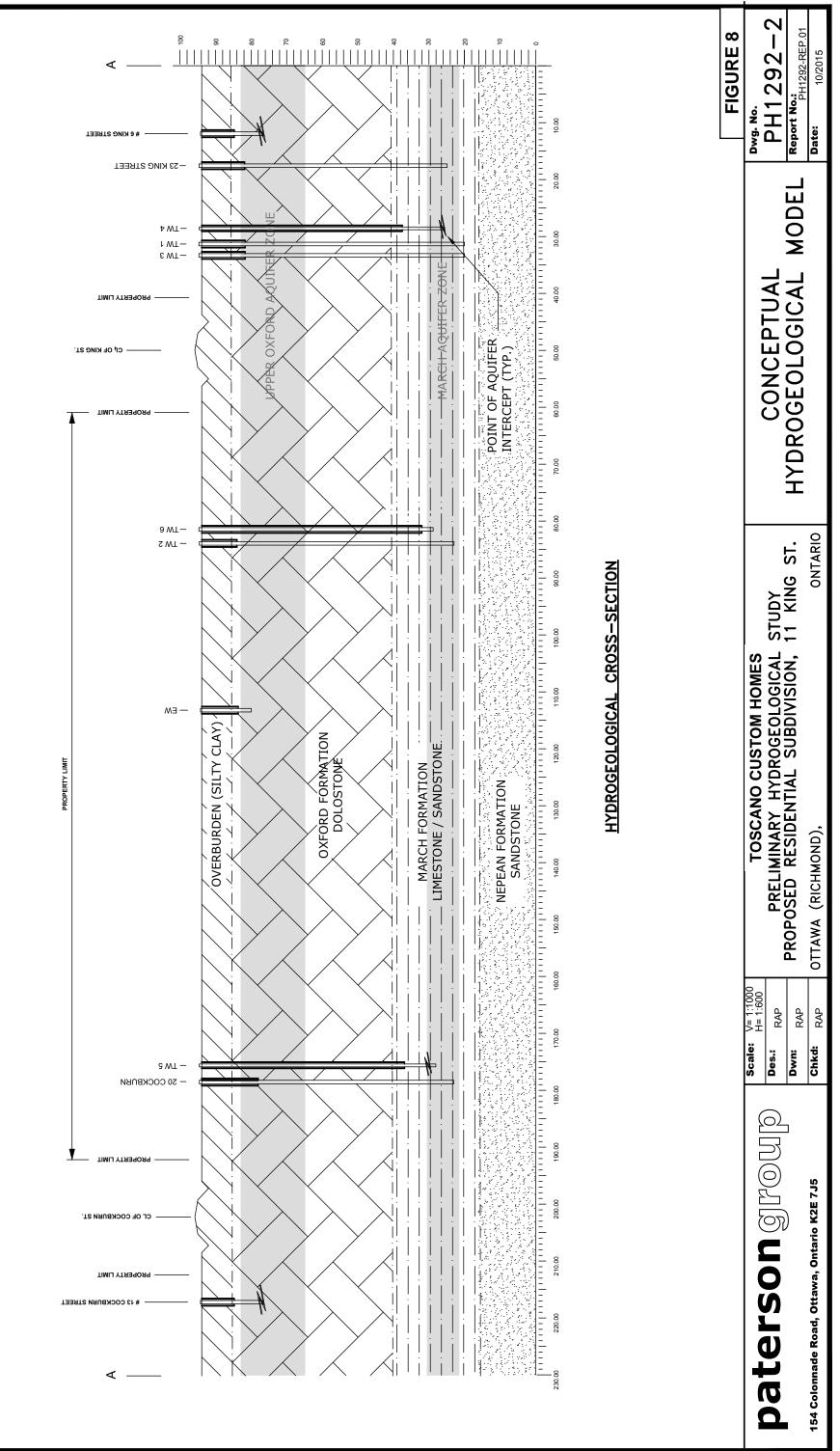
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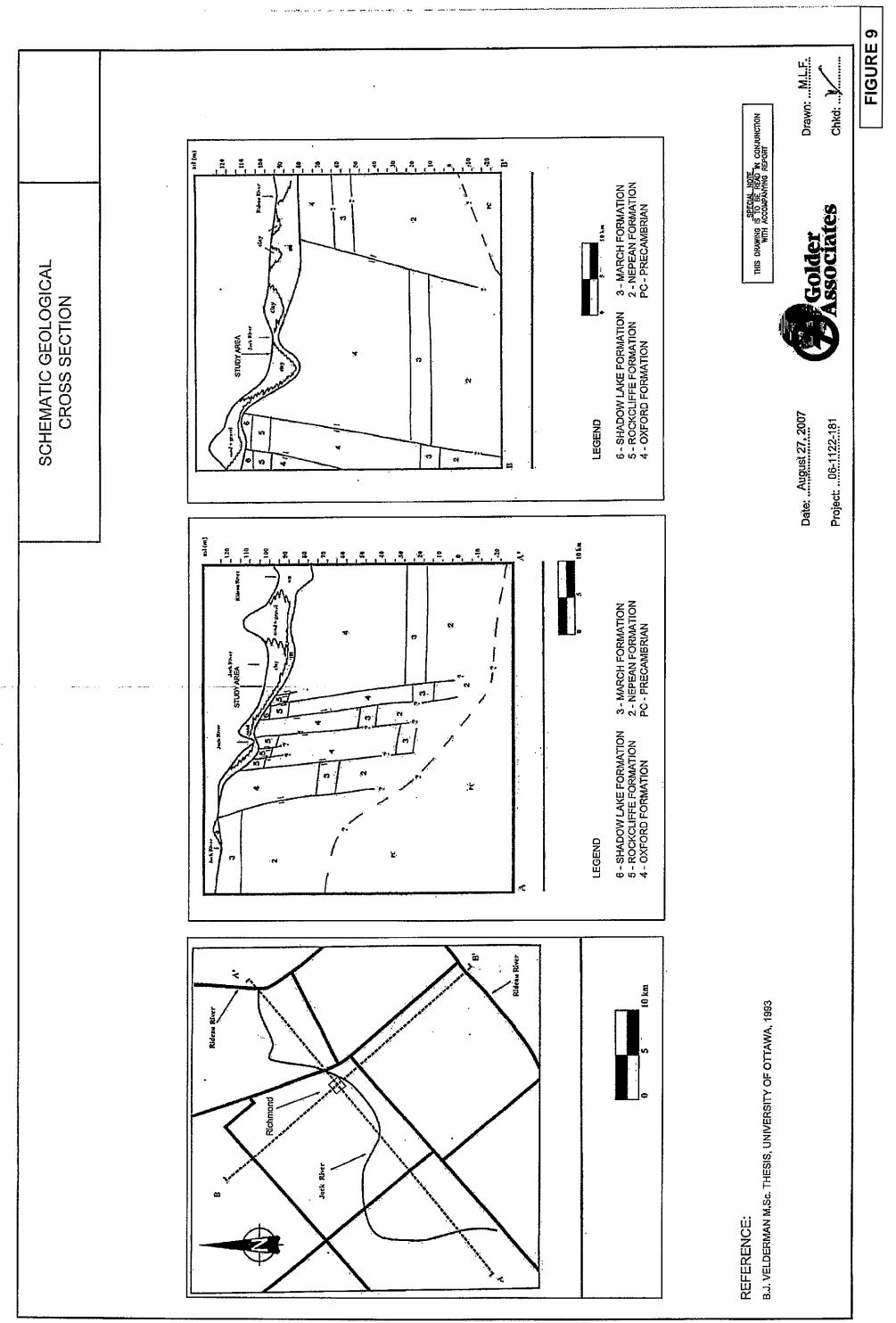
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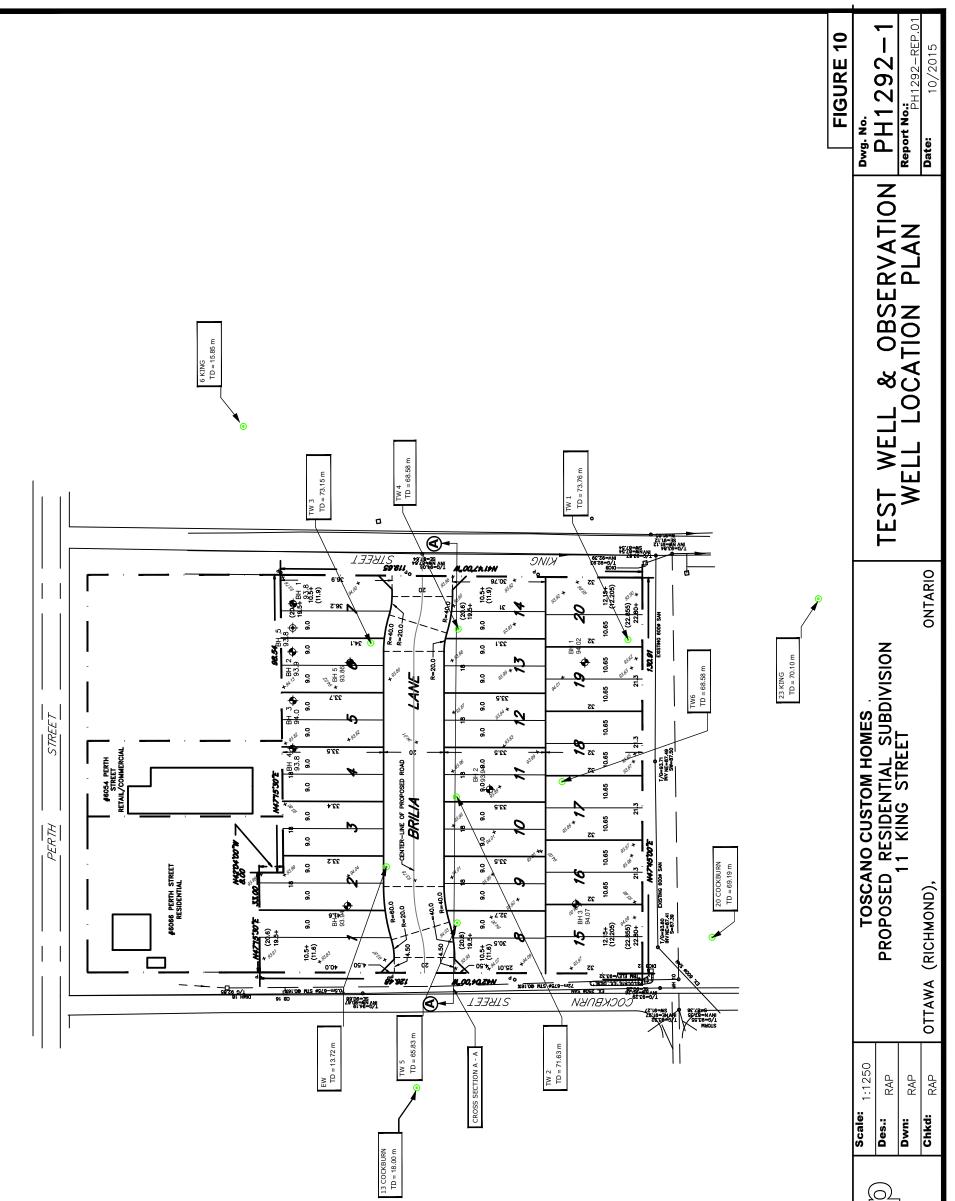
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154 Colonnade Road, Ottawa, Ontario K2E 7J5

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