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Hydrogeological Assessment for Private Services:

Proposed Residential Development
11 King Street
Richmond, Ontario

Prepared For

Toscano Land Corp.

February, 2010

Report: PH1292-REP.01R5
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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 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 m^2/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 that the development takes place in an effective manner, with a minimal impact on the natural environment.

Table of Contents

Tables

Appendices

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.

Table 1 - Overburden Groundwater Elevations (Geotechnical Boreholes)

SUMMARY OF GROUNDWATER ELEVATIONS - GEOTECHNICAL BOREHOLES

Test Hole Number	Ground Surface Elevation (m)	Groundwater Levels		Recording Date
		Depth (m)	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

Note: The ground surface elevation at each test hole location are referenced to the top of manhole located along the south property boundary of the subject site.

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.

Table 2 - Test Well Summary

TEST WELL SUMMARY						
Well ID	**Year drilled**	**Depth to BR (m)**	**Casing depth (m)**	**Depth to water bearing fractures (m)**	**Total depth (m)**	**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

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^{TM} ExStik II portable multi-meter. Field parameter results are included in Appendix 3.

Table 3 - Pumping Tests Summary

Pumping Tests Summary

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
TW4	2011	9	26-Aug-11	75.6
		2.78	simultaneous test 31-Oct-14	99.8
TW5	2011	9	30-Sep-11	81.8
		2.78	simultaneous test 31-Oct-14	99.8
TW6	2014	3 days	4 day test from 1-4-Nov-14	34
		2.78	simultaneous test 31-Oct-14	99.8

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.

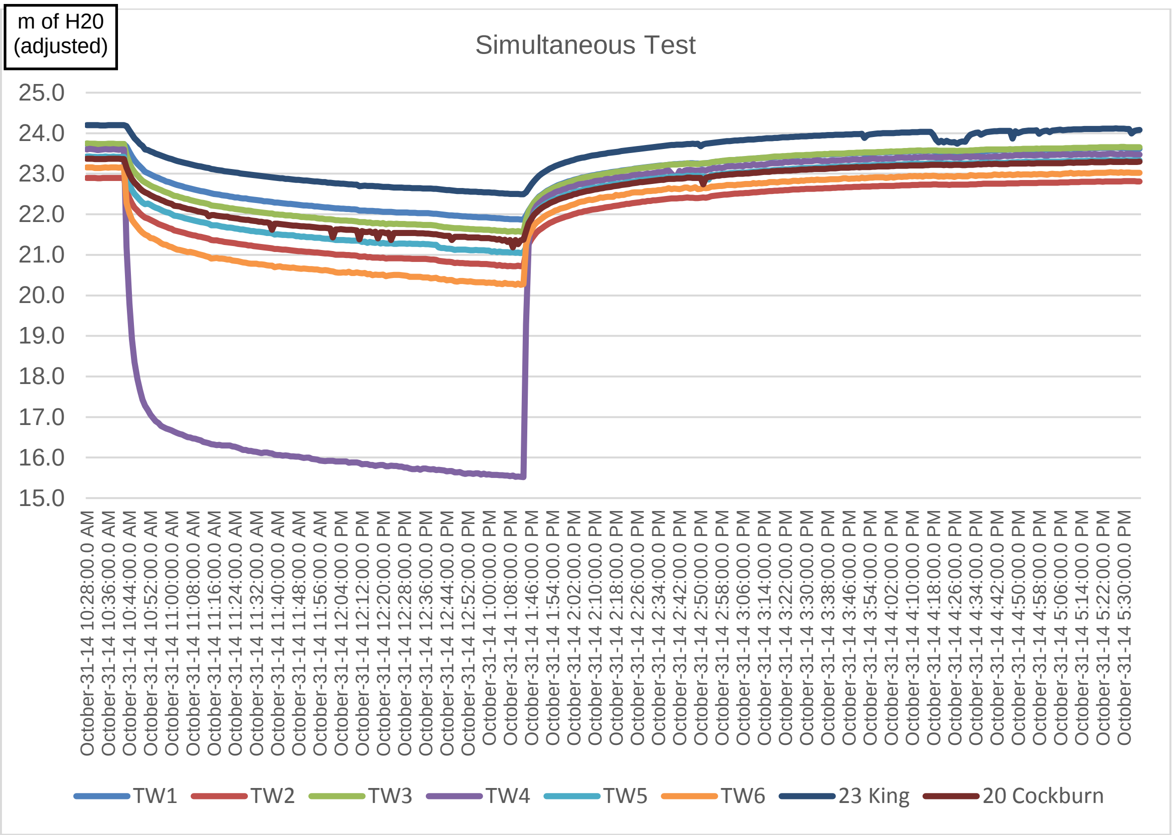
2.4.4 Simultaneous Pumping of TW4, TW5 and TW6

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).

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).

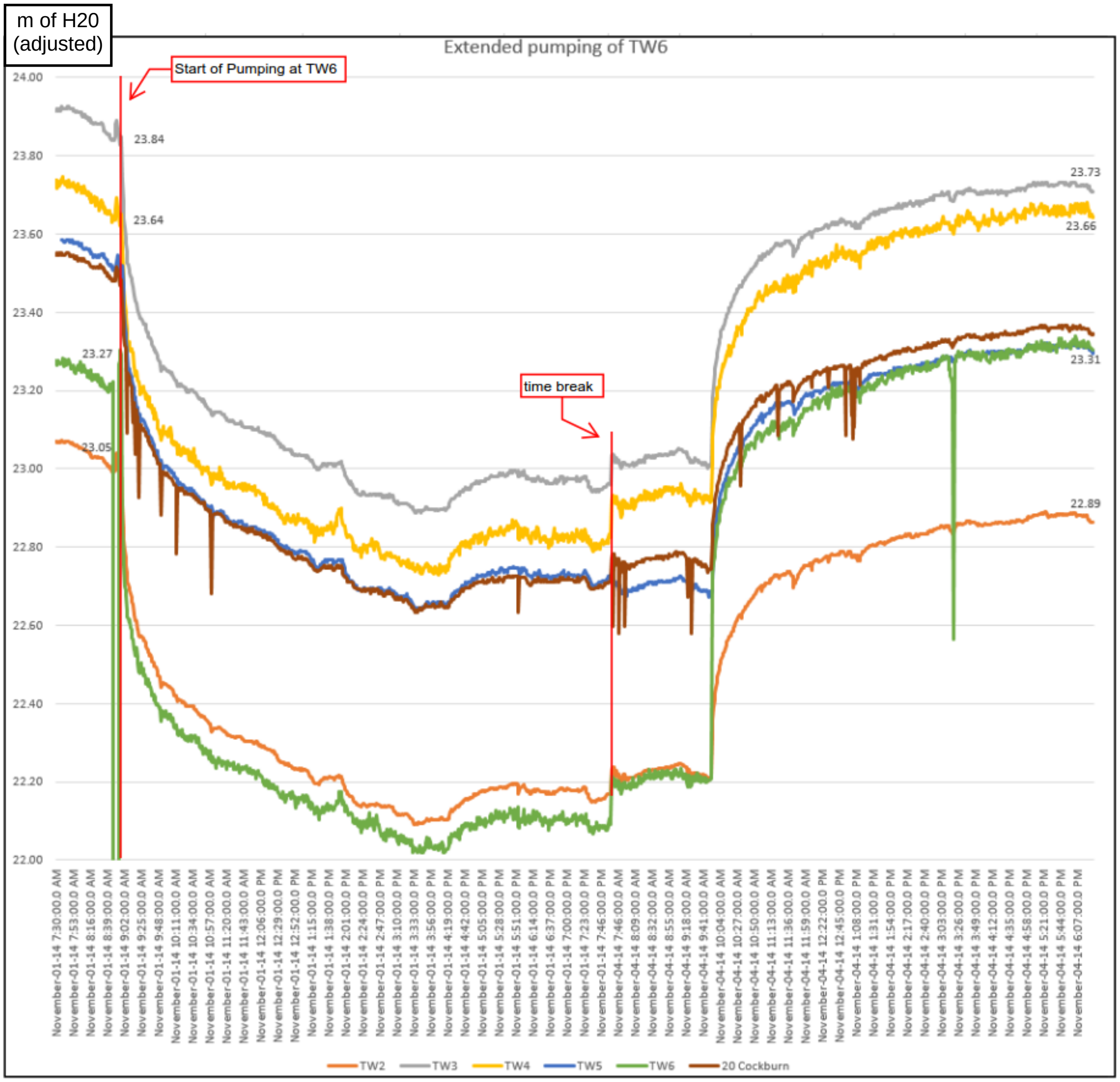


The plot provided above has superimposed pumping signatures from known and unknown sources (X axis = metres H_20 adjusted). The hydrograph traces for 23 King and 20 Cockburn show evidence of pump cycling from the pumps that are installed in those wells. The other hydrograph traces also include evidence 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.

Table 4 - Extended Pumping Test of TW6 - Recovery Analysis

EXTENDED PUMPING TEST OF TW6 - RECOVERY ANALYSIS

time	TW1	TW2	TW3	TW4	TW5	TW6	23 King	20 Cockburn
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	November-01-14 8:59AM							
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	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%

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.

Please Note: 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-of-way 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 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 Geochemistry - Neighbouring Wells

GROUNDWATER GEOCHEMISTRY - NEIGHBOURING WELLS						
Parameter	Units	Neighbouring Water Wells			Ontario Drinking Water Standards	
		6 KingStreet	13 Cockburn	'Perth @ Shea' well	Type	Limit
Microbiological Parameters						
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 (Health 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 Objectives/ Operational Guidelines						
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
pH		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 Objective		OG= Operational 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.

Table 6 - Aquifer Investigation Wells Configuration Summary

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)
Test wells intercepting Oxford/March and Upper Nepean Fms	TW1	2010	7.67	9.75	71.0	73.76
	TW2	2010	9.14	11.58	69.2 / 69.8	71.63
	TW3	2010	10.06	12.19	40.5 / 65.8 / 69.5	73.15
Test wells intercepting preferred aquifer only (i.e. Lower March Fm)	TW4	2011	8.84	56.38	68.0	68.58
	TW5	2011	8.53	56.98	63.3	65.83
	TW6	2014	9.14	54.86	56.4 / 62.5 / 66.8	68.58
Observation wells intercepting Oxford and March Fms	20 Cockburn	2005	8.23	7.77	67.1	69.19
	23 King	2005	7.31	8.22	69.5	70.10
Observation wells intercepting Oxford Fm only	EW	1987	9.14	10.36	11.3	13.72
	13 Cockburn	MOECC Water Well Record not identified (depth measured)				18.00
	6 King	1969	8.23	9.45	15.2	15.85

6.1 Aquifer Characteristics

Pumping test data were analyzed using Aquifer Test Pro^{TM} software. All pressure data from the dataloggers was corrected for atmospheric pressure variations (i.e. barometric compensation) using Schlumberger Diver-Office^{TM} 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 m^2/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 m^2/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^{TM} 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.

Table 7 - Simultaneous Test Analysis Summary

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.

Table 8 - Extended Test of TW6 Analysis Summary

Extended Test (TW6)			
Analysis	**Well ID**	**T (m2/day)**	**S**
Theis	TW4	67.9	1.00E-07
Theis	TW5	51.2	2.33E-06
Theis	TW1	70.8	1.00E-07
Theis	TW3	59.7	1.00E-07
Theis	TW2	71.0	1.37E-07
Theis	20 Cockburn	68.8	1.17E-07
Theis	23 King	66.5	1.00E-07
Agarwal + Theis	TW4	42.1	1.19E-05
Agarwal + Theis	TW5	54.4	5.35E-06
Agarwal + Theis	TW1	51.6	7.20E-06
Agarwal + Theis	TW2	53.2	2.57E-05
Agarwal + Theis	20 Cockburn	53.8	8.04E-06
Agarwal + Theis	23 King	53.1	2.10E-06
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.

Table 9 - Extended Test of TW6 (TW4 and TW5 analyses)

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.

GROUNDWATER GEOCHEMISTRY TW1, TW2 & TW3

Parameter	Units	TW1		TW2		TW3		ODWS	
		3 HR (771127)	6 HR (771144)	3 HR (777415)	6 HR (777416)	3 HR (783870)	6 HR (783871)	TYPE	LIMIT
Microbiological Parameters									
E.coli	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 Parameters (Health 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 Parameters with Aesthetic Objectives/ Operational Guidelines									
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
pH		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 Parameters									
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	-	-

MAC=Maximum Allowable Concentration AO = Aesthetic Objective OG= Operational Guideline

GROUNDWATER GEOCHEMISTRY TW4, TW5 and TW6

Parameter	Units	TW4		TW5		TW6		ODWS	
		26-Aug-11		30-Sep-11		03-Nov-14	04-Nov-14		
		3 HR	9 HR	3 HR	9 HR			TYPE	LIMIT
Microbiological Parameters									
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 Related)									
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 Aesthetic Objectives/ Operational 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
pH		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 Parameters									
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	-	-
Potassium	mg/L	3	3	3	3	3	4	-	-

MAC=Maximum Allowable Concentration   AO = Aesthetic Objective   OG= Operational Guideline

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 Geochemistry – TW6 (Metals)

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.

Table 11 - Groundwater Geochemistry - TW1 (VOCs)

GROUNDWATER GEOCHEMISTRY - VOLATILE ORGANIC COMPOUNDS - TW1					
PARAMETER	UNITS	MRL	TW 1	TYPE	LIMIT
VOLATILE ORGANIC COMPOUNDS (VOC'S)					
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 HYDROCARBONS					
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	0.2	<0.2		
F4 (C34 TO C50)	mg/L	0.2	<0.2		
MAC=Maximum Allowable Concentration			AO = Aesthetic Objective		

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.

Table 12 - Peak Demand Estimates

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
City of Ottawa	326	120	2.72	4	10.9	435
CMHC	225	120	1.88	4	7.5	300
CMHC (w new efficiency changes)	163	120	1.36	4	5.4	217

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.

Table 13 - 20 Year Safe Yield

20 YEAR SAFE YIELD			
	Simultaneous Test		
Transmissivity Calculated Using	**TW4**	**TW5**	**TW6**
Transmissivity (m2/d)	37	37	37
Average Test Pumping Rate (L/min)	99.8	99.8	99.8
Average Test Pumping Rate (m^3/day)	144	144	144
Available Drawdown (m)	12.19	8.84	13.72
Drawdown at 100 mins (m)	7.81	2.14	2.70
Maximum Test Drawdown (m)	8.05	2.36	2.92
% of available drawdown	66%	27%	21%
Drawdown at 20 years (extrapolated)	15.2	9.2	9.4
Specific Capacity (L/min/m) at 167 mins	12	42	34
Q20 safe well yield (m^3/day)$_{\text{Farvolden}}$	216	156	243
Q20 safe well yield (m^3/day)$_{\text{Maarthius \& van der Kamp}}$	81	97	147
Q20 safe well yield (L/min)$_{\text{Maarthius \& van der Kamp}}$	56	67	102
Farvolden, 1959, Maathius & van der Kamp, 2006			

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”.

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:

1. 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.

2. 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:

1. 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.

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 qualified 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-table-of-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 aquifer 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.

patersongroup

Russell Chown, P.Geo.
Senior Hydrogeologist

Reviewed by:

Stephen J. Walker, P.Eng
Principal

11.0 REFERENCES

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APPENDIX 1

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

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

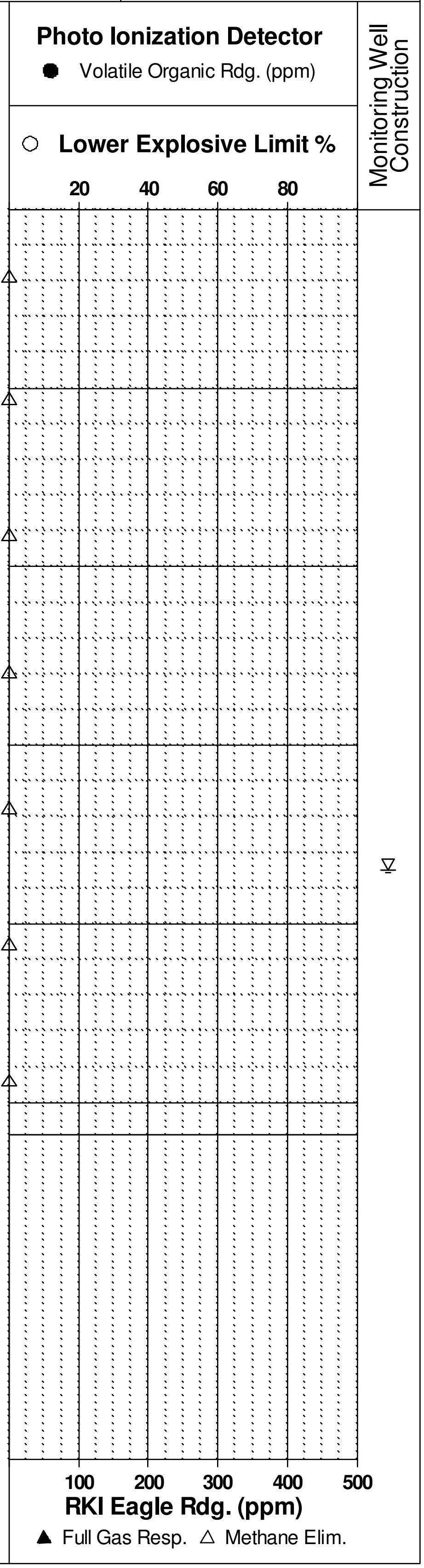
BORINGS BY CME 45 Power Auger

DATE July 3, 2009

FILE NO. PE1623

HOLE NO. BH 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.80
TOPSOIL 0.10							
		AU	1				
		SS	2	25	7	1	92.80
		SS	3	58	3		
Brown **SILTY CLAY**						2	91.80
		SS	4	75	5		
						3	90.80
		SS	5	100	2		
- grey by 3.7m depth							
						4	89.80
		SS	6	100	1		
		SS	7	100	1		
						5	88.80
5.18 End of Borehole							
(Open hole GWL @ 3.7m depth)							



SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

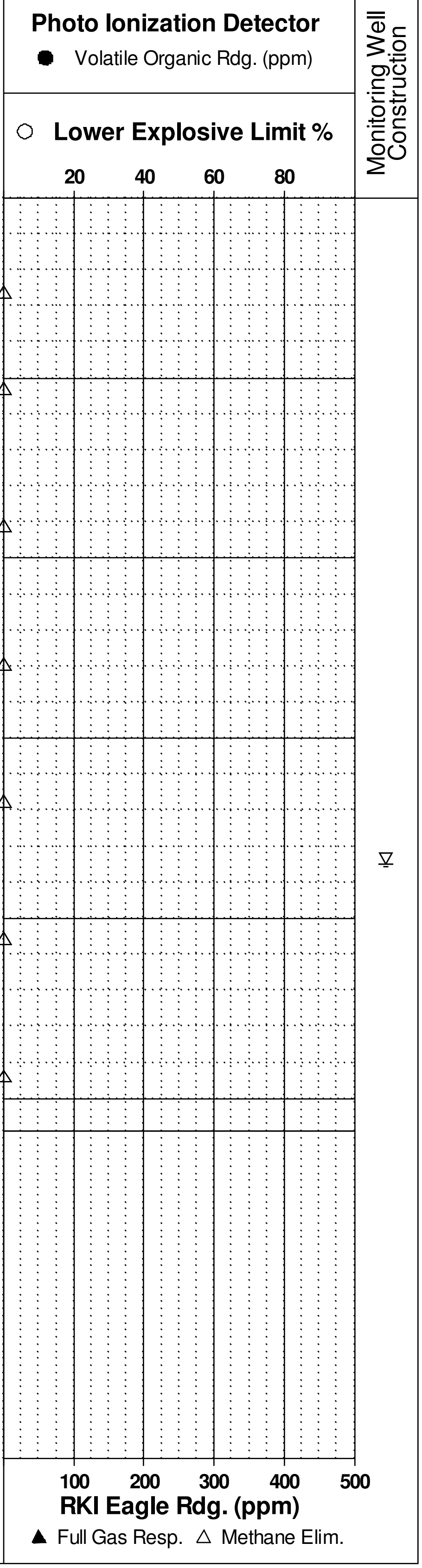
BORINGS BY CME 45 Power Auger

DATE July 3, 2009

FILE NO. PE1623

HOLE NO. BH 2

SOIL DESCRIPTION	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	93.90
TOPSOIL 0.13						
Brown **SILTY CLAY**	AU	1				
	SS	2	75	3	1	92.90
	SS	3	100	4		
					2	91.90
	SS	4	100	3		
					3	90.90
	SS	5	100	2		
- grey by 3.7m depth						
	SS	6	100	1	4	89.90
	SS	7	100	1		
5.18					5	88.90
End of Borehole (Open hole GWL @ 3.7m depth)						



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

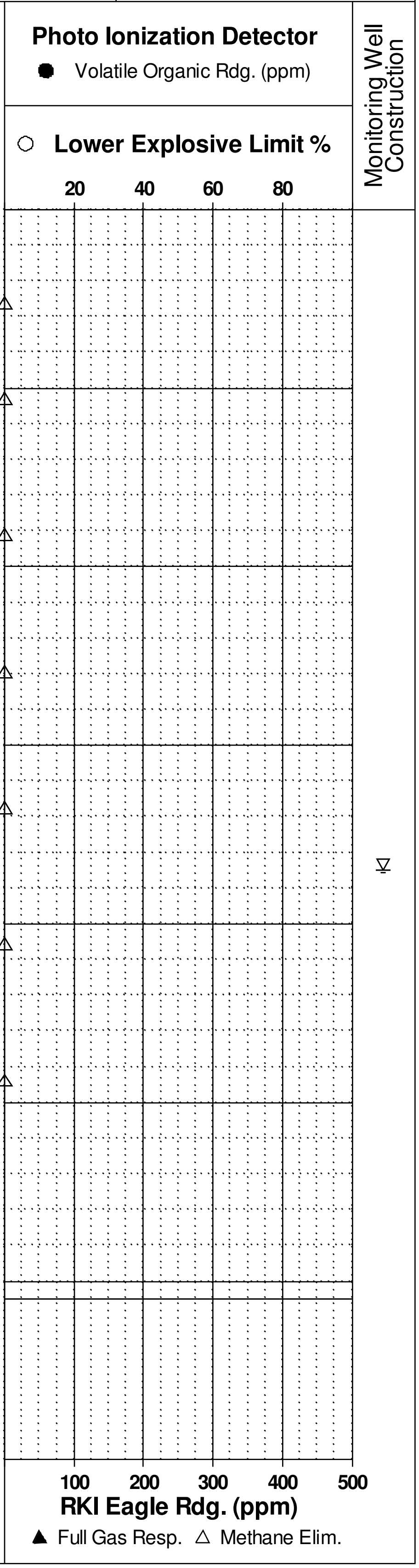
BORINGS BY CME 45 Power Auger

DATE July 3, 2009

FILE NO. **PE1623**

HOLE NO. **BH 3**

SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.00
TOPSOIL	0.10						
		AU	1				
		SS	2	50	2	1	93.00
		SS	3	83	4		
						2	92.00
Brown **SILTY CLAY**		SS	4	100	3		
						3	91.00
		SS	5	100	2		
- grey by 3.5m depth							
						4	90.00
		SS	6	100	1		
		SS	7	100	1		
						5	89.00
						6	88.00
	6.10						
End of Borehole							
(Open hole GWL @ 3.7m depth)							



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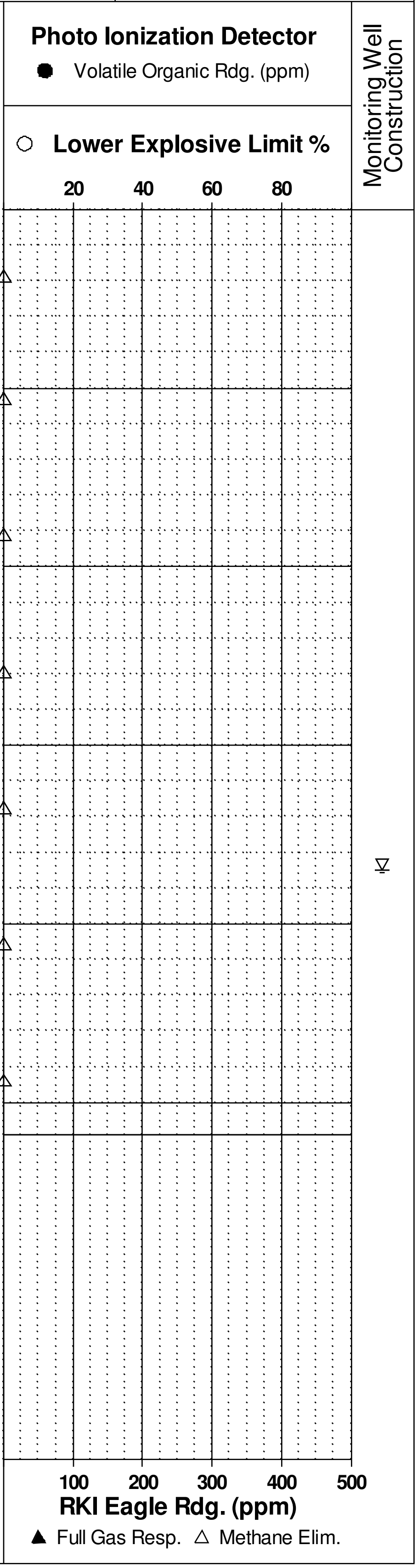
SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.
REMARKS
BORINGS BY CME 45 Power Auger
DATE July 3, 2009
FILE NO. PE1623
HOLE NO. BH 4

SOIL DESCRIPTION		TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.10				
		AU	1		
		SS	2	33	5
		SS	3	67	4
Brown **SILTY CLAY**		SS	4	100	2
		SS	5	100	1
- grey by 3.5m deth		SS	6	100	1
		SS	7	100	1
	5.18				
End of Borehole					
(Open hole GWL @ 3.7m depth)					

DEPTH (m)	ELEV. (m)
0	93.80
1	92.80
2	91.80
3	90.80
4	89.80
5	88.80



SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

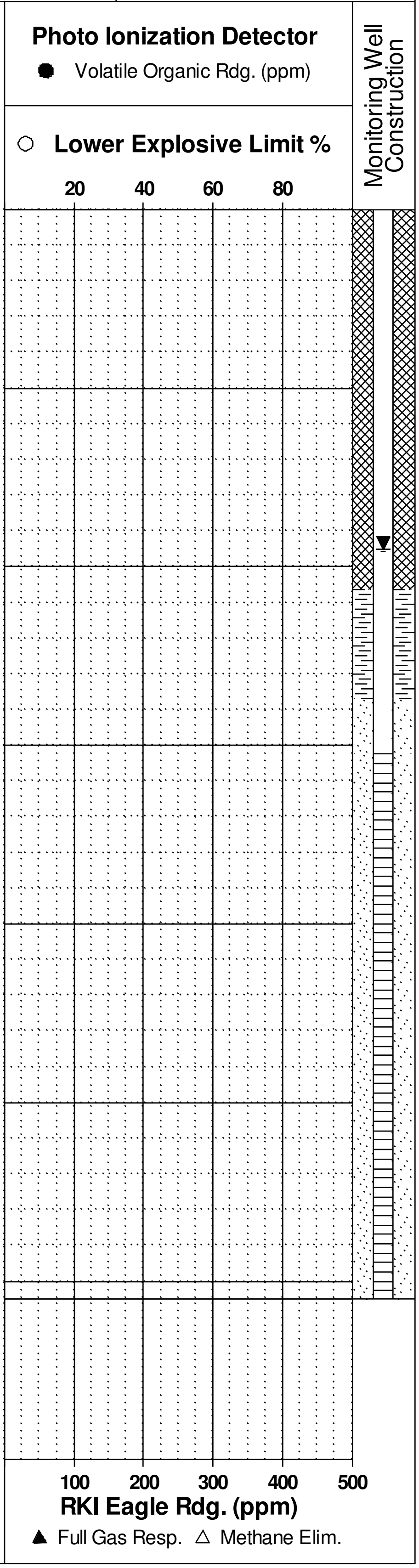
BORINGS BY CME 45 Power Auger

DATE July 3, 2009

FILE NO. PE1623

HOLE NO. BH 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
TOPSOIL 0.10						0	93.80
						1	92.80
						2	91.80
Inferred **SILTY CLAY**						3	90.80
						4	89.80
						5	88.80
6.10						6	87.80
End of Borehole (GWL @ 1.90m-July 7/09)							



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Developement-King Street
Ottawa, Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

BORINGS BY CME 55 Power Auger

DATE January 29, 2010

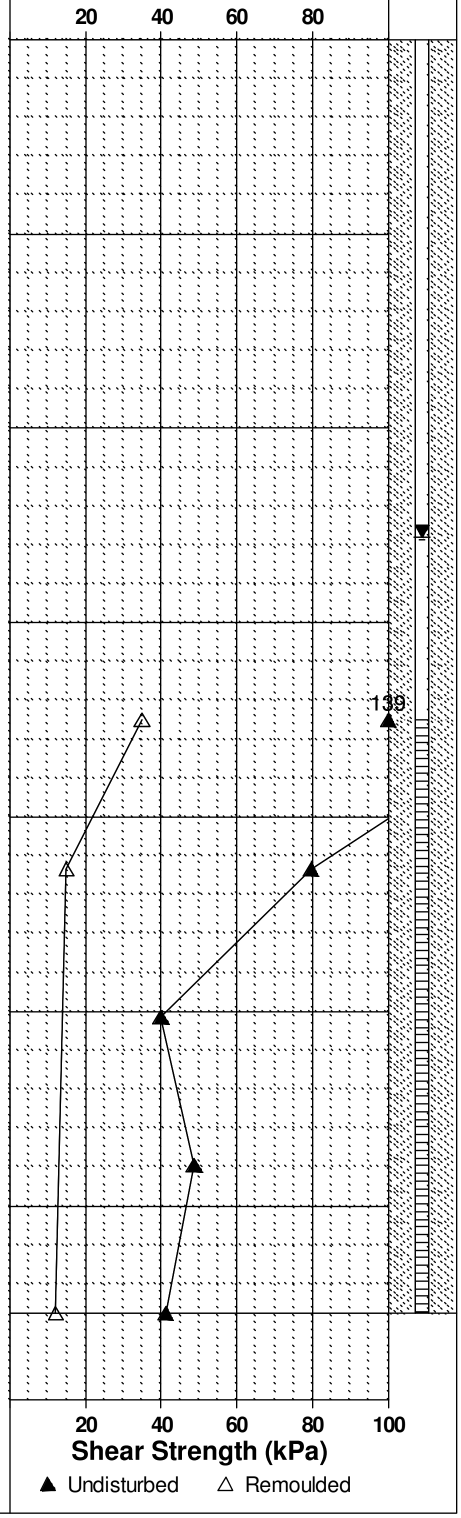
FILE NO. PG2022

HOLE NO. BH 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.02
	▨	AU	1				
	▨					1	93.02
	▨	SS	2	38	8		
	▨	SS	3	0	9		
	▨					2	92.02
Very stiff to stiff, brown **SILTY CLAY**	▨	SS	4	100	5		
	▨					3	91.02
	▨					4	90.02
- stiff to firm and grey by 4.3m depth	▨						
	▨					5	89.02
	▨					6	88.02
6.55							
End of Borehole (GWL @ 2.56m-Feb. 5/10)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Developement-King Street
Ottawa, Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

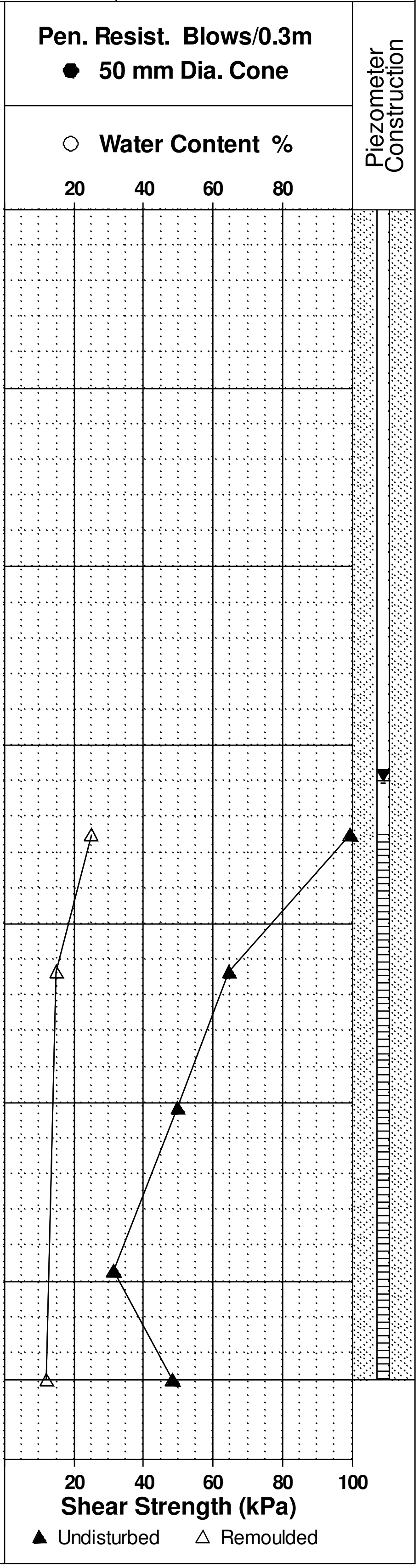
BORINGS BY CME 55 Power Auger

DATE January 29, 2010

FILE NO. PG2022

HOLE NO. BH 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.94
		AU	1				
		SS	2	4	4	1	92.94
		SS	3	83	3		
Very stiff to stiff, brown **SILTY CLAY**						2	91.94
- stiff to firm and grey-brown by 2.9m depth		SS	4	100	5		
						3	90.94
						4	89.94
- grey by 4.3m depth							
						5	88.94
						6	87.94
6.55							
End of Borehole (GWL @ 3.20m-Feb. 5/10)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Developement-King Street
Ottawa, Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

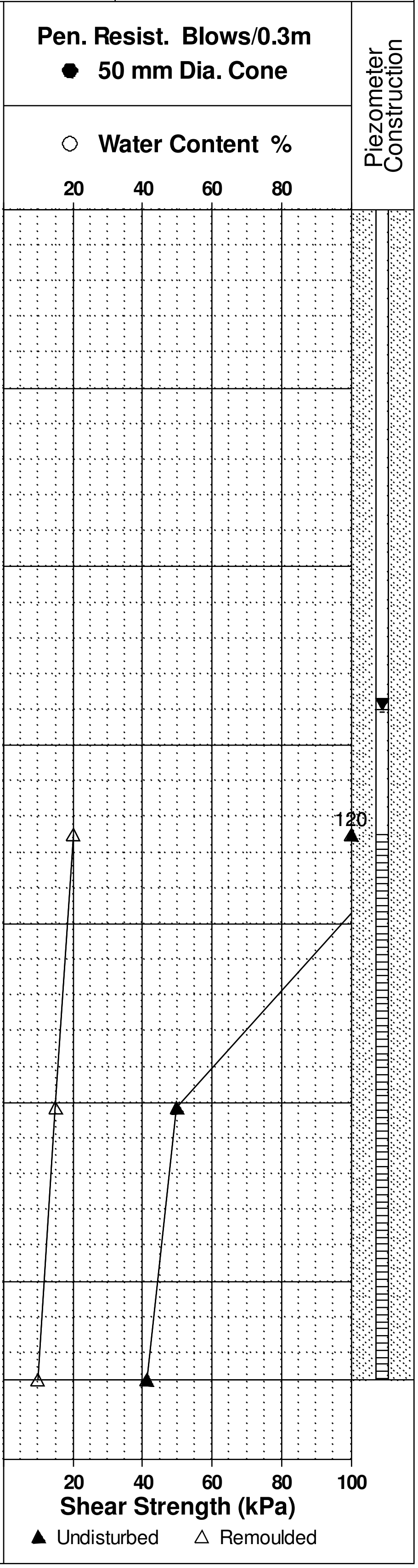
BORINGS BY CME 55 Power Auger

DATE January 29, 2010

FILE NO. PG2022

HOLE NO. BH 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE						0	94.07
		AU	1				
		SS	2	21	3	1	93.07
		SS	3	100	3	2	92.07
		SS	4	88	5		
Very stiff to stiff, brown **SILTY CLAY**						3	91.07
- stiff to firm and grey-brown by 3.5m depth							
						4	90.07
- grey by 5.0m depth						5	89.07
						6	88.07
6.55							
End of Borehole							
(GWL @ 2.80m-Feb. 5/10)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Developement-King Street
Ottawa, Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

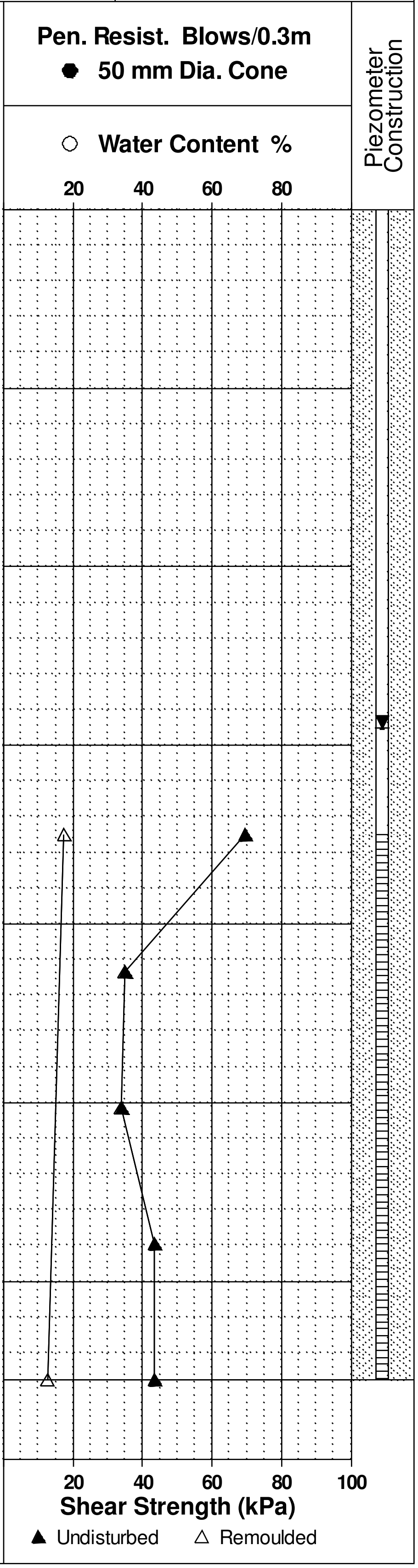
BORINGS BY CME 55 Power Auger

DATE January 29, 2010

FILE NO. PG2022

HOLE NO. BH 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.94
		AU	1				
		SS	2	58	5	1	92.94
		SS	3	75	3		
Very stiff to stiff, brown **SILTY CLAY**						2	91.94
- stiff to firm and grey-brown by 2.9m depth		SS	4	100	4		
						3	90.94
						4	89.94
- grey by 4.4m depth							
						5	88.94
						6	87.94
6.55							
End of Borehole (GWL @ 2.90m-Feb. 5/10)							



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Developement-King Street
Ottawa, Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

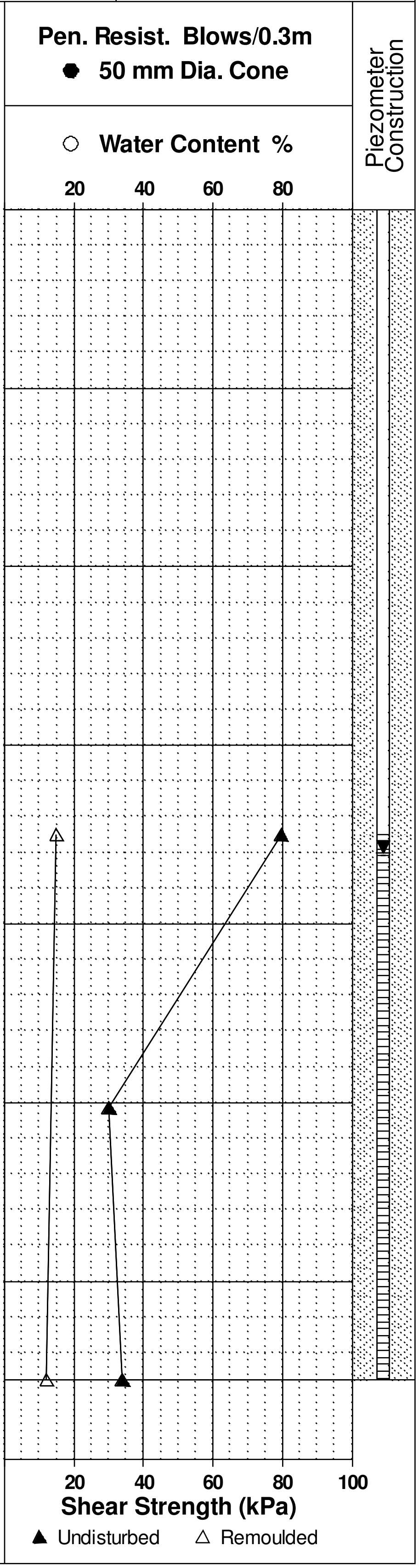
BORINGS BY CME 55 Power Auger

DATE January 29, 2010

FILE NO. PG2022

HOLE NO. BH 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.86
		AU	1				
		SS	2	58	11	1	92.86
		SS	3	71	5		
Very stiff to stiff, brown **SILTY CLAY**						2	91.86
-stiff to firm and grey by 2.9m depth		SS	4	100	4		
						3	90.86
						4	89.86
						5	88.86
						6	87.86
6.55							
End of Borehole (GWL @ 3.60m-Feb. 5/10)							



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% - Natural moisture content or water content of sample, %
LL - Liquid Limit, % (water content above which soil behaves as a liquid)
PL - Plastic limit, % (water content above which soil behaves plastically)
PI - 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

Cc - Concavity coefficient = $(D30)^2$ / (D10 x 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 $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands 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)

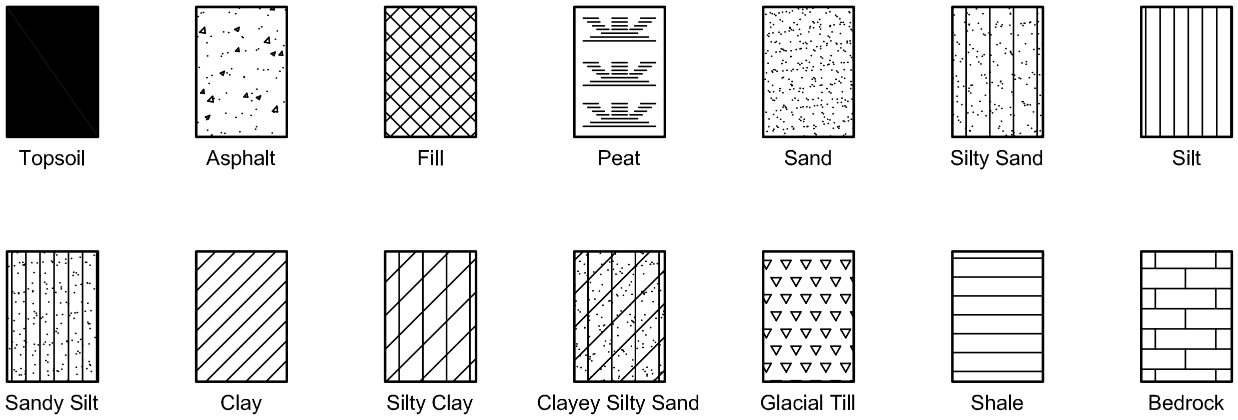
OC Ratio Overconsolidaton ratio = p'_c / p'_o
Void Ratio Initial sample void ratio = volume of voids / volume of solids
Wo - Initial water content (at start of consolidation test)

PERMEABILITY TEST

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

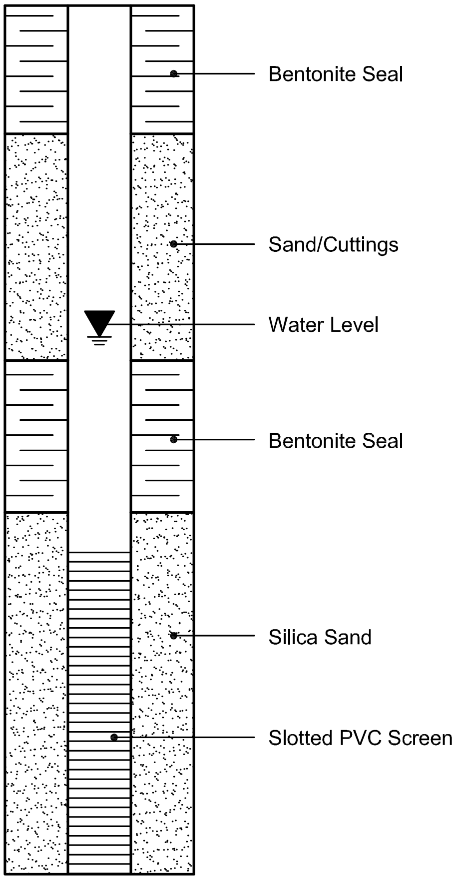
SYMBOLS AND TERMS (continued)

STRATA PLOT

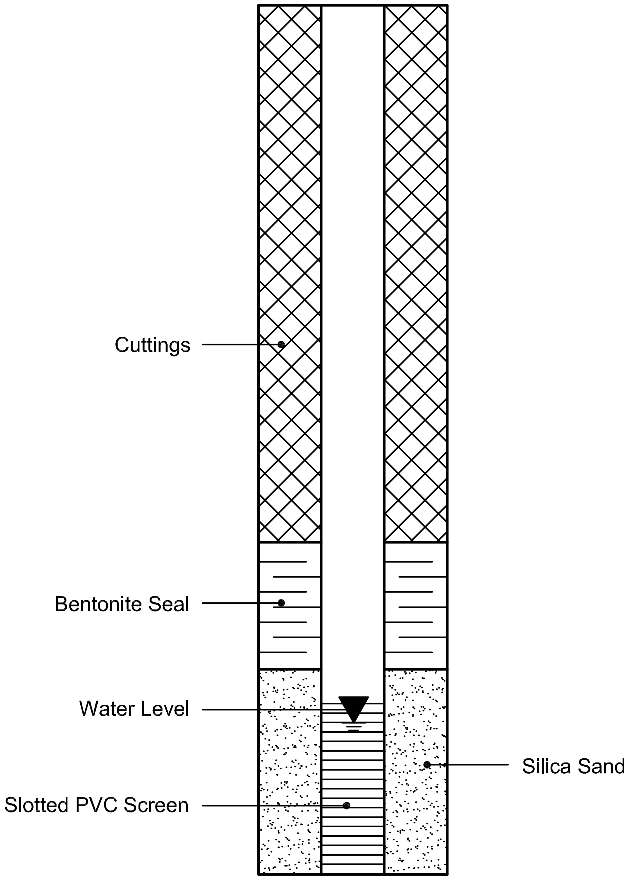


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Ottawa

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.

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:

c.c. Kevin Hall
Michel Kearney
Jocelyn Chandler RVCA

Conservation Partners
Partenaires de conservation

Mississippi Valley
Conservation
de la vallée Mississippi

OFFICE DE PROTECTION DE LA NATURE DE LA VALLÉE RIDEAU
RIDEAU VALLEY CONSERVATION AUTHORITY

South Nation
CONSERVATION
de la Nation Sud

March 30, 2010
File: 09-GLO-ZBA

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

Attention: Cheryl McWilliams

Subject: **Talos Custom Homes Ltd.**
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,

Jocelyn Chandler M.Pl., MCIP RPP
Planner, Planning and Regulations (RVCA)

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

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

RIDEAU VALLEY
CONSERVATION AUTHORITY

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

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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 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:

a The report has discussed the surficial and bedrock geology. However, the geological mapping has not been attached with the report nor has a cross-section been provided. The report discussion on surficial geology (section 4.1) is incomplete. These will need to be addressed.

- Cross sectn

b The hydrogeological study (PGI dated Feb. 04, 2010) identified only the 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 yields.

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.

c A water sample was analyzed for petroleum hydrocarbon fractions to 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.

d The report has indicated that the Jock River flows in the south some 1000 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.

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.

b 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.

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.

APPENDIX 2

- **MOECC Water Well Records**

TW1

A 093645

Ontario Ministry of the Environment

Well Tag (below)
A093649

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

TEST WELL
No. 1
(TW1)

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name: TALOS
Last Name / Organization: Custom Homes LTD
E-mail Address: c/o Paterson Group
☐ Well Constructed by Well Owner
Mailing Address (Street Number/Name): #1-5509 Canotek Road
Municipality: Ottawa
Province: Ont
Postal Code: K1J 9J8
Telephone No. (inc. area code):

Well Location

Address of Well Location (Street Number/Name): #10 King Street
Township: Goulbourn
[✓ Lot] [✓ Concession]: See below.
County/District/Municipality: Ottawa - Carleton
City/Town/Village: Richmond
Province: Ontario
Postal Code:
Other
UTM Coordinates Zone: NAD 83 | 18
Easting: 434551
Northing: 5005021
Municipal Plan and Sublot Number

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (ft) From	Depth (ft) To
	Grey Clay			0'	25½'
	Grey Limestone			25½'	205'
	Grey Sandstone + Lime stone Mix			205'	242'

* PLAN D-13 Unit 57 / PLAN 4R5234 Part 1 & 2 *
* LESS 4R 11108 Part 2+4 *
Paterson File PH 1292 Test Well #1

Annular Space

Depth Set at (ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (ft³)
32'	22'	Neat Cement Slurry	9.36
22'	0'	Neat Bentonite Slurry	8.4

Method of Construction

☐ Cable Tool
☐ Rotary (Conventional)
☐ Rotary (Reverse)
☐ Boring
☒ Air percussion
☐ Other, specify
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging

Well Use

☐ Public
☒ Domestic
☐ Livestock
☐ Irrigation
☐ Industrial
☐ Other, specify
☐ Commercial
☐ Municipal
☐ Test Hole
☐ Cooling & Air Conditioning
☐ Not used
☐ Dewatering
☐ Monitoring

Construction Record - Casing

Inside Diameter (in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (in)	Depth (ft) From	To
6"	Steel	.188"	+2'	32'
5 15/16"	Open hole		32'	242'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

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

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify: Silted
If pumping discontinued, give reason:
Pump intake set at (ft): 230'
Pumping rate (GPM): 20
Duration of pumping: 1 hrs + 0 min
Final water level end of pumping (ft): 16'3"
If flowing give rate (GPM):
Recommended pump depth (ft): 140'
Recommended pump rate (GPM): 20
Well production (GPM): 50
Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (ft)	Recovery Time (min)	Water Level (ft)
Static Level	8'6"		16'3"
1	12'3"	1	11'7"
2	13'4"	2	10'7"
3	14'1"	3	10'1"
4	14'4"	4	9'7"
5	14'6"	5	9'4"
10	15'	10	8'6"
15	15'3"	15	
20	15'6"	20	
25	15'8"	25	
30	15'9"	30	
40	16'1"	40	
50	16'2"	50	
60	16'3"	60	9'7

Water Details

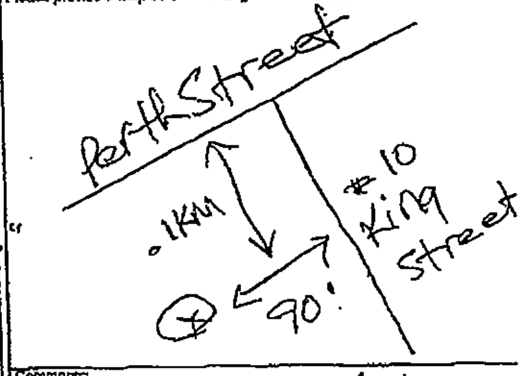
Water found at Depth 233 (ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
Water found at Depth (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
Water found at Depth (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (ft) From	To	Diameter (in)
0'	32'	6"
32'	242'	5 15/16"

Map of Well Location

Please provide a map below following instructions on the back.



Well Contractor and Well Technician Information

Business Name of Well Contractor: Air Rock DRILLING Co. LTD
Well Contractor's Licence No.: 1119
Business Address (Street Number/Name): RR#1
Municipality: RICHMOND
Province: ONT
Postal Code: K0A 2Z0
Business E-mail Address:
Bus. Telephone No. (inc. area code): 6138382170
Name of Well Technician (Last Name, First Name): GRAHAM RYAN
Well Technician's Licence No.: T3484
Signature of Technician and/or Contractor
Date Submitted

Comments: Test Well #1

Well owner's information package delivered ☒ Yes ☐ No
Date Package Delivered: 20100412
Date Work Completed: 20100411

Ministry Use Only
Audit No. Z108263
Received

0506E (12/2007)

Ministry's Copy

© Queen's Printer for Ontario, 20

TW2

Ontario Ministry of the Environment

Well Tag No. A 089325 (Below)

A089325

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☒ Imperial

TW2

Well Owner's Information

First Name: TALOS
Last Name / Organization: CUSTOM HOMES LTD
E-mail Address:
☐ Well Constructed by Well Owner
Mailing Address (Street Number/Name): Unit 1-5509 Canotek Road
Municipality: Ottawa
Province: Ont
Postal Code: K1J 9J8
Telephone No. (inc. area code):

Well Location

Address of Well Location (Street Number/Name): #10 King Street
Township: Goulbourn
Lot: See below
Concession:
County/District/Municipality: Ottawa-Carleton
City/Town/Village: Richmond
Province: Ontario
Postal Code:
UTM Coordinates: Zone: NAD 83 18
Easting: 434567
Northing: 5005007
Municipal Plan and Sublot Number:
Other:

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	Grey Clay			0'	30'
	Grey Limestone			30'	185'
	Grey & White Limestone & Sandstone Mix			185'	229'
	White Sandstone			229'	235'

* PLAN D-13 Unit 59 / PLAN 4R5234 Part 1+2
* LESS 4R11108 Part 2 + 4
* PATERSON FILE PH 1292

TEST WELL #2

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
38'	28'	Neat Cement Slurry	10.92
28'	0'	Neat Bentonite Slurry	12.6

Method of Construction

☐ Cable Tool
☐ Rotary (Conventional)
☐ Rotary (Reverse)
☐ Boring
☒ Air percussion
☐ Other, specify
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging

Well Use

☐ Public
☒ Domestic
☐ Livestock
☐ Irrigation
☐ Industrial
☐ Other, specify
☐ Commercial
☐ Municipal
☐ Test Hole
☐ Cooling & Air Conditioning
☐ Not used
☐ Dewatering
☐ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6"	Steel	.188"	+2'	38'
6"	Open hole		38'	235'

Status of Well

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

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

Water found at Depth 227 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
Water found at Depth 229 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
Water found at Depth (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0'	235	6"

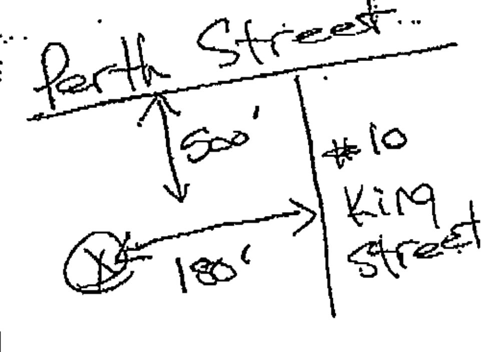
Results of Well Yield Testing

After test of well yield, water was: ☒ Clear and sand free ☐ Other, specify: CD
If pumping discontinued, give reason:
Pump intake set at (m/ft): 200'
Pumping rate (l/min / GPM): 20
Duration of pumping: 1 hrs + 0 min
Final water level end of pumping (m/ft): 9' 2"
If flowing give rate (l/min / GPM):
Recommended pump depth (m/ft): 140'
Recommended pump rate (l/min / GPM): 20
Well production (l/min / GPM): 20+
Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	5' 8"		9' 2"
1	7' 5"	1	7' 1"
2	7' 8"	2	6' 8"
3	7' 9"	3	6' 7"
4	8' 1"	4	6' 6"
5	8' 2"	5	6' 6"
10	8' 4"	10	6' 3"
15	8' 6"	15	6' 2"
20	8' 7"	20	6' 2"
25	8' 8"	25	6' 1"
30	8' 9"	30	6' 1"
40	8' 9"	40	5' 9"
50	9' 1"	50	5' 9"
60	9' 2"	60	5' 8"

Map of Well Location

Please provide a map below following instructions on the back.



Well Contractor and Well Technician Information

Business Name of Well Contractor: AIR ROCK DRILLING Co LTD
Well Contractor's Licence No.: 1119
Business Address (Street Number/Name): RR#1
Municipality: RICHMOND
Province: ONT
Postal Code: K0A 2Z0
Business E-mail Address:
Bus. Telephone No. (inc. area code): 613 838 2170
Name of Well Technician (Last Name, First Name): PURCELL SHANNON
Well Technician's Licence No.: T2122
Signature of Technician and/or Contractor:
Date Submitted:

Comments: Test Well #2

Well owner's information package delivered: ☒ Yes ☐ No
Data Package Delivered: 20100212
Date Work Completed: 20100211

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03/05/2010 12:19 6137472868 TALOS HOMES LTD PAGE 02/03

TW3

A 095979

Ontario Ministry of the Environment

Well T[ag No.] (Below)
A095979

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☒ Imperial

TW3

Well Owner's Information

First Name / Last Name / Organization: TALOS CUSTOM HOMES LTD C/O PatersonGroup
E-mail Address:
☐ Well Constructed by Well Owner
Mailing Address (Street Number/Name): #1-5509 Canotek Road
Municipality: Ottawa
Province: Ont
Postal Code: K1J 9J8
Telephone No. (inc. area code):

Well Location

Address of Well Location (Street Number/Name): #10 King Street
Township: Goulbourn
Lot: See Below
Concession:
County/District/Municipality: Ottawa-Carleton
City/Town/Village: Richmond
Province: Ontario
Postal Code:
UTM Coordinates: NAD 8 3 Zone 18 Easting 434490 Northing 5005077
Municipal Plan and Sublot Number:
Other:

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
	Gray Clay			0'	33'
	Grey Limestone			33'	155'
	Gray & White Limestone & Sandstone Mix			155'	195'
	White Sandstone			195'	210'
	Gray & Brown Limestone & Sandstone Mix			210'	240'

*PLAN D-13 Unit 59/PLAN 4R5234 Part 1&2
*LESS 4R11108 Part 2&4
*PATERSON FILE PH 1292

TEST WELL #3

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
40'	30'	Neat Cement Slurry	7.8
30'	0'	Neat Bentonite Slurry	16.8

Method of Construction

☐ Cable Tool
☐ Rotary (Conventional)
☐ Rotary (Reverse)
☐ Boring
☒ Air percussion
☐ Other, specify
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging

Well Use

☐ Public
☒ Domestic
☐ Livestock
☐ Irrigation
☐ Industrial
☐ Other, specify
☐ Commercial
☐ Municipal
☐ Test Hole
☐ Cooling & Air Conditioning
☐ Not used
☐ Dewatering
☐ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
6"	Steel	.188"	+2'	40'
6 1/8"	Open hole		40'	240'

Status of Well

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

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Results of Well Yield Testing

After test of well yield, water was:
☒ Clear and sand free
☐ Other, specify
If pumping discontinued, give reason:
Pump intake set at (m/ft): 230'
Pumping rate (l/min / GPM): 20
Duration of pumping: 1 hrs + 0 min
Final water level end of pumping (m/ft): 7'
If flowing give rate (l/min / GPM):
Recommended pump depth (m/ft): 100'
Recommended pump rate (l/min / GPM): 20
Well production (l/min / GPM): 20
Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	3'2"		7'
1	5'3"	1	4'7"
2	5'6"	2	3'2"
3	5'8"	3	
4	5'9"	4	
5	6'	5	
10	6'3"	10	
15	6'5"	15	
20	6'7"	20	
25	6'8"	25	
30	↓	30	
40	6'9"	40	
50	↓	50	
60	7'	60	

Water Details

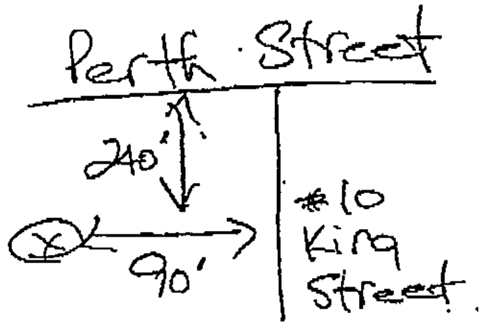
Water found at Depth 133 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
Water found at Depth 216 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
Water found at Depth 228 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0'	40'	6"
40'	240'	6 1/8"

Map of Well Location

Please provide a map below following instructions on the back.



Well Contractor and Well Technician Information

Business Name of Well Contractor: AIR ROCK DRILLING Co LTD
Well Contractor's Licence No.: 1117
Business Address (Street Number/Name): RR#1
Municipality: RICHMOND
Province: ONT
Postal Code: K0A 2Z0
Business E-mail Address:
Bus. Telephone No. (inc. area code): 6138382176
Name of Well Technician (Last Name, First Name): GRAHAM RYAN
Well Technician's Licence No.: T3484
Signature of Technician and/or Contractor:
Date Submitted:

Comments: Test Well #3

Well owner's information package delivered: ☒ Yes ☐ No
Date Package Delivered: 2010 03 16
Date Work Completed: 2010 03 10

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TW4

Ontario Ministry of the Environment

A093641

(Print Below)

We

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	
	Talos Custom Homes Ltd		☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
Unit 1-5509 Canotek Road	Ottawa	ON	K1J 9B8	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
10 King Street	Goulbourn	SEE	BELOW.

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa-Carleton	Richmond	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	18	434437	5004993	4R5234	Part 1&2

Overburden and Bedrock Materials/Abandonment Sealing Record

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
	Clay	Gravel		0'	28'
Grey	Limestone			29'	175'
Grey & White	Sandstone			175'	223'
Grey & White	Sandstone			223'	225'

Plan D 13-Unit 59 - Plan 4R5234 Part 1+2
Less 4R11108 Part 2+4

Test well
#4

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
185'	175'	Neat cement slurry	7.8
175'	0'	Bentonite slurry	50.4

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify Not tested

If pumping discontinued, give reason: X

Pump intake set at (m/ft) 200

Pumping rate (l/min / GPM) 20

Duration of pumping 1 hrs + 0 min

Final water level end of pumping (m/ft) 9'

If flowing give rate (l/min / GPM) X

Recommended pump depth (m/ft) 100'

Recommended pump rate (l/min / GPM) 20

Well production (l/min / GPM) 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	7.1'		9'
1	8.2	1	7.1
2	8.2	2	7.1
3	8.3	3	7.1
4	8.4	4	7.1
5	8.4	5	7.1
10	8.5	10	7.1
15	8.6	15	7.1
20	8.7	20	7.1
25	8.8	25	7.1
30	8.8	30	7.1
40	8.9	40	7.1
50	8.9	50	7.1
60	9'	60	7.1'

Method of Construction

☐ Cable Tool
☐ Rotary (Conventional)
☐ Rotary (Reverse)
☐ Boring
☒ Air percussion
☐ Other, specify
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging

Well Use

☐ Public
☒ Domestic
☐ Livestock
☐ Irrigation
☐ Industrial
☐ Other, specify
☐ Commercial
☐ Municipal
☐ Test Hole
☐ Cooling & Air Conditioning
☐ Not used
☐ Dewatering
☐ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
6"	Steel	.188"	+2'	185'
5 7/8"	Open Hole		185'	225'

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify TW#4
☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

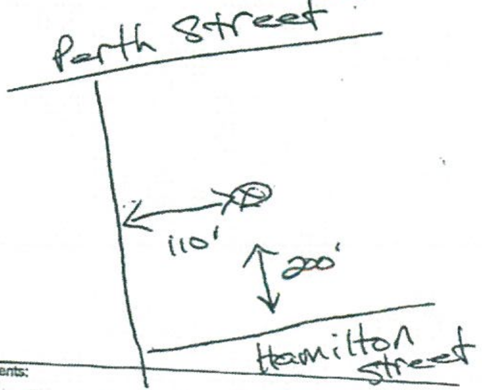
Water found at Depth 223 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
Water found at Depth (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
Water found at Depth (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0'	185'	6"
185'	225'	5 7/8"

Map of Well Location

Please provide a map below following instructions on the back.



Well Contractor and Well Technician Information

Business Name of Well Contractor: Air Rock Drilling Co. Ltd.
Well Contractor's Licence No.: 1119
Business Address (Street Number/Name): 6658 Franktown Road, RR#1
Municipality: Richmond
Province: ON
Postal Code: K0A 2Z0
Business E-mail Address: air-rock@sympatico.ca
Bus. Telephone No. (inc. area code): 6138382170
Name of Well Technician (Last Name, First Name): Purcell, Shannon
Well Technician's Licence No.: T2122
Signature of Technician and/or Contractor:
Date Submitted: 2011 08 31 (YYYY MM DD)

Comments: Test Well #4

Well owner's information package delivered: ☒ Yes ☐ No

Date Package Delivered: 2011 08 23 (YYYY MM DD)

Date Work Completed: 2011 08 22 (YYYY MM DD)

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Ontario Ministry of the Environment

Well ID: A093639

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name:
Last Name / Organization: Talos Custom Homes Ltd
E-mail Address:
Mailing Address (Street Number/Name): Unit 1-5509 Canotek Road
Municipality: Ottawa
Province: ON
Postal Code: K1J 9B8
Telephone No. (inc. area code):
☐ Well Constructed by Well Owner

Well Location

Address of Well Location (Street Number/Name): 10 King Street
Township: Goulbourn
Lot: SEE BELOW.
Concession:
County/District/Municipality: Ottawa-Carleton
City/Town/Village: Richmond
Province: Ontario
Postal Code:
UTM Coordinates: NAD 8 3 Zone 18 Easting 434515 Northing 5005061
Municipal Plan and Sublot Number: 4R5234
Other: Part 1&2

Overburden and Bedrock Materials/Abandonment Sealing Record

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Grey	Clay				
	Gravel			0'	26'
Grey	Limestone			26'	28'
Grey & White	Sandstone	Mix		28'	176'
Grey+White	Sandstone	Mix		176'	208'
				208'	216'

Plan R13 - Unit 59 - Plan 4R5234 Part 1+2
Less 4R11108 Part 2+4

Test well #5

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
187'	177'	Neat cement slurry	9.36
177'	0'	Bentonite slurry	50.4

Method of Construction

☐ Cable Tool
☐ Rotary (Conventional)
☐ Rotary (Reverse)
☐ Boring
☒ Air percussion
☐ Other, specify
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging

Well Use

☐ Public
☒ Domestic
☐ Livestock
☐ Irrigation
☐ Industrial
☐ Other, specify
☐ Commercial
☐ Municipal
☐ Test Hole
☐ Cooling & Air Conditioning
☐ Not used
☐ Dewatering
☐ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6"	Steel	.188"	+2'	187'
6⅛"	Open Hole		187'	216'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify TW#5
☐ Other, specify

Water Details

Water found at Depth 208 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
Water found at Depth (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify
Water found at Depth (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0'	187'	6"
187'	216'	6⅛"

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify Not tested

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 210

Pumping rate (l/min / GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 32.3

If flowing give rate (l/min / GPM): X

Recommended pump depth (m/ft): 100'

Recommended pump rate (l/min / GPM): 20

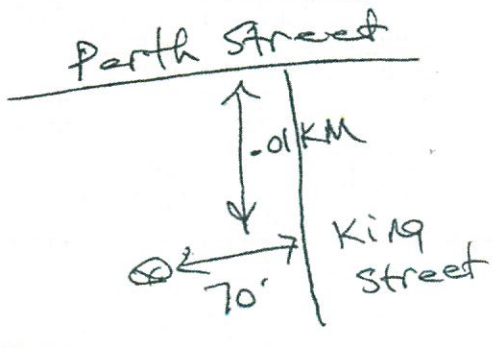
Well production (l/min / GPM): 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	7.2		32.3
1	16.1	1	16.3
2	21.5	2	7.2
3	23.7	3	7.2
4	26.4	4	7.2
5	27	5	7.2
10	30.1	10	7.2
15	30.5	15	7.2
20	30.8	20	7.2
25	31.2	25	7.2
30	31.6	30	7.2
40	31.9	40	7.2
50	32.1	50	7.2
60	32.3	60	7.2

Map of Well Location

Please provide a map below following instructions on the back.



Well Contractor and Well Technician Information

Business Name of Well Contractor: Air Rock Drilling Co. Ltd.
Well Contractor's Licence No.: 1119
Business Address (Street Number/Name): 6659 Franktown Road, RR#1
Municipality: Richmond
Province: ON
Postal Code: K0A 2Z0
Business E-mail Address: air-rock@sympatico.ca
Bus. Telephone No. (inc. area code): 6138382170
Name of Well Technician (Last Name, First Name): Graham, Ryan
Well Technician's Licence No.: T3484
Signature of Technician and/or Contractor:
Date Submitted: 2011 08 31

Comments: Test Well #5

Well owner's information package delivered: ☒ Yes ☐ No
Date Package Delivered: 2011 08 24
Date Work Completed: 2011 08 23

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Ontario Ministry of the Environment

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A144833

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	
	Talos Custom Homes Ltd		☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
Unit 1-5509 Canotek Road	Ottawa	ON	K1J 9B8	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
10 King Street	Goulbourn	SEE BELOW.	

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa-Carleton	Richmond	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 8 3	18	434498	5005003	4R5234	Part 1+2

Overburden and Bedrock Materials/Abandonment Sealing Record

General Colour	Most Common Material	Other Materials	General Description	Depth (m/[✓ ft]) From	To
Grey	Clay	+ Sand		0'	30'
Grey	Limestone			30'	170'
Grey & White	Sandstone			170'	185'
Grey & White	Sandstone			185'	205'
Grey & White	Sandstone			205'	219'
Grey & White	Sandstone			219'	225'

PLAN D13 - Unit 59 - Plan 4R5234 Part 1+2
LESS 4R11108 Parts 2+4

TEST WELL #6

Annular Space

Depth Set at (m/[✓ ft]) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/[✓ ft³])
180'	170'	Neat cement	7.8
170'	0'	Bentonite slurry	33.6

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☒ Other, specify Not tested

If pumping discontinued, give reason: X

Pump intake set at (m/[✓ ft]) 200

Pumping rate (l/min / [✓ GPM]) 20

Duration of pumping 1 hrs + 0 min

Final water level end of pumping (m/ft) 8.7'

If flowing give rate (l/min / GPM) X

Recommended pump depth (m/[✓ ft]) 140

Recommended pump rate (l/min / [✓ GPM]) 20

Well production (l/min / [✓ GPM]) 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	4.5'		8.7'
1	6.9	1	4.5
2	7.2	2	4.5
3	7.3	3	4.5
4	7.4	4	4.5
5	7.4	5	4.5
10	7.7	10	4.5
15	7.8	15	4.5
20	7.9	20	4.5
25	8.1	25	4.5
30	8.2	30	4.5
40	8.4	40	4.5
50	8.6	50	4.5
60	8.7'	60	4.5'

Method of Construction

☐ Cable Tool
☐ Rotary (Conventional)
☐ Rotary (Reverse)
☐ Boring
☒ Air percussion
☐ Other, specify
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging

Well Use

☐ Public
☒ Domestic
☐ Livestock
☐ Irrigation
☐ Industrial
☐ Other, specify
☐ Commercial
☐ Municipal
☐ Test Hole
☐ Cooling & Air Conditioning
☐ Not used
☐ Dewatering
☐ Monitoring

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
	Steel	.188	+2	180
	Open Hole		180	225

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify TW#6

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
	X			

Water Details

Water found at Depth 185 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
Water found at Depth 205 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify
Water found at Depth 219 (m/ft) ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	180	
+02	225	

Map of Well Location

Please provide a map below following instructions on the back.

Well Contractor and Well Technician Information

Business Name of Well Contractor: Air Rock Drilling Co. Ltd.
Well Contractor's Licence No.: 1119
Business Address (Street Number/Name): 6658 Franktown Road, RR#1
Municipality: Richmond
Province: ON
Postal Code: K0A 2Z0
Business E-mail Address: air-rock@sympatico.ca
Bus. Telephone No. (inc. area code): 6138382170
Name of Well Technician (Last Name, First Name): Hogan, Dan
Well Technician's Licence No.: T3058
Signature of Technician and/or Contractor
Date Submitted: 2014 7 31 (Y Y Y Y M M D D)

Comments: 1/2 HP - 10 GPM SET @ 140 FT

TW#6

Well owner's information package delivered: ☒ Yes ☐ No

Date Package Delivered: 2014 07 17 (Y Y Y Y M M D D)

Date Work Completed: 2014 07 15 (Y Y Y Y M M D D)

Ministry Use Only
Audit No. Z 166953
Received

0506E (2007/12)

Ministry's Copy

EW

Ministry of the Environment
Ontario

EW

The Ontario Water Resources Act
WATER WELL RECORD

Carleton	[illegible]	[illegible]	10
[illegible] Jack	[illegible] St [illegible] Ont	22 10 87	

LOG OF OVERBURDEN AND BEDROCK MATERIALS

grey	clay			0	30
grey	limestone			30	45

WATER RECORD

37	☑

CASING & OPEN HOLE RECORD

6¼	☑	.188	0	34
6	☑		34	45

SCREEN

PLUGGING & SEALING RECORD

0	33	Cement [illegible] grouted

PUMPING TEST

☑ PUMP ☐ BAILER

30 min

1 hr

6	25	95	25	25	25

25

70

LOCATION OF WELL

08689

FINAL STATUS OF WELL

WATER USE

METHOD OF DRILLING

CONTRACTOR

[illegible] Well Drilling 3644

Box 326 Richmond Ont

21 12 87

OFFICE USE ONLY

OWNER'S COPY

20 Cockburn St

1535814

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below) A028770

A 028770

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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

Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

RR#/Street Number/Name: # 20 COCKBURN STREET

City/Town/Village: RICHMOND

Site/Compartment/Block/Tract etc.: PLAN 4R-18160 UNIT 60, PLAN 13 - S/L1

GPS Reading: NAD 83 Zone 18 Easting 434490 Northing 5004941

Unit Make/Model: MAGELLAN

Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	To
	CLAY			0	8.23
GREY	LIMESTONE			8.23	69.19

Hole Diameter

Depth Metres From	To	Diameter Centimetres
0	69.19	14.91

Water Record

Water found at Metres / Kind of Water

67.05 m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: NOT TESTED

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was ☐ Clear and sediment free ☐ Other, specify CLOUDY NOT TESTED

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	To
Casing				
15.88	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	0	7.77
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☒ Open hole		7.16	69.19

Test of Well Yield

Pumping test method: SUBPUMP

Pump intake set at (metres): 36.57

Pumping rate - (litres/min): 81.90

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping: 2.37 metres

Recommended pump type. ☐ Shallow ☒ Deep

Recommended pump depth: 36.57 metres

Recommended pump rate. (litres/min): 81.90

If flowing give rate - (litres/min):

If pumping discontinued, give reason. ✓

Draw Down Time min	Water Level Metres	Recovery Time min	Water Level Metres
Static Level	1.84		2.37
1	2.15	1	2.07
2	2.16	2	1.84
3	2.17	3	
4	2.18	4	
5	2.19	5	
10	2.24	10	
15	2.26	15	
20	2.27	20	
25	2.29	25	
30	2.31	30	
40	2.34	40	
50	2.36	50	
60	2.37	60	

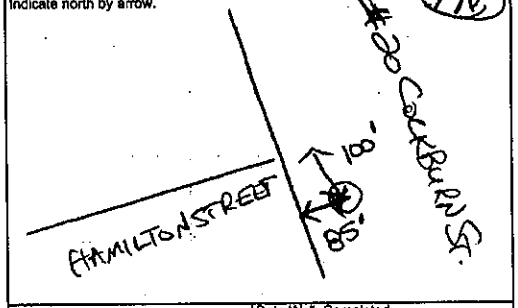
Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
7.16	0	NEAT CEMENT SLURRY	.1816

Location of Well

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



Method of Construction

☐ Cable Tool ☐ Rotary (conventional) ☐ Rotary (reverse) ☐ Rotary (air) ☒ Air percussion ☐ Boring ☐ Diamond ☐ Jetting ☐ Driving ☐ Digging ☐ Other

Water Use

☒ Domestic ☐ Stock ☐ Irrigation ☐ Industrial ☐ Commercial ☐ Municipal ☐ Public Supply ☐ Not used ☐ Cooling & air conditioning ☐ Other

Final Status of Well

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

Well Contractor/Technician Information

Name of Well Contractor: AIR ROCK DRILLING CO LTD

Well Contractor's Licence No.: 1119

Business Address (street name, number, city etc.): RR#1 RICHMOND ONT K0A 2Z0

Name of Well Technician (last name, first name): PURCELL SHANNON

Well Technician's Licence No.: T0122

Signature of Technician/Contractor: X

Date Submitted: 2005 09 06

Audit No. Z 30795

Date Well Completed: 2005 08 09

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

Date Delivered: YYYY 2005 MM 08 DD 10

Ministry Use Only

Data Source

Contractor 1119

Date Received YYYY MM DD SEP 2 6 2005

Date of Inspection YYYY MM DD

Remarks

Well Record Number

0506E (09/03)

Contractor's Copy ☐ Ministry's Copy ☒ Well Owner's Copy ☐

Cette formule est disponible en français

The Ontario Water Resources Commission Act

WATER WELL RECORD

Water management in Ontario

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

11 | 1510338 | MUNICIP. 15701 | CON.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT 25-27
Carl	Richmond		

OWNER (SURNAME FIRST) 28-47	ADDRESS	DATE COMPLETED 48-53
Julia's Constr. Ltd.	Richmond Ont.	DAY 18 MO 08 YR 69

21 | UTM ZONE 18 | EASTING 434460 | NORTHING 5010925 | RC 4 | ELEVATION 0304 | RC. 4 | BASIN CODE 25

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH — FEET FROM	DEPTH — FEET TO
brown	clay	boulders	hard	0	27'
blue	lime		firm	27	52'

31 | 0027605130 | 0052315

32

41 WATER RECORD

WATER FOUND AT — FEET	KIND OF WATER
0050	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH — FEET FROM	DEPTH — FEET TO
05 4 7/8	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE	188	0 31	0031 ~~52~~
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE			0052
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT — FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER

PUMPING RATE: 0010 GPM.

DURATION OF PUMPING: 01 HOURS 00 MINS.

STATIC LEVEL: 013 FEET

WATER LEVEL END OF PUMPING: 018 FEET

WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE: GPM.

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP

RECOMMENDED PUMP SETTING: 030 FEET

RECOMMENDED PUMPING RATE: 0005 GPM.

002.0 GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL

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

WATER USE 01

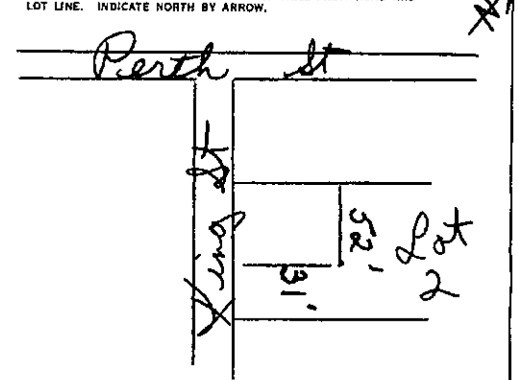
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING

1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL

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



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: Capital Water Supply | LICENCE NUMBER: 3216

ADDRESS: 14 Ashford Dr Ottawa

NAME OF DRILLER OR BORER: B Acres | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Peter Kavanagh | SUBMISSION DATE DAY__ MO__ YR.__

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 1503 | DATE RECEIVED: 281169

DATE OF INSPECTION: | INSPECTOR: Phillips PP

REMARKS:

PY

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A 025593
A025593

Well Record

Regulation 903 Ontario Water Resources Act

23 King St

page ___ of ___

Instructions for Completing Form

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- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only
MUN ☐☐☐☐☐☐ CON ☐☐☐☐☐☐☐☐☐☐ LOT ☐☐☐☐

Well Owner's Information and Location of Well Information

[redacted]

Ottawa Carleton | Goulbourn | 22 | 3

RR#/Street Number/Name	City/Town/Village	Site/Compartment/Block/Tract etc.
23 King Street	Richmond	

GPS Reading	NAD	Zone	Easting	Northing	Unit Make/Model	Mode of Operation:
	83	18	43 45 81	500 49 63	Garmin	☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Metres To
Brown	Clay	Stones		0	2.43
Gray	Clay			2.43	7.31
Gray	Limestone			7.31	48.76
Gray & White	Sandstone			48.76	70.10

Hole Diameter

Depth From	Metres To	Diameter Centimetres
0	8.22	22.75
8.22	70.10	15.23

Water Record

Water found at ___ Metres	Kind of Water	
69.49	☐ Fresh ☐ Sulphur	☐ Gas ☐ Salty ☐ Minerals ☐ Other: not tested
___ m	☐ Fresh ☐ Sulphur	☐ Gas ☐ Salty ☐ Minerals ☐ Other:
___ m	☐ Fresh ☐ Sulphur	☐ Gas ☐ Salty ☐ Minerals ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+ .76	8.22
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.23	☒ Open hole		8.22	70.10

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
submersible				
Pump intake set at - (metres) 30.47	Static Level	1.92		
Pumping rate - (litres/min) 54.6	1	2.94	1	2.87
Duration of pumping 2 hrs + ___ min	2	3.27	2	2.63
Final water level end of pumping 4.01 metres	3	3.42	3	2.54
Recommended pump type. ☐ Shallow ☒ Deep	4	3.49	4	2.46
Recommended pump depth. 30.47 metres	5	3.54	5	2.41
Recommended pump rate. 45.5 (litres/min)	10	3.66	10	2.27
	15	3.71	15	2.19
If flowing give rate - (litres/min)	20	3.76	20	2.15
	25	3.80	25	2.12
If pumping discontinued, give reason.	30	3.83	30	2.11
	40	3.87	40	2.07
	50	3.90	50	2.05
	60	3.93	60	2.03

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
8.22	0	Grouted - Bentonite Slurry	.154m3

Method of Construction

☐ Cable Tool ☒ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☒ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

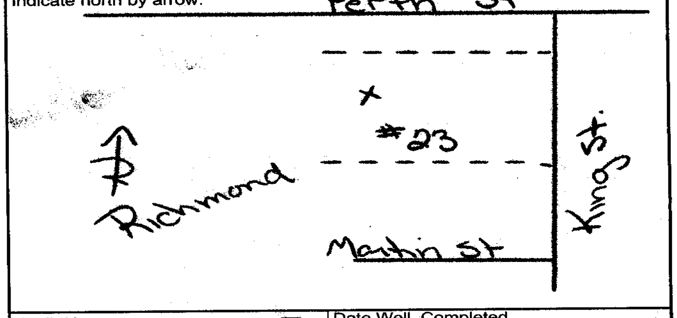
☒ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence No.: 1558
Business Address (street name, number, city etc.): P.O. Box 490 Stittsville,Ontario K2S 1A6
Name of Well Technician (last name, first name): Miller Stephen
Well Technician's Licence No.: T0097
Signature of Technician/Contractor: X
Date Submitted YYYY MM DD: 2005 | 8 | 18

Location of Well

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



Audit No. Z 26097

Date Well Completed YYYY MM DD: 2005 | 8 | 15

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

Date Delivered YYYY MM DD: 2005 | 8 | 16

Ministry Use Only

Data Source	Contractor 1558
Date Received YYYY MM DD: OCT 2 4 200	Date of Inspection YYYY MM DD
Remarks	Well Record Number

0506E (09/03)

Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐

Cette formule est disponible en français

1509178

316/4f. "A"

UTM 18 Z 4 3 4 5 3 0 E
5 R 5 0 0 4 7 6 5 N
Elev. 4 R 0 3 0 0
Basin 2 5

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

GROUND WATER BRANCH 15
DEC 10 1958
ONTARIO WATER RESOURCES COMMISSION

No 9178

C

Water-Well Record

County or Territorial District CARL

Township, [✓ Village], Town or City ~~[illegible]~~ RICHMOND

[redacted]

Village, Town or City) ....

Address RICHMOND ONTARIO

Date completed .... (day) .... (month) .... (year)

Pipe and Casing Record

Casing diameter(s) 4 INCH
Length(s) 22
Type of screen NO
Length of screen ....

Pumping Test

Static level 10'
Pumping rate 300 GPH.
Pumping level 15'
Duration of test 1 HOUR

Well Log

Water 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, or sulphur)
CLAY	0	16			
			40	30	FRESH
LIMESTONE	16	90			
			60	50	"
			90	80	"

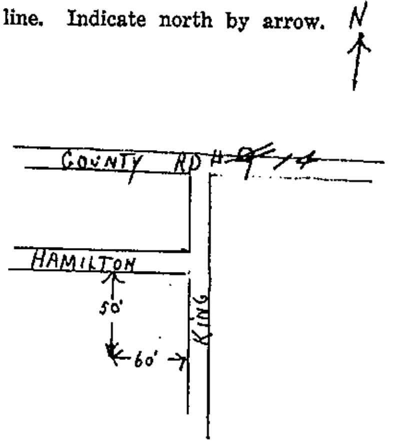
For what purpose(s) is the water to be used? HOUSE
Is water clear or cloudy? CLEAR
Is well on upland, in valley, or on hillside? UPLAND
Drilling firm MOLOUGHNEY
Address OTTAWA
Name of Driller E. MOLOUGHNEY
Address ....
Licence Number............

I certify that the foregoing statements of fact are true.

Date Sept 14/58 .... Signature of Licensee

Location of Well

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



Form 5

UTM 1 16 434380 CODED

4 5T0047210

Elev. 4 3 5 B0 302

Basin 2 5 T L

Water management in Ontario

1509739

3 9

B

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District Carleton Township, Village, Town or City Richmond

Con. III Lot 24 Date completed 26 (day) Nov (month) 1968 (year)

[redacted]ress Stittsville Ont.

Casing and Screen Record	
Inside diameter of casing	5"
Total length of casing	25'
Type of screen	
Length of screen	
Depth to top of screen	
Diameter of finished hole	5"

Pumping Test	
Static level	6'
Test-pumping rate	10 G.P.M.
Pumping level	7'
Duration of test pumping	1 hr
Water clear or cloudy at end of test	
Recommended pumping rate	5 G.P.M.
with pump setting of	30 feet below ground surface

Well Log Overburden and Bedrock Record	From ft.	To ft.	Water Record Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
clay	0	22'	44	fresh
limestone	22	45		

For what purpose(s) is the water to be used? new house

Is well on upland, in valley, or on hillside?

Drilling or Boring Firm Capital Water Supply Ltd.

Address 14 Ashford Dr. Ottawa 6

Licence Number 2857

Name of Driller or Borer V Miron

Address

Date Nov 26 1968

Walter Kavanagh

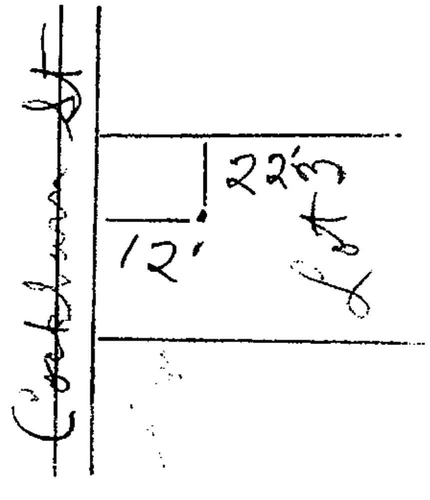
(Signature of Licensed Drilling or Boring Contractor)

Form 7

OWRC COPY

Location of Well

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



1536816

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A041993
A 041993

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

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- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only
MUN ☐☐☐☐☐ CON ☐☐☐☐☐☐☐☐☐☐ LOT ☐☐☐

Well Owner's Information and Location of Well Information

[redacted]

Ottawa CArleton | Goulbourn | 25 | 4

RR#/Street Number/Name: lot 76 Kings grant Gardens
City/Town/Village: Richmond
Site/Compartment/Block/Tract etc.:

GPS Reading: NAD 83 Zone 18 Easting 434344 Northing 5005241
Unit Make/Model: garmin
Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
brown	caly			0	3.65
grey	clay			3.65	11.88
grey	sand&gravel			11.88	13.41
grey	limestone			13.41	45.10
grey & white	sandstone			45.10	75.58

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	15.23	22.75
15.23	75.58	15.23

Water Record

Water found at ___ Metres / Kind of Water
74.97 ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other Not TESTED
☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
☐ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+.45	15.23
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☒ Open hole		15.23	75.58

Test of Well Yield

Pumping test method: Submersible
Pump intake set at - (metres) 45.71
Pumping rate - (litres/min) 54.6
Duration of pumping 5 hrs + ___ min
Final water level end of pumping 5.58 metres
Recommended pump type. ☐ Shallow ☒ Deep
Recommended pump depth. 30.47 metres
Recommended pump rate. 45.5 (litres/min)
If flowing give rate - (litres/min)
If pumping discontinued, give reason.

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	3.59		
1	4.80	1	4.05
2	5.03	2	3.87
3	5.27	3	3.84
4	5632	4	3.83
5	5.35	5	3.83
10	5.39	10	3.74
15	5.33	15	3.69
20	5.35	20	3.67
25	5.37	25	3.66
30	5.38	30	3.66
40	5.41	40	3.65
50	5.43	50	3.64
60	5.44	60	3.64

Plugging and Sealing Record ☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
15.23	0	Grouted Bentonite Slurry	.63m3

Method of Construction

☐ Cable Tool ☐ Rotary (conventional) ☐ Rotary (reverse)
☒ Rotary (air) ☒ Air percussion ☐ Boring
☐ Diamond ☐ Jetting ☐ Driving
☐ Digging ☐ Other

Water Use

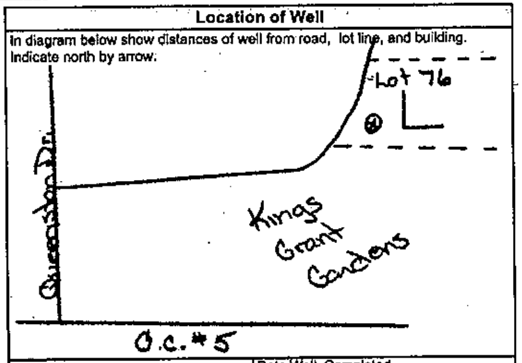
☒ Domestic ☐ Stock ☐ Irrigation
☐ Industrial ☐ Commercial ☐ Municipal
☐ Public Supply ☐ Not used ☐ Cooling & air conditioning
☐ Other

Final Status of Well

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

Location of Well

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



Audit No. Z 47075
Date Well Completed YYYY MM DD: 2006 9 5
Was the well owner's information package delivered? ☒ Yes ☐ No
Date Delivered YYYY MM DD: 2006 9 6

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence No.: 1558
Business Address (street name, number, city etc.): Box 490 Stittsville Ontario K2S 1A6
Name of Well Technician (last name, first name): Miller, Stephen
Well Technician's Licence No.: T0097
Signature of Technician/Contractor: X
Date Submitted YYYY MM DD: 2006 9 6

Ministry Use Only

Data Source:
Contractor: 1558
Date Received: NOV 17 2006
Date of Inspection YYYY MM DD:
Remarks:
Well Record Number:

0506E (09/03)

Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐

Cette formule est disponible en français

7039656

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)

A 042038

A042038

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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- Please print clearly in blue or black ink only.

Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

Ottawa Carleton | West Carleton - Huntley | 24 | 4

RR#/Street Number/Name: Lot 80, Kings Grant Gardens

City/Town/Village: Richmond

Site/Compartment/Block/Tract etc.:

GPS Reading: NAD 83 Zone 18 Easting 43 42 71 Northing 50 052 04

Unit Make/Model: Garmin

Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
Brown	Clay		Packed	0	3.96
Gray	Clay		Loose	3.96	13.41
Gray	Limestone		Medium	13.41	48.76
Gray & White	Sndstone		medium Hard	48.76	75.58

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	15.23	22.75
15.23	75.58	15.23

Water Record

Water found at ___ Metres / Kind of Water

74.06 m ☐ Gas ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Other: not tested

___ m ☐ Gas ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Other:

___ m ☐ Gas ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+ .45	15.23
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.23	☒ Open hole		15.23	75.58

Test of Well Yield

Pumping test method: submersible

Pump intake set at - (metres) 45.71

Pumping rate - (litres/min) 72.8

Duration of pumping 4 hrs + 30 min

Final water level end of pumping 5.46 metres

Recommended pump type. ☐ Shallow ☒ Deep

Recommended pump depth 30.47 metres

Recommended pump rate. (litres/min)

If flowing give rate - (litres/min)

If pumping discontinued, give reason.

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	2.68		
1	4.27	1	3.45
2	4.62	2	3.30
3	4.80	3	3.22
4	4.87	4	3.18
5	4.91	5	3.11
10	4.94	10	2.95
15	4.98	15	2.89
20	5.03	20	2.86
25	5.09	25	2.84
30	5.18	30	2.82
40	5.24	40	2.81
50	5.27	50	2.80
60	5.28	60	2.80

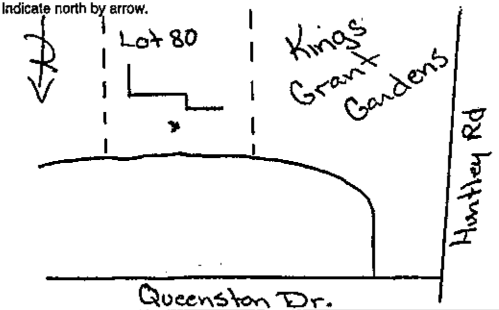
Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
15.23	0	Grouted - Bentonite Slurry	.42m3

Location of Well

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



Method of Construction

☐ Cable Tool ☒ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☒ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

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

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.

Well Contractor's Licence No.: 1558

Business Address (street name, number, city etc.): Box 490 Stittsville, Ontario K2S 1A6

Name of Well Technician (last name, first name): Miller, Stephen

Well Technician's Licence No.: T0097

Signature of Technician/Contractor: X

Date Submitted: YYYY 2006 MM 12 DD 7

Audit No. Z 58727

Date Well Completed: YYYY 2006 MM 12 DD 4

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

Date Delivered: YYYY 2006 MM 12 DD 7

Ministry Use Only

Data Source

Contractor 1558

Date Received YYYY MM DD: JAN 25 2007

Date of Inspection YYYY MM DD

Remarks

Well Record Number

0506E (08/2006)

Ministry's Copy

Cette formule est disponible en français

7044844

Ontario Ministry of the Environment

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

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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- Please print clearly in blue or black ink only.

Ministry Use Only

[redacted]

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
Lot 83 Oradeas Crs Ottawa CArleton	Goulbourn	24	4

RR#/Street Number/Name	City/Town/Village	Site/Compartment/Block/Tract etc.
L- 83 Oradea Cres.	Richmond	

GPS Reading	NAD	Zone	Easting	Northing	Unit Make/Model	Mode of Operation:
	83	18	434226	5005160	Garmin	☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
brown	clay		packed	0	3.96
grey	clay	stones	sticky	3.96	12.49
grey	limestone		med	12.49	47.24
grey&white	sandstone		med hard	47.24	75.58

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	14.32	22.75
14.32	75.58	15.23

Water Record

Water found at ___ Metres / Kind of Water

73.14 m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: NOT TESTED

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: ___

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: ___

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+.45	14.32
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.23	☒ Open hole		14.32	75.58

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Submersible				
Pump intake set at - (metres) 45.71	Static Level	2.18		
Pumping rate - (litres/min) 54.6	1	3.94	1	4.86
Duration of pumping 2 hrs + 30 min	2	4.89	2	3.94
Final water level end of pumping 7.44 metres	3	5.53	3	3.48
Recommended pump type. ☐ Shallow ☒ Deep	4	5.93	4	3.17
Recommended pump depth. 30.47 metres	5	6.12	5	2.97
Recommended pump rate. (litres/min) 45.5	10	6.85	10	2.63
	15	7.09	15	2.57
If flowing give rate - (litres/min)	20	7.14	20	2.54
	25	7.19	25	2.51
If pumping discontinued, give reason.	30	7.25	30	2.49
	40	7.31	40	2.46
	50	7.36	50	2.44
	60	7.38	60	2.43

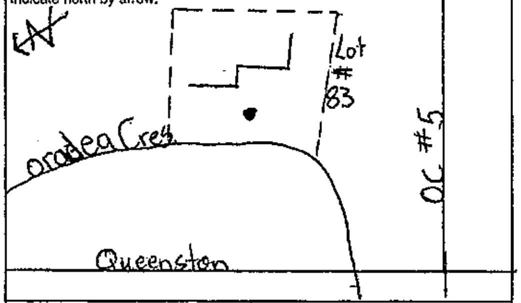
Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
14.32	0	Grouted Bentonite slurry	.63m3

Location of Well

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



Method of Construction

☐ Cable Tool ☒ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☒ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

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

Audit No.	Date Well Completed (YYYY MM DD)
Z 58616	2007 3 16

Was the well owner's information package delivered?	Date Delivered (YYYY MM DD)
☒ Yes ☐ No	2007 3 19

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Suply Ltd.
Well Contractor's Licence No.: 1558
Business Address (street name, number, city etc.): Box 490 Stittsville Ontario K2s 1A6
Name of Well Technician (last name, first name): Miller Stephen
Well Technician's Licence No.: T0097
Signature of Technician/Contractor: X
Date Submitted (YYYY MM DD): 2007 3 20

Ministry Use Only

Data Source	Contractor 1558
Date Received JUN 14 2007	Date of Inspection
Remarks	Well Record Number

0506E (08/2006) **Ministry's Copy** *Cette formule est disponible en français*

7044845

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A035472
A 035472

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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- Please print clearly in blue or black ink only.

Ministry Use Only

[redacted]

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
Ottawa Carleton	Goulbourn	24	4

RR#/Street Number/Name	City/Town/Village	Site/Compartment/Block/Tract etc.
L- 77 Oradea Cres.	Richmond	

GPS Reading	NAD	Zone	Easting	Northing	Unit Make/Model	Mode of Operation:
	83	18	434332	5005240	Garmin	☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
brown	clay		packed	0	3.65
grey	clay	stones		3.65	13.41
grey	limestone		med / hard	13.41	48.76
grey& white sndstone				48.76	60.34

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	14.93	22.75
14.93	60.34	15.39

Water Record

Water found at ___ Metres / Kind of Water

58.51 m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: NOT TESTED

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: ___

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: ___

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+.45	14.93
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.39	☒ Open hole		14.93	60.34

Test of Well Yield

Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Submersible				
Pump intake set at - (metres) 45.71	Static Level	2.51		
Pumping rate - (litres/min) 54.6	1	4.32	1	5.02
Duration of pumping 2 hrs + 30 min	2	5.25	2	3.90
Final water level end of pumping 7.63 metres	3	5.82	3	3.47
Recommended pump type. ☐ Shallow ☒ Deep	4	6.22	4	3.24
Recommended pump depth. 30.47 metres	5	6.48	5	3.01
Recommended pump rate. 45.5 (litres/min)	10	7.04	10	2.95
	15	7.22	15	2.90
If flowing give rate - (litres/min)	20	7.26	20	2.86
	25	7.35	25	2.84
If pumping discontinued, give reason.	30	7.40	30	2.83
	40	7.44	40	2.79
	50	7.48	50	2.75
	60	7.49	60	2.71

Plugging and Sealing Record ☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
14.93	0	Gøouted Bentonite slurry	.63m3

Method of Construction

☐ Cable Tool ☐ Rotary (conventional) ☐ Rotary (reverse) ☒ Rotary (air) ☒ Air percussion ☐ Boring ☐ Diamond ☐ Jetting ☐ Driving ☐ Digging ☐ Other

Water Use

☒ Domestic ☐ Stock ☐ Irrigation ☐ Industrial ☐ Commercial ☐ Municipal ☐ Public Supply ☐ Not used ☐ Cooling & air conditioning ☐ Other

Final Status of Well

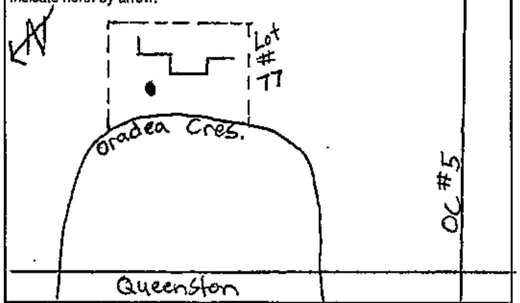
☒ Water Supply ☐ Observation well ☐ Test Hole ☐ Recharge well ☐ Abandoned, insufficient supply ☐ Abandoned, poor quality ☐ Unfinished ☐ Dewatering ☐ Replacement well ☐ Abandoned, (Other)

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence No.: 1558
Business Address (street name, number, city etc.): Box 490 Stittsville Ontario K2S 1A6
Name of Well Technician (last name, first name): Miller Stephen
Well Technician's Licence No.: T0097
Signature of Technician/Contractor
Date Submitted YYYY MM DD: 2007 3 20

Location of Well

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



Audit No. Z 58615
Date Well Completed YYYY MM DD: 2007 3 16
Was the well owner's information package delivered? ☒ Yes ☐ No
Date Delivered YYYY MM DD: 2007 3 19

Ministry Use Only

Data Source
Contractor 1558
Date Received YYYY MM DD: JUN 14 2007
Date of Inspection YYYY MM DD
Remarks
Well Record Number

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7039570

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A041987
A 041987

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

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- Please print clearly in blue or black ink only.

Ministry Use Only
MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

Ottawa-Carleton | Goulbourn | 24 | 4

RR#/Street Number/Name: Lot 81, Kings Grant Gardens
City/Town/Village: Richmond
Site/Compartment/Block/Tract etc.:

GPS Reading: NAD 83 | Zone 18 | Easting 43 42 66 | Northing 50 051 87
Unit Make/Model: Garmin
Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify ____

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
Brown	Clay			0	3.65
Gray	Clay	Stones		3.65	12.80
Gray	Limestone			12.80	51.20
Gray & White	Sandston			51.20	75.58

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	14.62	22.75
14.62	75.58	15.07

Water Record

Water found at ___ Metres	Kind of Water
73.75	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: not tested
___ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
___ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+ .45	14.62
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.07	☒ Open hole		14.62	75.58

Test of Well Yield

Pumping test method: submersible
Pump intake set at - (metres) 42.66
Pumping rate - (litres/min) 72.8
Duration of pumping 4 hrs +30 min
Final water level end of pumping 8.67 metres
Recommended pump type. ☐ Shallow ☒ Deep
Recommended pump depth 22.85 metres
Recommended pump rate. 45.5 (litres/min)
If flowing give rate - (litres/min)
If pumping discontinued, give reason.

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	2.38		
1	4.17	1	5.24
2	4.72	2	4.07
3	5.21	3	3.38
4	5.64	4	2.98
5	5.93	5	2.88
10	6.77	10	2.70
15	7.05	15	2.64
20	7.34	20	2.60
25	7.79	25	2.58
30	8.07	30	2.52
40	8.15	40	2.52
50	8.05	50	2.52
60	8.07	60	2.52

Plugging and Sealing Record ☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
14.62	0	Grouted-Bentoint Slurry	.66m3

Method of Construction

☐ Cable Tool ☒ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☒ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

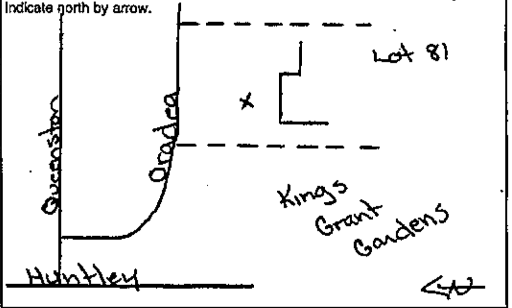
☒ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence No.: 1558
Business Address (street name, number, city etc.): Box 490 Stittsville, Ontario K2S 1A6
Name of Well Technician (last name, first name): Miller, Stephen
Well Technician's Licence No.: T0097
Signature of Technician/Contractor: X
Date Submitted YYYY MM DD: 2006 11 10

Location of Well

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



Audit No. Z 58710
Date Well Completed YYYY MM DD: 2006 11 8
Was the well owner's information package delivered? ☒ Yes ☐ No
Date Delivered YYYY MM DD: 2006 11 9

Ministry Use Only
Data Source
Contractor 1558
Date Received YYYY MM DD: JAN 25 2007
Date of Inspection YYYY MM DD
Remarks
Well Record Number

0506E (08/2003)

Ministry's Copy

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1536472

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A 035391
A035391

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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- Please print clearly in blue or black ink only.

Ministry Use Only
MUN ☐☐☐☐☐ CON ☐☐☐☐☐☐☐☐ LOT ☐☐☐☐

Well Owner's Information and Location of Well Information

[redacted]

Ottawa Carleton | Goulbourn | 24/25 | 4

RR#/Street Number/Name: Lot 78, Kings Grant Gardens
City/Town/Village: Richmond
Site/Compartment/Block/Tract etc.

GPS Reading NAD 8|3 Zone 18 Easting 4|8|4|8|0|4 Northing 5|0|0|5|2|1|2
Unit Make/Model: Garmin
Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	To
Brown	Clay			0	3.65
Gray	Clay			3.65	12.19
Gray	Sand & Gravel			12.19	12.80
Gray	Limestone			12.80	48.76
Gray & White	Sandstone			48.76	67.96

Hole Diameter

Depth Metres From	To	Diameter Centimetres
0	14.02	22.75
14.02	67.96	15.07

Water Record

Water found at ___ Metres / Kind of Water
66.44 m ☐ Gas ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Other: not tested
___ m ☐ Gas ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Other:
___ m ☐ Gas ☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+ .45	14.02
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.07	☒ Open hole		14.02	67.96

Test of Well Yield

Pumping test method: submersible
Pump intake set at - (metres) 60.95
Pumping rate - (litres/min) 54.6
Duration of pumping 1 hrs + ___ min
Final water level end of pumping 18.13 metres
Recommended pump type. ☐ Shallow ☒ Deep
Recommended pump depth. 30.47 metres
Recommended pump rate. 45.5 (litres/min)
If flowing give rate - (litres/min)
If pumping discontinued, give reason.

Draw Down Time min	Water Level Metres	Recovery Time min	Water Level Metres
Static Level	2.26		
1	3.30	1	14.61
2	4.30	2	12.09
3	5.71	3	10.09
4	6.87	4	8.63
5	8.74	5	7.28
10	11.87	10	3.78
15	13.95	15	2.51
20	15.09	20	2.45
25	16.18	25	2.38
30	16.93	30	[illegible].30
40	17.55	40	2.39
50	17.45	50	2.37
60	18.13	60	2.37

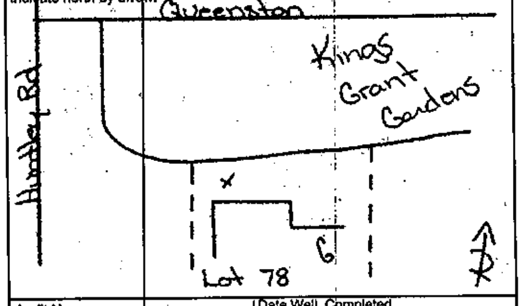
Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
14.02	0	Grouted - Bentonite Slurry	.42m3

Location of Well

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



Method of Construction

☐ Cable Tool ☐ Rotary (conventional) ☐ Rotary (reverse)
☒ Rotary (air) ☒ Air percussion ☐ Boring
☐ Diamond ☐ Jetting ☐ Driving
☐ Digging ☐ Other

Water Use

☒ Domestic ☐ Stock ☐ Irrigation
☐ Industrial ☐ Commercial ☐ Municipal
☐ Public Supply ☐ Not used ☐ Cooling & air conditioning
☐ Other

Final Status of Well

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

Audit No. Z 46982
Date Well Completed YYYY MM DD: 2006 6 9
Was the well owner's information package delivered? ☒ Yes ☐ No
Date Delivered YYYY MM DD: 2006 6 13

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence No.: 1558
Business Address (street name, number, city etc.): Box 490 Stittsville, Ontario K2S 1A6
Name of Well Technician (last name, first name): Miller; S.
Well Technician's Licence No.: T0097
Signature of Technician/Contractor: X
Date Submitted YYYY MM DD: 2006 6 13

Ministry Use Only
Data Source
Contractor 1558
Date Received: JUL 11 2006
Date of Inspection YYYY MM DD
Remarks
Well Record Number

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐

Cette formule est disponible en français

1536616

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A041898
A 041898

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

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- Please print clearly in blue or black ink only.

Ministry Use Only
MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

Ottawa Carleton | Goulbourn | 24/25 | 4

RR#/Street Number/Name: L-82 Kings Grant Garden
City/Town/Village: Richmond Rd.
Site/Compartment/Block/Tract etc.

GPS Reading: NAD 83 Zone 18 Easting 434256 Northing 5005177
Unit Make/Model: Garmin
Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
Brown	clay		packed	0	3.65
grey	clay			3.65	13.41
grey	limestone	badly broken & layered		13.41	14.62
grey	limestone			14.62	48.76
grey & white	sandstone			48.76	75.58

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	15.23	22.75
15.23	75.58	15.39

Water Record

Water found at ___ Metres / Kind of Water

73.49 ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other Not Tested

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+.45	15.23
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.39	☒ Open hole		15.23	75.58

Test of Well Yield

Pumping test method: Submersible
Pump intake set at - (metres) 45.71
Pumping rate - (litres/min) 54.6
Duration of pumping 4 hrs + 30 min
Final water level end of pumping 39.83 metres
Recommended pump type. ☐ Shallow ☒ Deep
Recommended pump depth 45.71 metres
Recommended pump rate. 45.5 (litres/min)
If flowing give rate - (litres/min)
If pumping discontinued, give reason.

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	2.07		
1	4.34	1	36.50
2	5.92	2	33.29
3	7.24	3	30.94
4	8.39	4	29.27
5	9.45	5	27.59
10	13.73	10	20.20
15	17.78	15	15.17
20	20.32	20	10.74
25	23.12	25	7.14
30	25.40	30	4.14
40	29.92	40	3.79
50	33.36	50	3.50
60	36.79	60	3.41

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
15.23	0	Grouted Bentonite Slurry	.43m3

Method of Construction

☐ Cable Tool ☒ Rotary (air) ☐ Diamond ☐ Digging
☐ Rotary (conventional) ☒ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

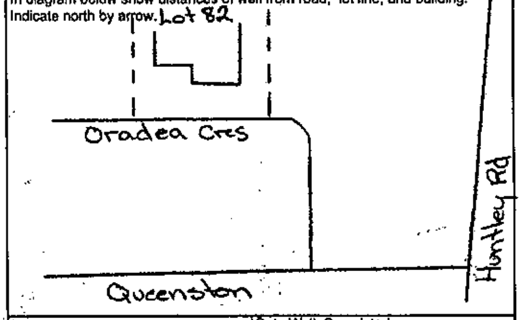
☒ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence No.: 1558
Business Address (street name, number, city etc.): Box 490 Stittsville Ontario K2S 1A6
Name of Well Technician (last name, first name): Miller, Stephen
Well Technician's Licence No.: T0097
Signature of Technician/Contractor: X
Date Submitted YYYY MM DD: 2006 7 11

Location of Well

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



Audit No. Z 47006
Date Well Completed YYYY MM DD: 2006 7 6
Was the well owner's information package delivered? ☒ Yes ☐ No
Date Delivered YYYY MM DD: 2006 7 10

Ministry Use Only
Data Source
Contractor: 1558
Date Received YYYY MM DD: AUG 25 2006
Date of Inspection YYYY MM DD
Remarks
Well Record Number

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐

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1536820

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A041992
A 041992

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

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Ministry Use Only
MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

Ottawa CArleton
Goulhourn
24
4

RR#/Street Number/Name: Lot 85 Kings grant Gardens
City/Town/Village: Richmond
Site/Compartment/Block/Tract etc.:

GPS Reading: NAD 83 Zone 18 Easting 434206 Northing 5005158
Unit Make/Model: garmin
Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify ____

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
Brown	clay	stones		0	3.65
grey	clay			3.65	11.88
grey	limestone			11.88	42.66
grey & white	sandstone			42.66	75.58

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	13.71	22.75
13.71	75.58	15.23

Water Record

Water found at ___ Metres / Kind of Water
73.75 m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: NOT TESTED
___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:
___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15686	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+.45	13.71
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.23	☒ Open hole		13.71	75.58

Test of Well Yield

Pumping test method: Submersible
Pump intake set at - (metres) 45.71
Pumping rate - (litres/min) 54.6
Duration of pumping 2 hrs + ____ min
Final water level end of pumping 13.47 metres
Recommended pump type. ☐ Shallow ☒ Deep
Recommended pump depth. 30.47 metres
Recommended pump rate. 45.557 (litres/min)
If flowing give rate - (litres/min)
If pumping discontinued, give reason.

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	2.86		
1	5.00	1	9.92
2	6.46	2	7.90
3	7.62	3	6.47
4	8.55	4	5.55
5	9.29	5	4.86
10	11.40	10	3.61
15	12.24	15	3.55
20	12.68	20	3.99
25	12.88	25	3.46
30	13.02	30	3.45
40	13.22	40	3.44
50	13.40	50	3.43
60	13.38	60	3.42

Plugging and Sealing Record ☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
13.71	0	Grouted Bentonite Slurry	.84m3

Method of Construction

☐ Cable Tool ☐ Rotary (conventional) ☐ Rotary (reverse)
☒ Rotary (air) ☒ Air percussion ☐ Boring
☐ Diamond ☐ Jetting ☐ Driving
☐ Digging ☐ Other

Water Use

☒ Domestic ☐ Stock ☐ Irrigation
☐ Industrial ☐ Commercial ☐ Municipal
☐ Public Supply ☐ Not used ☐ Cooling & air conditioning
☐ Other

Final Status of Well

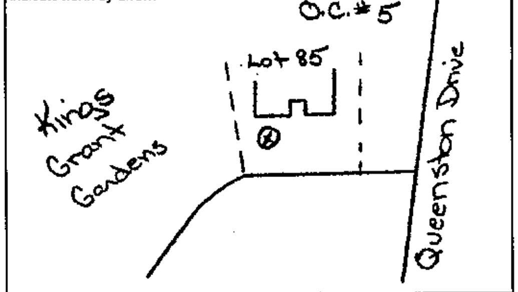
☒ Water Supply ☐ Observation well ☐ Test Hole
☐ Recharge well ☐ Abandoned, insufficient supply ☐ Abandoned, poor quality
☐ Unfinished ☐ Dewatering ☐ Replacement well
☐ Abandoned, (Other)

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence No.: 1558
Business Address (street name, number, city etc.): Box 490 Stittsville Ontario K2S 1A6
Name of Well Technician (last name, first name): Miller Stephen
Well Technician's Licence No.: T0097
Signature of Technician/Contractor: X
Date Submitted: YYYY 2006 MM 9 DD 6

Location of Well

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



Audit No. Z 47076
Date Well Completed: YYYY 2006 MM 9 DD 1
Was the well owner's information package delivered? ☒ Yes ☐ No
Date Delivered: YYYY 2006 MM 9 DD 6

Ministry Use Only

Data Source:
Contractor: 1558
Date Received: NOV 17 2006
Date of Inspection: YYYY MM DD
Remarks:
Well Record Number:

0506E (09/03)

Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐

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1536816

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)

A 041994

A041994

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

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Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

Ottawa Carleton | Goulbourn | 24 | 4

RR#/Street Number/Name: Lot 79 Kings grant gardens

City/Town/Village: Richmond

Site/Compartment/Block/Tract etc.

GPS Reading NAD 83 Zone 18 Easting 434287 Northing 5005216

Unit Make/Model: garmin

Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify ____

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
brown	clay		packed	0	3.65
grey	clay			3.65	10.66
grey	clay	stones	loose	830666	13.71
grey	limestone		med	13.71	45.10
grey &white	sandstone		hard	45.10	75.58

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	15.23	22.75
15.23	75.58	15.23

Water Record

Water found at ___ Metres / Kind of Water

74.97 ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: NOT TESTED

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: ____

___ m ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: ____

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+.45	15.23
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.23	☒ Open hole		15.23	75.58

Test of Well Yield

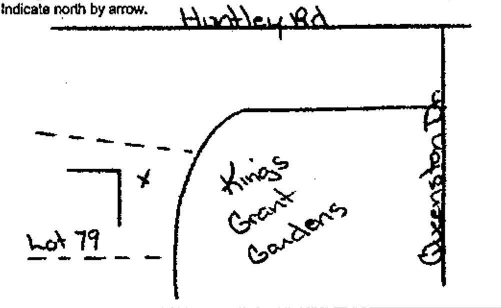
Pumping test method	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Submersible				
Pump intake set at - (metres) 30.47	Static Level	4.65		
Pumping rate - (litres/min) 54.6	1	6.02	1	4.77
Duration of pumping 5 hrs + ___ min	2	6.29	2	4.77
Final water level end of pumping 6.19 metres	3	6.37	3	4.75
Recommended pump type. ☐ Shallow ☒ Deep	4	6.37	4	4.71
Recommended pump depth. 30.47 metres	5	6.37	5	4.70
Recommended pump rate. 45.5 (litres/min)	10	6.34	10	4.69
	15	6.31	15	4.69
If flowing give rate - (litres/min)	20	6.15	20	4.69
	25	6.15	25	4.69
If pumping discontinued, give reason.	30	6.15	30	4.69
	40	6.17	40	4.68
	50	6.17	50	4.69
	60	6.17	60	4.69

Plugging and Sealing Record ☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
15.23	0	Grouted Bentonite Slurry	.63m3

Location of Well

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



Method of Construction

☐ Cable Tool ☐ Rotary (conventional) ☐ Rotary (reverse)
☒ Rotary (air) ☒ Air percussion ☐ Boring
☐ Diamond ☐ Jetting ☐ Driving
☐ Digging ☐ Other

Water Use

☒ Domestic ☐ Stock ☐ Irrigation
☐ Industrial ☐ Commercial ☐ Municipal
☐ Public Supply ☐ Not used ☐ Cooling & air conditioning
☐ Other

Final Status of Well

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

Audit No. Z 47072

Date Well Completed YYYY MM DD: 2006 9 7

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

Date Delivered YYYY MM DD: 2006 9 7

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.

Well Contractor's Licence No.: 1558

Business Address (street name, number, city etc.): Box 490 Stittsville Ontario K2S 1A6

Name of Well Technician (last name, first name): Miller Stephen

Well Technician's Licence No.: T0097

Signature of Technician/Contractor X

Date Submitted YYYY MM DD: 2006 9 12

Ministry Use Only

Data Source

Contractor: 1558

Date Received YYYY MM DD: NOV 17 2006

Date of Inspection YYYY MM DD

Remarks: NOV 17 2006

Well Record Number

0506E (09/03)

Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐

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1535407

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A 025593
A025593

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

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- Please print clearly in blue or black ink only.

Ministry Use Only
MUN ___ CON ___ LOT ___

Well Owner's Information and Location of Well Information

[redacted]

Ottawa Carleton Goulbourn 22 3

RR#/Street Number/Name: 23 King Street
City/Town/Village: Richmond
Site/Compartment/Block/Tract etc.:

GPS Reading NAD: 8 3 Zone: 18 Easting: 43 45 81 Northing: 500 49 63
Unit Make/Model: Garmin
Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
Brown	Clay	Stones		0	2.43
Gray	Clay			2.43	7.31
Gray	Limestone			7.31	48.76
Gray & White	Sandstone			48.76	70.10

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	8.22	22.75
8.22	70.10	15.23

Water Record

Water found at ___ Metres / Kind of Water
69.49 ☐ Fresh ☐ Sulphur ☐ Salty ☐ Minerals ☐ Gas ☐ Other: not tested
___ m ☐ Fresh ☐ Sulphur ☐ Salty ☐ Minerals ☐ Gas ☐ Other:
___ m ☐ Fresh ☐ Sulphur ☐ Salty ☐ Minerals ☐ Gas ☐ Other:

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+ .76	8.22
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.23	☒ Open hole		8.22	70.10

Test of Well Yield

Pumping test method: submersible
Pump intake set at - (metres) 30.47
Pumping rate - (litres/min) 54.6
Duration of pumping 2 hrs + ___ min
Final water level end of pumping 4.01 metres
Recommended pump type. ☐ Shallow ☒ Deep
Recommended pump depth. 30.47 metres
Recommended pump rate. 45.5 (litres/min)
If flowing give rate - (litres/min)
If pumping discontinued, give reason.

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	1.92		
1	2.94	1	2.87
2	3.27	2	2.63
3	3.42	3	2.54
4	3.49	4	2.46
5	3.54	5	2.41
10	3.66	10	2.27
15	3.71	15	2.19
20	3.76	20	2.15
25	3.80	25	2.12
30	3.83	30	2.11
40	3.87	40	2.07
50	3.90	50	2.05
60	3.93	60	2.03

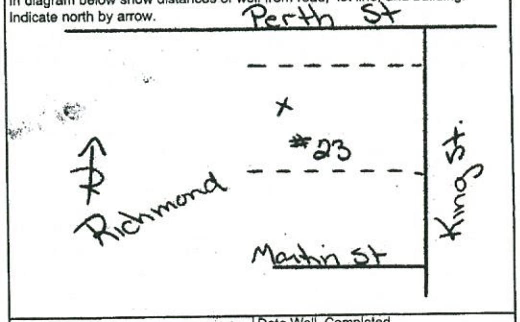
Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
8.22	0	Grouted - Bentonite Slurry	.154m3

Location of Well

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



Audit No. Z 26097

Date Well Completed YYYY 2005 MM 8 DD 15
Date Delivered YYYY 2005 MM 8 DD 16

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

Method of Construction

☐ Cable Tool ☐ Rotary (conventional) ☐ Rotary (reverse)
☒ Rotary (air) ☒ Air percussion ☐ Boring
☐ Diamond ☐ Jetting ☐ Driving
☐ Digging ☐ Other

Water Use

☒ Domestic ☐ Stock ☐ Irrigation
☐ Industrial ☐ Commercial ☐ Municipal
☐ Public Supply ☐ Not used ☐ Cooling & air conditioning
☐ Other

Final Status of Well

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

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence No. 1558
Business Address (street name, number, city etc.): P.O. Box 490 Stittsville,Ontario K2S 1A6
Name of Well Technician (last name, first name): Miller Stephen
Well Technician's Licence No. T0097
Signature of Technician/Contractor X
Date Submitted YYYY 2005 MM 8 DD 18

Ministry Use Only

Data Source
Contractor 1558
Date Received OCT 24 200
Date of Inspection YYYY MM DD
Remarks
Well Record Number

0506E (09/03)

Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐

Cette formule est disponible en français

1509220 e

316/4f. "A"

UTM 1 8 Z 4 3 4 6 1 0 E

5 R 5 0 0 4 7 4 0 N

Elev. 4 R 0 3 0 0

Basin 2 5

15 No 9220

GROUND WATER BRANCH
JAN 1[illegible] 1960
RESOURCES COMMISSION

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District Carleton ~~Township~~, Village, ~~Town or City~~ Richmond

[redacted] completed 27 (day) Nov month 59 year)

ss Ottawa

Casing and Screen Record

Inside diameter of casing 4"

Total length of casing 25'

Type of screen —

Length of screen —

Depth to top of screen —

Diameter of finished hole 4"

Pumping Test

Static level 12

Test-pumping rate 5 G.P.M.

Pumping level 15

Duration of test pumping 1/2 hr.

Water clear or cloudy at end of test clear

Recommended pumping rate 4 G.P.M.

with pumping level of 14

Well Log | Water 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)
clay & hardpan	0	21			
limestone	21	62	55	43	fresh

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? flat

Drilling Firm Ben E Sparks

Address

Licence Number 245

Name of Driller Ben

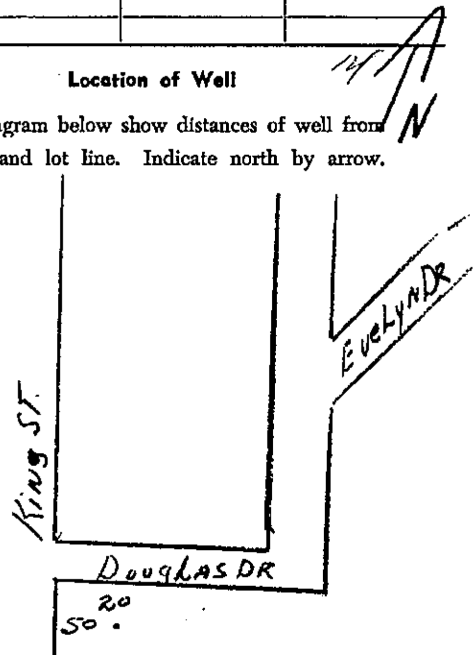
Address

Date Jan 5/60

Ben E Sparks
Signature of Licensed Drilling Contractor

Location of Well

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



Form 5
15M-58-4149

The Ontario Water Resources Commission Act

WATER WELL RECORD

Water management in Ontario
1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 1510286 | MUNICIP. 15201 | CON.

COUNTY OR DISTRICT: Carl
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Richmond
CON., BLOCK, TRACT, SURVEY, ETC.:
LOT 25-27:
OWNER (SURNAME FIRST) 28-47: Star Quality Homes
ADDRESS: Stittsville Ont
DATE COMPLETED 48-53: DAY 21 MO. 07 YR. 69

21 | UTM ZONE 18 | EASTING 434590 | NORTHING 5004700 | RC. 4 | ELEVATION 0300 | RC. 4 | BASIN CODE 25

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
grey	sand		fill	0'	3'
brown	clay			3	17
blue	limestone		hard	17	79

31 | 0003209 | 0017005 | 0079215
32

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
0075	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ ~~OPEN HOLE~~	188	0 ~~19~~	0019 ~~79~~
05	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE			0079
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	DEPTH SET AT – FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER
PUMPING RATE: 0007 GPM.
DURATION OF PUMPING: 01 HOURS 00 MINS.
STATIC LEVEL: 011 FEET
WATER LEVEL END OF PUMPING: 030 FEET
WATER LEVELS DURING: 1 ☐ PUMPING 2 ☐ RECOVERY
15 MINUTES: FEET | 30 MINUTES: FEET | 45 MINUTES: FEET | 60 MINUTES: FEET
IF FLOWING, GIVE RATE: GPM.
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: FEET
RECOMMENDED PUMPING RATE: 0005 GPM.
000.4 GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL

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

WATER USE 01

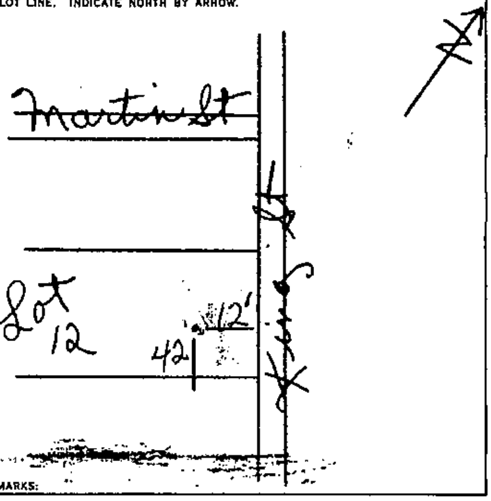
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING

1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL

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



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: Capital Water Supply
LICENCE NUMBER: 3216
ADDRESS: 14 Ashford Dr Ottawa
NAME OF DRILLER OR BORER: H Brown
LICENCE NUMBER:
SIGNATURE OF CONTRACTOR: Walter Kavanagh
SUBMISSION DATE: DAY ____ MO. ____ YR. ____

OFFICE USE ONLY

DATA SOURCE: 1
CONTRACTOR: 1503
DATE RECEIVED: 301069
DATE OF INSPECTION:
INSPECTOR:
REMARKS:

OWRC COPY

316/4f. "A"

1509222 c

15 Nº 9222

UTM 1 8 Z 4 3 4 6 3 0 E
5 R 5 0 0 4 7 6 0 N
Elev. 4 R 0 3 0 1
Basin 2 5

GROUND WATER BRANCH
JAN 1 60
RESOURCES COMMISSION

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District Carleton ~~Township~~, Village, ~~Town or City~~ Richmond

[redacted] completed 15 (day) Dec (month) 59 (year)

ss Ottawa

Casing and Screen Record

Inside diameter of casing 4"
Total length of casing 27'
Type of screen —
Length of screen —
Depth to top of screen —
Diameter of finished hole 4"

Pumping Test

Static level 8
Test-pumping rate 3 G.P.M.
Pumping level 22
Duration of test pumping 1/2 hr
Water clear or cloudy at end of test clear
Recommended pumping rate 2 G.P.M.
with pumping level of 20

Well Log / Water 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)
clay & Hardpan	0	20			
limestone	20	84	80	72	fresh

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? flat

Drilling Firm Ben E Sparks
Address

Licence Number 245
Name of Driller Ben
Address
Date Jan 5/60

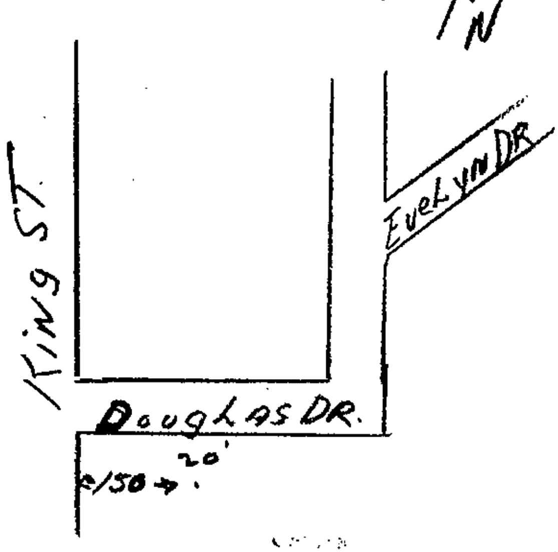
Ben E Sparks
(Signature of Licensed Drilling Contractor)

Form 5
15M-58-4149

Location of Well

11

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



UTM 18 434580

4 5004715

lev. 4 10300

25T

CODED 1509993

3 9

Water management in Ontario

The Ontario Water Resources Commission Act

WATER WELL RECORD

APR 8 1969

ONTARIO WATER RESOURCES COMMISSION

County or District Carl Township, Village, Town or City Richmond Ot.

Con. III Lot 24 Date completed 28 (day) Feb (month) 1969 (year)

[redacted]ress 1515 Base Line Rd. Ottawa

36

Casing and Screen Record

Inside diameter of casing 5"

Total length of casing 25'

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 5"

Pumping Test

Static level 16

Test-pumping rate 10 G.P.M.

Pumping level 40

Duration of test pumping 1 hr

Water clear or [✓ cloudy] at end of test

Recommended pumping rate 5 G.P.M.

with pump setting of 70 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
clay	0	21	105	fresh
limestone	21	107		

For what purpose(s) is the water to be used? new house

Is well on [✓ upland], in ~~valley,~~ or on hillside?

Drilling or Boring Firm Capital Water Supply Ltd

Address 14 Ashford Dr Ottawa 6

Licence Number 3216

Name of Driller or Borer H Mains

Address

Date Feb 28 1969

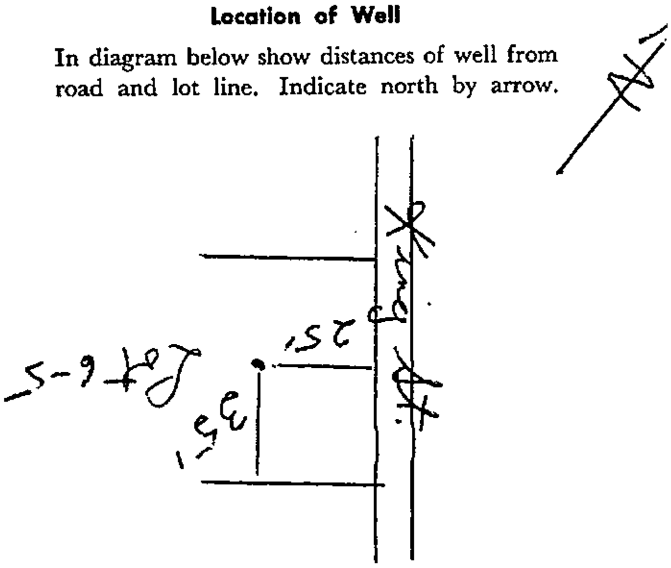
Walter Kavanagh
(Signature of Licensed Drilling or Boring Contractor)

Form 7

OWRC COPY

Location of Well

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



CSS.S8

Ontario Ministry of Environment and Energy

The Ontario Water Resources Act

WATER WELL RECORD

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

11 **1533685** Municipality 15003 Con.

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
[redacted]	GOULBOURN	PLAN D-14	30

Address of Well Location: 24 KING ST.
Date completed: 06 day 05 month 03 year

21 Zone Easting Northing RC Elevation RC Basin Code ii iii iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	To
		THIS DOCUMENT IS TO INFORM			
		THAT THE WELL CASING HAS			
		BEEN EXTENDED ABOVE THE			
		GROUND SURFACE.			
		THIS IS AN ATTACHMENT TO			
		THE ORIGINAL WELL RECORD			
		WHICH MAY OR MAY NOT EXIST			
		OVERALL WELL DEPTH 39'			

31

32

41 WATER RECORD

Water found at - feet	Kind of water
10-13	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas 14
15-18	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas 19
20-23	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas 24
25-28	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas 29
30-33	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas 34 80

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	To
10-11	1 ☐ Steel 12 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			13-16
17-18	1 ☐ Steel 19 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			20-23
24-25	1 ☐ Steel 26 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			27-30

SCREEN

Sizes of opening (Slot No.) 31-33 Diameter 34-38 inches Length 39-40 feet
Material and type
Depth at top of screen 41-44 feet 30

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at - feet From	To	Material and type (Cement grout, bentonite, etc.)
10-13	14-17	
18-21	22-25	
26-29	30-33 80	

71 PUMPING TEST

Pumping test method 10: 1 ☐ Pump 2 ☐ Bailer
Pumping rate 11-14 GPM
Duration of pumping 15-16 Hours 17-18 Mins

Static level	Water level end of pumping	25 Water levels during 1 ☐ Pumping 2 ☐ Recovery			
19-21	22-24	15 minutes 26-28	30 minutes 29-31	45 minutes 32-34	60 minutes 35-37
7 feet	feet	feet	feet	feet	feet

If flowing give rate 38-41 GPM
Pump intake set at 34 feet
Water at end of test 42: ☐ Clear ☐ Cloudy
Recommended pump type: ☐ Shallow ☐ Deep
Recommended pump setting 43-45 feet
Recommended pump rate 46-49 GPM
50-53

FINAL STATUS OF WELL 54

1 ☐ Water supply
2 ☐ Observation well
3 ☐ Test hole
4 ☐ Recharge well
5 ☐ Abandoned, insufficient supply
6 ☐ Abandoned, poor quality
7 ☐ Abandoned (Other)
8 ☐ Dewatering
9 ☐ Unfinished
10 ☐ Replacement well

WATER USE 55-56

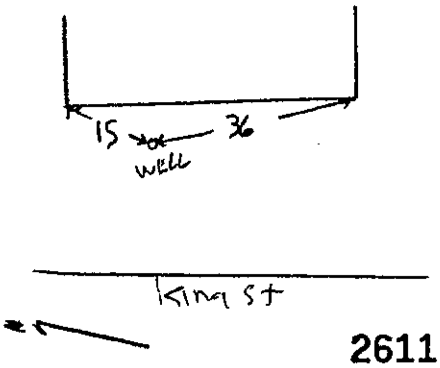
1 ☐ Domestic
2 ☐ Stock
3 ☐ Irrigation
4 ☐ Industrial
5 ☐ Commercial
6 ☐ Municipal
7 ☐ Public supply
8 ☐ Cooling & air conditioning
9 ☐ Not use
10 ☐ Other

METHOD OF CONSTRUCTION 57

1 ☐ Cable tool
2 ☐ Rotary (conventional)
3 ☐ Rotary (reverse)
4 ☐ Rotary (air)
5 ☐ Air percussion
6 ☐ Boring
7 ☐ Diamond
8 ☐ Jetting
9 ☐ Driving
10 ☐ Digging
11 ☒ Other WELL CASING EXTENSION

LOCATION OF WELL

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



261106

Name of Well Contractor: AQUA PUMP SERVICE
Well Contractor's Licence No.: 6907
Address: 5555 FERNBANK Rd. STITTSVILLE
Name of Well Technician: Barry Wedd
Well Technician's Licence No.: T-2489
Signature of Technician/Contractor
Submission date: 10 day 05 mo 03 yr

MINISTRY USE ONLY
Data source 58
Contractor 59-62: 6907
Date received 63-68: MAY 14 2003 80
Date of inspection
Inspector
Remarks: CSS.ES3

2 - MINISTRY OF ENVIRONMENT AND ENERGY COPY

0506 (06/02) Front Form 9

Ontario Ministry of the Environment

The Ontario Water Resources Act
WATER WELL RECORD

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

11 1532547

Municipality 15003 Con. CON 03
Sub lot 30 Part B

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
Ottawa Carleton	Goulbourn	3	25
[redacted]	Address Richmond, Ont		Date completed 21 day 12 month 01 year

21 Northing RC Elevation RC Basin Code

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
	clay			0	13
grey	limestone			13	62

31
32

41 WATER RECORD

Water found at - feet	Kind of water
28	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
34	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
47	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
51	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas

NOT TESTED

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6 1/4	1 ☒ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	188	0	22
8 3/4	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☒ Open hole 5 ☐ Plastic		0	20
6	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☒ Open hole 5 ☐ Plastic		20	62

SCREEN

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

61 PLUGGING & SEALING RECORD

☒ Annular space ☐ Abandonment

Depth set at - feet From	Depth set at - feet To	Material and type (Cement grout, bentonite, etc.)
2	22	cement grout

71 PUMPING TEST

Pumping test method 1 ☒ Pump 2 ☐ Bailer
Pumping rate 20 GPM
Duration of pumping 1 Hours Mins

Static level	Water level end of pumping	Water levels during 1 ☐ Pumping 2 ☒ Recovery: 15 minutes	30 minutes	45 minutes	60 minutes
11 feet	50 feet	11 feet	11 feet	11 feet	11 feet

If flowing give rate GPM
Pump intake set at feet
Water at end of test ☐ Clear ☒ Cloudy
Recommended pump type ☐ Shallow ☒ Deep
Recommended pump setting 50 feet
Recommended pump rate 20 GPM

FINAL STATUS OF WELL

1 ☒ Water supply
2 ☐ Observation well
3 ☐ Test hole
4 ☐ Recharge well
5 ☐ Abandoned, insufficient supply
6 ☐ Abandoned, poor quality
7 ☐ Abandoned (Other)
8 ☐ Dewatering
9 ☐ Unfinished
10 ☐ Replacement well

WATER USE

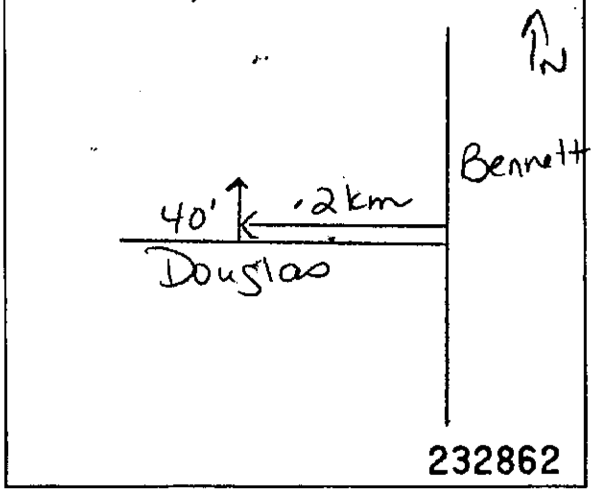
1 ☒ Domestic
2 ☐ Stock
3 ☐ Irrigation
4 ☐ Industrial
5 ☐ Commercial
6 ☐ Municipal
7 ☐ Public supply
8 ☐ Cooling & air conditioning
9 ☐ Not use
10 ☐ Other

METHOD OF CONSTRUCTION

1 ☐ Cable tool
2 ☐ Rotary (conventional)
3 ☐ Rotary (reverse)
4 ☐ Rotary (air)
5 ☒ Air percussion
6 ☐ Boring
7 ☐ Diamond
8 ☐ Jetting
9 ☐ Driving
10 ☐ Digging
11 ☐ Other

LOCATION OF WELL

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



232862

Name of Well Contractor: AirRock Drilling Co Ltd
Well Contractor's Licence No.: 1119
Address: RR#2 Jasper, Ont
Name of Well Technician: Shannon Purcell
Well Technician's Licence No.: T2122.
Signature of Technician/Contractor
Submission date: 10 day 01 mo 02 yr

MINISTRY USE ONLY
Data source
Contractor 1119
Date received JAN 25 2002
Date of inspection
Inspector
Remarks
CSS.ES2

0506 (07/00) Front Form 9

2 - MINISTRY OF THE ENVIRONMENT COPY

TM | 1 | 8 | | 4 | 3 | 4 | 3 | ~~4 0~~ 90

| 4 | 7 | 5 | 0 | 0 | 4 | 7 | 0 | 0 |

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cdn | 2 | 5 |

316/4P

15 10066
3 9

Water management in Ontario

The Ontario Water Resources Commission Act

WATER WELL RECORD

DIVISION OF
WATER RESOURCES
JUN 13 1969

County or District Carl
Township, [✓ Village,] Town or City Richmond
Con. III Lot 24
Date completed 8 (day) Apr (month) 1969 (year)
[redacted] RR#2 Stittsville Ont

Casing and Screen Record

SB

Inside diameter of casing 5"
Total length of casing 35'
Type of screen
Length of screen
Depth to top of screen
Diameter of finished hole 5"

Pumping Test

Static level 3'
Test-pumping rate 10 G.P.M.
Pumping level 6'
Duration of test pumping 1 hr
Water clear or [✓ cloudy] at end of test
Recommended pumping rate 5 G.P.M.
with pump setting of 30 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
clay	0	32	52	fresh
limestone	32	54		

Water Record: Depth(s) at which water(s) found; Kind of water (fresh, salty, sulphur)

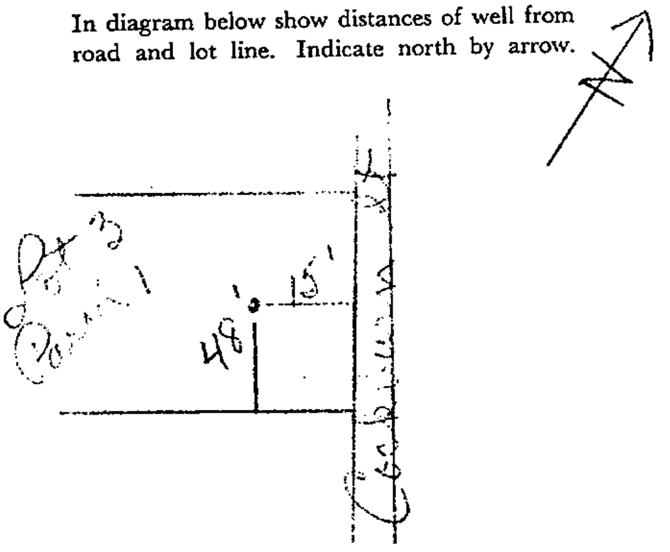
For what purpose(s) is the water to be used?
new house

Is well on [✓ upland], in valley, or on hillside?

Drilling or Boring Firm Capital Water Supply Ltd
Address 14 Ashford Dr
Ottawa 6
Licence Number 3216
Name of Driller or Borer M Kavanagh
Address
Date Apr 8 1969
Walter Kavanagh
(Signature of Licensed Drilling or Boring Contractor)

Location of Well

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



Form 7

OWRC COPY

153.5917

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)
A 025610
A025610

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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

Ministry Use Only
MUN | CON | LOT

[redacted]

Address of Well Location (County/District/Municipality): Ottawa Carleton
Township: Goulbourn
3
22
RR#/Street Number/Name: 22 Cockburn Street
City/Town/Village: Richmond
Site/Compartment/Block/Tract etc.:
GPS Reading NAD 83 Zone 18 Easting 43 45 05 Northing 500 49 23
Unit Make/Model: Garmin
Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
Brown	Clay		Packed	0	3.65
Gray	Clay	Stones		3.65	8.53
Gray	Limestone	Brown Layers	Medium	8.53	29.86

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	9.44	22.75
9.44	29.86	15.07

Water Record

Water found at Metres	Kind of Water
24.38 ☐ Gas ☐ Other: not tested	☐ Fresh ☐ Sulphur ☐ Salty ☐ Minerals
___ m ☐ Gas ☐ Other:	☐ Fresh ☐ Sulphur ☐ Salty ☐ Minerals
___ m ☐ Gas ☐ Other:	☐ Fresh ☐ Sulphur ☐ Salty ☐ Minerals

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.86	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	.48	+ .60	9.44
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
15.07	☒ Open hole		9.44	29.86

Test of Well Yield

Pumping test method: submersible
Pump intake set at - (metres) 18.28
Pumping rate - (litres/min) 54.6
Duration of pumping 1 hrs + ___ min
Final water level end of pumping 4.57 metres
Recommended pump type. ☐ Shallow ☒ Deep
Recommended pump depth. 15.23 metres
Recommended pump rate. 45.5 (litres/min)
If flowing give rate - (litres/min)
If pumping discontinued, give reason.

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	3.08		
1	4.05	1	3.25
2	4.26	2	3.231
3	4.36	3	3.21
4	4.39	4	3.21
5	4.42	5	3.21
10	4.44	10	3.17
15	4.47	15	3.16
20	4.51	20	3.15
25	4.51	25	3.15
30	4.53	30	3.12
40	4.54	40	3.14
50	4.55	50	3.14
60	4.57	60	3.14

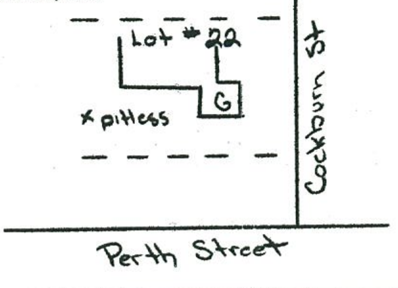
Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
9.44	0	Grouted - Bentonite Slurry	.22m3

Location of Well

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



Method of Construction

☐ Cable Tool
☐ Rotary (conventional)
☐ Rotary (reverse)
☒ Rotary (air)
☒ Air percussion
☐ Boring
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging
☐ Other

Water Use

☒ Domestic
☐ Stock
☐ Irrigation
☐ Industrial
☐ Commercial
☐ Municipal
☐ Public Supply
☐ Not used
☐ Cooling & air conditioning
☐ Other

Final Status of Well

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

Audit No. Z 26132

Date Well Completed YYYY 2005 MM 9 DD 21

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

Date Delivered YYYY 2005 MM 9 DD 22

Well Contractor/Technician Information

Name of Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence No.: 1558
Business Address (street name, number, city etc.): Box 490 Stittsville, Ontario K2S 1A6
Name of Well Technician (last name, first name): Miller; Stephen
Well Technician's Licence No.: T0097
Signature of Technician/Contractor: X
Date Submitted YYYY 2005 MM 9 DD 22

Ministry Use Only

Data Source
Contractor 1558
Date Received YYYY MM DD
Date of Inspection YYYY MM DD
Remarks
Well Record Number

0506E (09/03)

Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐

Cette formule est disponible en français

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

Ontario

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

11 | 1516159 | MUNICIP. 15701 | CON.

COUNTY OR DISTRICT: [redacted]

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Richmond

CON., BLOCK, TRACT, SURVEY, ETC: —

LOT: —

Savage Dr. Stittsville, Ontario

DATE COMPLETED: DAY 03 MO. 08 YR. 77

04700 4 | ELEVATION 0302 4 | BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
brown	sand	gravel & boulders	packed	0	3
brown	clay		packed	3	10
blue	clay		soft	10	30
grey	sand	gravel & boulders	pacled	30	32
grey	limestone		medium	32	49

31 | 0003628(1113) 0010605179 0030305855 0032008(1113 0049215

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0047	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
~~01~~ 06 ~~5 ½~~	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE ~~4 ☒ OPEN HOLE~~	188	0 34	~~34~~ 0034 ~~49~~
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE			0049
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 0010 GPM
DURATION OF PUMPING: 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
006 FEET	025 FEET	025 FEET	025 FEET	025 FEET	025 FEET

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY
IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING: 025 FEET
RECOMMENDED PUMPING RATE: 0005 GPM
GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL

1

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

WATER USE

GWO 01

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

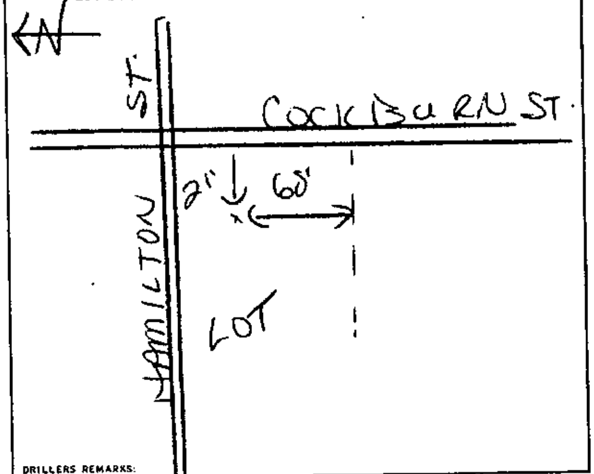
METHOD OF DRILLING

5

1 ☐ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☒ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL

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



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: Capital Water Supply Ltd.
LICENCE NUMBER: 1558
ADDRESS: Box 490 Stittsville, Ontario
NAME OF DRILLER OR BORER: W. Kavanagh
LICENCE NUMBER:
SIGNATURE OF CONTRACTOR:
SUBMISSION DATE: DAY 4 MO. 8 YR. 77

OFFICE USE ONLY

DATA SOURCE: 1
CONTRACTOR: 1558
DATE RECEIVED: 140977
DATE OF INSPECTION: MAY 16/78
INSPECTOR: ON
REMARKS:
P ✓
WI

FORM 7 MOE 07-091

MINISTRY OF THE ENVIRONMENT COPY

Ontario

3164 b

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

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

11 1516957 MUNICIP 15701 CON. CON Perth St 04

COUNTY OR DISTRICT Carleton	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE Richmond	CON., BLOCK, TRACT, SURVEY, ETC ~~[illegible]~~ St 024	LOT 25-27 5 3024
OWNER (SURNAME FIRST) 28-47 H. Rea Construction	ADDRESS Box 69 Richmond Ont.		DATE COMPLETED 48-53 DAY 14 MO 05 YR 79

21 UTM ZONE 18 EASTING 434299 NORTHING 5004999 RC. 4 ELEVATION 0310 RC. 4 BASIN CODE 26 II III IV

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
grey	clay			0	38
grey	limestone			38	64

31 0038205 0064215

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0062	1 ☑ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
06 6 1/4	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0039
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

61 PLUGGING & SEALING RECORD

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

71 PUMPING TEST

PUMPING TEST METHOD 1 ☑ PUMP 2 ☐ BAILER
PUMPING RATE 0007 GPM
DURATION OF PUMPING 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
004 FEET	025 FEET	025 FEET	025 FEET	025 FEET	025 FEET

WATER LEVELS DURING 1 ☒ PUMPING 2 ☐ RECOVERY
IF FLOWING, GIVE RATE GPM
PUMP INTAKE SET AT FEET
WATER AT END OF TEST 1 ☐ CLEAR 2 ☑ CLOUDY
RECOMMENDED PUMP TYPE ☑ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING 025 FEET
RECOMMENDED PUMPING RATE 0006 GPM
50-53 GPM./FT. SPECIFIC CAPACITY

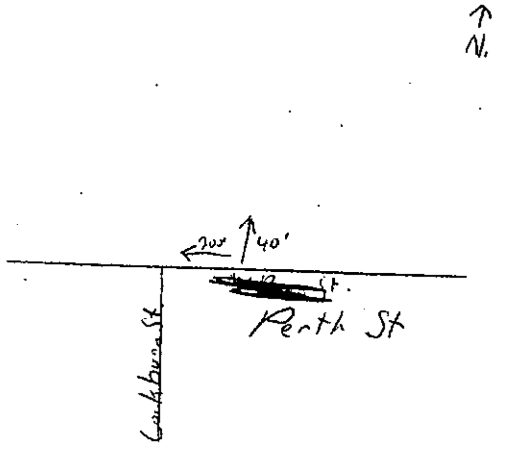
FINAL STATUS OF WELL 1
1 ☑ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED POOR QUALITY
7 ☐ UNFINISHED

WATER USE 01
1 ☑ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING 5
1 ☐ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☑ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL

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



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR Henry Mains Well Drilling
LICENCE NUMBER 3644
ADDRESS Box 326, Richmond Ont
NAME OF DRILLER OR BORER Henry Mains
LICENCE NUMBER
SIGNATURE OF CONTRACTOR
SUBMISSION DATE DAY 16 MO. 5 YR. 79

OFFICE USE ONLY

DATA SOURCE 1
CONTRACTOR 3644
DATE RECEIVED 280579
DATE OF INSPECTION
INSPECTOR Km
REMARKS:
CSS.58
P
WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

The Ontario Water Resources Commission Act

WATER WELL RECORD

Water management in Ontario

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

11 | 1510331 | MUNICIP. 15701 | CON.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Carl	Richmond		

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
Julia Constr Ltd	Richmond Ont.	DAY 13 MO 08 YR 69

2 | UTM ZONE 18 | EASTING 434520 | NORTHING 5004870 | RC. 4 | ELEVATION 0302 | RC. 4 | BASIN CODE 25

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
brown	clay		hard	0	25
grey	clay	boulders	packed	25	27
blue	limestone		hard	27	60

31 | 0025d05 | 0027d0513 | 0060d15

32

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
0058	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE ~~4 ☒ OPEN HOLE~~	188	0 ~~30~~	0030 60
~~4¾~~	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE			0060
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER

PUMPING RATE: 0010 GPM.

DURATION OF PUMPING: 01 HOURS 00 MINS.

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
012 FEET	015 FEET	FEET	FEET	FEET	FEET

IF FLOWING, GIVE RATE: GPM.

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP

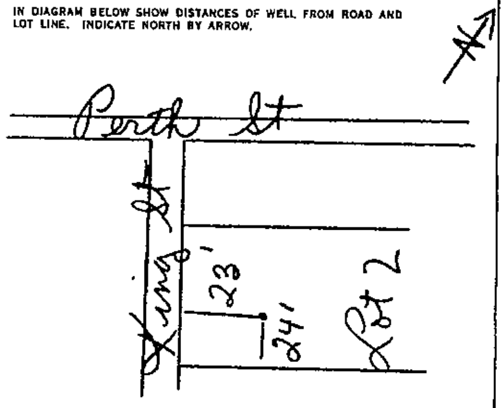
RECOMMENDED PUMP SETTING: 030 FEET

RECOMMENDED PUMPING RATE: 0005 GPM.

003.3 GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

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



DRILLERS REMARKS:

FINAL STATUS OF WELL

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

WATER USE 01

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

METHOD OF DRILLING

- 1 ☒ CABLE TOOL
- 2 ☐ ROTARY (CONVENTIONAL)
- 3 ☐ ROTARY (REVERSE)
- 4 ☐ ROTARY (AIR)
- 5 ☐ AIR PERCUSSION
- 6 ☐ BORING
- 7 ☐ DIAMOND
- 8 ☐ JETTING
- 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Capital Waters Supply Ltd — LICENCE NUMBER: 3216

ADDRESS: 14 Ashford Dr Ottawa

NAME OF DRILLER OR BORER: B Acres — LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Walter Kavanagh — SUBMISSION DATE: DAY ____ MO ____ YR. ____

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 1503 | DATE RECEIVED: 281169

DATE OF INSPECTION: | INSPECTOR:

REMARKS:

OWRC COPY

The Ontario Water Resources Commission Act

WATER WELL RECORD

Water management in Ontario

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

11

1510339

MUNICIP. 15701

CON.

COUNTY OR DISTRICT: Carl

TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Richmond

CON., BLOCK, TRACT, SURVEY, ETC.:

LOT 25-27:

[redacted]

ADDRESS: Richmond Ont.

DATE COMPLETED 48-53: DAY 15 MO. 08 YR. 69

21 UTM ZONE 18 EASTING 434500 NORTHING 5004880 RC. 4 ELEVATION 0303 RC 4 BASIN CODE 25

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH – FEET FROM	DEPTH – FEET TO
brown	clay	boulders	hard	0	27
blue	lime		hard	27	43
grey	lime		soft	43	56

31 002765013 | 0043215 | 0056215

32

41 WATER RECORD

WATER FOUND AT – FEET	KIND OF WATER
0055	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH – FEET FROM	DEPTH – FEET TO
05 ~~4½~~	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ ~~OPEN HOLE~~	188	0 ~~30~~	0030 ~~56~~
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE			0056
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.):

DIAMETER: INCHES

LENGTH: FEET

MATERIAL AND TYPE:

DEPTH TO TOP OF SCREEN: FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT – FEET FROM	DEPTH SET AT – FEET TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☒ BAILER

PUMPING RATE: 0010 GPM.

DURATION OF PUMPING: 01 HOURS 00 MINS.

STATIC LEVEL: 011 FEET

WATER LEVEL END OF PUMPING: 013 FEET

WATER LEVELS DURING 1 ☐ PUMPING 2 ☐ RECOVERY

15 MINUTES: FEET | 30 MINUTES: FEET | 45 MINUTES: FEET | 60 MINUTES: FEET

IF FLOWING, GIVE RATE: GPM.

PUMP INTAKE SET AT: FEET

WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE: ☑ SHALLOW ☐ DEEP

RECOMMENDED PUMP SETTING: 030 FEET

RECOMMENDED PUMPING RATE: 0005 GPM.

005.0 GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL

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

WATER USE 01

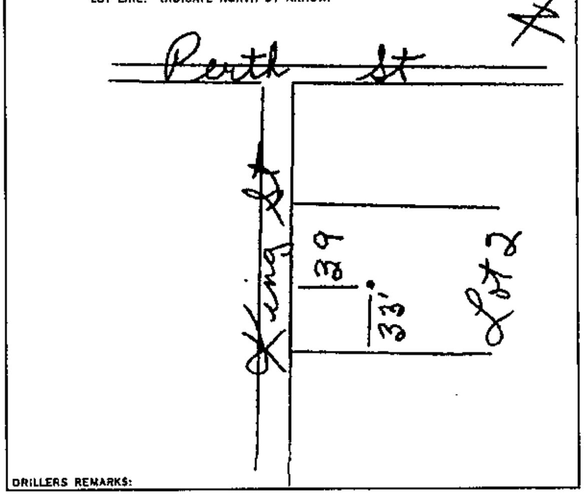
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING

1 ☒ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL

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



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR: Capital Water Supply Ltd

LICENCE NUMBER: 3216

ADDRESS: 14 Ashford Dr Ottawa

NAME OF DRILLER OR BORER: B Acres

LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Walter Kavanagh

SUBMISSION DATE: DAY ____ MO ____ YR ____

OFFICE USE ONLY

DATA SOURCE: 1

CONTRACTOR: 1503

DATE RECEIVED: 281169

DATE OF INSPECTION:

INSPECTOR:

REMARKS:

OWRC COPY

316/4f. "A"

GROUND WATER BRANCH
1509273
A152 № 927
ONTARIO WATER
RESOURCES COMMISSION

UTM |1|8|Z |4|3|4|3|5|0|E

|5|R |5|0|0|4|7|4|5|N

Elev. |4|R |0|3|0|2|

Basin |2|5|

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District Carl

Township, [✓ Village], Town or City ~~Goulbourn~~ Richmond

Con. ~~III~~ Lot ~~24~~

Date completed 1 (day) July (month) 63 (year)

[redacted]

Address Richmond Ont

Casing and Screen Record

Inside diameter of casing 5"

Total length of casing 38

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 5"

Pumping Test

Static level 10'

Test-pumping rate 7 G.P.M.

Pumping level 40

Duration of test pumping 1 hr

Water clear or cloudy at end of test cloudy

Recommended pumping rate 5 G.P.M.

with pump setting of 55' feet below ground surface

Well Log

Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
clay	0	34	50	fresh
limestone	34	65	64	"

For what purpose(s) is the water to be used? NEW household

Is well on upland, in valley, or on hillside? upland

Drilling or Boring Firm Capital Water Supply

Address 1243 Heron Rd Ottawa

Licence Number 976

Name of Driller or Borer M Kavanagh

Address

Date 2 July 1963

Walter Kavanagh

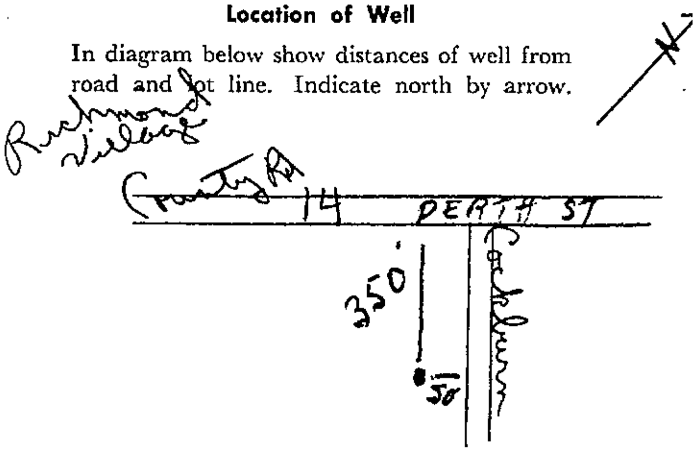
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

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



UTM 1 8 : 4 3 4 3 5 0

4 : 5 0 0 4 7 5 0 CODED

Elev. 4 : [illegible] 3 0 2

Basin 2 5

1509740

3 9

Water management in Ontario

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District Carleton Township, Village, Town or City Richmond

Con. III Lot 24 Date completed 22 Nov 1968 (day month year)

[redacted]ddress Stittsville Ont.

Casing and Screen Record

Inside diameter of casing 5"

Total length of casing 20'

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 5"

Pumping Test

Static level 6'

Test-pumping rate 10 G.P.M.

Pumping level 10'

Duration of test pumping 1 hr

Water clear or cloudy at end of test

Recommended pumping rate 5 G.P.M.

with pump setting of 30 feet below ground surface

Well Log

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
limestone	17	46		

For what purpose(s) is the water to be used? new house

Is well on [✓ upland], in valley, ~~or~~ on hillside?

Drilling or Boring Firm Capital Water Supply Ltd.

Address 14 Ashford Dr Ottawa 6

Licence Number 2857

Name of Driller or Borer V Miron

Address

Date 22 Nov 1968

Walter Kavanagh

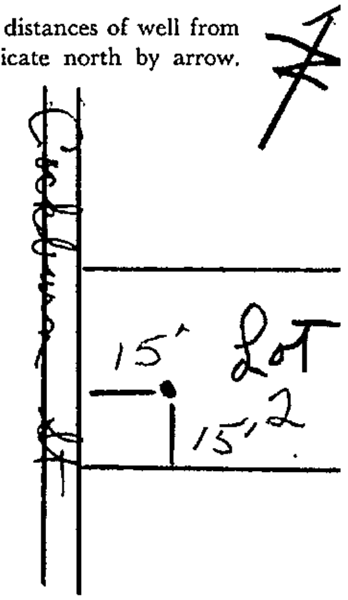
(Signature of Licensed Drilling or Boring Contractor)

Form 7

OWRC COPY

Location of Well

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



3/9/4f. W

1509241

GROUND WATER BRANCH
15 № 9241
MAY 25 1961

UTM 18 Z 434340 E
5 R 5004760 N

Elev. 4 R 0302

Basin 215 RICHMOND.

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District Carleton Township, [✓ Village], Town or City ~~Goulbourn~~ Richmond

Con. Lot Date completed 9 (day) Dec. (month) 1960 (year)

[redacted]ress Richmond Ont.

Casing and Screen Record		Pumping Test	
Inside diameter of casing	4"	Static level	10'
Total length of casing	30'	Test-pumping rate	5 G.P.M.
Type of screen	—	Pumping level	15'
Length of screen	—	Duration of test pumping	2 hr
Depth to top of screen	—	Water clear or cloudy at end of test	Clear
Diameter of finished hole	4"	Recommended pumping rate	5 G.P.M.
		with pumping level of	15'

Well Log			Water 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)
Blue Clay	0	30'			
Gray lime stone	30'	60'	60'	50'	Fresh

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? valley

Drilling Firm J P Sparks

Address Stittsville Ont.

Licence Number

Name of Driller Clayton H Sparks

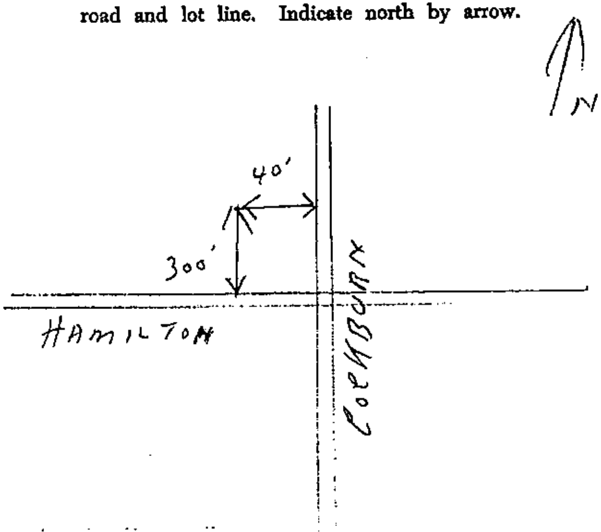
Address Stittsville Ont

Date Dec 9 1960

J. P. Sparks
(Signature of Licensed Drilling Contractor)

Location of Well

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



UTM 18 434330 CODED 1509732

14 ~~25~~6 0047725

Elev. 4 0303

Basin 25

Water management in Ontario

B

JAN 8

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District Carleton Township, Village, Town or City Richmond

Con. III Lot 24 Date completed 18 (day) Dec (month) 1968 (year)

[redacted] Address 45 BAYSHORE DR, AP. 18, OTTAWA 14 ONT.

Casing and Screen Record

Inside diameter of casing 5"

Total length of casing 29'

Type of screen

Length of screen

Depth to top of screen

Diameter of finished hole 5"

Pumping Test

Static level 2'

Test-pumping rate 10 G.P.M.

Pumping level 18'

Duration of test pumping 1 hr

Water clear or [✓ cloudy] at end of test

Recommended pumping rate 5 G.P.M

with pump setting of 30 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.
clay	0'	27'
limestone	27	60

Water Record

Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
58'	fresh

For what purpose(s) is the water to be used? new house

Is well on [✓ upland], in valley, or on hillside?

Drilling or Boring Firm Capital Water Supply Ltd.

Address 14 Ashford Dr
Ottawa 6

Licence Number 2857

Name of Driller or Borer B Acres

Address

Date 18 Dec 1968

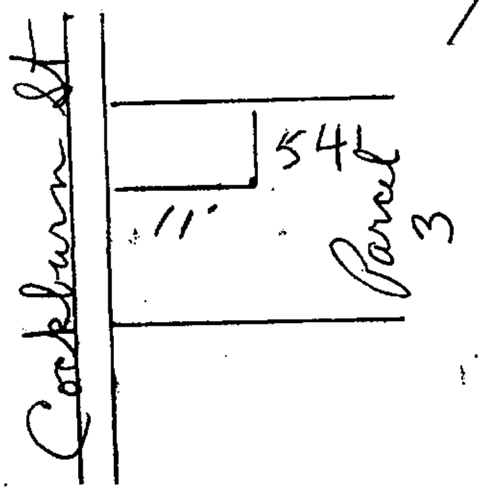
Walter Kavanagh
(Signature of Licensed Drilling or Boring Contractor)

Form 7

OWRC COPY

Location of Well

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



Ontario Ministry of the Environment

The Ontario Water Resources Act
WATER WELL RECORD

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

OTTAWA-CARLETON

11 1532630 Municipality 15701 Con.

County or District: Richmond
[redacted]

Township/Borough/City/Town/Village: (GOULbourn)
Con block tract survey, etc.: Part 1&2 4R-16960 Lot

Address: 9 CockBURN st. Richmond ON.
Date completed: 25 day 10 month 01 year

21 UTM Northing RC Elevation RC Basin Code ii iii iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
BROWN	clay		thick	0	15
GREY	clay		thick	15	30
GREY	Clay & stones		HaRD Pan	30	34
GREY	Limestone		MED HARD	34	51
		37' OF 6¼" casing			
		1 DRive shoe			
		1 Well Cap			

31

32

41 WATER RECORD

Water found at - feet	Kind of water
44	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☒ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6¼ 6⅛	1 ☒ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☒ Open hole 5 ☐ Plastic	.188	0 35½	35½ 51
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

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

61 PLUGGING & SEALING RECORD

☒ Annular space ☐ Abandonment

Depth set at - feet From	Depth set at - feet To	Material and type (Cement grout, bentonite, etc.)
0	35½	Cement GROUT

71 PUMPING TEST

Pumping test method: 1 ☐ Pump 2 ☒ Bailer
Pumping rate: 30 GPM
Duration of pumping: 1 Hours ____ Mins

Water levels during: 1 ☒ Pumping 2 ☐ Recovery

Static level	Water level end of pumping	15 minutes	30 minutes	45 minutes	60 minutes
8 feet	20 feet	20 feet	20 feet	20 feet	20 feet

If flowing give rate: GPM
Pump intake set at: feet
Water at end of test: ☐ Clear ☒ Cloudy
Recommended pump type: ☐ Shallow ☒ Deep
Recommended pump setting: 35 feet
Recommended pump rate: 10 GPM

FINAL STATUS OF WELL

- 1 ☒ Water supply
- 2 ☐ Observation well
- 3 ☐ Test hole
- 4 ☐ Recharge well
- 5 ☐ Abandoned, insufficient supply
- 6 ☐ Abandoned, poor quality
- 7 ☐ Abandoned (Other)
- 8 ☐ Dewatering
- 9 ☐ Unfinished
- 10 ☐ Replacement well

WATER USE

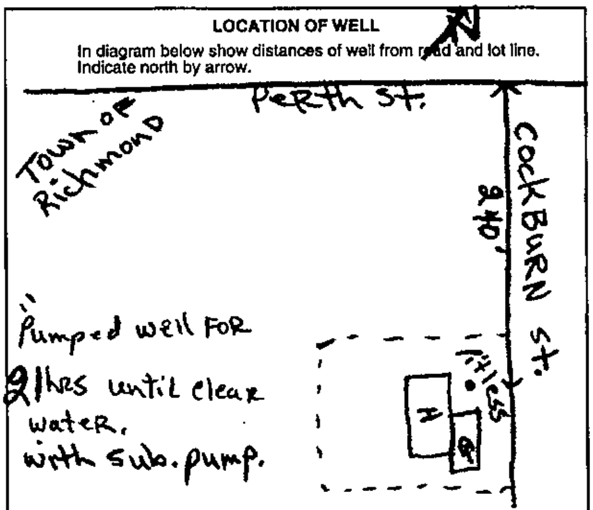
- 1 ☒ Domestic
- 2 ☐ Stock
- 3 ☐ Irrigation
- 4 ☐ Industrial
- 5 ☐ Commercial
- 6 ☐ Municipal
- 7 ☐ Public supply
- 8 ☐ Cooling & air conditioning
- 9 ☐ Not use
- 10 ☐ Other

METHOD OF CONSTRUCTION

- 1 ☒ Cable tool
- 2 ☐ Rotary (conventional)
- 3 ☐ Rotary (reverse)
- 4 ☐ Rotary (air)
- 5 ☐ Air percussion
- 6 ☐ Boring
- 7 ☐ Diamond
- 8 ☐ Jetting
- 9 ☐ Driving
- 10 ☐ Digging
- 11 ☐ Other

LOCATION OF WELL

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



Pumped well FOR 2 hrs until clear water. with sub. pump.

227634

Name of Well Contractor: B. MOORE Well DRilling
Well Contractor's Licence No.: 6455
Address: Box 436 OSGOODE ON. K0A 2W0
Name of Well Technician: Bob MOORE
Well Technician's Licence No.: T-0319
Signature of Technician/Contractor: Bob Moore
Submission date: day 25 mo 10 yr 01

MINISTRY USE ONLY
Data source
Contractor: 6455
Date received: JAN 07 2002
Date of inspection
Inspector
Remarks: CSS.ES2

0506 (07/00) Front Form 9

2 - MINISTRY OF THE ENVIRONMENT COPY

319/4f. "A"

1509244

UTM 18 z 4|3|4|3|2|0 E
5 R 5|0|0|4|7|9|0 N
Elev. 4 R 0|3|0|2
Basin 2|5

15 No. 9244
GROUND WATER BRANCH
MAY 25 1961
ONTARIO WATER RESOURCES COMMISSION

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District Carleton ~~Township~~, [✓ Village], ~~Town or City~~ Richmond

Con. — Lot — Date completed 10 (day) Jan (month) 61 (year)

[redacted] ress Richmond

Casing and Screen Record

Inside diameter of casing 4"
Total length of casing 31'
Type of screen —
Length of screen —
Depth to top of screen —
Diameter of finished hole 4"

Pumping Test

Static level 8'
Test-pumping rate 6 G.P.M.
Pumping level 14'
Duration of test pumping 1 hr
Water clear or cloudy at end of test clearing
Recommended pumping rate 5 G.P.M.
with pump~~ing~~ level of 30'

Well Log

Water 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)
Blue clay	0	29	41	33	fresh
Blue limestone	29	42			

For what purpose(s) is the water to be used?
house

Is well on upland, in valley, or on hillside?
upland

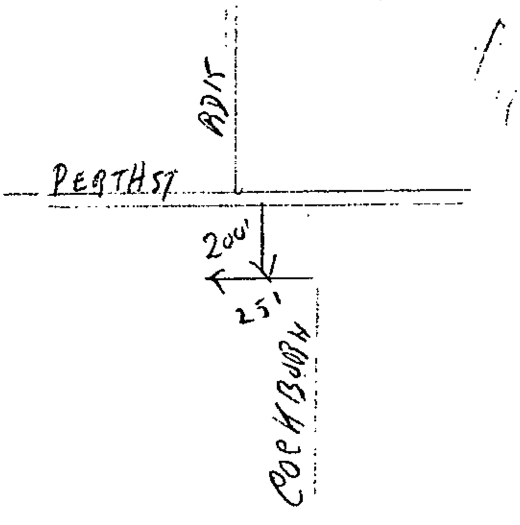
Drilling Firm Ben E Sparks
Address

Licence Number (483 1960)
Name of Driller Ben E Sparks
Address
Date Mar 7/61
Ben E Sparks
(Signature of Licensed Drilling Contractor)

Form 5

Location of Well

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



31G48

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

11 1519486 MUNICIP. 15701 CON. CON 03

COUNTY OR DISTRICT: Carleton
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Richmond
CON., BLOCK, TRACT, SURVEY, ETC.: Murray St. 024
LOT: ~~024~~

[redacted]

ADDRESS: Box 93, Richmond K0A2Z0
DATE COMPLETED: DAY 06 MO. 12 YR. 84

21 ZONE 18 EASTING 434299 NORTHING 5004799 RC. 4 ELEVATION 0310 RC. 4 BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
grey	clay			0	36
grey	limestone			36	43

MOE VF-18

31 0036205 0043215

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0039	1 ☑ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06 6 1/4	1 ☑ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0038
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☑ OPEN HOLE		38	0043
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☑ PUMP 2 ☐ BAILER
PUMPING RATE: 0020 GPM
DURATION OF PUMPING: 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
008 FEET	025 FEET	025 FEET	025 FEET	025 FEET	025 FEET

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY
IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☑ CLOUDY
RECOMMENDED PUMP TYPE: ☑ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING: 025 FEET
RECOMMENDED PUMPING RATE: 0010 GPM

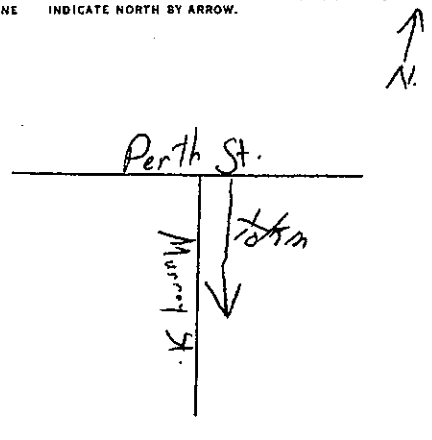
FINAL STATUS OF WELL 1
1 ☑ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE 01
1 ☑ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING 5
1 ☐ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☑ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

6393 LOCATION OF WELL

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



DRILLERS REMARKS:

CONTRACTOR
NAME OF WELL CONTRACTOR: Henry Maine Well Drilling
LICENCE NUMBER: 3644
ADDRESS: Box 326, Richmond Ont.
NAME OF DRILLER OR BORER:
LICENCE NUMBER:
SIGNATURE OF CONTRACTOR:
SUBMISSION DATE: DAY 2 MO. 12 YR. 84

OFFICE USE ONLY
DATA SOURCE: 1 CONTRACTOR: 3644 DATE RECEIVED: 060285
DATE OF INSPECTION:
INSPECTOR:
REMARKS:

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506-4-77 FORM 7

1509127

316/4f. "A"

UTM 18 Z 434300 E
5 R 5004820 N
Elev. 4 R 0303
Basin 25

RECEIVED
15 No. 9127
DEC - 8 1954
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

ONTARIO

The Water-well Drillers Act, 1954

Department of Mines

Water-Well Record

County or Territorial District Carleton ~~Township~~, Village, ~~Town or City~~ Richmond

[redacted] Village, Town or City)

ddress Richmond Ont.

(day) (month) (year)

Pipe and Casing Record		Pumping Test	
Casing diameter(s)	4 inch	Static level	10 ft
Length(s)	30 ft	Pumping rate	300 g. p. h.
Type of screen	No screen	Pumping level	12 ft.
Length of screen		Duration of test	1/2 hour

Well Log | **Water 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, or sulphur)
			Depths to water horizons		
blue clay	0	25			
gravel	25	30			
limestone rock	30	50	~~10 ft~~ 48	40	fresh

For what purpose(s) is the water to be used? private home

Is water clear or cloudy? Clear

Is well on upland, in valley, or on hillside? valley

Drilling firm K. C. Sparks

Address Stittsville Ont

Name of Driller C. H. Sparks

Address Stittsville Ont.

Licence Number 396

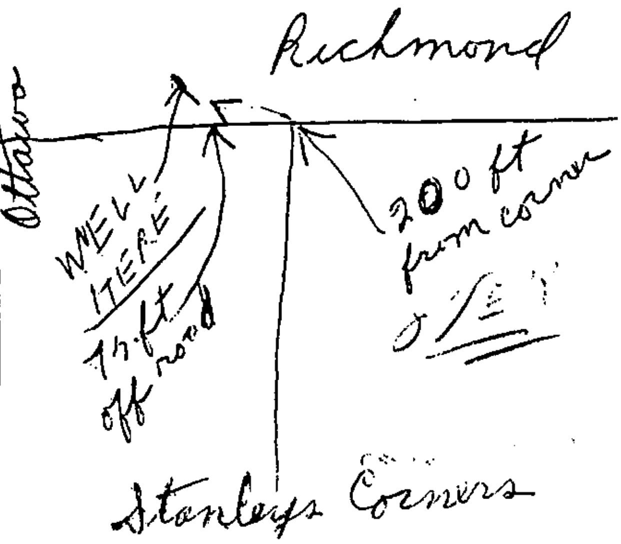
I certify that the foregoing statements of fact are true.

Date June 23 54 Clayton H. Sparks

Signature of Licensee

Location of Well

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



Form 5

316/4f. A"

1509228 e

15 No 9228

GROUND WATER BRANCH
JUN 27 1960
ONTARIO WATER RESOURCES COMMISSION

UTM 18 Z 434320 E
5 R 5004850 N
Elev. 4 R 0305
Basin 25

The Ontario Water Resources Commission Act, 1957

WATER WELL RECORD

County or District: [illegible]
Township, [✓ Village], Town or City: [illegible]
Con. — Lot —
Date completed: 9 (day) JUNE (month) 60 (year)

[redacted]

ress RICHMOND

Casing and Screen Record

Inside diameter of casing: 4"
Total length of casing: 30'
Type of screen: —
Length of screen: —
Depth to top of screen: —
Diameter of finished hole: 4"

Pumping Test

Static level: 2
Test-pumping rate: 6 G.P.M.
Pumping level: 4
Duration of test pumping: 1 HR
Water clear or cloudy at end of test: CLEAR
Recommended pumping rate: 6 G.P.M.
with pumping level of: 4

Well Log

Water 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)
CLAY	0	29			
LIMESTONE	29	31	29	27	FRESH

For what purpose(s) is the water to be used? Home

Is well on [✓ upland], in valley, or on hillside?

Drilling Firm: BEN SPARKS
Address: OTTAWA

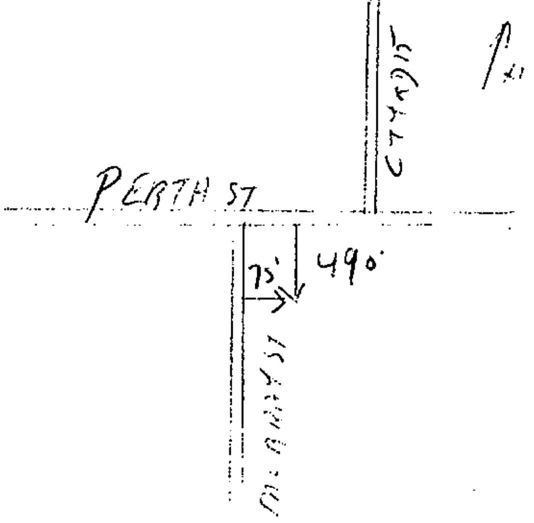
Licence Number: 483
Name of Driller: SAME
Address:
Date: JUNE 20/60

Ben E Sparks
(Signature of Licensed Drilling Contractor)

Form 8

Location of Well

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



31G/4f "A"

1509168

GROUND WATER BRANCH
15 № 9168
NOV 26 1957
ONTARIO WATER
RESOURCES COMMISSION

UTM 18 Z 434315 E
5 R 5004855 N
Elev. 4 R 0303
Basin 25

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

Water-Well Record

R1C[illegible]

[redacted]

...ip, Village, Town or City [illegible]
...n Village, Town or City) Richmond Rd
Address Aladdin Motel Ottawa

Date completed Oct 20 (day) (month) 57 (year)

Pipe and Casing Record		Pumping Test	
Casing diameter(s)	4"	Static level	6'
Length(s)	42'	Pumping rate	300 G.P.H.
Type of screen	NONE	Pumping level	10'
Length of screen		Duration of test	1 hr

Well Log **Water 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, or sulphur)
Clay	1'	42'			
Limestone	42	53'	39'	47'	fresh

For what purpose(s) is the water to be used? ~~Home~~ Motel

Is water clear or cloudy? clear

Is well on upland, in valley, or on hillside? valley

Drilling firm M Meagher
Address 639 [illegible] Ave
Ottawa

Name of Driller M Meagher
Address

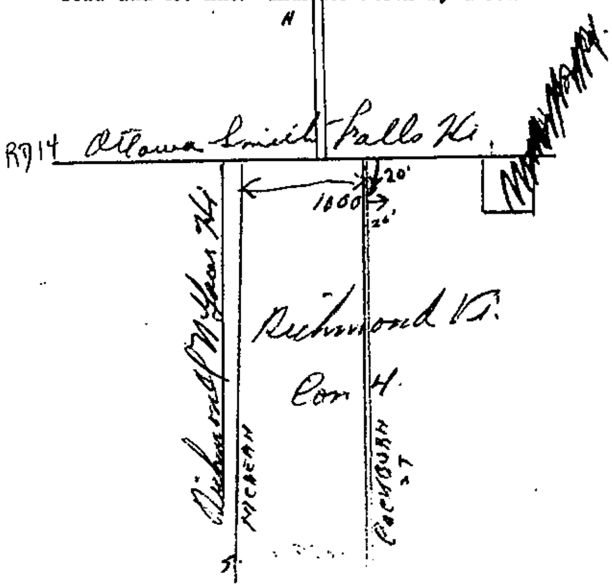
Licence Number 171

I certify that the foregoing statements of fact are true.

Date Oct 20 M Meagher
Signature of Licensee

Location of Well

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



Form 5

Ministry of the Environment
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

1516474

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

11

MUNICIP. 15701
CON.

COUNTY OR DISTRICT: OTTAWA - CARLETON
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: ~~GOULBOURN~~ Richmond Vlg
CON., BLOCK, TRACT, SURVEY, ETC.: ~~III~~
LOT: ~~#57~~ 1

[redacted] PERTH ST. RICHMOND
DATE COMPLETED: DAY 26 MO. 05 YR. 78

[redacted] 004860 4 0305 4 26 (ELEVATION, RC., BASIN CODE)

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
	CLAY			0	32
GREY	LIMESTONE			32	50

31 0032 05 0050 15
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0045	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY #5 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
~~6¼~~ 06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0035 ~~34½~~
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		34½	0050
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: AIR 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 0100 GPM
DURATION OF PUMPING: 02 HOURS 00 MINS
STATIC LEVEL: 005 FEET
WATER LEVEL END OF PUMPING: 030 FEET
WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
030 FEET	030 FEET	030 FEET	030 FEET

IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING: 030 FEET
RECOMMENDED PUMPING RATE: 0030 GPM

FINAL STATUS OF WELL: 1

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

WATER USE: 04

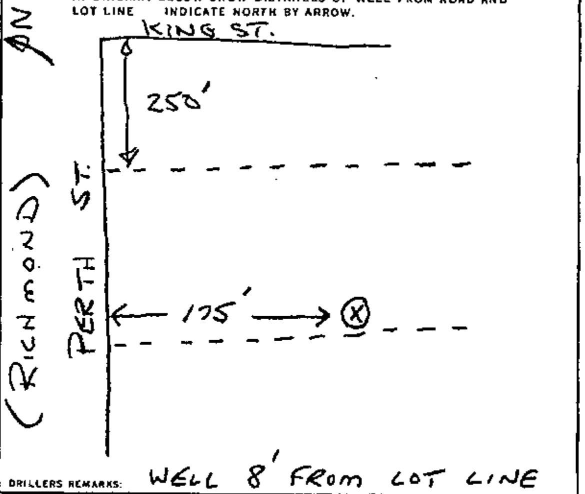
1 ☐ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☒ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING: 5

1 ☐ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☒ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL

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



DRILLERS REMARKS: WELL 8' FROM LOT LINE

CONTRACTOR

NAME OF WELL CONTRACTOR: BISSON MAPLE LEAF DRILLING
LICENCE NUMBER: 1365
ADDRESS: 877 RIDLEY BLVD.
NAME OF DRILLER OR BORER: S. SKUSE
LICENCE NUMBER:
SIGNATURE OF CONTRACTOR: Robert Bisson
SUBMISSION DATE: DAY 5 MO. 6 YR. 78

OFFICE USE ONLY

DATA SOURCE: 1
CONTRACTOR: 1365
DATE RECEIVED: 080678
DATE OF INSPECTION: 14/5/79
INSPECTOR: J.P.P.
REMARKS:

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506-4-77

1509308 B

UTM 18 Z 434320 E CCFFC [redacted] 3 9

15 № 9308

4R 5009440 N

Elev. 2R 0306

The Ontario Water Resources Commission Act

WATER WELL RECORD

Basin 25 County or District Carleton Township, Village, Town or City Richmond

Con. IV Lot 24 Date completed 10 (day) MAY month 1968 year)

[redacted] ress Richmond Ont

Casing and Screen Record

Inside diameter of casing 4"

Total length of casing 35'

Type of screen none

Length of screen —

Depth to top of screen —

Diameter of finished hole 4"

Pumping Test

Static level 10'

Test-pumping rate 5 G.P.M.

Pumping level 12'

Duration of test pumping 1/2 hr.

Water clear or cloudy at end of test clear

Recommended pumping rate 5 G.P.M.

with pump setting of 20 feet below ground surface

Well Log

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Blue ~~gr~~ clay	0	35		
gray limestone	35	60	50-60	fresh

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? valley

Drilling or Boring Firm C. SPARKS

Address 100 MAIN ST STITTSVILLE

Licence Number

Name of Driller or Borer SAME

Address

Date MAY 23/68

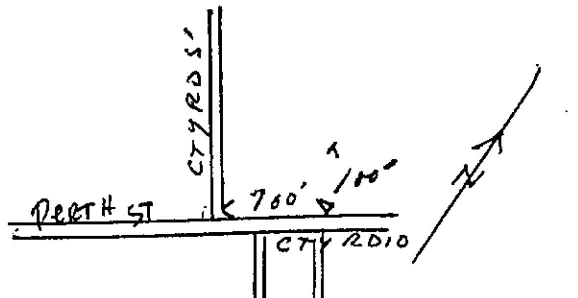
C. H. Sparks (Signature of Licensed Drilling or Boring Contractor)

Form 7 15M-60-4138

OWRC COPY

Location of Well

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



64(316/4f. A"

1509137

UTM |1 8| Z |4 3 4 3 5 5| E
|5| R |5 0 0 4 9 3 5| N
Elev. |4| R |0 3 0 5|
Basin |2 5| | | | |

ONTARIO

RECEIVED
APR - 3 1956
GEOLOGICAL BRANCH
DEPARTMENT of MINES

15 № 9137

The Water-well Drillers Act, 1954
Department of Mines

Water-Well Record

County or Territorial District Carleton ~~Township~~, Village, ~~Town or City~~ Richmond

[redacted] in Village, Town or City) Richmond

Address Richmond

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 4"
Length(s) 50"
Type of screen
Length of screen

Pumping Test

Static level 26'
Pumping rate 220 GPH
Pumping level 29'
Duration of test 1 hr

Well Log

Water 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, or sulphur)
Clay	1'	49'	76'	50'	fresh
Shale	49	50'			
Limestone	50	76'			

For what purpose(s) is the water to be used?
Domestic
Is water clear or cloudy? Clear
Is well on upland, in valley, or on hillside?
valley
Drilling firm M. M. Meagher
Address 639 Rowanwood Ave
Ottawa
Name of Driller M. M. Meagher
Address

Licence Number 171

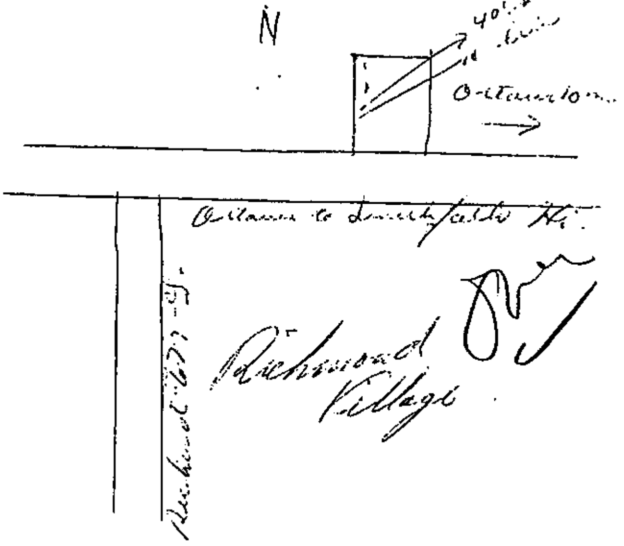
I certify that the foregoing statements of fact are true.

Date Feb 24 M. M. Meagher
Signature of Licensee

Form 5

Location of Well

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



Ontario Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

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

11 1531944 Municipality 15003 Con. CON 03

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
Ottawa Carleton	Goulbourn	3	23

[redacted]

Address Richmond, Ont

Date completed 26 04 01 (day month year)

21 Northing RC Elevation RC Basin Code

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	To
	clay			0	33
grey	Limestone			33	45
		Multilevel wells installed by Aqua-Terre			

31

32

41 WATER RECORD

Water found at - feet	Kind of water
37	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas NOT TESTED
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	To
6¼	1 ☒ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	188	0	36
8¾	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☒ Open hole 5 ☐ Plastic		0	34
6	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☒ Open hole 5 ☐ Plastic		34	45

SCREEN

Sizes of opening (Slot No.) Diameter inches Length feet

Material and type Depth at top of screen feet

61 PLUGGING & SEALING RECORD

☒ Annular space ☐ Abandonment

Depth set at - feet From	To	Material and type (Cement grout, bentonite, etc.)
2	36	cement grout

71 PUMPING TEST

Pumping test method 1 ☒ Pump 2 ☐ Bailer

Pumping rate 40 GPM

Duration of pumping 1 Hours ___ Mins

Static level	Water level end of pumping	Water levels during 1 ☐ Pumping 2 ☒ Recovery 15 minutes	30 minutes	45 minutes	60 minutes
10 feet	40 feet	10 feet	10 feet	10 feet	10 feet

If flowing give rate GPM

Pump intake set at feet

Water at end of test ☐ Clear ☒ Cloudy

Recommended pump type ☒ Shallow ☐ Deep

Recommended pump setting 40 feet

Recommended pump rate 40 GPM

FINAL STATUS OF WELL

- 1 ☐ Water supply
- 2 ☐ Observation well
- 3 ☒ Test hole
- 4 ☐ Recharge well
- 5 ☐ Abandoned, insufficient supply
- 6 ☐ Abandoned, poor quality
- 7 ☐ Abandoned (Other)
- 8 ☐ Dewatering
- 9 ☐ Unfinished
- 10 ☐ Replacement well

WATER USE

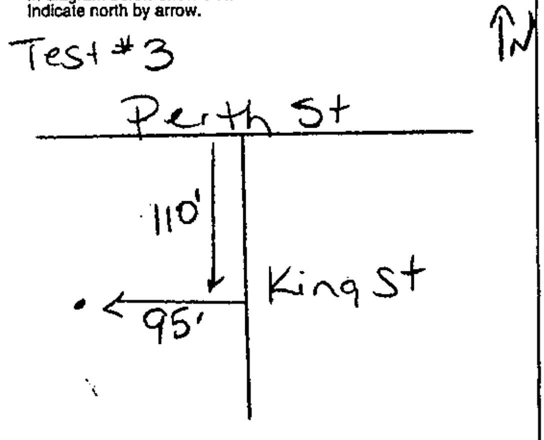
- 1 ☐ Domestic
- 2 ☐ Stock
- 3 ☐ Irrigation
- 4 ☐ Industrial
- 5 ☐ Commercial
- 6 ☐ Municipal
- 7 ☐ Public supply
- 8 ☐ Cooling & air conditioning
- 9 ☒ Not use
- 10 ☐ Other

METHOD OF CONSTRUCTION

- 1 ☐ Cable tool
- 2 ☐ Rotary (conventional)
- 3 ☐ Rotary (reverse)
- 4 ☐ Rotary (air)
- 5 ☒ Air percussion
- 6 ☐ Boring
- 7 ☐ Diamond
- 8 ☐ Jetting
- 9 ☐ Driving
- 10 ☐ Digging
- 11 ☐ Other

LOCATION OF WELL

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



229377

Name of Well Contractor: Air Rock Drilling Co. Ltd

Well Contractor's Licence No.: 1119

Address: RR#2 Jasper, Ont

Name of Well Technician: Shannon Purcell

Well Technician's Licence No.: T2122

Signature of Technician/Contractor: Ken

Submission date: 24 05 01 (day mo yr)

MINISTRY USE ONLY

Data source | Contractor 1119 | Date received JUN 12 2001

Date of inspection | Inspector

Remarks CSS.ES1

0506 (07/00) Front Form 9

2 - MINISTRY OF THE ENVIRONMENT COPY

WB

316/4f. "A"

1509259

GROUND WATER BRANCH
15 №
MAY 22 1962
ONTARIO WATER
RESOURCES COMMISSION

9~~259~~

UTM |1|8|Z |4|3|4|4|4|0|E

|5|R |5|0|0|4|9|6|0|N

Elev. |4|R |0|3|0|5|

Basin |2|5| | |

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District Carleton ~~Township~~, Village, ~~Town or City~~ Richmond

Con. 3 Lot — Date completed 24th (day) April (month) 1962 (year)

Owner [redacted] Address Richmond Ont.

Casing and Screen Record		Pumping Test	
Inside diameter of casing	6¼"	Static level	10'
Total length of casing	34'	Test-pumping rate	10 G.P.M.
Type of screen		Pumping level	70 ft.
Length of screen		Duration of test pumping	30 min
Depth to top of screen		Water clear or cloudy at end of test	clear.
Diameter of finished hole	6¼"	Recommended pumping rate	5 G.P.M.
		with pump setting of	100 feet below ground surface

Well Log			Water Record	
Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
clay.	0	31		
limestone rock.	31	122	114	fresh

For what purpose(s) is the water to be used? house

Is well on upland, in valley, or on hillside? upland

Drilling or Boring Firm Mel McLaughlin

Address Ashton Ont.

Licence Number 593

Name of Driller or Borer Melville McLaughlin

Address Ashton Ont.

Date May 19 1962

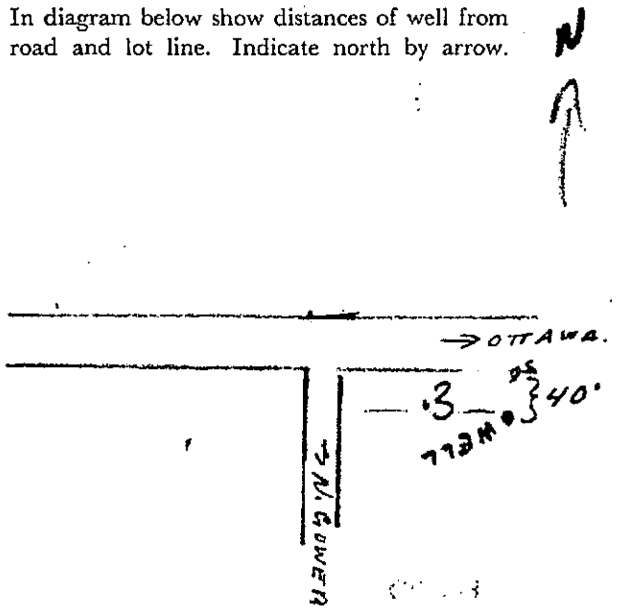
Melville McLaughlin
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M Sets 60-5930

OWRC COPY

Location of Well

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



7176405

Ontario Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)*
A102465 **A102465**

Well Record

tion 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☒ Metric ☐ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	
	Melryan Holdings Inc.		☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. *(inc. area code)*
38 Auriga Drive Suite 200	Ottawa	Ontario	K2E 8A5	613

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
6073 Perth Street	Goulbourn	24	4

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Richmond	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	434234	5005122		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth *(m/ft)* From	Depth *(m/ft)* To
Brown	Clay		Packed	0	3.96
Grey	Clay		Sticky	3.96	10.05
Grey	Limestone		Medium Hard	10.05	44.49
Grey & White	Sandstone		Hard	44.49	76.19

Annular Space

Depth Set at *(m/ft)* From	To	Type of Sealant Used *(Material and Type)*	Volume Placed *(m³/ft³)*
19.50	0	Grouted Cement & Bentonite	.69m^3

Method of Construction

☐ Cable Tool
☐ Rotary (Conventional)
☒ Rotary (Reverse) Mud
☐ Boring
☐ Air percussion
☐ Other, *specify* ____
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging

Well Use

☐ Public
☒ Domestic
☐ Livestock
☐ Irrigation
☐ Industrial
☐ Other, *specify* ____
☐ Commercial
☐ Municipal
☐ Test Hole
☐ Cooling & Air Conditioning
☐ Not used
☐ Dewatering
☐ Monitoring

Construction Record - Casing

Inside Diameter *(cm/in)*	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness *(cm/in)*	Depth *(m/ft)* From	Depth *(m/ft)* To
15.86	Steel	.48	+.76	19.50

Status of Well

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

Construction Record - Screen

Outside Diameter *(cm/in)*	Material (Plastic, Galvanized, Steel)	Slot No.	Depth *(m/ft)* From	Depth *(m/ft)* To

Water Details

Water found at Depth 74.06 *(m/ft)* ☐ Gas | Kind of Water: ☐ Fresh ☒ Untested ☐ Other, *specify* ____
Water found at Depth ____ *(m/ft)* ☐ Gas | Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify* ____
Water found at Depth ____ *(m/ft)* ☐ Gas | Kind of Water: ☐ Fresh ☐ Untested ☐ Other, *specify* ____

Hole Diameter

Depth *(m/ft)* From	Depth *(m/ft)* To	Diameter *(cm/in)*
0	19.50	15.86
19.50	76.19	15.23

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, *specify* ____

If pumping discontinued, give reason:

Pump intake set at *(m/ft)*

Pumping rate *(l/min / GPM)*

Duration of pumping ____ hrs + ____ min

Final water level end of pumping *(m/ft)*

If flowing give rate *(l/min / GPM)*

Recommended pump depth *(m/ft)*

Recommended pump rate *(l/min / GPM)*

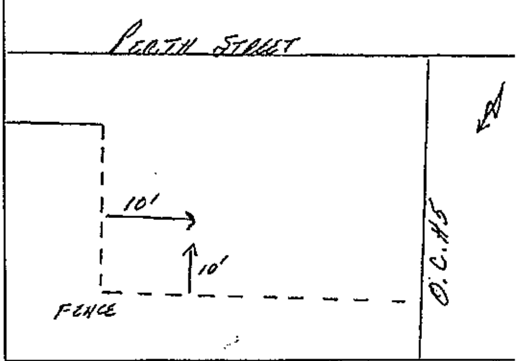
Well production *(l/min / GPM)*

Disinfected? ☐ Yes ☐ No

Draw Down Time *(min)*	Draw Down Water Level *(m/ft)*	Recovery Time *(min)*	Recovery Water Level *(m/ft)*
Static Level			
1		1	
2	Pump tested	2	
3	by engineers	3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S 1A6	office@capitalwater.ca

Bus.Telephone No. *(inc. area code)*	Name of Well Technician (Last Name, First Name)
613 836 1766	Miller, Stephen

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		20110707

Well owner's information package delivered ☒ Yes ☐ No

Date Package Delivered 20110707

Date Work Completed 20YYMMDD

Ministry Use Only
Audit No. Z115709
Received FEB 09 2012

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Ontario

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

31G4F

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

11 1516749 III MUNIC. 15701 (King St.) CON.

COUNTY OR DISTRICT: Carleton.
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Richmond
CON., BLOCK, TRACT, SURVEY, ETC.: ~~King~~ ~~E~~ ~~III~~
LOT 25-27: 62

[redacted]

ADDRESS: 617 Richmond Ont.

DATE COMPLETED 48-53: DAY 22 MO. 05 YR. 78

21 UTM 18 | EASTING 434460 | NORTHING 5004960 | RC 4 | ELEVATION 0305 | RC 4 | BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
grey	clay			0	10
blue	clay		soft	10	29
grey	limestone			29	44

31 0010295 0029305 0044815

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0039	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	0032
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

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

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	DEPTH SET AT - FEET TO	MATERIAL AND TYPE (CEMENT GROUT LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER
PUMPING RATE: 020 GPM
DURATION OF PUMPING: 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
006 FEET	025 FEET	025 FEET	025 FEET	025 FEET	025 FEET

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY
IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE: ☒ SHALLOW ☐ DEEP
RECOMMENDED PUMP SETTING: 025 FEET
RECOMMENDED PUMPING RATE: 0010 GPM
GPM./FT SPECIFIC CAPACITY

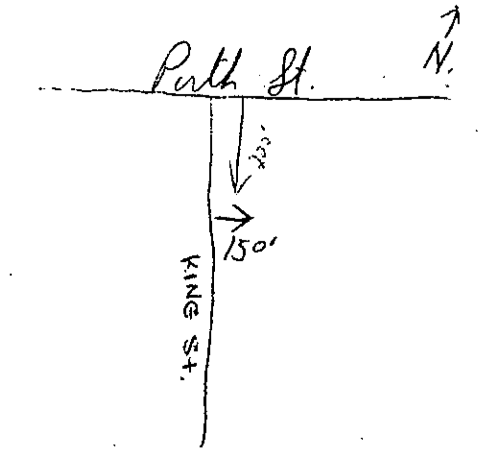
FINAL STATUS OF WELL 1
1 ☑ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE 01
1 ☑ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING 5
1 ☐ CABLE TOOL
2 ☐ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☑ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL

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



DRILLERS REMARKS

CONTRACTOR
NAME OF WELL CONTRACTOR: Henry Maris Well Drilling
LICENCE NUMBER: 3644
ADDRESS: Box 326, Richmond Ont.
NAME OF DRILLER OR BORER: Henry Maris
LICENCE NUMBER:
SIGNATURE OF CONTRACTOR:
SUBMISSION DATE: DAY 22 MO. 5 YR. 78

OFFICE USE ONLY
DATA SOURCE: 1
CONTRACTOR: 3644
DATE RECEIVED: 271178
DATE OF INSPECTION: 14/5/79
INSPECTOR: Km J.P.P.
REMARKS:
P
WI

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

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
UTM Coordinates	NAD83 — Zone 18 Easting: 434520.60 Northing: 5005117.00
Municipal Plan and Sublot Number	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
BLUE	CLAY			0 ft	25 ft
BLUE	LMSN			25 ft	48 ft

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume 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		25 ft
4 inch	OPEN HOLE		48 ft

Construction Record - Screen

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 set at	
Pumping Rate	5 GPM
Duration of Pumping	0 h:30 m
Final water level	8 ft
If flowing give rate	
Recommended pump depth	
Recommended pump rate	
Well Production	PUMP
Disinfected?	

Water Details

Water Found at Depth	Kind
35 ft	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

patersongroup

Phase I-II Environmental Site Assessment

10 King Street
Richmond (Ottawa), Ontario

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

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

TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

Assessment

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.

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.
Legal Description:	Registered Plan D-13 Unit 59 REF Plans; 4R5234, Parts 1 and 2 Less 4R11108; PTS 2, 4, Ottawa, Ontario.
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.

Site Description:

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

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 Historical Research

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 Historical Review

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 µg/L was below the MOE standard of 1000 µg/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 Exterior Assessment

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

☐ ***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.

☐ ***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.

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;
☐	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 Phase I - Environmental Assessment

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 Subsurface Investigation

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.
☐ 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 Subsurface Profile

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 Groundwater

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:

☐ 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.

Table 1
Analytical Test Results - Soil
BTEX and Petroleum Hydrocarbons (F1 to F4)

Parameters	**MDL (µg/g)**	**Soil Sample (ug/g)**		***MOE Table 2 (Residential) (ug/g)***
		BH1 SS6	**BH2 SS5**	
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 Detection Limit
nd - Not Detected (i.e <MDL)
nt - Not tested

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.

Table 2
Analytical Test Results - Groundwater
PHCs (Fractions 1 to 4)

Parameter	MDL (ug/L)	Groundwater Samples (ug/L)	Residential Land Use MOE Table 2 (ug/L)
		BH5 - MW1	
F1 PHCs (C_6-C_{10})	200	nd	*1,000*
F2 PHCs (C_{10}-C_{16})	100	nd	
F3 PHCs (C_{16}-C_{34})	100	nd	*1,000*
F4 PHCs (C_{34}-C_{50})	100	nd	

Notes:
- ☐ MDL - Method Detection Limit
- ☐ nd - Not Detected (< MDL)

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

Table 3
Analytical Test Results - Groundwater
Volatile Organic Compounds (VOCs)

Parameters	MDL (µg/L)	Groundwater Samples (ug/L)	*MOE Table 2 (Residential) (ug/L)*
		BH5 - MW1	
Benzene	0.5	nd	*5.0*
Toluene	0.5	nd	*24*
Ethylbenzene	0.5	nd	*2.4*
Total Xylenes	0.5	nd	*300*
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	nd	*30*
Chloroethane	1.0	nd	*nv*
Chloroform	0.5	nd	*5.0*
Chloromethane	3.0	nd	*nv*
Dibromochloromethane	0.5	nd	*5.0*
1,2 - Dibromoethane	1.0	nd	*nv*
1,2 - Dichlorobenzene	0.4	nd	*3.0*
1,3 - Dichlorobenzene	0.4	nd	*630*
1,4 - Dichlorobenzene	0.4	nd	*1.0*
1,1-Dichloroethane	0.5	nd	*70*
1,2-Dichoroethane	0.5	nd	*5.0*
1,1-Dichloroethylene	0.5	nd	*0.66*
c-1,2-Dichloroethylene	0.4	nd	*70*
t-1,2-Dichloroethylene	1.0	nd	*100*
1,2-Dichloropropane	0.5	nd	*5.0*
c-1,3-Dichloropropylene	0.4	nd	*nv*
t-1,3-Dichloropropylene	0.5	nd	*nv*
Methylene Chloride	4.0	nd	*50*
Styrene	0.4	nd	*100*
1,1,1,2-tetrachloroethane	0.5	nd	*5.0*
1,1,2,2-tetrachloroethane	0.6	nd	*1.0*
Tetrachloroethylene	0.5	nd	*5.0*
1,1,1-Trichloroethane	0.4	nd	*200*
1,1,2-Trichloroethane	0.6	nd	*5.0*
Trichloroethylene	0.4	nd	*50*
Trichlorofluoromethane	1.0	nd	*nv*
1,3,5-Trimethylbenzene	0.5	nd	*nv*
Vinyl Chloride	0.4	nd	*0.5*

Notes:
- ☐ MDL - Method Detection Limit;
- ☐ nd - Not Detected (< MDL)
- ☐ nv - No current MOE standard

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

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.

Soil

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.

Water

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

6.0 ASSESSMENT AND RECOMMENDATIONS

6.1 Assessment

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 Recommendations

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.

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.

LICENSED PROFESSIONAL ENGINEER
M. S. D'ARCY
Feb 24
2010
PROVINCE OF ONTARIO

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- ☐ Paterson Group Inc. (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TEST RESULTS

patersongroup Consulting Engineers

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

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

BORINGS BY CME 45 Power Auger

DATE 3 Jul 09

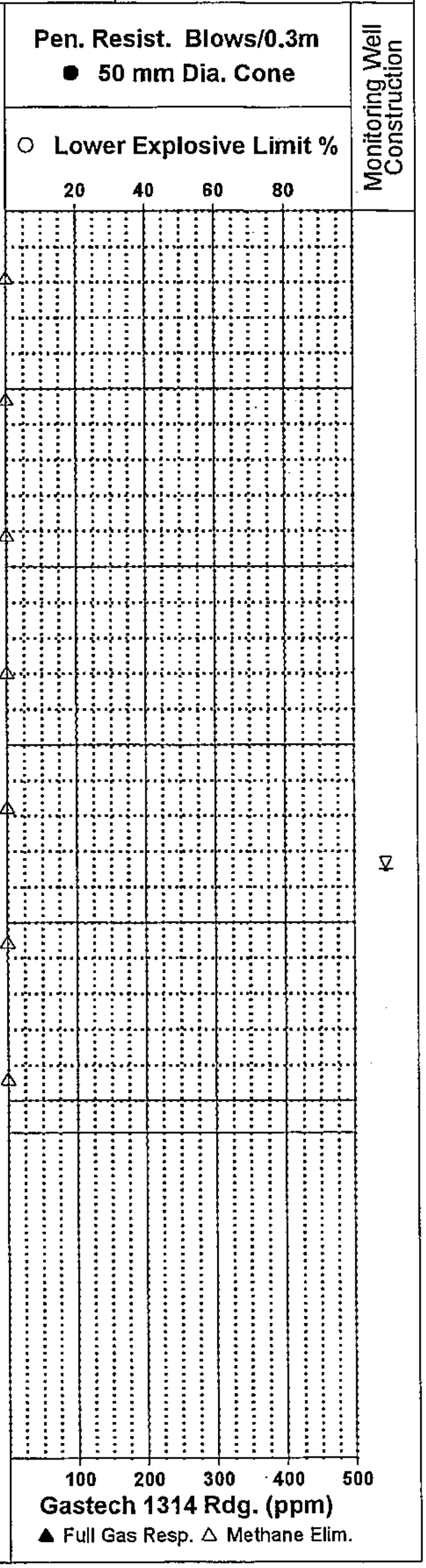
FILE NO. PE1623

HOLE NO. BH 1

SOIL DESCRIPTION	Depth of change (m)
GROUND SURFACE	
TOPSOIL	0.10
Brown **SILTY CLAY** - grey by 3.7m depth	5.18
End of Borehole (Open hole GWL @ 3.7m depth)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	25	7
SS	3	58	3
SS	4	75	5
SS	5	100	2
SS	6	100	1
SS	7	100	1

DEPTH (m)	ELEV. (m)
0	93.80
1	92.80
2	91.80
3	90.80
4	89.80
5	88.80



patersongroup Consulting Engineers

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

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

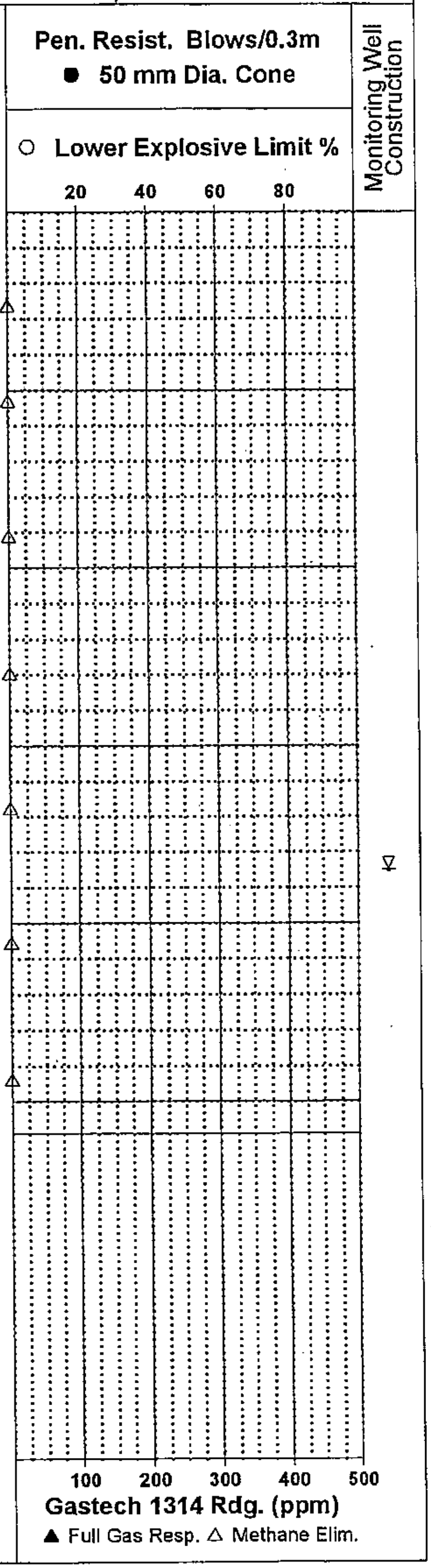
BORINGS BY CME 45 Power Auger

DATE 3 Jul 09

FILE NO. **PE1623**

HOLE NO. **BH 2**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.90
TOPSOIL 0.13							
		AU	1				
		SS	2	75	3	1	92.90
		SS	3	100	4		
Brown **SILTY CLAY**						2	91.90
		SS	4	100	3		
						3	90.90
		SS	5	100	2		
- grey by 3.7m depth							
		SS	6	100	1	4	89.90
		SS	7	100	1		
5.18						5	88.90
End of Borehole (Open hole GWL @ 3.7m depth)							



patersongroup Consulting Engineers
28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

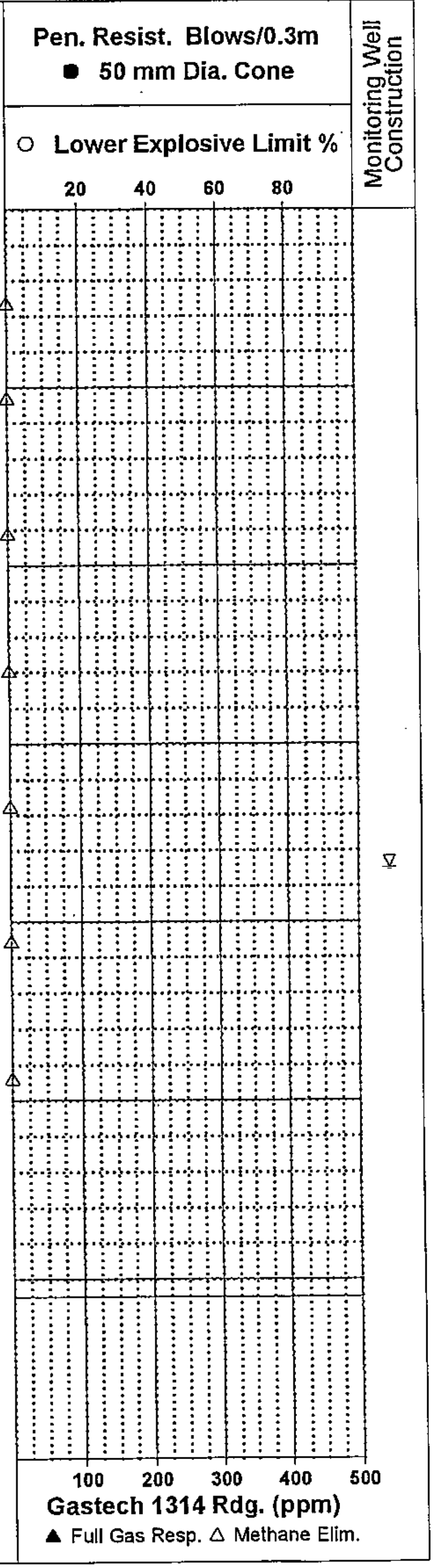
BORINGS BY CME 45 Power Auger

DATE 3 Jul 09

FILE NO. PE1623

HOLE NO. BH 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.00
TOPSOIL 0.10							
		AU	1				
		SS	2	50	2	1	93.00
		SS	3	83	4		
						2	92.00
Brown **SILTY CLAY**		SS	4	100	3		
						3	91.00
		SS	5	100	2		
- grey by 3.5m depth							
		SS	6	100	1	4	90.00
		SS	7	100	1		
						5	89.00
						6	88.00
6.10							
End of Borehole (Open hole GWL @ 3.7m depth)							



patersongroup Consulting Engineers

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

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

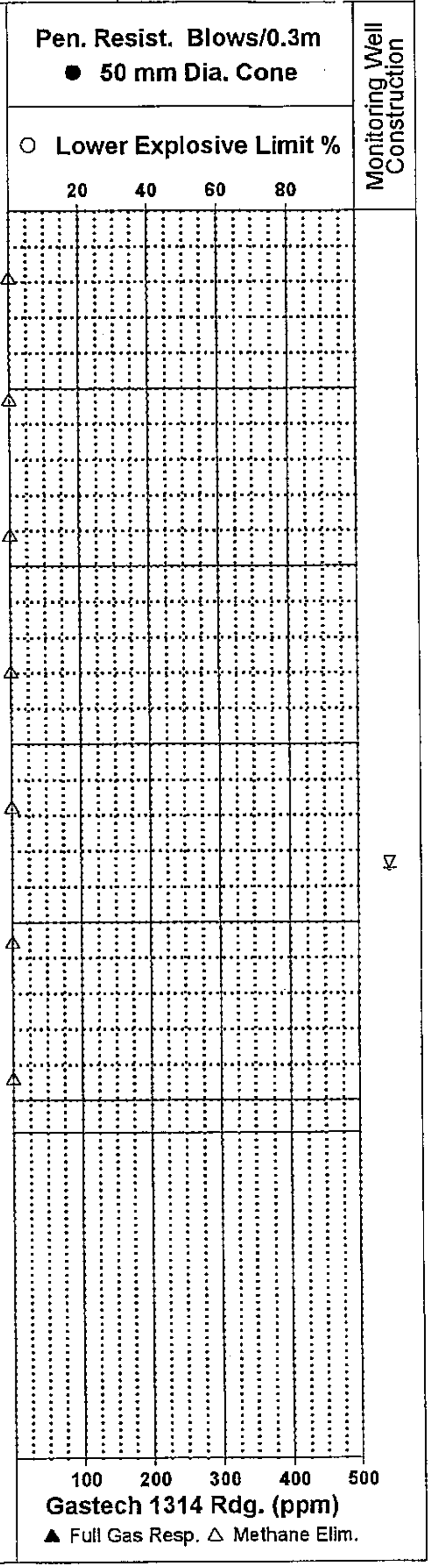
BORINGS BY CME 45 Power Auger

DATE 3 Jul 09

FILE NO. **PE1623**

HOLE NO. **BH 4**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.80
TOPSOIL 0.10							
		AU	1				
						1	92.80
		SS	2	33	5		
		SS	3	67	4		
						2	91.80
Brown **SILTY CLAY**							
		SS	4	100	2		
						3	90.80
		SS	5	100	1		
- grey by 3.5m deth							
						4	89.80
		SS	6	100	1		
		SS	7	100	1		
						5	88.80
5.18 End of Borehole							
(Open hole GWL @ 3.7m depth)							



patersongroup Consulting Engineers

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

SOIL PROFILE AND TEST DATA

Phase I-II Environmental Site Assessment
10 King Street
Ottawa (Richmond), Ontario

DATUM TBM - Top of grate located on south side of subject site. Geodetic elevation = 93.71m.

REMARKS

BORINGS BY CME 45 Power Auger

DATE 3 Jul 09

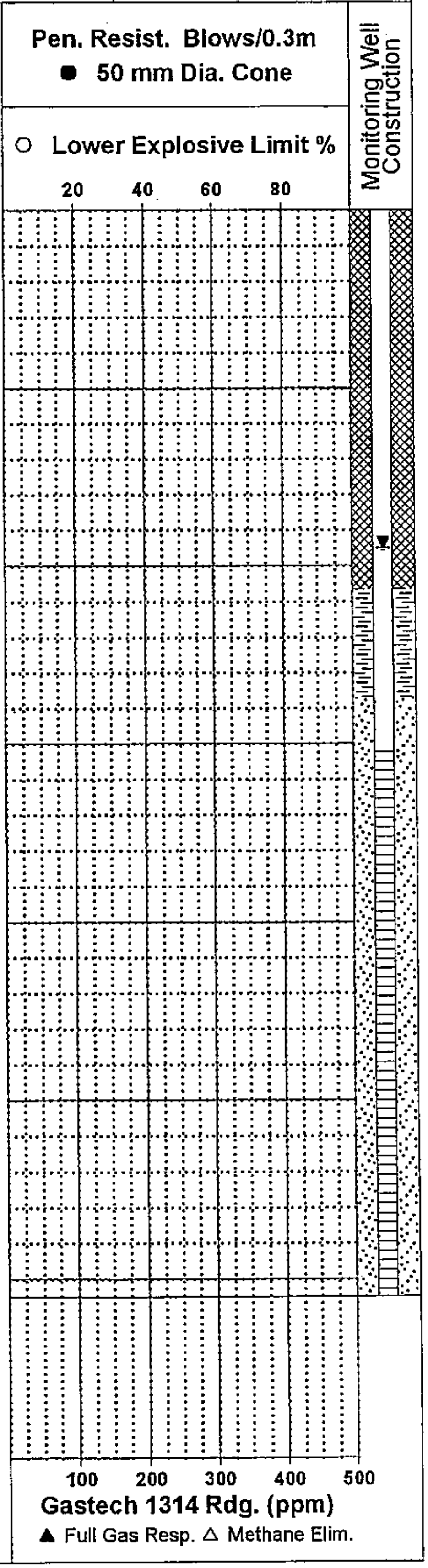
FILE NO. PE1623

HOLE NO. BH 5

SOIL DESCRIPTION	Depth	STRATA PLOT
GROUND SURFACE		
TOPSOIL	0.10	■
Inferred **SILTY CLAY**	6.10	▨
End of Borehole (GWL @ 1.90m-July 7/09)		

SAMPLE			
TYPE	NUMBER	% RECOVERY	N VALUE or RQD

DEPTH (m)	ELEV. (m)
0	93.80
1	92.80
2	91.80
3	90.80
4	89.80
5	88.80
6	87.80



SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	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 x 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	$Cu > 4$
Well-graded sands have:	$1 < Cc < 3$	and	$Cu > 6$

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

CONSOLIDATION TEST

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)

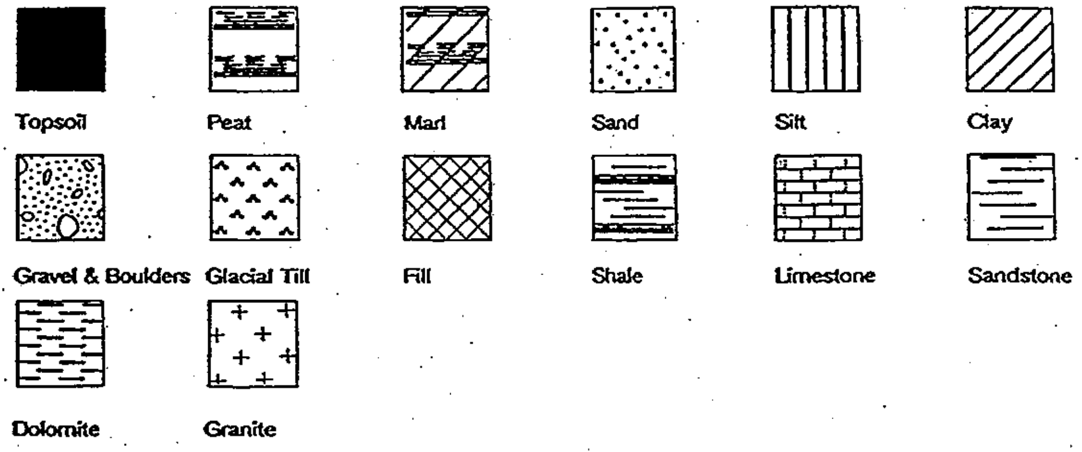
OC Ratio	Overconsolidation ratio	=	p'_c / p'_o
Void Ratio	Initial sample void ratio	=	volume of voids / volume of solids
Wo	- Initial water content (at start of consolidation test)		

PERMEABILITY TEST

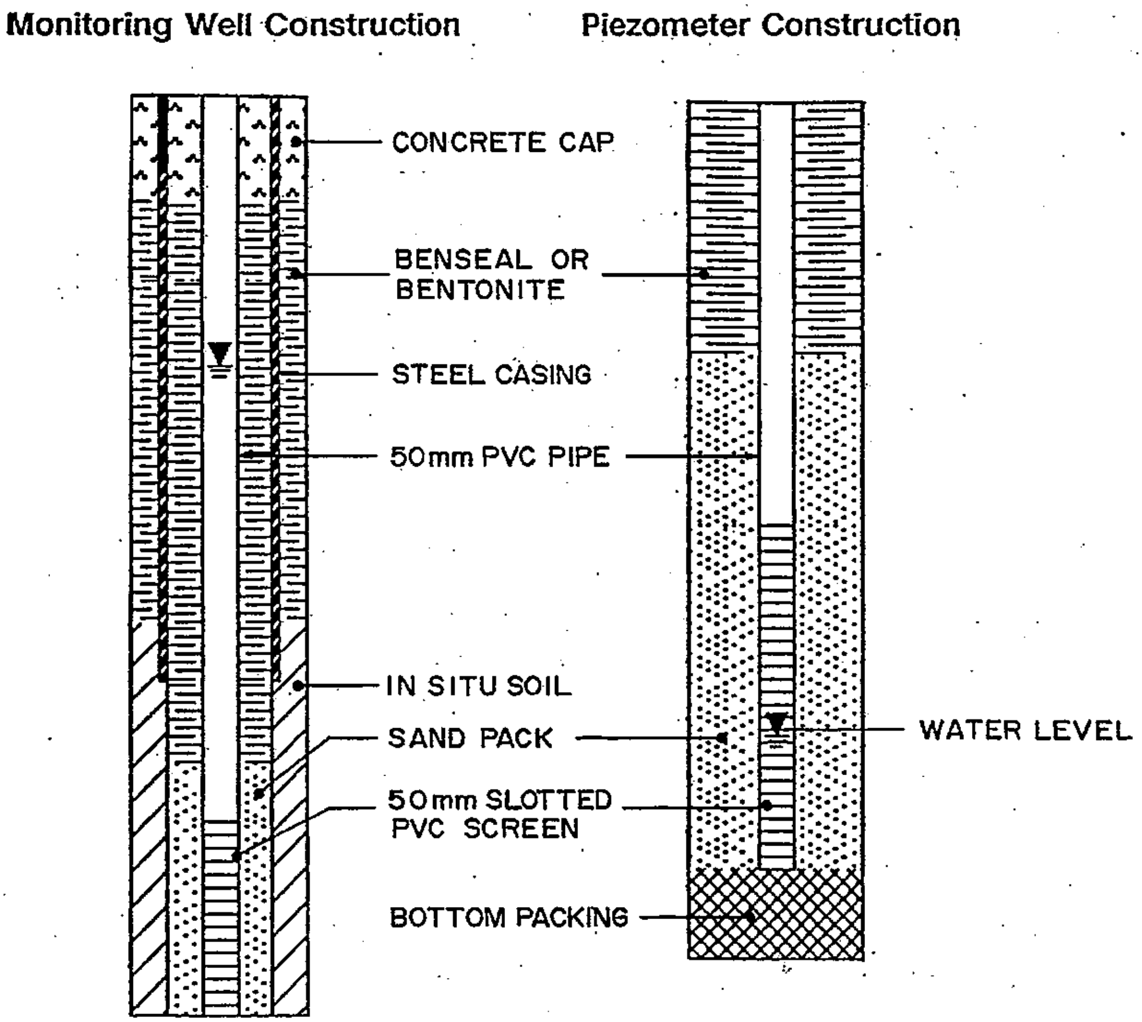
k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during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

SYMBOLS AND TERMS (continued)

STRATA PLOT



MONITORING WELL AND PIEZOMETER CONSTRUCTION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Piezometer Construction

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Certificate of Analysis

Paterson Group Consulting Engineers
28 Concourse Gate, Unit 1
Nepean, ON K2E 7T7
Attn: Eric Leveque

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

Client PO: 8093
Project: PE1623
Custody: 62523

Report Date: 9-Jul-2009
Order Date: 3-Jul-2009
Order #: 0928003

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: Mark Foto

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

Certificate of Analysis

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

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

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis 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

Certificate of Analysis

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

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

	Client ID:	BH1-SS6	BH2-SS5	-	-
	Sample Date:	03-Jul-09	03-Jul-09	-	-
	Sample ID:	0928003-01	0928003-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	70.6	70.0	-	-
Volatiles					
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 ug/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	-	-

Certificate of Analysis

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

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

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	ug/g						
o-Xylene	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.09*		*ug/g*		*101*	*76-118*			

Certificate of Analysis

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

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

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	% by Wt.	96.0			0.6	25	
Volatiles									
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*			

Certificate of Analysis

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

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

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*	*76-118*			

Certificate of Analysis

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

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

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.
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.

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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www.paracellabs.com

Chain of Custody Record
Nº 62523
Pg 1 of 1

Company Name: Paterson Group.
Contact Name: Eric Leveque.
Address: 28 Concourse Gate, Unit 1
Tel: 226 7381 Cell: -
Email: Bleveque@patersongroup.ca

Project Ref: PE 1673
PO# 8093
Quote # —— ☐Not Quoted
Preservative to be added by Paracel? ☐Yes ☒No

Date Required:
Turn Around Time: [ ] 1-day [ ] 2-day [✓] Regular
Regulatory/Guideline Requirements

Matrix Types: S-Soil/Sed GW-Ground Water SW-Surface Water SS-Storm/Sanitary Sewer A-Air O-Other RDW-Regulated Drinking Water

Sample Information | **Analysis Required**

Paracel Order # 0908003

	Sample Identification	Matrix	Air Volume	# Containers	Date Sampled dd/mm/yy	BTEX + PHCs (F1)													Hazardous? (Y/N)
1	BH 1 - SS 6	S	J	1	July 3	✓													
2	BH 2 - SS 5	S	V	1	u	✓													
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Relinquished By: Mark L	Received at Depot:	Received at Lab:	Verified By:
Date: July 3rd Time: 1:50pm	Date: Time:	Date: July 3, 2009 Time: 4:05	Date: July 6/09 Time: 9:47

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

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

Client PO: 8088
Project: PE1623
Custody: 62549

Report Date: 8-Jul-2009
Order Date: 7-Jul-2009
Order # 0928057

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

Paracel ID	**Client ID**
0928057-01	BH5-MW1

Approved By: Mark Foto

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

Certificate of Analysis

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

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

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis 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-Jul-09	8-Jul-09

Certificate of Analysis

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

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

	Client ID:	BH5-MW1	-	-	-
	Sample Date:	07/07/2009 09:00	-	-	-
	Sample ID:	0928057-01	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.4 ug/L	<0.4	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.7 ug/L	<0.7	-	-	-
Carbon Tetrachloride	0.5 ug/L	<0.5	-	-	-
Chlorobenzene	0.4 ug/L	<0.4	-	-	-
Chloroethane	1.0 ug/L	<1.0	-	-	-
Chloroform	0.5 ug/L	<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	-	-	-
1,1,2-Trichloroethane	0.6 ug/L	<0.6	-	-	-

Certificate of Analysis

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

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

	Client ID:	BH5-MW1	-	-	-
	Sample Date:	07/07/2009 09:00	-	-	-
	Sample ID:	0928057-01	-	-	-
	MDL/Units	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					
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	-	-	-

Certificate of Analysis

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

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

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									
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.4	ug/L						
Bromoform	ND	0.5	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	0.4	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
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*			

Certificate of Analysis

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

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

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	200	ug/L	ND				32	
Volatiles									
Benzene	ND	0.5	ug/L	ND				20	
Bromodichloromethane	ND	0.4	ug/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	
trans-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	ug/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*		*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*	*76-118*			

Certificate of Analysis

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

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

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1540	200	ug/L	ND	77.1	68-117			
F2 PHCs (C10-C16)	1200	100	ug/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			
1,4-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			
1,2-Dichloroethane	34.1	0.5	ug/L	ND	85.4	50-140			
1,1-Dichloroethylene	31.6	0.5	ug/L	ND	78.9	43-153			
cis-1,2-Dichloroethylene	30.4	0.4	ug/L	ND	76.0	58-145			
trans-1,2-Dichloroethylene	29.4	1.0	ug/L	ND	73.5	51-145			
1,2-Dichloropropane	30.2	0.5	ug/L	ND	75.6	56-136			
cis-1,3-Dichloropropylene	37.5	0.4	ug/L	ND	93.7	54-141			
trans-1,3-Dichloropropylene	43.2	0.5	ug/L	ND	108	61-140			
Ethylbenzene	36.8	0.5	ug/L	ND	92.1	61-139			
Methylene Chloride	36.1	4.0	ug/L	ND	90.2	58-149			
Styrene	39.2	0.4	ug/L	ND	98.0	63-143			
1,1,1,2-Tetrachloroethane	36.0	0.5	ug/L	ND	90.0	61-148			
1,1,2,2-Tetrachloroethane	47.7	0.6	ug/L	ND	119	50-157			
Tetrachloroethylene	40.4	0.5	ug/L	ND	101	51-145			
Toluene	36.6	0.5	ug/L	ND	91.6	54-136			
1,1,1-Trichloroethane	30.0	0.4	ug/L	ND	75.1	55-140			
1,1,2-Trichloroethane	31.5	0.6	ug/L	ND	78.7	63-144			
Trichloroethylene	27.0	0.4	ug/L	ND	67.6	52-135			
Trichlorofluoromethane	33.4	1.0	ug/L	ND	83.6	37-155			
1,3,5-Trimethylbenzene	32.5	0.5	ug/L	ND	81.2	61-151			
Vinyl chloride	30.0	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*			

Certificate of Analysis

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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LABORATORIES LTD.

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e: paracel@paracellabs.com
www.paracellabs.com

Chain of Custody Record
Nº 62549
Pg __ of __

Company Name: PATERSON GROUP
Contact Name: Eric Leveque
Address: 28 Concourse Gate, Ottawa
Tel: 226-7381 Cell:
Email: ~~Eleque~~ ELeveque @ patersongroup.ca

Project Ref: PE-1623
PO# 8088
Quote # ☐Not Quoted
Preservative to be added by Paracel? ☐Yes ☒No

Date Required:
Turn Around Time: ☐ 1-day ☐ 2-day ☒ Regular
Regulatory Guideline Requirements

Matrix Types: S-Soil/Sed GW-Ground Water SW-Surface Water SS-Storm/Sanitary Sewer A-Air O-Other RDW-Regulated Drinking Water

Sample Information / Analysis Required

Paracel Order # 0928057

	Sample Identification	Matrix	Air Volume	# Containers	Date Sampled dd/mm/yy	PHC(F1-F4)	VOCs												Hazardous? (Y/N)
1	BH5-mw1	GW		3	July 7/09	✓	✓												
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:
SWIFT 1063

Relinquished By: Michael DeSjardins	Received at Depot:	Received at Lab:	Verified By:
Date: July 7, 09 Time	Date Time	Date: 07/07/09 Time: 1:20	Date: 07/07/09 Time: 1:30

Please refer to the back page for Locations and Sample Preservation, Container and Hold Time Requirements.

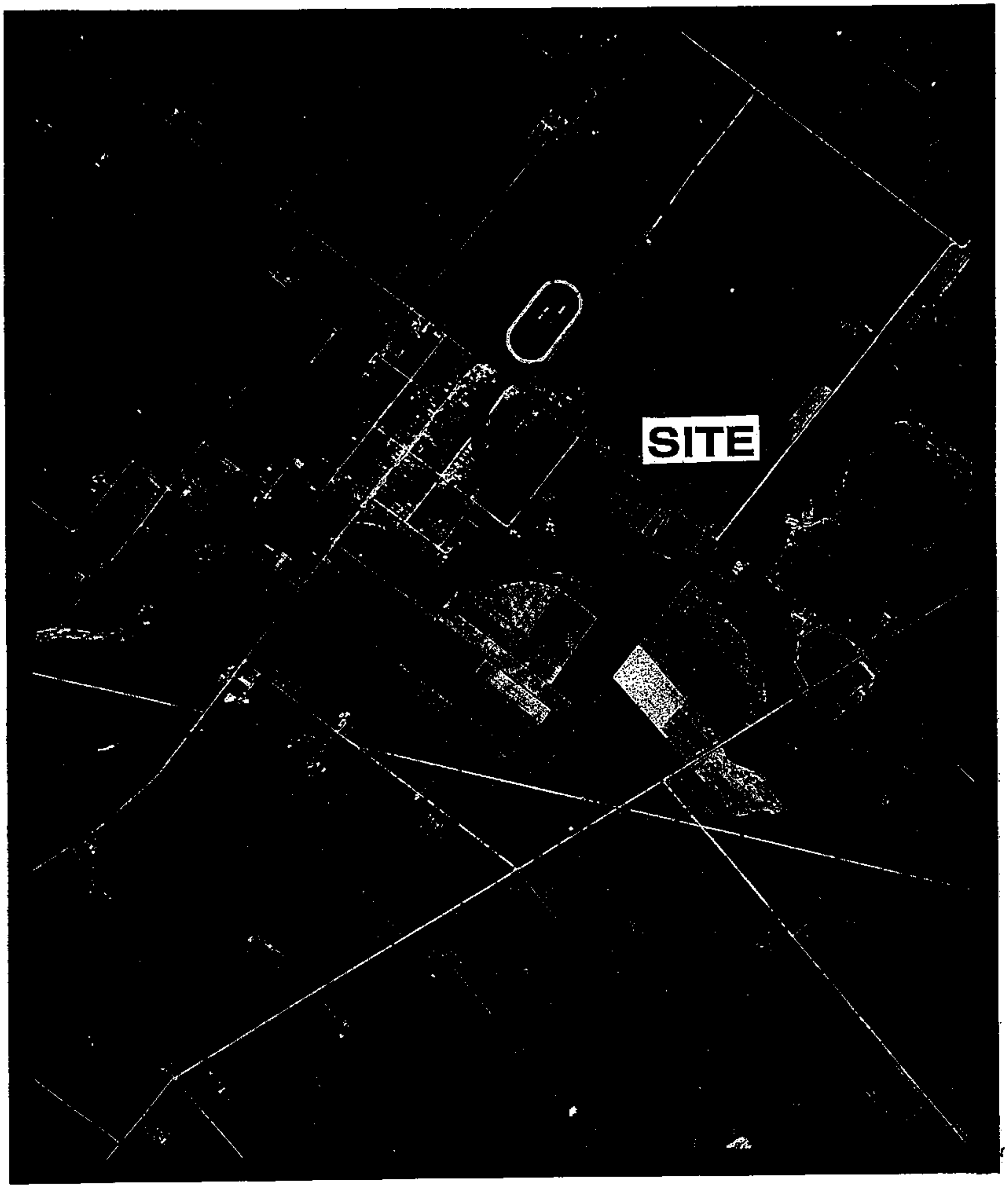
WHITE - Lab Copy, PINK - Client Copy

APPENDIX 2

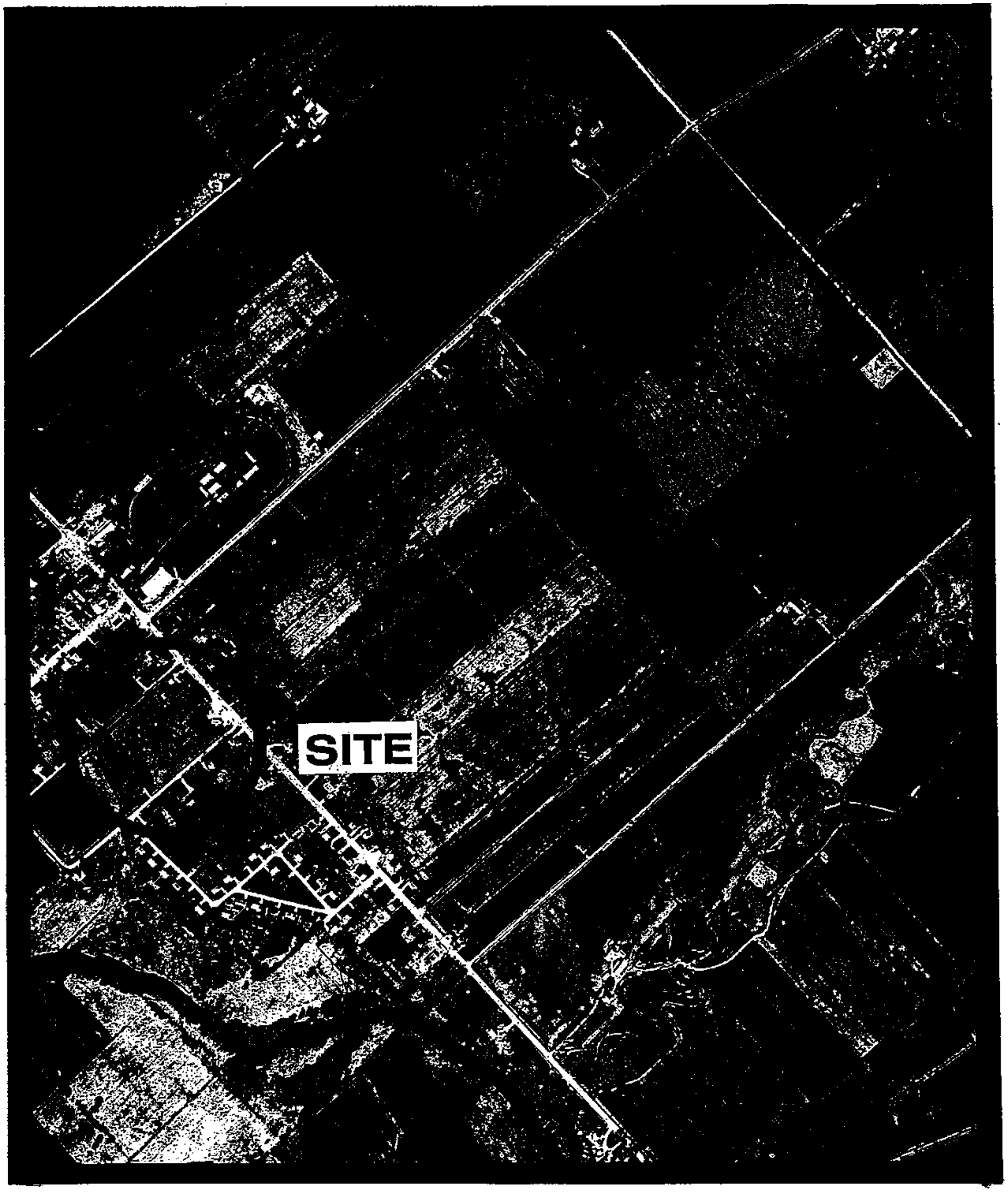
AERIAL PHOTOGRAPHS

FIGURE 1 - KEY PLAN

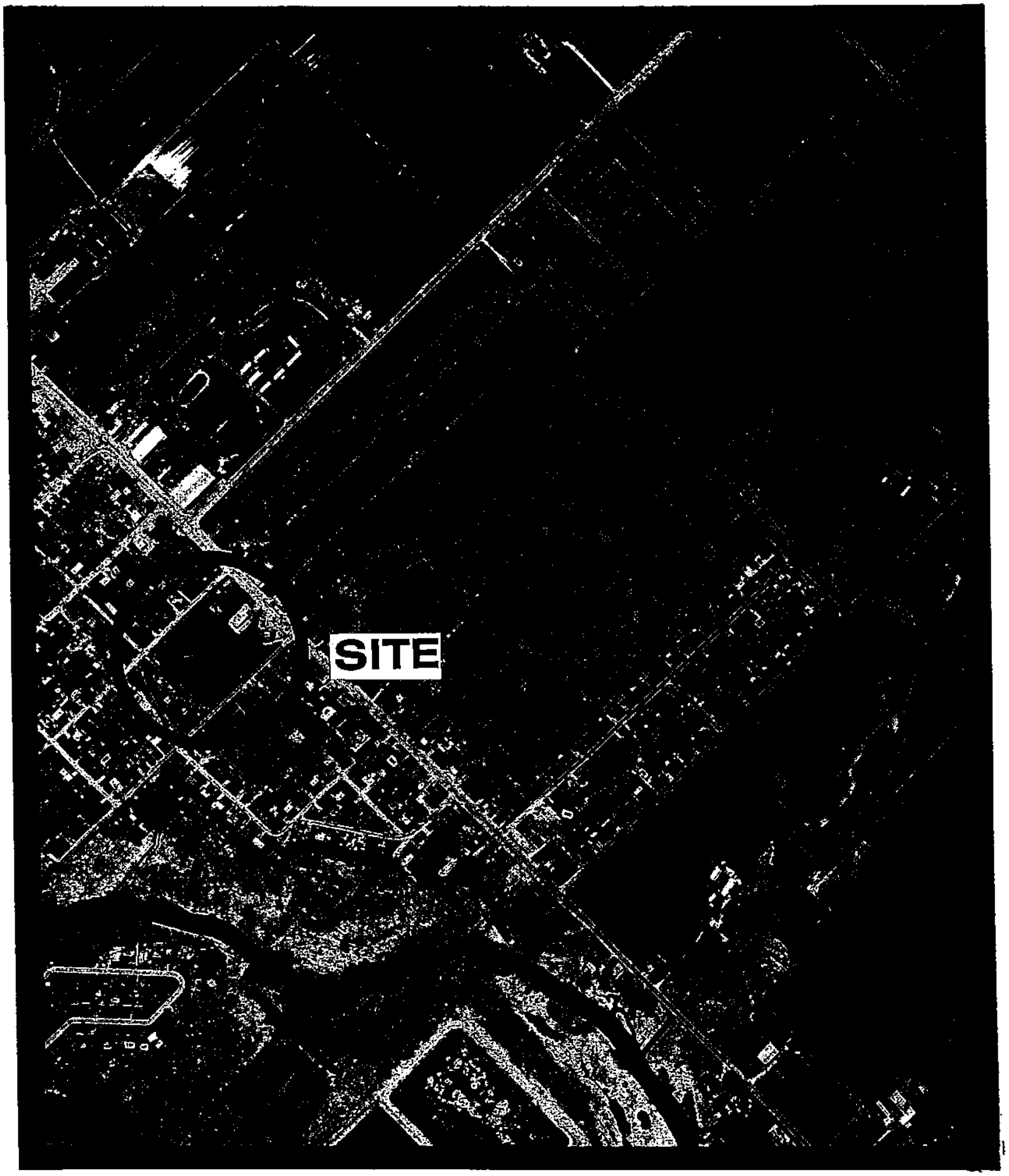
DRAWING NO. PE1623-1 - TEST HOLE LOCATION PLAN



AERIAL PHOTOGRAPH
1950



AERIAL PHOTOGRAPH
1963

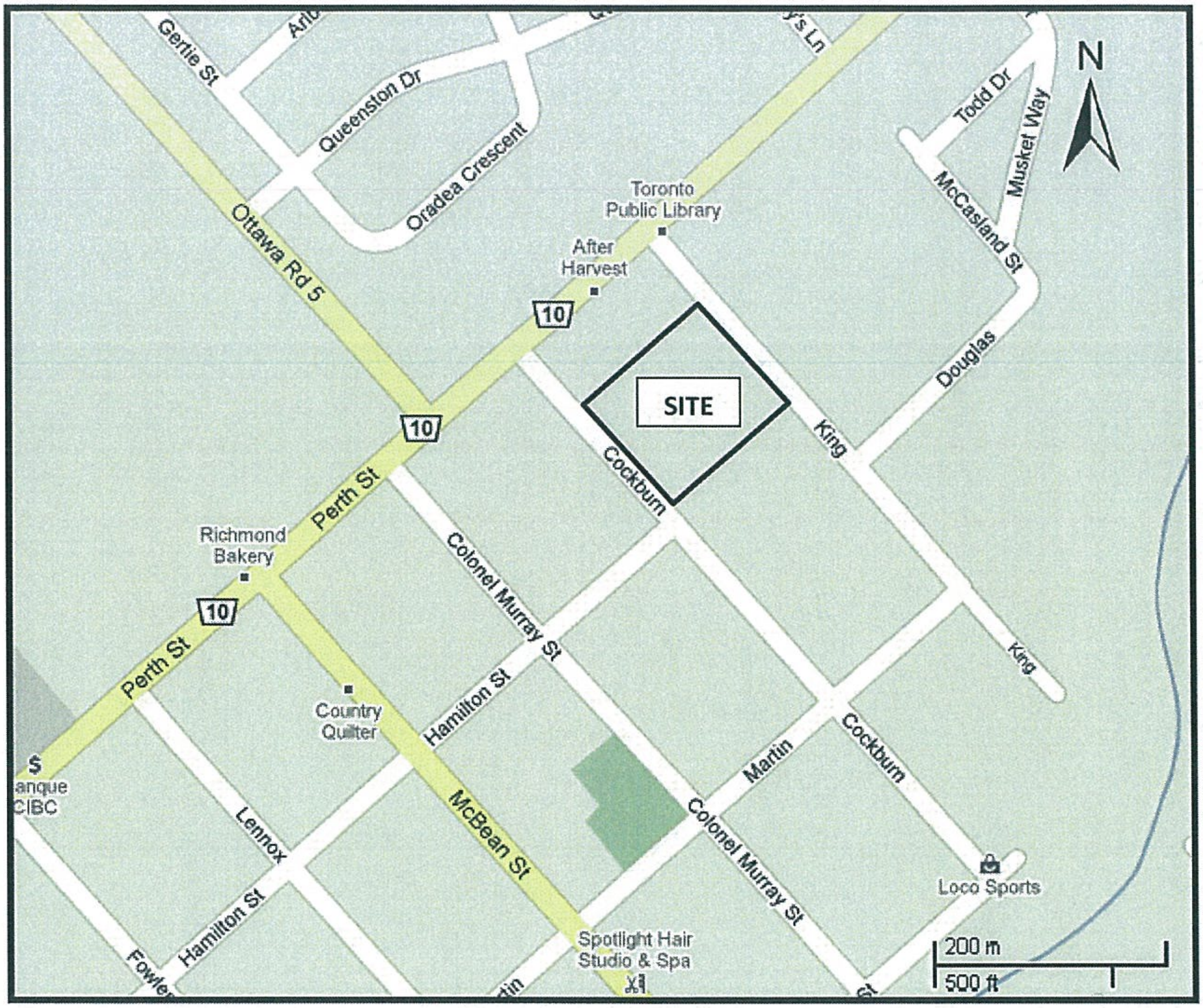


AERIAL PHOTOGRAPH
1980

patersongroup

AERIAL PHOTOGRAPH
2001

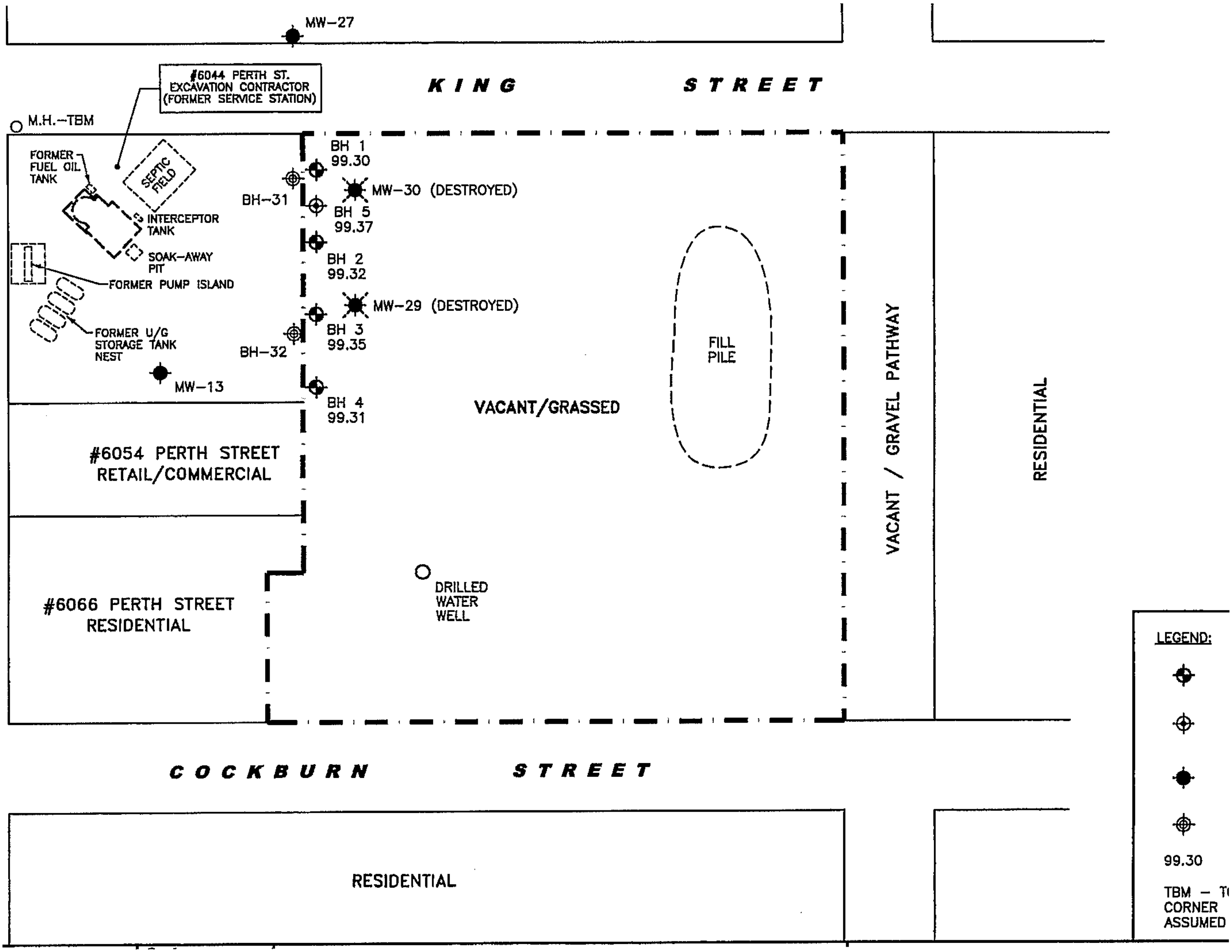
patersongroup



Source: Google Maps

FIGURE 1

KEY PLAN


MW-27
#6044 PERTH ST.
EXCAVATION CONTRACTOR
(FORMER SERVICE STATION)
KING STREET
M.H.-TBM
FORMER FUEL OIL TANK
SEPTIC FIELD
INTERCEPTOR TANK
SOAK-AWAY PIT
FORMER PUMP ISLAND
FORMER U/G STORAGE TANK NEST
MW-13
BH 1
99.30
BH-31
MW-30 (DESTROYED)
BH 5
99.37
BH 2
99.32
MW-29 (DESTROYED)
BH 3
99.35
BH-32
BH 4
99.31
VACANT/GRASSED
FILL PILE
VACANT / GRAVEL PATHWAY
RESIDENTIAL
#6054 PERTH STREET
RETAIL/COMMERCIAL
#6066 PERTH STREET
RESIDENTIAL
DRILLED WATER WELL
COCKBURN STREET
RESIDENTIAL
LEGEND:
99.30
TBM – T
CORNER
ASSUMED

WATER LABORATORY TEST RESULTS

REPORT OF ANALYSIS

Client: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 105597

Report Number: 1000779
Date: 2010-01-18
Date Submitted: 2010-01-14

Project: PH1292

P.O. Number: 8794
Matrix: Water

		LAB ID:	771127					GUIDELINE		
		Sample Date:	2010-01-13					ODWSOG		
		Sample ID:	TW1-WS1							
PARAMETER	UNITS	MRL						TYPE	LIMIT	UNITS
Total Coliforms	CFU/100mL		0					MAC	0	CFU/100mL
Escherichia Coli	CFU/100mL		0					MAC	0	CFU/100mL
Heterotrophic Plate Count	CFU/1mL		1							
Faecal Coliforms	CFU/100mL		0							
Faecal Streptococcus	CFU/100mL		0							

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

Comment:

APPROVAL:
Dragana Dzeletovic
Microbiology Analyst

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova Accutest

Client: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 105597

Report Number: 1000787
Date: 2010-01-22
Date Submitted: 2010-01-14

Project: PH 1292

P.O. Number: 8794
Matrix: Water

		LAB ID:	771142					GUIDELINE		
		Sample Date:	2010-01-13					ODWSOG		
		Sample ID:	TW1-WS1							
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Alkalinity as CaCO3	mg/L	5	258					OG	500	mg/L
Chloride	mg/L	1	50					AO	250	mg/L
Colour	TCU	2	<2					AO	5	TCU
Conductivity	uS/cm	5	702							
Fluoride	mg/L	0.1	0.31					MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.1	<0.1					AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	0.07							
N-NO2 (Nitrite)	mg/L	0.1	<0.10					MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10					MAC	10.0	mg/L
pH			7.97						6.5-8.5	
Phenols	mg/L	0.001	<0.001							
Sulphate	mg/L	1	46					AO	500	mg/L
Tannin & Lignin	mg/L	0.1	<0.1							
Total Dissolved Solids (COND - CALC)	mg/L	5	456					AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	<0.10							
Turbidity	NTU	0.1	52.3					MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	292					OG	100	mg/L
Ion Balance		0.01	0.94							
Calcium	mg/L	1	74							
Magnesium	mg/L	1	26							
Potassium	mg/L	1	5							
Sodium	mg/L	2	26					AO	200	mg/L
Iron	mg/L	0.03	0.99					AO	0.3	mg/L
Manganese	mg/L	0.01	0.02					AO	0.05	mg/L

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

Comment:
H2S MRL elevated due to sample turbidity.

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

REPORT OF ANALYSIS

Client: **Paterson Group**
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.
Chain of Custody Number: **105597**

Report Number: 1000780
Date: 2010-01-18
Date Submitted: 2010-01-14

Project: PH1292

P.O. Number: 8794
Matrix: Water

LAB ID:			771128					**GUIDELINE**		
Sample Date:			2010-01-13							
Sample ID:			TW1-WS2					ODWSOG		
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Total Coliforms	CFU/100mL		0					MAC	0	CFU/100mL
Escherichia Coli	CFU/100mL		0					MAC	0	CFU/100mL
Heterotrophic Plate Count	CFU/1mL		8							
Faecal Coliforms	CFU/100mL		0							
Faecal Streptococcus	CFU/100mL		0							

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

APPROVAL:
Dragana Dzeletovic
Microbiology Analyst

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova
Accutest

Client: **Paterson Group**
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.
Chain of Custody Number: **105597**

Report Number: 1000789
Date: 2010-01-26
Date Submitted: 2010-01-14

Project: PH 1292

P.O. Number: 8794
Matrix: Water

		LAB ID:	771144					**GUIDELINE**		
		Sample Date:	2010-01-13					ODWSOG		
		Sample ID:	TW1-WS2							
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Alkalinity as CaCO3	mg/L	5	258					OG	500	mg/L
Chloride	mg/L	1	51					AO	250	mg/L
Colour	TCU	2	2					AO	5	TCU
Conductivity	uS/cm	5	705							
Dissolved Organic Carbon	mg/L	0.5	1.3					AO	5	mg/L
Fluoride	mg/L	0.1	0.31					MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.1	<0.1					AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	0.06							
N-NO2 (Nitrite)	mg/L	0.1	<0.10					MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10					MAC	10.0	mg/L
pH			7.95						6.5-8.5	
Phenols	mg/L	0.001	<0.001							
Sulphate	mg/L	1	46					AO	500	mg/L
Tannin & Lignin	mg/L	0.1	0.2							
Total Dissolved Solids (COND - CALC)	mg/L	5	458					AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	<0.10							
Turbidity	NTU	0.1	27.6					MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	308					OG	100	mg/L
Ion Balance		0.01	0.99							
Calcium	mg/L	1	77							
Magnesium	mg/L	1	28							
Potassium	mg/L	1	4							
Sodium	mg/L	2	29					AO	200	mg/L
Iron	mg/L	0.03	0.81					AO	0.3	mg/L
Manganese	mg/L	0.01	0.02					AO	0.05	mg/L

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

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

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova Accutest

Client: **Paterson Group**
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.
Chain of Custody Number: **105597**

Report Number: 1000789
Date: 2010-01-26
Date Submitted: 2010-01-14

Project: PH 1292

P.O. Number: 8794
Matrix: Water

		LAB ID:	771144					**GUIDELINE**		
		Sample Date:	2010-01-13							
		Sample ID:	TW1-WS2					ODWSOG		
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
VOLATILE ORGANIC COMPOUNDS - VOCs										
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	ug/L
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	ug/L
Trichlorofluoromethane	ug/L	2	<2							
1,1-dichloroethylene	ug/L	2	<2					MAC	14	ug/L
1,2-dichlorobenzene	ug/L	2	<2					MAC	200	ug/L
1,2-dichloroethane	ug/L	2	<2					IMAC	5	ug/L
1,4-dichlorobenzene	ug/L	2	<2					MAC	5	ug/L
Benzene	ug/L	2	<2					MAC	5	ug/L
Carbon Tetrachloride	ug/L	2	<2					MAC	5	ug/L
Dichloromethane	ug/L	16	<16					MAC	50	ug/L
Monochlorobenzene	ug/L	0.8	<0.8					MAC	80	ug/L
Tetrachloroethylene	ug/L	1	<1					MAC	30	ug/L

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

Comment:
771144: VOC MRL elevated due to matrix interference.

APPROVAL:
Mina Nasrai
Organic Lab Supervisor

REPORT OF ANALYSIS

Client: **Paterson Group**
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.
Chain of Custody Number: **105597**

Report Number: 1000789
Date: 2010-01-26
Date Submitted: 2010-01-14

Project: PH 1292

P.O. Number: 8794
Matrix: Water

		LAB ID:	771144					**GUIDELINE**		
		Sample Date:	2010-01-13					ODWSOG		
		Sample ID:	TW1-WS2							
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Trichloroethylene	ug/L	1	<1					MAC	5	ug/L
Vinyl Chloride	ug/L	0.8	<0.8					MAC	2	ug/L
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							
VOC SURROGATES										
Toluene-d8	%		92							
4-bromofluorobenzene	%		120							
1,2-dichloroethane-d4	%		92							
CCME Total Petroleum Hydrocarbons										
F1 (C6-C10)	mg/L	0.1	<0.1							
F1-BTEX (C6-C10)	mg/L	0.1	<0.1							
F2 (C10-C16)	mg/L	0.1	<0.1							
F3 (C16-C34)	mg/L	0.2	<0.2							
F4 (C34-C50)	mg/L	0.2	<0.2							

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

Comment:

APPROVAL:
Mina Nasrai
Organic Lab Supervisor

EXOVA ACCUTEST

CCME METHOD VERIFICATION REPORT

Exova Accutest

Client: **Paterson Group**
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.

Report Number: 1000789
Date: 2010-01-26
Date Submitted: 2010-01-14

Project: PH 1292

P.O. Number: 8794
Matrix: Water

Samples were analysed by Accutest Method AMCCME2, "Petroleum 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.

Fractions Analysed Within Acceptable Holding/Analysis Times	**HOLD TIME**		**ANALYSIS TIME**		**If No then Reasons**
	YES	**NO**	**YES**	**NO**	
F1 (C6-C10)	☑	☐	☑	☐	
F2 (C10-C16)	☑	☐	☑	☐	
F3 (C16-C34)	☑	☐	☑	☐	
F4 (C34-C50)	☑	☐	☑	☐	
F4 (C34-C50) gravimetric (when applicable)	☐	☐	☐	☐	

Fraction Specific Information

F1	**YES**	**NO**	
nC6 and nC10 response factors within 30% of Toluene	☑	☐	
BTEX subtracted from F1 fraction	☑	☐	
If YES was F1-BTEX (C6-C10) reported	☑	☐	
F2	**YES**	**NO**	
nC10, nC16 and nC34 response factors within 10% of their average (F2-F4)	☑	☐	
Linearity within 15 % (F2-F4)	☑	☐	
Naphthalene subtracted from F2 fraction	☐	☑	Naphthalene (PAH) not requested/analysed
If YES was F2-Napthalene reported	☐	☐	
F3	**YES**	**NO**	
PAH (selected compounds) subtracted from F3 fraction	☐	☑	PAH not requested/analysed
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	☑	☐	
If NO was F4 (C34-C50) gravimetric reported	☐	☐	

APPROVAL:
Mina Nasirai
Organic Lab Supervisor

REPORT OF ANALYSIS

Client: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 105022

Report Number: 1003171
Date: 2010-02-22
Date Submitted: 2010-02-17

Project: PH1292

P.O. Number: 8808
Matrix: Water

		LAB ID:	777417	777418				GUIDELINE		
		Sample Date:	2010-02-17	2010-02-17				ODWSOG		
		Sample ID:	TW2-WS1	TW2-WS2						
PARAMETER	UNITS	MRL						TYPE	LIMIT	UNITS
Total Coliforms	CFU/100mL		0	0				MAC	0	CFU/100mL
Escherichia Coli	CFU/100mL		0	0				MAC	0	CFU/100mL
Heterotrophic Plate Count	CFU/1mL		0	0						
Faecal Coliforms	CFU/100mL		0	0						
Faecal Streptococcus	CFU/100mL		0	0						

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

Comment:

APPROVAL:
Dragana Dzeletovic
Microbiology Analyst

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova
Accutest

Client: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 105022

Report Number: 1003170
Date: 2010-02-25
Date Submitted: 2010-02-17

Project: PH1292

P.O. Number: 8808
Matrix: Water

		LAB ID:	777415	777416				GUIDELINE		
		Sample Date:	2010-02-17	2010-02-17				ODWSOG		
		Sample ID:	TW2-WS1	TW2-WS2						
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Alkalinity as CaCO3	mg/L	5	254	255				OG	500	mg/L
Chloride	mg/L	1	56	55				AO	250	mg/L
Colour	TCU	2	<2	2				AO	5	TCU
Conductivity	uS/cm	5	722	718						
Dissolved Organic Carbon	mg/L	0.5	1.4	1.2				AO	5	mg/L
Fluoride	mg/L	0.1	0.29	0.29				MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01	0.03	0.02				AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	0.03	0.03						
N-NO2 (Nitrite)	mg/L	0.1	<0.10	<0.10				MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10	<0.10				MAC	10.0	mg/L
pH			7.93	7.94					6.5-8.5	
Phenols	mg/L	0.001	<0.001	<0.001						
Sulphate	mg/L	1	47	47				AO	500	mg/L
Tannin & Lignin	mg/L	0.1	0.1	<0.1						
Total Dissolved Solids (COND - CALC)	mg/L	5	469	467				AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	<0.10	<0.10						
Turbidity	NTU	0.1	16.7	17.2				MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	288	297				OG	100	mg/L
Ion Balance		0.01	0.92	0.95						
Calcium	mg/L	1	74	76						
Magnesium	mg/L	1	25	26						
Potassium	mg/L	1	4	4						
Sodium	mg/L	2	28	29				AO	200	mg/L
Iron	mg/L	0.03	0.58	0.59				AO	0.3	mg/L
Manganese	mg/L	0.01	0.01	0.01				AO	0.05	mg/L

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

Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

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

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova
Accutest

Client: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 105024

Report Number: 1005516
Date: 2010-03-22
Date Submitted: 2010-03-18

Project: PH1292

P.O. Number: 8811
Matrix: Water

		LAB ID:	783872	783873				**GUIDELINE**		
		Sample Date:	2010-03-18	2010-03-18				ODWSOG		
		Sample ID:	TW3-WS1	TW3-WS2						
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Total Coliforms	CFU/100mL		0	0				MAC	0	CFU/100mL
Escherichia Coli	CFU/100mL		0	0				MAC	0	CFU/100mL
Heterotrophic Plate Count	CFU/1mL		3	0						
Faecal Coliforms	CFU/100mL		0	0						
Faecal Streptococcus	CFU/100mL		0	0						

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

APPROVAL: K Quantrill
Krista Quantrill
Drinking Water Coordinator

REPORT OF ANALYSIS

Client: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

Report Number: 1005515
Date: 2010-03-29
Date Submitted: 2010-03-18

Project: PH1292

INVOICE: Paterson Group Inc.
Chain of Custody Number: 105024

P.O. Number: 8811
Matrix: Water

		LAB ID:	783870	783871				**GUIDELINE**		
		Sample Date:	2010-03-18	2010-03-18				ODWSOG		
		Sample ID:	TW3-WS1	TW3-WS2						
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Alkalinity as CaCO3	mg/L	5	252	253				OG	500	mg/L
Chloride	mg/L	1	52	52				AO	250	mg/L
Colour	TCU	2	<2	<2				AO	5	TCU
Conductivity	uS/cm	5	685	683						
Dissolved Organic Carbon	mg/L	0.5	1.2	1.2				AO	5	mg/L
Fluoride	mg/L	0.1	0.34	0.36				MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01	0.01	<0.01				AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	0.05	0.05						
N-NO2 (Nitrite)	mg/L	0.1	<0.10	<0.10				MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10	<0.10				MAC	10.0	mg/L
pH			7.96	7.98					6.5-8.5	
Phenols	mg/L	0.001	<0.001	<0.001						
Sulphate	mg/L	1	54	53				AO	500	mg/L
Tannin & Lignin	mg/L	0.1	0.2	0.2						
Total Dissolved Solids (COND - CALC)	mg/L	5	445	444				AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	<0.10	<0.10						
Turbidity	NTU	0.1	13.2	5.1				MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	287	287				OG	100	mg/L
Ion Balance		0.01	0.93	0.93						
Calcium	mg/L	1	72	72						
Magnesium	mg/L	1	26	26						
Potassium	mg/L	1	4	4						
Sodium	mg/L	2	29	30				AO	200	mg/L
Iron	mg/L	0.03	0.58	0.40				AO	0.3	mg/L
Manganese	mg/L	0.01	0.01	<0.01				AO	0.05	mg/L

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

Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

EXOVA ACCUTEST

REPORT OF ANALYSIS

TW4-Bact- 3-9hr

Exova
Accutest

Client: Paterson Group
28 Concourse Gate, Unit 1

Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.
Chain of Custody Number: 146205

Report Number: 1119873
Date: 2011-08-29
Date Submitted: 2011-08-27

Project: PH1292

P.O. Number:
Matrix: Water

		LAB ID:	906781	906782				GUIDELINE		
		Sample Date:	2011-08-26	2011-08-26				ODWSOG		
		Sample ID:	TW4-WS-26/-8/11	TW4-WS 9hr 26/08/11						
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Total Coliforms	CFU/100mL		6	2				MAC	0	CFU/100mL
Escherichia Coli	CFU/100mL		0	0				MAC	0	CFU/100mL
Heterotrophic Plate Count	CFU/1mL		234	490						
Faecal Coliforms	CFU/100mL		0	0						
Faecal Streptococcus	CFU/100mL		46	182						

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

APPROVAL:
Krista Quantrill
Microbiology Lab Supervisor

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

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova
Accutest

Client: **Paterson Group**
28 Concourse Gate, Unit 1

Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 141371

Report Number: 1122788
Date: 2011-10-12
Date Submitted: 2011-09-30

Project: PH1292

P.O. Number: 11627
Matrix: Water

		LAB ID:	914267					**GUIDELINE**		
		Sample Date:	2011-09-30					ODWSOG		
		Sample ID:	TW5-WS09/2930/11							
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Alkalinity as CaCO3	mg/L	5	266					OG	500	mg/L
Chloride	mg/L	1	45					AO	250	mg/L
Colour	TCU	2	<2					AO	5	TCU
Conductivity	uS/cm	5	691							
Dissolved Organic Carbon	mg/L	0.5	1.0					AO	5	mg/L
Fluoride	mg/L	0.1	0.28					MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01	<0.01					AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	<0.02							
N-NO2 (Nitrite)	mg/L	0.1	<0.10					MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10					MAC	10.0	mg/L
pH			7.97						6.5-8.5	
Phenols	mg/L	0.001	<0.001							
Sulphate	mg/L	1	49					AO	500	mg/L
Tannin & Lignin	mg/L	0.1	<0.1							
Total Dissolved Solids (COND - CALC)	mg/L	1	449					AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	<0.10							
Turbidity	NTU	0.1	6.5					MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	285					OG	100	mg/L
Ion Balance		0.01	0.91							
Calcium	mg/L	1	73							
Magnesium	mg/L	1	25							
Potassium	mg/L	1	3							
Sodium	mg/L	2	26					AO	200	mg/L
Iron	mg/L	0.03	0.66					AO	0.3	mg/L
Manganese	mg/L	0.01	0.01					AO	0.05	mg/L

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

Comment:
Sample was subcontracted for DOC analysis.

APPROVAL:
Lorna Wilson
Inorganic Lab Supervisor

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

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

EXOVA ACCUTEST

REPORT OF ANALYSIS

Tw4- 3hr- 9hr

Exova Accutest

Client: Paterson Group
28 Concourse Gate, Unit 1

Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 146205

Report Number: 1119874
Date: 2011-09-08
Date Submitted: 2011-08-27

Project: PH1292

P.O. Number:
Matrix: Water

		LAB ID:	906783	906784				GUIDELINE		
		Sample Date:	2011-08-26	2011-08-26				ODWSOG		
		Sample ID:	TW4-WS 26/08/11	TW4-WS 9hr 26/08/11						
PARAMETER	UNITS	MRL						TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5	268	267				OG	500	mg/L
Chloride	mg/L	1	44	44				AO	250	mg/L
Colour	TCU	2	<2	3				AO	5	TCU
Conductivity	uS/cm	5	687	686						
Dissolved Organic Carbon	mg/L	0.5	1.2	1.2				AO	5	mg/L
Fluoride	mg/L	0.1	0.29	0.29				MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01	<0.01	<0.01				AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	0.04	0.05						
N-NO2 (Nitrite)	mg/L	0.1	<0.10	<0.10				MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10	<0.10				MAC	10.0	mg/L
pH			8.17	8.17					6.5-8.5	
Phenols	mg/L	0.001	<0.001	<0.001						
Sulphate	mg/L	1	46	46				AO	500	mg/L
Tannin & Lignin	mg/L	0.1	<0.1	<0.1						
Total Dissolved Solids (COND - CALC)	mg/L	1	447	446				AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	<0.10	<0.10						
Turbidity	NTU	0.1	2.8	1.5				MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	304	302				OG	100	mg/L
Ion Balance		0.01	0.95	0.95						
Calcium	mg/L	1	79	78						
Magnesium	mg/L	1	26	26						
Potassium	mg/L	1	3	3						
Sodium	mg/L	2	24	24				AO	200	mg/L
Iron	mg/L	0.03	0.32	0.32				AO	0.3	mg/L
Manganese	mg/L	0.01	<0.01	<0.01				AO	0.05	mg/L

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

Comment:
Samples were subcontracted for DOC analysis.

APPROVAL:
Lorna Wilson
Inorganic Lab Supervisor

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

REPORT OF ANALYSIS

Client: Paterson Group
28 Concourse Gate, Unit 1

Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 141372

Report Number: 1122839
Date: 2011-10-14
Date Submitted: 2011-10-03

Project: PH1292

P.O. Number: 11627
Matrix: Water

		LAB ID:	914459					GUIDELINE		
		Sample Date:	2011-09-30					Provincial Water Quality Objectives - MOE 1999		
		Sample ID:	TW5- WS 30/09/11							
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Alkalinity as CaCO3	mg/L	5	258							
Chloride	mg/L	1	45							
Colour	TCU	2	2							
Conductivity	uS/cm	5	680							
Dissolved Organic Carbon	mg/L	0.5	1.1							
Fluoride	mg/L	0.1	0.27							
Hydrogen Sulphide	mg/L	0.01	<0.01					PWQO	0.002	mg/L
N-NH3 (Ammonia)	mg/L	0.02	<0.02							
N-NO2 (Nitrite)	mg/L	0.1	<0.10							
N-NO3 (Nitrate)	mg/L	0.1	<0.10							
pH			7.86						6.5-8.5	
Phenols	mg/L	0.001	<0.001					PWQO	0.001	mg/L
Sulphate	mg/L	1	49							
Tannin & Lignin	mg/L	0.1	<0.1							
Total Dissolved Solids (COND - CALC)	mg/L	1	442							
Total Kjeldahl Nitrogen	mg/L	0.1	0.12							
Turbidity	NTU	0.1	5.7							
Hardness as CaCO3	mg/L	1	306							
Ion Balance		0.01	0.96							
Calcium	mg/L	1	78							
Magnesium	mg/L	1	27							
Potassium	mg/L	1	3							
Sodium	mg/L	2	27							
Iron	mg/L	0.03	0.54					PWQO	0.30	mg/L
Manganese	mg/L	0.01	0.01							

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

Comment:
Holding time for turbidity analysis was exceeded.

APPROVAL: ____________
Lorna Wilson
Inorganic Lab Supervisor

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

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

REPORT OF ANALYSIS

Tw5- Bad eChr

Client: Paterson Group
28 Concourse Gate, Unit 1

Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 141371

Report Number: 1122782
Date: 2011-10-03
Date Submitted: 2011-09-30

Project: PH292

P.O. Number:
Matrix: Water

		LAB ID:	914257					GUIDELINE		
		Sample Date:	2011-09-30					ODWSOG		
		Sample ID:	TW5 - WS09							
PARAMETER	UNITS	MRL						TYPE	LIMIT	UNITS
Total Coliforms	CFU/100mL		0					MAC	0	CFU/100mL
Escherichia Coli	CFU/100mL		0					MAC	0	CFU/100mL
Heterotrophic Plate Count	CFU/1mL		15							
Faecal Coliforms	CFU/100mL		0							
Faecal Streptococcus	CFU/100mL		0							

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

Comment:

APPROVAL:____________
Krista Quantrill
Microbiology Lab Supervisor

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

REPORT OF ANALYSIS

Client: Paterson Group
28 Concourse Gate, Unit 1

Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

Report Number: 1122788
Date: 2011-10-12
Date Submitted: 2011-09-30

Project: PH1292

P.O. Number: 11627
Matrix: Water

INVOICE: Paterson Group Inc.
Chain of Custody Number: 141371

								GUIDELINE		
		LAB ID:	914267					ODWSOG		
		Sample Date:	2011-09-30							
		Sample ID:	TW5-WS09/2930/1 1							
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Alkalinity as CaCO3	mg/L	5	266					OG	500	mg/L
Chloride	mg/L	1	45					AO	250	mg/L
Colour	TCU	2	<2					AO	5	TCU
Conductivity	uS/cm	5	691							
Dissolved Organic Carbon	mg/L	0.5	1.0					AO	5	mg/L
Fluoride	mg/L	0.1	0.28					MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01	<0.01					AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	<0.02							
N-NO2 (Nitrite)	mg/L	0.1	<0.10					MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10					MAC	10.0	mg/L
pH			7.97						6.5-8.5	
Phenols	mg/L	0.001	<0.001							
Sulphate	mg/L	1	49					AO	500	mg/L
Tannin & Lignin	mg/L	0.1	<0.1							
Total Dissolved Solids (COND - CALC)	mg/L	1	449					AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	<0.10							
Turbidity	NTU	0.1	6.5					MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	285					OG	100	mg/L
Ion Balance		0.01	0.91							
Calcium	mg/L	1	73							
Magnesium	mg/L	1	25							
Potassium	mg/L	1	3							
Sodium	mg/L	2	26					AO	200	mg/L
Iron	mg/L	0.03	0.66					AO	0.3	mg/L
Manganese	mg/L	0.01	0.01					AO	0.05	mg/L

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

Comment:
Sample was subcontracted for DOC analysis.

APPROVAL: ____________________
Lorna Wilson
Inorganic Lab Supervisor

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

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

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

Exova

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

Report Number: 1423579
Date Submitted: 2014-11-04
Date Reported: 2014-11-06
Project: PH 1292
COC #: 177452

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).

Report Comments:

APPROVAL: ______________________________
Krista Quantrill
Laboratory Supervisor, Microbiology

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

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

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

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

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

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

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

Report Number: 1423579
Date Submitted: 2014-11-04
Date Reported: 2014-11-06
Project: PH 1292
COC #: 177452

				Lab I.D.	1144196	1144197
				Sample Matrix	Water	Water
				Sample Type		
				Sampling Date	2014-11-03	2014-11-04
				Sample I.D.	TW6 - WS1	TW6 - WS2
Group	**Analyte**	**MRL**	**Units**	**Guideline**		
Microbiology	Escherichia Coli	0	ct/100mL	MAC-0	0	0
	Faecal Coliforms	0	ct/100mL		0	0
	Faecal Streptococcus	0	ct/100mL		0	0
	Heterotrophic Plate Count	0	ct/1mL		3	7
	Total Coliforms	0	ct/100mL	MAC-0	0	0

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

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

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

Report Number: 1423554
Date Submitted: 2014-11-04
Date Reported: 2014-11-05
Project: PH1292
COC #: 177452

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).

Report Comments:

APPROVAL: ______________________________
Lorna Wilson
Laboratory Supervisor, Inorganics

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

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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

Certificate of Analysis

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

Report Number: 1423554
Date Submitted: 2014-11-04
Date Reported: 2014-11-05
Project: PH1292
COC #: 177452

				Lab I.D.	1144094	1144095	1144096
				Sample Matrix	Water	Water	Water
				Sample Type			
				Sampling Date	2014-11-02	2014-11-03	2014-11-04
				Sample I.D.	TW6 Metals 1	TW6 - WS1	TW6 - WS2
Group	**Analyte**	**MRL**	**Units**	**Guideline**			
Calculations	Hardness as CaCO3	1	mg/L	OG-100		329*	329*
	Ion Balance	0.01				1.06	1.06
	TDS (COND - CALC)	1	mg/L	AO-500		461	460
Chromium (CrVI)	Cr(VI)	0.01	mg/L		<0.01		
Cyanide	Cyanide (free)	0.005	mg/L	MAC-0.2	<0.005		
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG-500		251	255
	Cl	1	mg/L	AO-250		52	52
	Colour	2	TCU	AO-5		<2	<2
	Conductivity	5	uS/cm			709	707
	DOC	0.5	mg/L	AO-5		1.0	1.2
	F	0.10	mg/L	MAC-1.5		0.31	0.31
	N-NO2	0.10	mg/L	MAC-1.0		<0.10	<0.10
	N-NO3	0.10	mg/L	MAC-10.0		<0.10	<0.10
	pH	1.00		6.5-8.5		8.11	8.10
	S2-	0.01	mg/L	AO-0.05		<0.01	<0.01
	SO4	1	mg/L	AO-500		51	51
	Turbidity	0.1	NTU	MAC-1.0		1.2*	1.2*
Mercury	Hg	0.0001	mg/L	MAC-0.001	<0.0001		
Metals	Ag	0.0001	mg/L		<0.0001		
	As	0.001	mg/L	IMAC-0.025	<0.001		
	B	0.01	mg/L	IMAC-5.0	0.15		
	Ba	0.01	mg/L	MAC-1.0	0.11		
	Be	0.0005	mg/L		<0.0005		
	Ca	1	mg/L			84	84
	Cd	0.0001	mg/L	MAC-0.005	<0.0001		
	Co	0.0002	mg/L		<0.0002		

Guideline = ODWSOG

*** = Guideline Exceedence**

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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

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

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

Report Number: 1423554
Date Submitted: 2014-11-04
Date Reported: 2014-11-05
Project: PH1292
COC #: 177452

				Lab I.D.	1144094	1144095	1144096
				Sample Matrix	Water	Water	Water
				Sample Type			
				Sampling Date	2014-11-02	2014-11-03	2014-11-04
				Sample I.D.	TW6 Metals 1	TW6 - WS1	TW6 - WS2
Group	**Analyte**	**MRL**	**Units**	**Guideline**			
Metals	Cr	0.001	mg/L	MAC-0.05	<0.001		
	Cu	0.001	mg/L	AO-1.0	<0.001		
	Fe	0.03	mg/L	AO-0.3		0.32*	0.31*
	K	1	mg/L			3	4
	Mg	1	mg/L			29	29
	Mn	0.01	mg/L	AO-0.05		<0.01	<0.01
	Mo	0.005	mg/L		<0.005		
	Na	2	mg/L	AO-200		32	33
	Ni	0.005	mg/L		<0.005		
	Pb	0.001	mg/L	MAC-0.010	<0.001		
	Sb	0.0005	mg/L	IMAC-0.006	<0.0005		
	Se	0.001	mg/L	MAC-0.01	<0.001		
	Sr	0.001	mg/L		1.84		
	Tl	0.0001	mg/L		<0.0001		
	U	0.001	mg/L	MAC-0.02	0.001		
	V	0.001	mg/L		<0.001		
	Zn	0.01	mg/L	AO-5.0	<0.01		
Nutrients	N-NH3	0.02	mg/L			0.14	0.02
	Phenols	0.001	mg/L			<0.001	<0.001
	Tannin & Lignin	0.1	mg/L			<0.1	<0.1
	Total Kjeldahl Nitrogen	0.10	mg/L			0.18	<0.10

Guideline = ODWSOG *** = Guideline Exceedence**

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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

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

Client:	Paterson Group 154 Colonnade Rd. South Nepean, ON K2E 7T7	Report Number:	1423554
Attention:	Mr. Robert Passmore	Date Submitted:	2014-11-04
PO#:		Date Reported:	2014-11-05
Invoice to:	Paterson Group	Project:	PH1292
		COC #:	177452

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**

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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

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

Report Number: 1423554
Date Submitted: 2014-11-04
Date Reported: 2014-11-05
Project: PH1292
COC #: 177452

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 279170 **Analysis Date** 2014-11-05	**Method**	SM 4110	
Cl	<1 mg/L	100	90-110
SO4	<1 mg/L	105	90-110
Run No 279173 **Analysis Date** 2014-11-05	**Method**	C SM4500-NH3D	
N-NH3	<0.02 mg/L	99	85-115
Run No 279174 **Analysis Date** 2014-11-05	**Method**	C SM5550B	
Tannin & Lignin	<0.1 mg/L	89	80-120
Run No 279187 **Analysis Date** 2014-11-05	**Method**	C SM4500-Norg-C	
Total Kjeldahl Nitrogen	<0.10 mg/L	102	77-123
Run No 279193 **Analysis Date** 2014-11-04	**Method**	C SM5310C	
DOC	<0.5 mg/L	100	84-116
Run No 279224 **Analysis Date** 2014-11-05	**Method**	EPA 200.8	
Ag	<0.0001 mg/L	101	94-106
As	<0.001 mg/L	98	93-106
B	<0.01 mg/L	106	88-112
Ba	<0.01 mg/L	96	91-109
Be	<0.0005 mg/L	106	93-107

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

Certificate of Analysis

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

Report Number: 1423554
Date Submitted: 2014-11-04
Date Reported: 2014-11-05
Project: PH1292
COC #: 177452

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Cd	<0.0001 mg/L	97	93-107
Co	<0.0002 mg/L	103	94-106
Cr	<0.001 mg/L	100	94-106
Cu	<0.001 mg/L	104	93-106
Fe	<0.03 mg/L	95	92-107
Mn	<0.01 mg/L	97	94-106
Mo	<0.005 mg/L	99	94-106
Ni	<0.005 mg/L	104	94-106
Pb	<0.001 mg/L	107	70-130
Sb	<0.0005 mg/L	94	90-110
Se	<0.001 mg/L	97	91-108
Sr	<0.001 mg/L	96	89-110
Tl	<0.0001 mg/L	101	95-105
U	<0.001 mg/L	102	94-106
V	<0.001 mg/L	97	93-107
Zn	<0.01 mg/L	102	94-106
Run No 279233	**Analysis Date** 2014-11-04	**Method** M SM3112B-3500B	

Guideline = ODWSOG

*** = Guideline Exceedence**

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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

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

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

Report Number: 1423554
Date Submitted: 2014-11-04
Date Reported: 2014-11-05
Project: PH1292
COC #: 177452

QC Summary

Analyte	Blank	QC % Rec	QC 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	99	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	99	95-105
F	<0.10 mg/L	99	90-110
pH	5.76	99	90-110
Run No 279260 **Analysis Date** 2014-11-05 **Method** M US EPA			
Cr(VI)			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.

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

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

Report Number: 1423554
Date Submitted: 2014-11-04
Date Reported: 2014-11-05
Project: PH1292
COC #: 177452

Sample Comment Summary

Sample ID: 1144094 TW6 Metals 1 Sample was subcontracted for CrVI analysis.

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

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova Accutest

Client: **Paterson Group**
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.
Chain of Custody Number: **105018**

Report Number: 1001797
Date: 2010-02-01
Date Submitted: 2010-01-28

Project: PH1292

P.O. Number:
Matrix: Water

		LAB ID:	773874	773875				**GUIDELINE**		
		Sample Date:	2010-01-28	2010-01-28				ODWSOG		
		Sample ID:	EW-WS1	EW-WS2						
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Total Coliforms	CFU/100mL		0	0				MAC	0	CFU/100mL
Escherichia Coli	CFU/100mL		0	0				MAC	0	CFU/100mL
Heterotrophic Plate Count	CFU/1mL		0	0						
Faecal Coliforms	CFU/100mL		0	0						
Faecal Streptococcus	CFU/100mL		0	0						

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

Comment:

This is an amendment and supercedes all other copies of this report. The sample ID's have been amended as per client request.

APPROVAL:
Dragana Dzeletovic
Microbiology Analyst

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova Accutest

Client: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.
Chain of Custody Number: **105018**

Report Number: 1001798
Date: 2010-02-04
Date Submitted: 2010-01-28
Project: PH1292
P.O. Number:
Matrix: Water

		LAB ID:	773876	773877				**GUIDELINE**		
		Sample Date:	2010-01-28	2010-01-28				ODWSOG		
		Sample ID:	EW-WS1	EW-WS2						
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Alkalinity as CaCO3	mg/L	5	269	269				OG	500	mg/L
Chloride	mg/L	1	44	43				AO	250	mg/L
Colour	TCU	2	<2	<2				AO	5	TCU
Conductivity	uS/cm	5	702	702						
Dissolved Organic Carbon	mg/L	0.5	1.3	1.2				AO	5	mg/L
Fluoride	mg/L	0.1	0.38	0.38				MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01	<0.01	<0.01				AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	0.09	0.08						
N-NO2 (Nitrite)	mg/L	0.1	<0.10	<0.10				MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10	<0.10				MAC	10.0	mg/L
pH			8.12	8.16					6.5-8.5	
Phenols	mg/L	0.001	<0.001	<0.001						
Sulphate	mg/L	1	49	49				AO	500	mg/L
Tannin & Lignin	mg/L	0.1	<0.1	<0.1						
Total Dissolved Solids (COND - CALC)	mg/L	5	456	456				AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	0.11	<0.10						
Turbidity	NTU	0.1	1.6	1.1				MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	290	283				OG	100	mg/L
Ion Balance		0.01	0.97	0.95						
Calcium	mg/L	1	70	69						
Magnesium	mg/L	1	28	27						
Potassium	mg/L	1	5	5						
Sodium	mg/L	2	34	34				AO	200	mg/L
Iron	mg/L	0.03	0.27	0.23				AO	0.3	mg/L
Manganese	mg/L	0.01	<0.01	<0.01				AO	0.05	mg/L

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

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova Accutest

Client: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.
Chain of Custody Number: 105597

Report Number: 1000782
Date: 2010-01-18
Date Submitted: 2010-01-14

Project: PH1292

P.O. Number: 8794
Matrix: Water

		LAB ID:	771137					**GUIDELINE**		
		Sample Date:	2010-01-13					ODWSOG		
		Sample ID:	20 King-WS1							
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Total Coliforms	CFU/100mL		0					MAC	0	CFU/100mL
Escherichia Coli	CFU/100mL		0					MAC	0	CFU/100mL
Heterotrophic Plate Count	CFU/1mL		2							
Faecal Coliforms	CFU/100mL		0							
Faecal Streptococcus	CFU/100mL		0							

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

Comment:

APPROVAL:
Dragana Dzeletovic
Microbiology Analyst

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

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova Accutest

Client: **Paterson Group**
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

INVOICE: Paterson Group Inc.
Chain of Custody Number: 105597

Report Number: 1000794
Date: 2010-01-27
Date Submitted: 2010-01-14

Project: PH 1292

P.O. Number: 8794
Matrix: Water

		LAB ID:	771149					GUIDELINE		
		Sample Date:	2010-01-13					ODWSOG		
		Sample ID:	20 King-WS1							
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Alkalinity as CaCO3	mg/L	5	328					OG	500	mg/L
Chloride	mg/L	1	13					AO	250	mg/L
Colour	TCU	2	<2					AO	5	TCU
Conductivity	uS/cm	5	654							
Dissolved Organic Carbon	mg/L	0.5	1.5					AO	5	mg/L
Fluoride	mg/L	0.1	0.36					MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01	<0.01					AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	<0.02							
N-NO2 (Nitrite)	mg/L	0.1	<0.10					MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	0.13					MAC	10.0	mg/L
pH			7.83						6.5-8.5	
Phenols	mg/L	0.001	<0.001							
Sulphate	mg/L	1	19					AO	500	mg/L
Tannin & Lignin	mg/L	0.1	0.1							
Total Dissolved Solids (COND - CALC)	mg/L	5	425					AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	<0.10							
Turbidity	NTU	0.1	0.2					MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	296					OG	100	mg/L
Ion Balance		0.01	0.92							
Calcium	mg/L	1	74							
Magnesium	mg/L	1	27							
Potassium	mg/L	1	2							
Sodium	mg/L	2	19					AO	200	mg/L
Iron	mg/L	0.03	<0.03					AO	0.3	mg/L
Manganese	mg/L	0.01	<0.01					AO	0.05	mg/L

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

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

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

REPORT OF ANALYSIS

Client: Paterson Group
28 Concourse Gate, Unit 1

Nepean, ON
K2E 7T7
Attention: **Mr. Robert Passmore**

Report Number: 1127252
Date: 2011-11-25
Date Submitted: 2011-11-23

Project: PH1292

INVOICE: Paterson Group Inc.
Chain of Custody Number: **141378**

P.O. Number:
Matrix: Water

								GUIDELINE		
		LAB ID:	927122	927123				ODWSOG		
		Sample Date:	2011-11-22	2011-11-22						
		Sample ID:	10 Cockburn - WS 22/11/11	6 King-WS 22/11/11						
PARAMETER	**UNITS**	**MRL**						**TYPE**	**LIMIT**	**UNITS**
Total Coliforms	CFU/100mL		0	0				MAC	0	CFU/100mL
Escherichia Coli	CFU/100mL		0	0				MAC	0	CFU/100mL
Heterotrophic Plate Count	CFU/1mL		0	0						
Faecal Coliforms	CFU/100mL		0	0						
Faecal Streptococcus	CFU/100mL		0	0						

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

APPROVAL: K Quantrill
Krista Quantrill
Microbiology Lab Supervisor

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

EXOVA ACCUTEST

REPORT OF ANALYSIS

Exova Accutest

Client: Paterson Group
28 Concourse Gate, Unit 1

Nepean, ON
K2E 7T7
Attention: Mr. Robert Passmore

INVOICE: Paterson Group Inc.
Chain of Custody Number: 141378

Report Number: 1127271
Date: 2011-11-25
Date Submitted: 2011-11-23

Project: PH1292

P.O. Number:
Matrix: Water

		LAB ID:	927147	927148				GUIDELINE		
		Sample Date:	2011-11-22	2011-11-22				ODWSOG		
		Sample ID:	10 Cockburn-WS 22/11/11	6 King-WS 22/11/11						
PARAMETER	UNITS	MRL						TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5	260	260				OG	500	mg/L
Chloride	mg/L	1	46	46				AO	250	mg/L
Colour	TCU	2	<2	2				AO	5	TCU
Conductivity	uS/cm	5	694	698						
Dissolved Organic Carbon	mg/L	0.5	1.1	1.2				AO	5	mg/L
Fluoride	mg/L	0.1	0.36	0.38				MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01	0.01	<0.01				AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	0.06	0.09						
N-NO2 (Nitrite)	mg/L	0.1	<0.10	<0.10				MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.1	<0.10	<0.10				MAC	10.0	mg/L
pH			7.90	7.94					6.5-8.5	
Phenols	mg/L	0.001	<0.001	<0.001						
Sulphate	mg/L	1	47	47				AO	500	mg/L
Tannin & Lignin	mg/L	0.1	<0.1	<0.1						
Total Dissolved Solids (COND - CALC)	mg/L	1	451	454				AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.1	<0.10	0.28						
Turbidity	NTU	0.1	6.5	3.4				MAC	1.0	NTU
Hardness as CaCO3	mg/L	1	303	298				OG	100	mg/L
Ion Balance		0.01	1.02	1.01						
Calcium	mg/L	1	75	73						
Magnesium	mg/L	1	28	28						
Potassium	mg/L	1	4	4						
Sodium	mg/L	2	34	35				AO	200	mg/L
Iron	mg/L	0.03	0.43	0.36				AO	0.3	mg/L
Manganese	mg/L	0.01	0.01	<0.01				AO	0.05	mg/L

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

Comment:

APPROVAL:
Lorna Wilson
Inorganic Lab Supervisor

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

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

EXOVA ENVIRONMENTAL ONTARIO

Certificate of Analysis

Exova

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

Report Number: 1423579
Date Submitted: 2014-11-04
Date Reported: 2014-11-06
Project: PH 1292
COC #: 177452

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).

Report Comments:

APPROVAL:
Krista Quantrill
2014.11.06
10:50:14 -05'00'

Krista Quantrill
Laboratory Supervisor, Microbiology

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

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

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

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

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

Certificate of Analysis

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

Report Number: 1423579
Date Submitted: 2014-11-04
Date Reported: 2014-11-06
Project: PH 1292
COC #: 177452

				Lab I.D.	1144196	1144197
				Sample Matrix	Water	Water
				Sample Type		
				Sampling Date	2014-11-03	2014-11-04
				Sample I.D.	TW6 - WS1	TW6 - WS2
Group	**Analyte**	**MRL**	**Units**	**Guideline**		
Microbiology	Escherichia Coli	0	ct/100mL	MAC-0	0	0
	Faecal Coliforms	0	ct/100mL		0	0
	Faecal Streptococcus	0	ct/100mL		0	0
	Heterotrophic Plate Count	0	ct/1mL		3	7
	Total Coliforms	0	ct/100mL	MAC-0	0	0

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

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

Well Inspection

Client: TALOS
Project: PH1292
Location 10 KING ST.

Address: 20 COCKBURN
Homeowner Interviewed? [✓ Y] / N
Well Inspected? [✓ Y] / N

Field Supervisor: RAP
Date: SEPT 2011

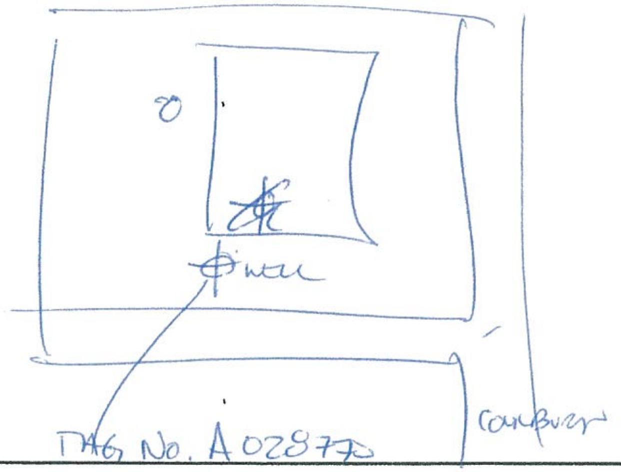
Quality Comments:
Taste: IRON
Odour: NO
Colour: NO ISSUES
Hardness: YES
Bacteria Testing: YES – 0/0

Quantity Comments: (NO ISSUES – NO COMPLAINTS)
Flow Rate:
Pump:
Pump Depth:
Problems:

Well Details:
Type of Well: 6"ϕ DRILLED
Depth of Well: 100 ft ±
Age of Well: DRILLED 2009/2011
Driller: AIR ROCK.
Well Record Available: YES (MOE SITE)

Environmental Concerns: NO CONCERNS
Surface Water:
Septic System:
Land Use:
Neighbouring Properties:

Sketch:



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

Well Inspection

Client: TALOS
Project: PH1292
Location ~~12 Cockburn~~

Address: 12 Cockburn
Homeowner Interviewed? [✓ Y] / N
Well Inspected? [✓ Y] / N

Field Supervisor: RAD
Date: Sept. 28/11

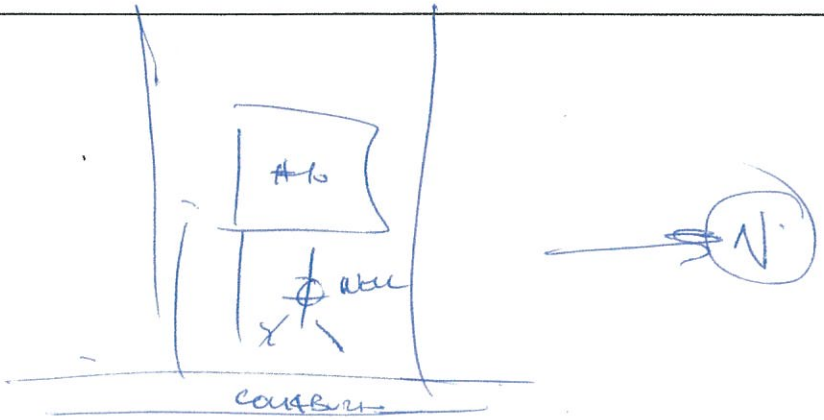
Quality Comments:
Taste: No issues
Odour: None
Colour: No issues
Hardness: Yes
Bacteria Testing: Yes, all 0/0.

Quantity Comments:
Flow Rate: No issues - good supply
Pump: Submersible in good shape
Pump Depth: No idea
Problems: None

Well Details:
Type of Well: 6" ϕ Drilled
Depth of Well: ±80 ft. (measured @ 60 ft ±
Age of Well: ~~±30~~ y. Drilled in 80's
Driller: N/A
Well Record Available: No

Environmental Concerns: (No concerns raised)
Surface Water:
Septic System: Absent
Land Use:
Neighbouring Properties:

Sketch:



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

Well Inspection

Client: TALOS
Project: PH1292
Location 10 KING ST, RICHMOND

Address: 6 KING ST
Homeowner Interviewed? [✓ Y] / N
Well Inspected? [✓ Y] / N

Field Supervisor: RAP
Date: SEPT. 28/11

Quality Comments:
Taste: none
Odour: none
Colour: N
Hardness: Med
Bacteria Testing: Yes - All 0/0

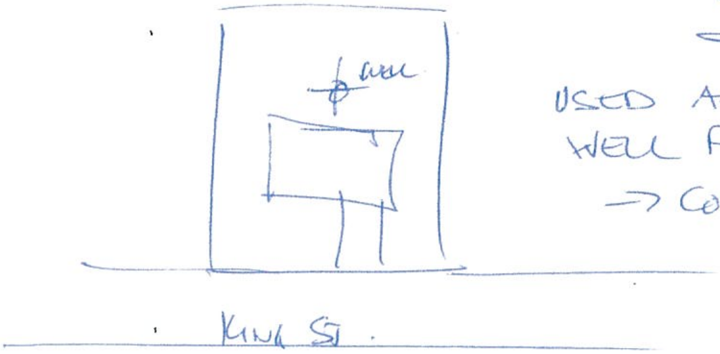
Quantity Comments:
Flow Rate: NO ISSUES
Pump: has malfunctioned previously
Pump Depth:
Problems: - history of well sucking air → pump was problem

Well Details:
Type of Well: 6"⌀ DRILLED
Depth of Well:
Age of Well: ±30 YRS
Driller:
Well Record Available: YES.

Environmental Concerns:
Surface Water: NONE
Septic System: ABSENT
Land Use: NO CONCERNS
Neighbouring Properties:

Sketch:

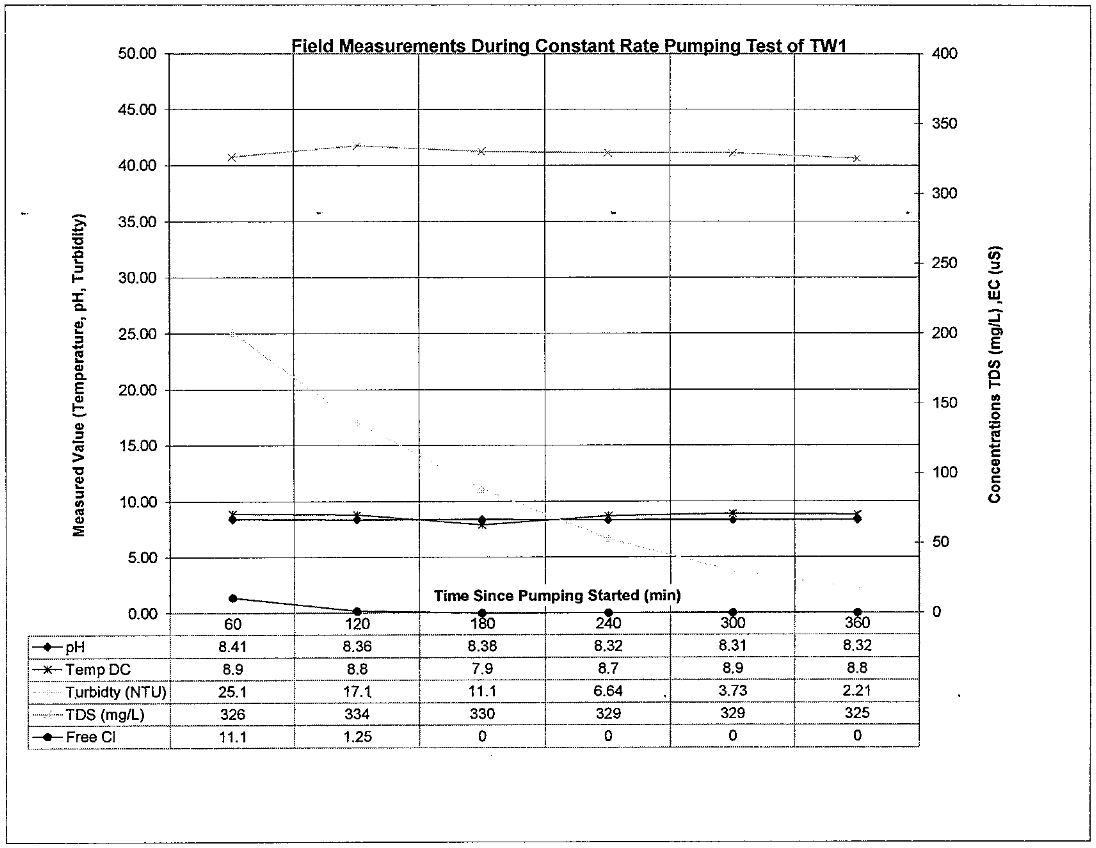
ANITA ROTHERAM
613-838-4909



USED AS OBSERVATION WELL FOR TESTING
→ COLLECTED RAW WATER SAMPLE

TW NO. 1 PH1292

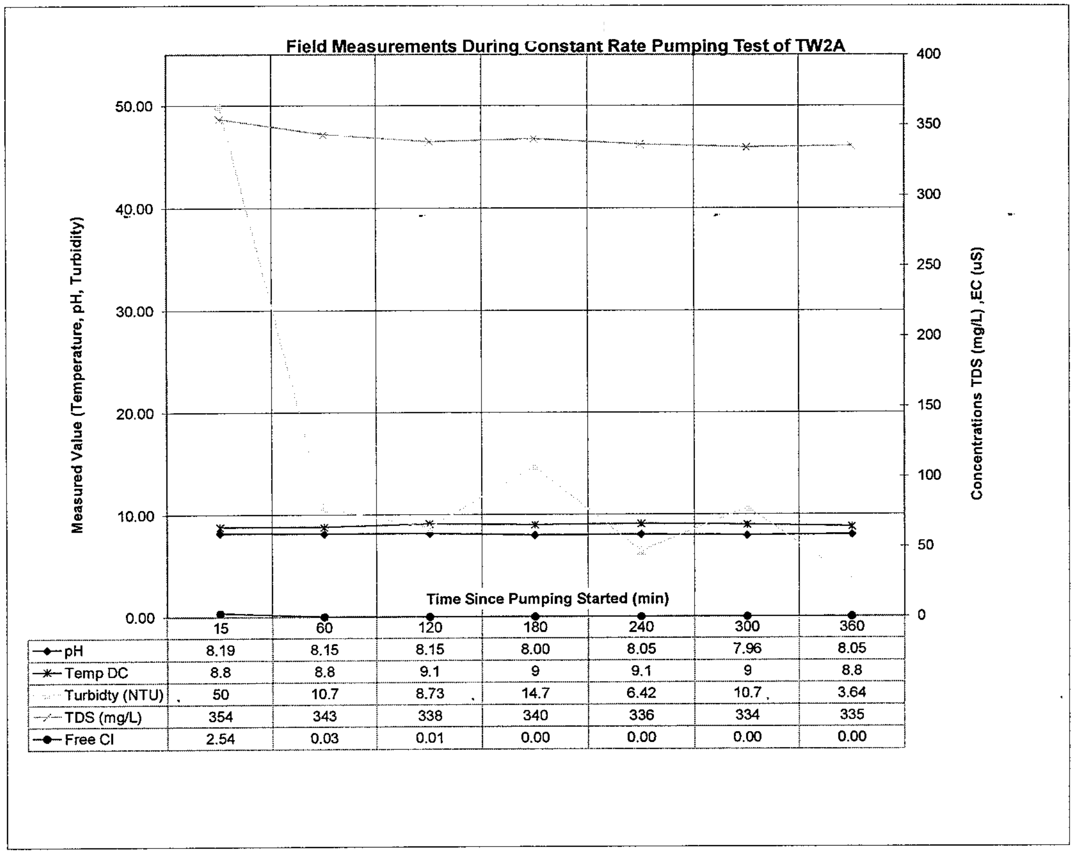
	Field Concentrations				
Time since pump start (min)	pH	Temp DC	Turbidty (NTU)	TDS (mg/L)	Free Cl
60	8.41	8.9	25.1	326	11.1
120	8.36	8.8	17.1	334	1.25
180	8.38	7.9	11.1	330	0
240	8.32	8.7	6.64	329	0
300	8.31	8.9	3.73	329	0
360	8.32	8.8	2.21	325	0


Field Measurements During Constant Rate Pumping Test of TW1

	60	120	180	240	300	360
◆ pH	8.41	8.36	8.38	8.32	8.31	8.32
✶ Temp DC	8.9	8.8	7.9	8.7	8.9	8.8
Turbidty (NTU)	25.1	17.1	11.1	6.64	3.73	2.21
TDS (mg/L)	326	334	330	329	329	325
● Free Cl	11.1	1.25	0	0	0	0

TW NO. 2 PH1292

Time since pump start (min)	Field Concentrations pH	Temp DC	Turbidty (NTU)	TDS (mg/L)	Free Cl
15	8.19	8.8	50	354	2.54
60	8.15	8.8	10.7	343	0.03
120	8.15	9.1	8.73	338	0.01
180	8.00	9	14.7	340	0.00
240	8.05	9.1	6.42	336	0.00
300	7.96	9	10.7	334	0.00
360	8.05	8.8	3.64	335	0.00

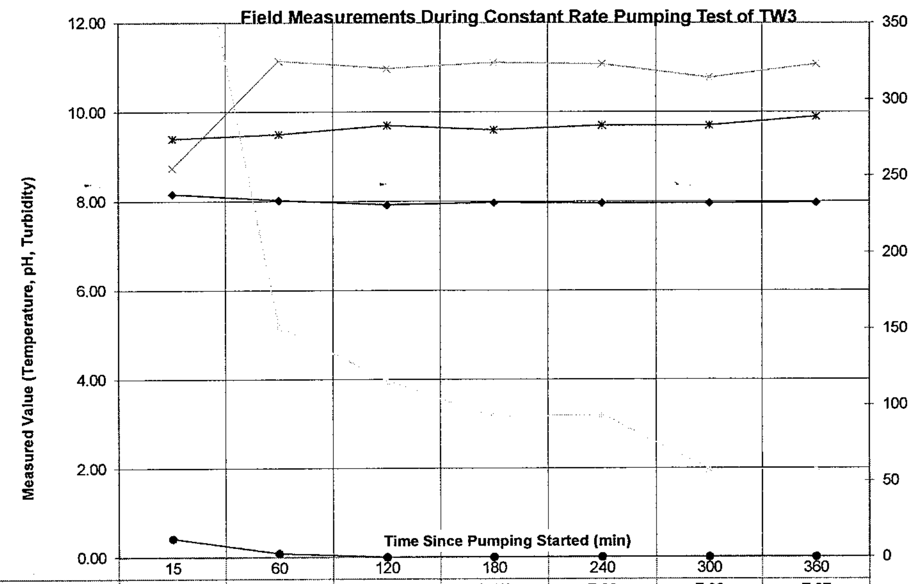


Field Measurements During Constant Rate Pumping Test of TW2A

	15	60	120	180	240	300	360
pH	8.19	8.15	8.15	8.00	8.05	7.96	8.05
Temp DC	8.8	8.8	9.1	9	9.1	9	8.8
Turbidty (NTU)	50	10.7	8.73	14.7	6.42	10.7	3.64
TDS (mg/L)	354	343	338	340	336	334	335
Free Cl	2.54	0.03	0.01	0.00	0.00	0.00	0.00

TW NO. 3 PH1292

	Field Concentrations				
Time since pump start (min)	pH	Temp DC	Turbidty (NTU)	TDS (mg/L)	Free Cl
15	8.16	9.4	17	255	12.3
60	8.02	9.5	5.2	325	2.54
120	7.92	9.7	3.97	320	0.01
180	7.97	9.6	3.17	324	0
240	7.96	9.7	3.2	323	0
300	7.96	9.7	1.98	314	0
360	7.97	9.9	1.98	323	0

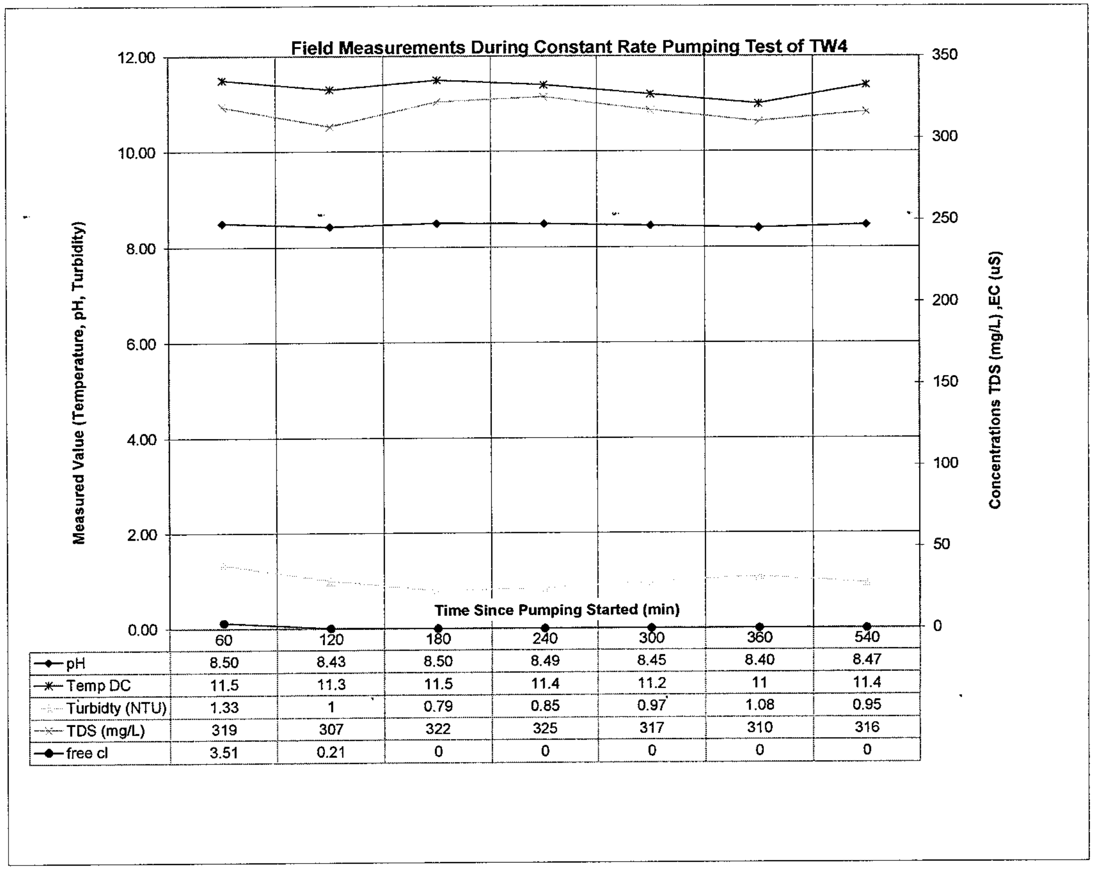


Field Measurements During Constant Rate Pumping Test of TW3

	15	60	120	180	240	300	360
◆ pH	8.16	8.02	7.92	7.97	7.96	7.96	7.97
✱ Temp DC	9.4	9.5	9.7	9.6	9.7	9.7	9.9
Turbidty (NTU)	17	5.2	3.97	3.17	3.2	1.98	1.98
× TDS (mg/L)	255	325	320	324	323	314	323
● Free Cl	12.3	2.54	0.01	0	0	0	0

TW NO. 4 PH1292

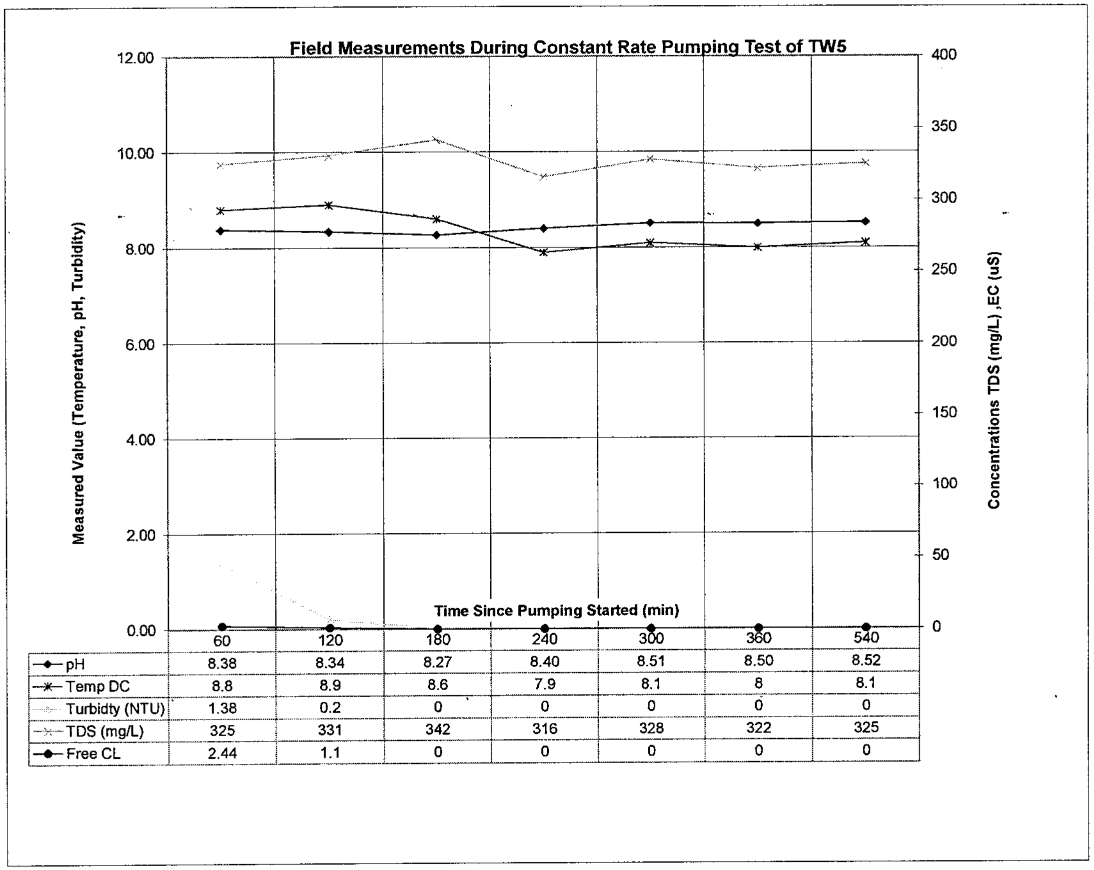
Time since pump start (min)	Field Concentrations pH	Temp DC	Turbidty (NTU)	TDS (mg/L)	free cl
60	8.50	11.5	1.33	319	3.51
120	8.43	11.3	1	307	0.21
180	8.50	11.5	0.79	322	0
240	8.49	11.4	0.85	325	0
300	8.45	11.2	0.97	317	0
360	8.40	11	1.08	310	0
540	8.47	11.4	0.95	316	0



	60	120	180	240	300	360	540
pH	8.50	8.43	8.50	8.49	8.45	8.40	8.47
Temp DC	11.5	11.3	11.5	11.4	11.2	11	11.4
Turbidty (NTU)	1.33	1	0.79	0.85	0.97	1.08	0.95
TDS (mg/L)	319	307	322	325	317	310	316
free cl	3.51	0.21	0	0	0	0	0

TW NO. 5   PH1292

	Field Concentrations				
Time since pump start (min)	pH	Temp DC	Turbidty (NTU)	TDS (mg/L)	Free CL
60	8.38	8.8	1.38	325	2.44
120	8.34	8.9	0.2	331	1.1
180	8.27	8.6	0	342	0
240	8.40	7.9	0	316	0
300	8.51	8.1	0	328	0
360	8.50	8	0	322	0
540	8.52	8.1	0	325	0



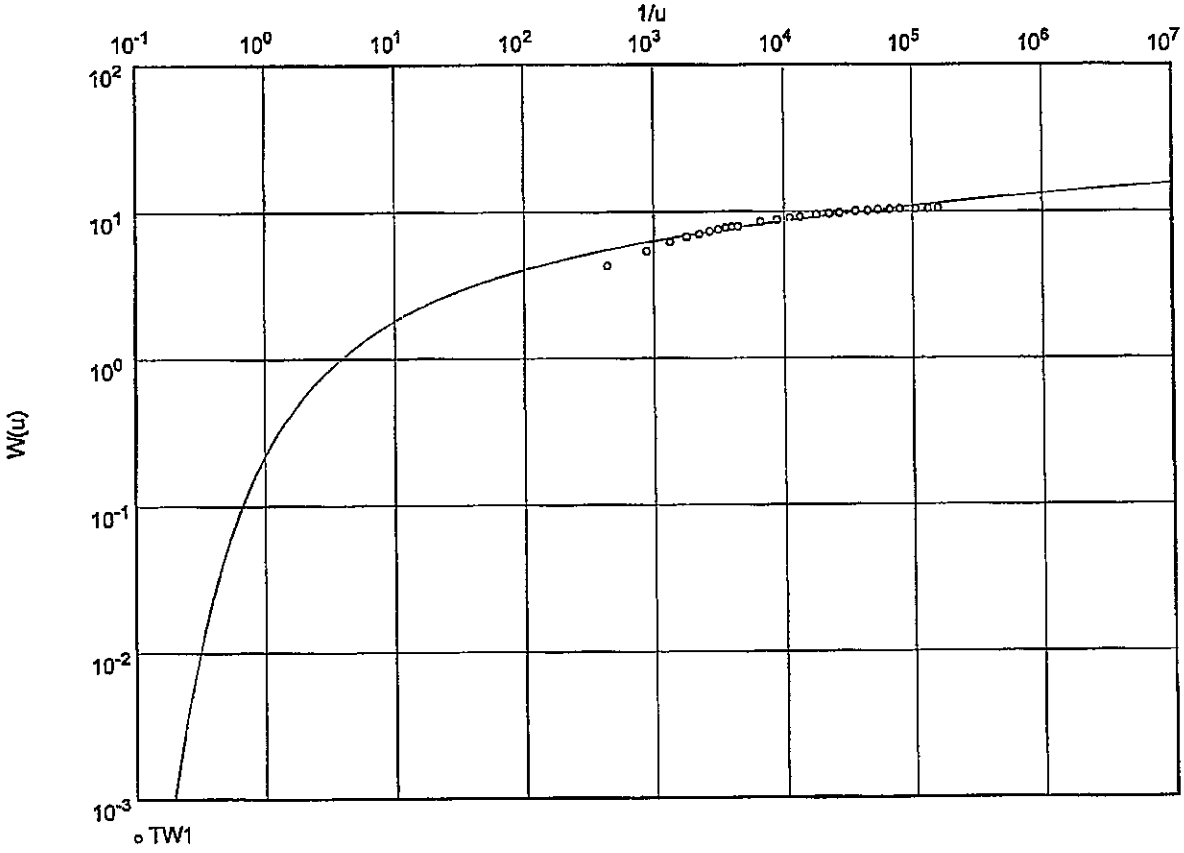
	60	120	180	240	300	360	540
pH	8.38	8.34	8.27	8.40	8.51	8.50	8.52
Temp DC	8.8	8.9	8.6	7.9	8.1	8	8.1
Turbidty (NTU)	1.38	0.2	0	0	0	0	0
TDS (mg/L)	325	331	342	316	328	322	325
Free CL	2.44	1.1	0	0	0	0	0

APPENDIX 4

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

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Theis analysis method Confined aquifer	Date: 04.02.2010	none, Page 1
		Project: PH1292	
		Evaluated by: RAP	

Pumping Test No. 1	Test conducted on: Jan. 13/2010
TW1	
Discharge 1.30 l/s	



Transmissivity [m²/min]: 2.21×10^{-2}

Storativity: 2.21×10^{-3}

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Theis analysis method Confined aquifer	Date: 04.02.2010	none, Page 2
		Project: PH1292	
		Evaluated by: RAP	

Pumping Test No. 1 | Test conducted on: Jan. 13/2010

TW1 | TW1

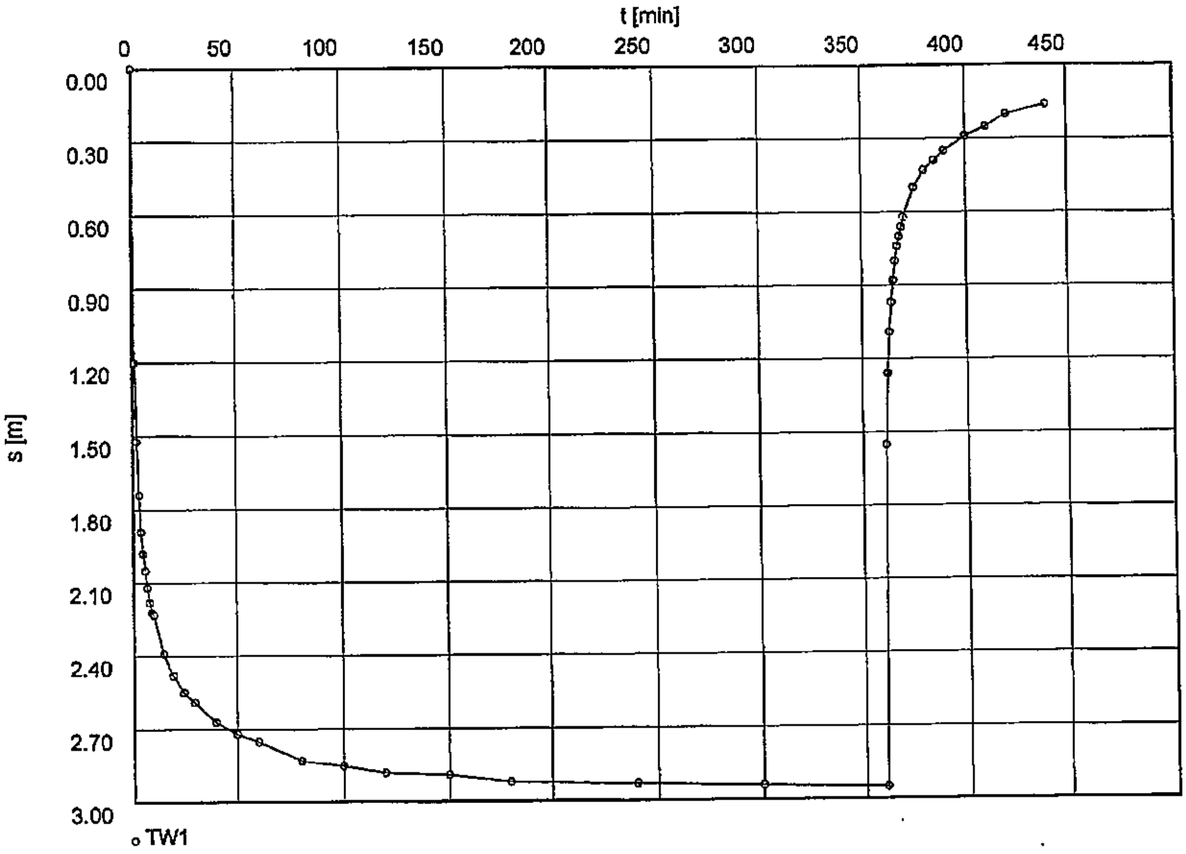
Discharge 1.30 l/s | Distance from the pumping well 0.300 m

Static water level: 2.090 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
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	1.980	
7	6.00	4.140	2.050	
8	7.00	4.210	2.120	
9	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	2.590	
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	
20	100.00	4.940	2.850	
21	120.00	4.970	2.880	
22	150.00	4.980	2.890	
23	180.00	5.010	2.920	
24	240.00	5.020	2.930	
25	300.00	5.030	2.940	
26	360.00	5.040	2.950	

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Time-Drawdown plot	Date: 04.02.2010	none, Page 1
		Project: PH1292	
		Evaluated by: RAP	

Pumping Test No. 1	Test conducted on: Jan. 13/2010
TW1	
Discharge 1.30 l/s	



Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

Pumping test analysis
Time-Drawdown plot

Date: 04.02.2010
none, Page 2
Project: PH1292
Evaluated by: RAP

Pumping Test No. 1
Test conducted on: Jan. 13/2010

TW1
TW1

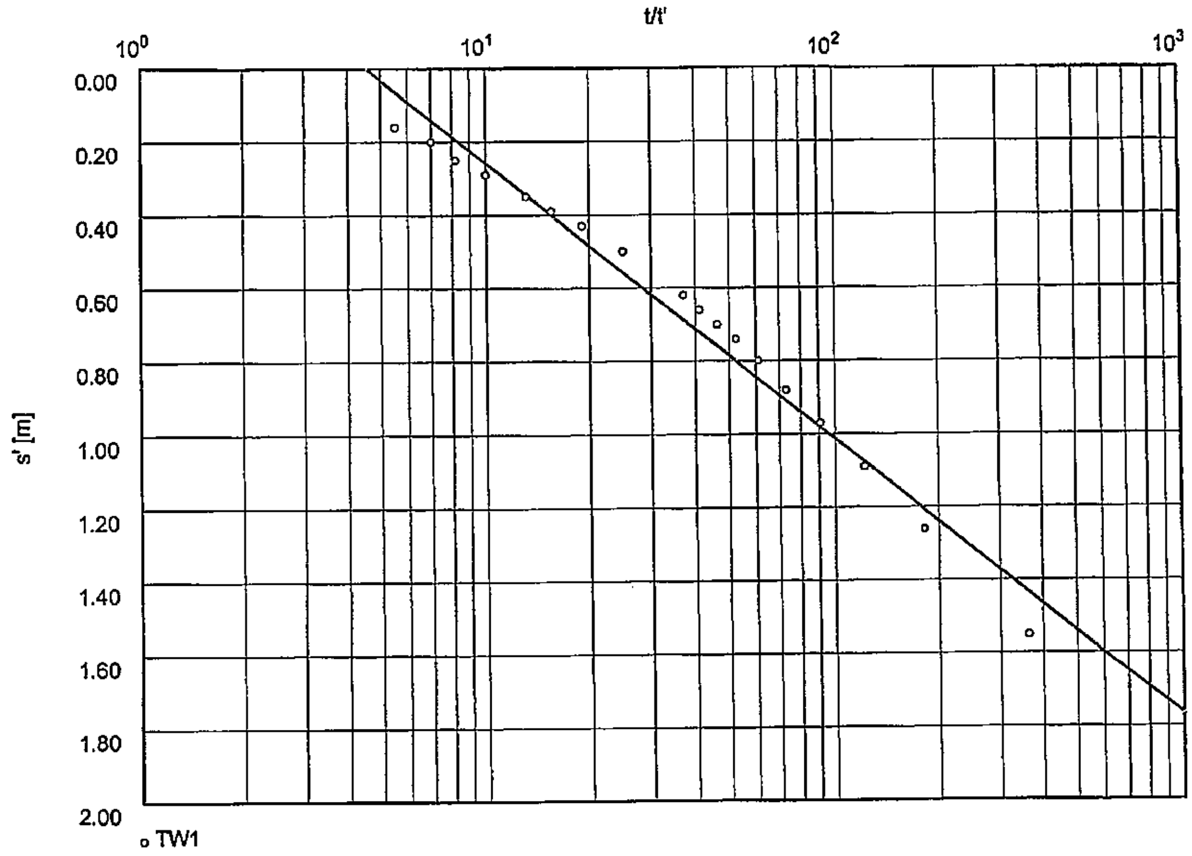
Discharge 1.30 l/s
Distance from the pumping well 0.300 m

Static water level: 2.090 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
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	1.890	
6	5.00	4.070	1.980	
7	6.00	4.140	2.050	
8	7.00	4.210	2.120	
9	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	2.590	
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	
20	100.00	4.940	2.850	
21	120.00	4.970	2.880	
22	150.00	4.980	2.890	
23	180.00	5.010	2.920	
24	240.00	5.020	2.930	
25	300.00	5.030	2.940	
26	360.00	5.040	2.950	
27	361.00	3.640	1.550	
28	362.00	3.350	1.260	
29	363.00	3.180	1.090	
30	364.00	3.060	0.970	
31	365.00	2.970	0.880	
32	366.00	2.890	0.800	
33	367.00	2.830	0.740	
34	368.00	2.790	0.700	
35	369.00	2.750	0.660	
36	370.00	2.710	0.620	
37	375.00	2.590	0.500	
38	380.00	2.520	0.430	
39	385.00	2.480	0.390	
40	390.00	2.440	0.350	
41	400.00	2.380	0.290	
42	410.00	2.340	0.250	
43	420.00	2.290	0.200	
44	440.00	2.250	0.160	

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 04.02.2010	none, Page 1
		Project: PH1292	
		Evaluated by: RAP	

Pumping Test No. 1	Test conducted on: Jan. 13/2010
TW1	
Discharge 1.30 l/s	
	Pumping test duration: 360.00 min



Transmissivity [m²/min]: 1.89×10^{-2}

Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

Pumping test analysis
Recovery method after
THEIS & JACOB
Confined aquifer

Date: 04.02.2010
none, Page 2
Project: PH1292
Evaluated by: RAP

Pumping Test No. 1
Test conducted on: Jan. 13/2010
TW1
TW1
Discharge 1.30 l/s
Distance from the pumping well 0.300 m
Static water level: 2.090 m below datum
Pumping test duration: 360.00 min

	Time from end of pumping [min]	Water level [m]	Residual drawdown [m]	
1	1.00	3.640	1.550	
2	2.00	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	2.710	0.620	
11	15.00	2.590	0.500	
12	20.00	2.520	0.430	
13	25.00	2.480	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	

Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

Pumping test analysis
Time-Drawdown plot
with discharge

Date: 16.11.2009 | none, Page 2
Project: PH1191
Evaluated by: RAP

Pumping Test No. 1 | Test conducted on: Sept. 25, 2009

TW1 | TW1

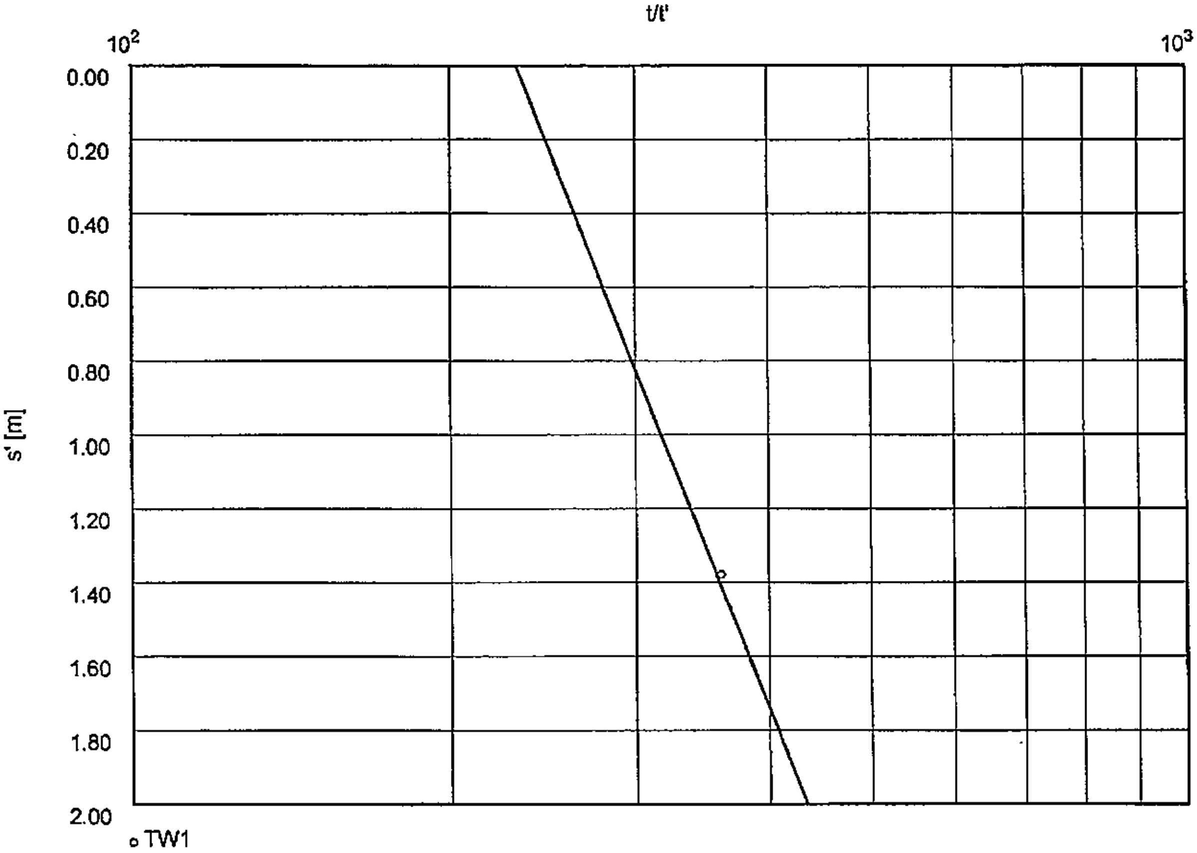
Discharge 1.26 l/s

Static water level: 2.575 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
1	0.00	0.000	-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	5.00	6.185	3.610	
7	6.00	6.645	4.070	
8	7.00	7.050	4.475	
9	8.00	7.230	4.655	
10	9.00	7.455	4.880	
11	10.00	7.755	5.180	
12	15.00	8.290	5.715	
13	20.00	8.520	5.945	
14	25.00	8.640	6.065	
15	30.00	8.700	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	150.00	8.775	6.200	
22	180.00	8.735	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	330.00	8.675	6.100	
28	360.00	8.650	6.075	
29	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	

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 16.11.2009	none, Page 1
		Project: PH1191	
		Evaluated by: RAP	

Pumping Test No. 1	Test conducted on: Sept. 25, 2009
TW1	
Discharge 1.26 l/s	
	Pumping test duration: 360.00 min



Transmissivity [m²/min]: 1.89 x 10^{-3}

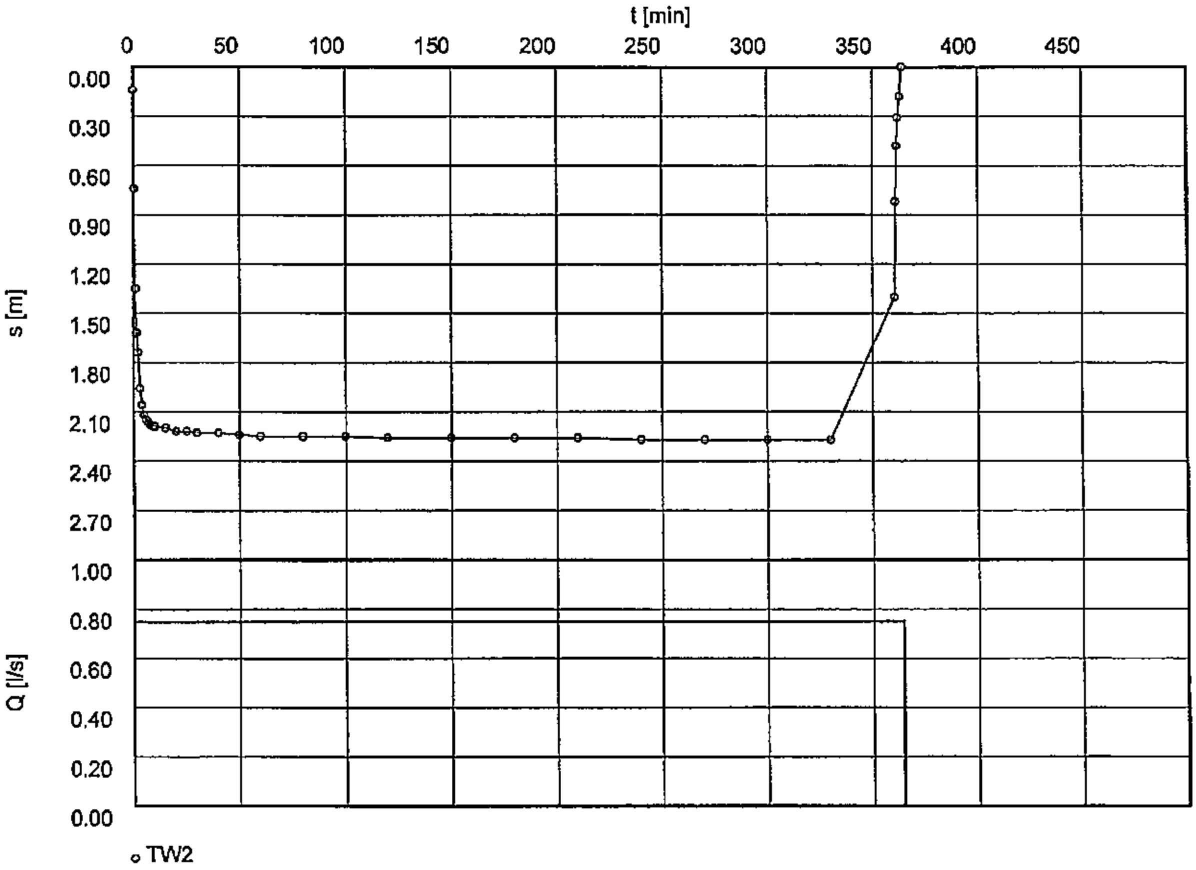
Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 16.11.2009 none, Page 2 Project: PH1191 Evaluated by: RAP

Pumping Test No. 1	Test conducted on: Sept. 25, 2009
TW1	TW1
Discharge 1.26 l/s	
Static water level: 2.575 m below datum	Pumping test duration: 360.00 min

	Time from end of pumping [min]	Water level [m]	Residual drawdown [m]	
1	1.00	3.955	1.380	
2	2.00	1.870	-0.705	
3	3.00	0.505	-2.070	
4	3.50	0.000	-2.575	

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Time-Drawdown plot with discharge	Date: 20.11.2009	none, Page 1
		Project: PH1191	
		Evaluated by: RAP	

Pumping Test No. 1	Test conducted on: October 21, 2009
TW2	
Discharge 0.75 l/s	



Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

Pumping test analysis
Time-Drawdown plot
with discharge

Date: 20.11.2009
none, Page 2
Project: PH1191
Evaluated by: RAP

Pumping Test No. 1
Test conducted on: October 21, 2009

TW2
TW2

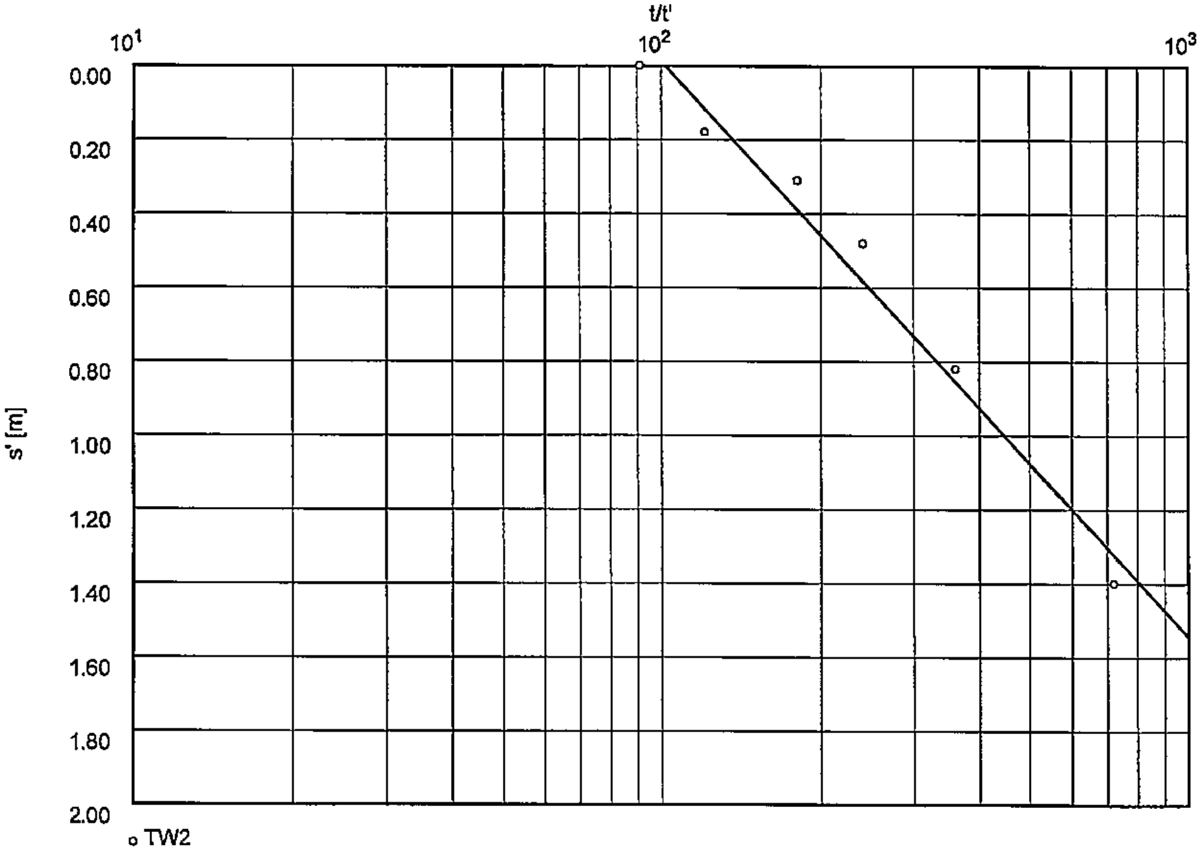
Discharge 0.75 l/s

Static water level: 0.000 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
1	0.00	0.140	0.140	
2	0.50	0.740	0.740	
3	1.00	1.350	1.350	
4	1.50	1.620	1.620	
5	2.00	1.740	1.740	
6	3.00	1.960	1.960	
7	4.00	2.060	2.060	
8	5.00	2.120	2.120	
9	6.00	2.150	2.150	
10	7.00	2.170	2.170	
11	8.00	2.180	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	25.00	2.220	2.220	
17	30.00	2.230	2.230	
18	40.00	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	120.00	2.260	2.260	
24	150.00	2.260	2.260	
25	180.00	2.260	2.260	
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	330.00	2.270	2.270	
31	360.50	1.400	1.400	
32	361.00	0.820	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	

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 20.11.2009 Project: PH1191 Evaluated by: RAP	none, Page 1

Pumping Test No. 1	Test conducted on: October 21, 2009
TW2	
Discharge 0.75 l/s	
	Pumping test duration: 360.00 min



Transmissivity [m²/min]: 5.29×10^{-3}

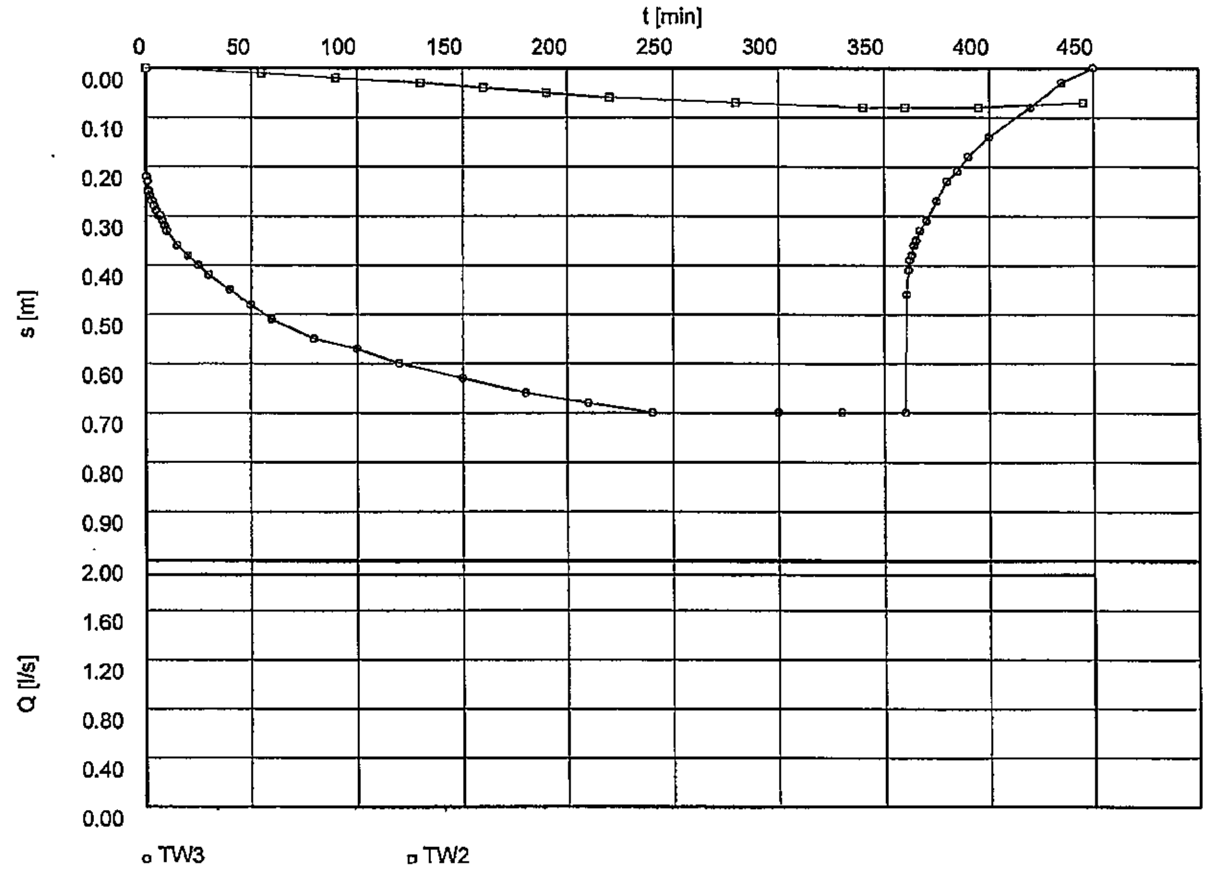
Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 20.11.2009 Project: PH1191 Evaluated by: RAP	none, Page 2

Pumping Test No. 1	Test conducted on: October 21, 2009
TW2	TW2
Discharge 0.75 l/s	
Static water level: 0.000 m below datum	Pumping test duration: 360.00 min

	Time from end of pumping [min]	Water level [m]	Residual drawdown [m]	
1	0.50	1.400	1.400	
2	1.00	0.820	0.820	
3	1.50	0.480	0.480	
4	2.00	0.310	0.310	
5	3.00	0.180	0.180	
6	4.00	0.000	0.000	

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Time-Drawdown plot with discharge	Date: 20.11.2009	none, Page 1
		Project: PH1191	
		Evaluated by: RAP	

Pumping Test No. 1	Test conducted on: October 20, 2009
TW3	
Discharge 1.89 l/s	



Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

Pumping test analysis
Time-Drawdown plot
with discharge

Date: 20.11.2009

none, Page 2

Project: PH1191

Evaluated by: RAP

Pumping Test No. 1

Test conducted on: October 20, 2009

TW3

TW3

Discharge 1.89 l/s

Static water level: 0.000 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
1	0.00	0.000	0.000	
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	3.00	0.270	0.270	
7	4.00	0.280	0.280	
8	5.00	0.290	0.290	
9	6.00	0.300	0.300	
10	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	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	60.00	0.510	0.510	
21	80.00	0.550	0.550	
22	100.00	0.570	0.570	
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	240.00	0.700	0.700	
28	300.00	0.700	0.700	
29	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	362.00	0.390	0.390	
34	363.00	0.380	0.380	
35	364.00	0.360	0.360	
36	365.00	0.350	0.350	
37	367.00	0.330	0.330	
38	370.00	0.310	0.310	
39	375.00	0.270	0.270	
40	380.00	0.230	0.230	
41	385.00	0.210	0.210	
42	390.00	0.180	0.180	
43	400.00	0.140	0.140	
44	420.00	0.080	0.080	
45	435.00	0.030	0.030	
46	450.00	0.000	0.000	

Pumping test analysis
Time-Drawdown plot
with discharge

Date: 20.11.2009

Project: PH1191

Evaluated by: RAP

Pumping Test No. 1

Test conducted on: October 20, 2009

TW3

TW2

Discharge 1.89 l/s

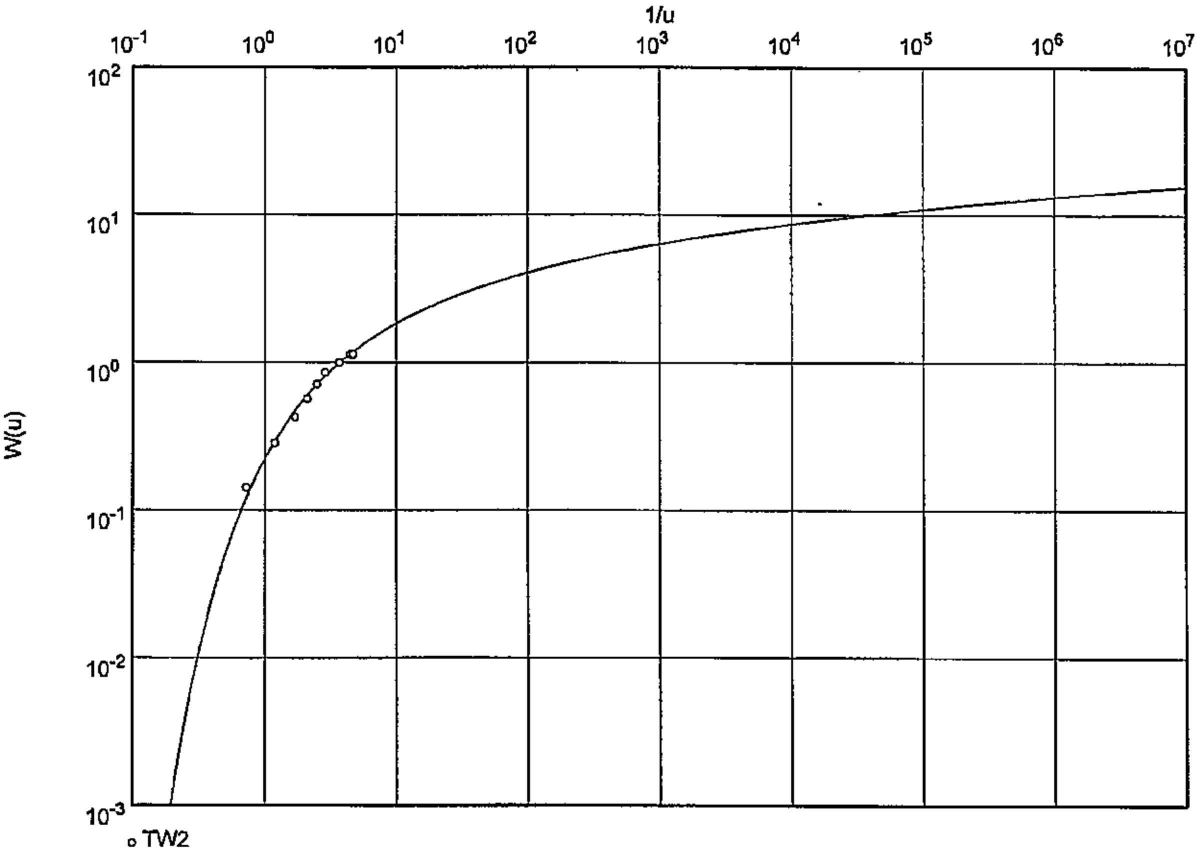
Distance from the pumping well 376.000 m

Static water level: 0.100 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [m]	
1	0.00	0.100	0.000	
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	
8	280.00	0.170	0.070	
9	340.00	0.180	0.080	
10	360.00	0.180	0.080	
11	395.00	0.180	0.080	
12	445.00	0.170	0.070	

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Theis analysis method Confined aquifer	Date: 20.11.2009	none, Page 1
		Project: PH1191	
		Evaluated by: RAP	

Pumping Test No. 1	Test conducted on: October 20, 2009
TW3	
Discharge 1.89 l/s	



Transmissivity [m²/min]: 1.27×10^{-1}

Storativity: 2.72×10^{-4}

Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

Pumping test analysis
Theis analysis method
Confined aquifer

Date: 20.11.2009
none, Page 2
Project: PH1191
Evaluated by: RAP

Pumping Test No. 1
Test conducted on: October 20, 2009

TW3
TW3

Discharge 1.89 l/s

Static water level: 0.000 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [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	3.00	0.270	0.270	
7	4.00	0.280	0.280	
8	5.00	0.290	0.290	
9	6.00	0.300	0.300	
10	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	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	60.00	0.510	0.510	
21	80.00	0.550	0.550	
22	100.00	0.570	0.570	
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	240.00	0.700	0.700	
28	300.00	0.700	0.700	
29	330.00	0.700	0.700	
30	360.00	0.700	0.700	

Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

Pumping test analysis
Time-Drawdown-method after
COOPER & JACOB
Confined aquifer

Date: 20.11.2009

none, Page 1

Project: PH1191

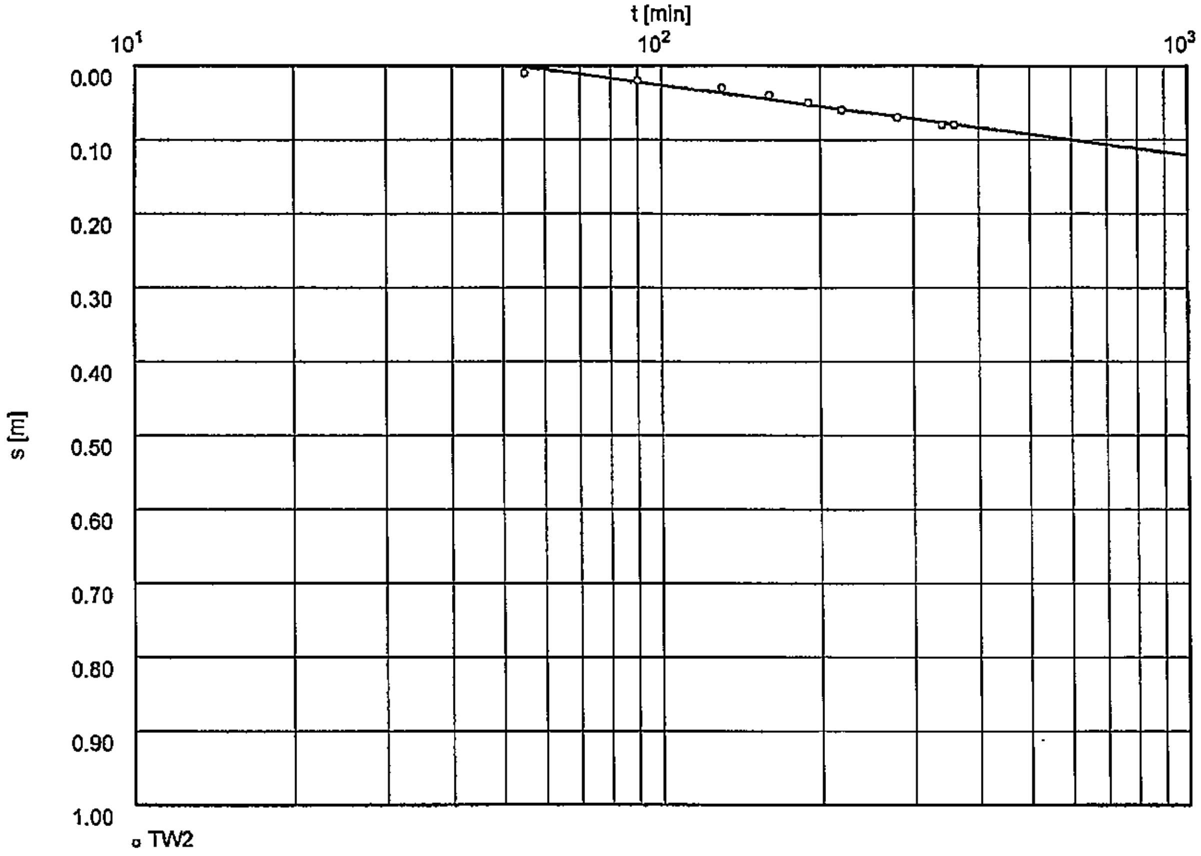
Evaluated by: RAP

Pumping Test No. 1

Test conducted on: October 20, 2009

TW3

Discharge 1.89 l/s



Transmissivity [m²/min]: 2.18 x 10^{-1}

Storativity: 1.85 x 10^{-4}

Waterloo Hydrogeologic
180 Columbia St. W.
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ph.(519)746-1798

Pumping test analysis
Theis analysis method
Confined aquifer

Date: 20.11.2009
none, Page 3
Project: PH1191
Evaluated by: RAP

Pumping Test No. 1

Test conducted on: October 20, 2009

TW3

TW2

Discharge 1.89 l/s

Distance from the pumping well 376.000 m

Static water level: 0.100 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [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	
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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ph.(519)746-1798

Pumping test analysis
Time-Drawdown-method after
COOPER & JACOB
Confined aquifer

Date: 20.11.2009
none, Page 2
Project: PH1191
Evaluated by: RAP

Pumping Test No. 1
Test conducted on: October 20, 2009

TW3
TW3

Discharge 1.89 l/s

Static water level: 0.000 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [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	3.00	0.270	0.270	
7	4.00	0.280	0.280	
8	5.00	0.290	0.290	
9	6.00	0.300	0.300	
10	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	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	60.00	0.510	0.510	
21	80.00	0.550	0.550	
22	100.00	0.570	0.570	
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	240.00	0.700	0.700	
28	300.00	0.700	0.700	
29	330.00	0.700	0.700	
30	360.00	0.700	0.700	

Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

Pumping test analysis
Time-Drawdown-method after
COOPER & JACOB
Confined aquifer

Date: 20.11.2009
none, Page 3
Project: PH1191
Evaluated by: RAP

Pumping Test No. 1

Test conducted on: October 20, 2009

TW3

TW2

Discharge 1.89 l/s

Distance from the pumping well 376.000 m

Static water level: 0.100 m below datum

	Pumping test duration [min]	Water level [m]	Drawdown [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	
8	280.00	0.170	0.070	
9	340.00	0.180	0.080	
10	360.00	0.180	0.080	

Waterloo Hydrogeologic
180 Columbia St. W.
Waterloo,Ontario,Canada
ph.(519)746-1798

Pumping test analysis
Recovery method after
THEIS & JACOB
Confined aquifer

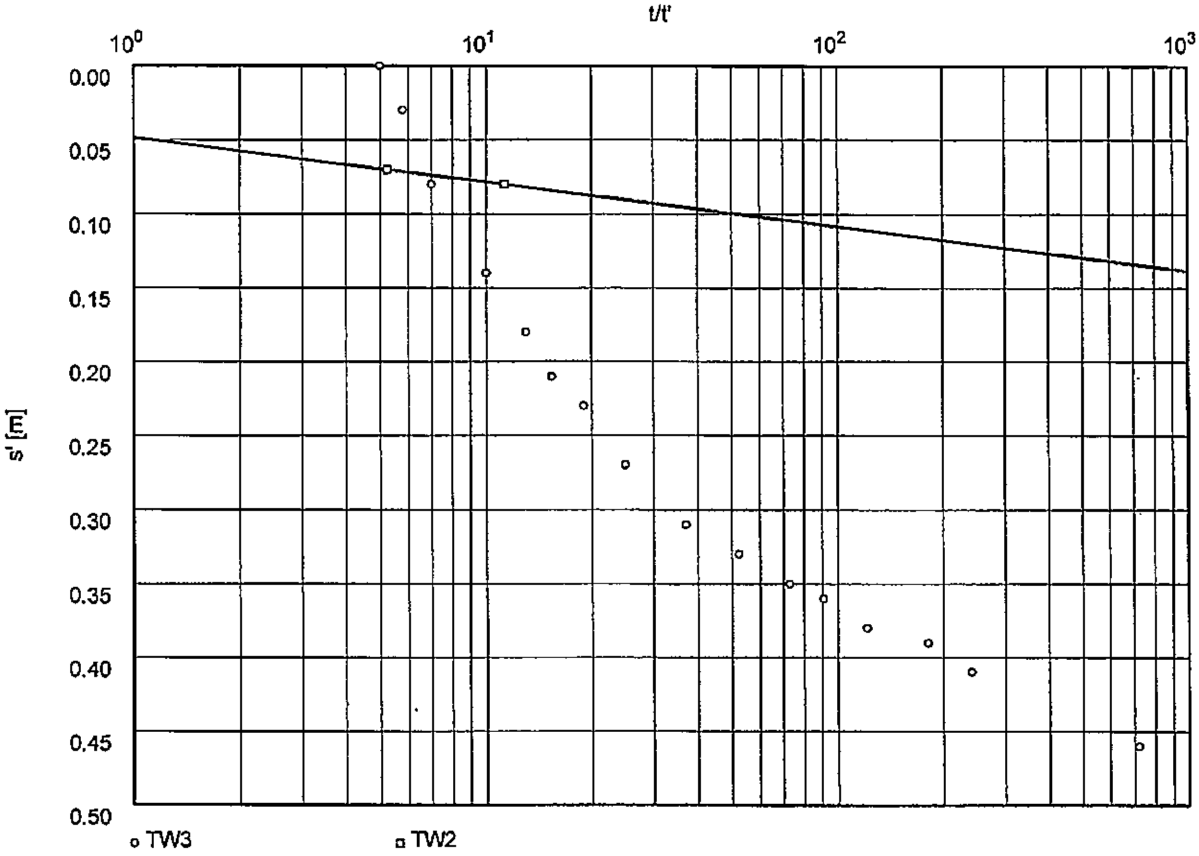
Date: 20.11.2009
none, Page 1
Project: PH1191
Evaluated by: RAP

Pumping Test No. 1
Test conducted on: October 20, 2009

TW3

Discharge 1.89 l/s

Pumping test duration: 360.00 min



Transmissivity [m²/min]: 6.92 x 10^{-1}

Waterloo Hydrogeologic
180 Columbia St. W.
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ph.(519)746-1798

Pumping test analysis
Recovery method after
THEIS & JACOB
Confined aquifer

Date: 20.11.2009
none, Page 2
Project: PH1191
Evaluated by: RAP

Pumping Test No. 1
Test conducted on: October 20, 2009

TW3
TW3

Discharge 1.89 l/s

Static water level: 0.000 m below datum
Pumping test duration: 360.00 min

	Time from end of pumping [min]	Water level [m]	Residual drawdown [m]	
1	0.50	0.460	0.460	
2	1.50	0.410	0.410	
3	2.00	0.390	0.390	
4	3.00	0.380	0.380	
5	4.00	0.360	0.360	
6	5.00	0.350	0.350	
7	7.00	0.330	0.330	
8	10.00	0.310	0.310	
9	15.00	0.270	0.270	
10	20.00	0.230	0.230	
11	25.00	0.210	0.210	
12	30.00	0.180	0.180	
13	40.00	0.140	0.140	
14	60.00	0.080	0.080	
15	75.00	0.030	0.030	
16	90.00	0.000	0.000	

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Recovery method after THEIS & JACOB Confined aquifer	Date: 20.11.2009	none, Page 3
		Project: PH1191	
		Evaluated by: RAP	

Pumping Test No. 1

Test conducted on: October 20, 2009

TW3

TW2

Discharge 1.89 l/s

Distance from the pumping well 376.000 m

Static water level: 0.100 m below datum

Pumping test duration: 360.00 min

	Time from end of pumping [min]	Water level [m]	Residual drawdown [m]	
1	35.00	0.180	0.080	
2	85.00	0.170	0.070	

TW4

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: PH1292

Client:

Location:

Pumping Test: Pumping Test 1

Pumping Well: TW4

Test Conducted by:

Test Date: 8/26/2011

Discharge Rate: 1.26 [l/s]

Observation Well: TW4

Static Water Level [m]: 2.09

Radial Distance to PW [m]: -

	Time [min]	Water Level [m]	Drawdown [m]
1	0	2.09	0.00
2	1	4.49	2.40
3	2	5.97	3.88
4	3	6.16	4.07
5	4	6.57	4.48
6	5	6.86	4.77
7	6	7.04	4.95
8	7	7.17	5.08
9	8	7.27	5.18
10	9	7.30	5.21
11	10	7.33	5.24
12	15	7.43	5.34
13	20	7.46	5.37
14	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
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
26	420	7.37	5.28
27	480	7.36	5.27
28	540	7.38	5.29
29	541	3.89	1.80
30	542	2.91	0.82
31	543	2.63	0.54
32	544	2.55	0.46
33	545	2.52	0.43
34	546	2.51	0.42
35	550	2.46	0.37
36	555	2.44	0.35
37	560	2.41	0.32
38	565	2.40	0.31
39	580	2.35	0.26

TW4

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: PH1292
	Client:

Location:	Pumping Test: Pumping Test 1	Pumping Well: TW4
Test Conducted by:	Test Date: 8/26/2011	Discharge Rate: 1.26 [l/s]
Observation Well: TW1	Static Water Level [m]: 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

TW4

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: PH1292

Client:

Location:	Pumping Test: Pumping Test 1	Pumping Well: TW4
Test Conducted by:	Test Date: 8/26/2011	Discharge Rate: 1.26 [l/s]
Observation Well: TW2	Static Water Level [m]: 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

TW4

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: PH1292

Client:

Location:

Pumping Test: Pumping Test 1

Pumping Well: TW4

Test Conducted by:

Test Date: 8/26/2011

Discharge Rate: 1.26 [l/s]

Observation Well: TW3

Static Water Level [m]: 2.14

Radial Distance to PW [m]: 29.27

	Time [min]	Water Level [m]	Drawdown [m]
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

TW4

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: PH1292

Client:

Location:

Pumping Test: Pumping Test 1

Pumping Well: TW4

Test Conducted by:

Test Date: 8/26/2011

Discharge Rate: 1.26 [l/s]

Observation Well: TW5

Static Water Level [m]: 2.20

Radial Distance to PW [m]: 97.19

	Time [min]	Water Level [m]	Drawdown [m]
1	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
11	580	2.37	0.17

TW4

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: PH1292 Client:

Location:	Pumping Test: Pumping Test 1	Pumping Well: TW4
Test Conducted by:	Test Date: 8/26/2011	Discharge Rate: 1.26 [l/s]
Observation Well: EW	Static Water Level [m]: 2.11	Radial Distance to PW [m]: 82.16

	Time [min]	Water Level [m]	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
6	300	2.17	0.06
7	360	2.16	0.05
8	420	2.18	0.07
9	480	2.265	0.155
10	540	2.18	0.07
11	580	2.22	0.11

TW4

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: PH1292

Client:

Location:

Pumping Test: Pumping Test 1

Pumping Well: TW4

Test Conducted by:

Test Date: 8/26/2011

Discharge Rate: 1.26 [l/s]

Observation Well: 13Cock

Static Water Level [m]: 3.29

Radial Distance to PW [m]: 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

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: PH1292

Client:

Location:

Pumping Test: Pumping Test 1

Pumping Well: TW4

Test Conducted by:

Test Date: 8/26/2011

Discharge Rate: 1.26 [l/s]

Observation Well: 6King

Static Water Level [m]: 4.06

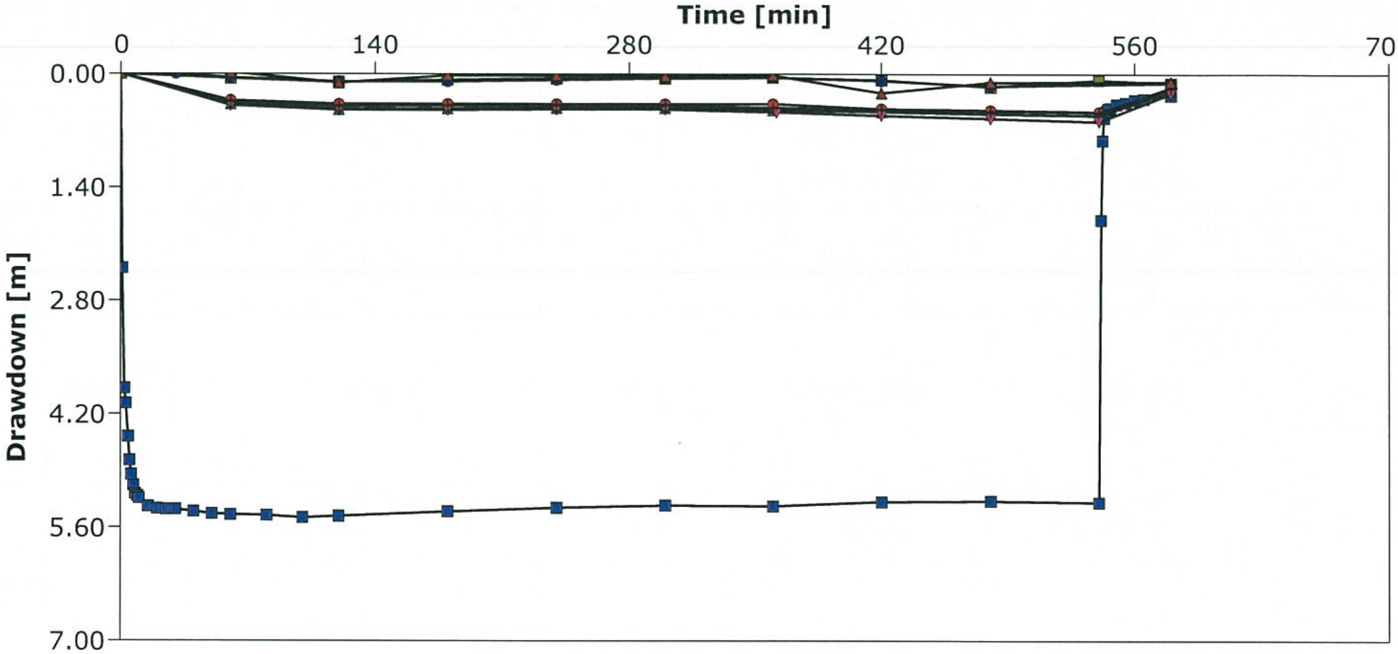
Radial Distance to PW [m]: 95.71

	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** **Ottawa, Ontario K2E 7J5**	**Pumping Test Analysis Report** Project: Talos- Deep Well Analysis Number: PH1292 Client:

Location:	Pumping Test: Pumping Test 1	Pumping Well: TW4
Test Conducted by:		Test Date: 8/26/2011
Analysis Performed by:	Time-Drawdown Analysis (TW4)	Analysis Date: 10/23/2013
Aquifer Thickness:	Discharge Rate: 1.26 [l/s]	



TW4

Paterson Group Inc.
154 Colonnade Road South
Ottawa, Ontario K2E 7J5

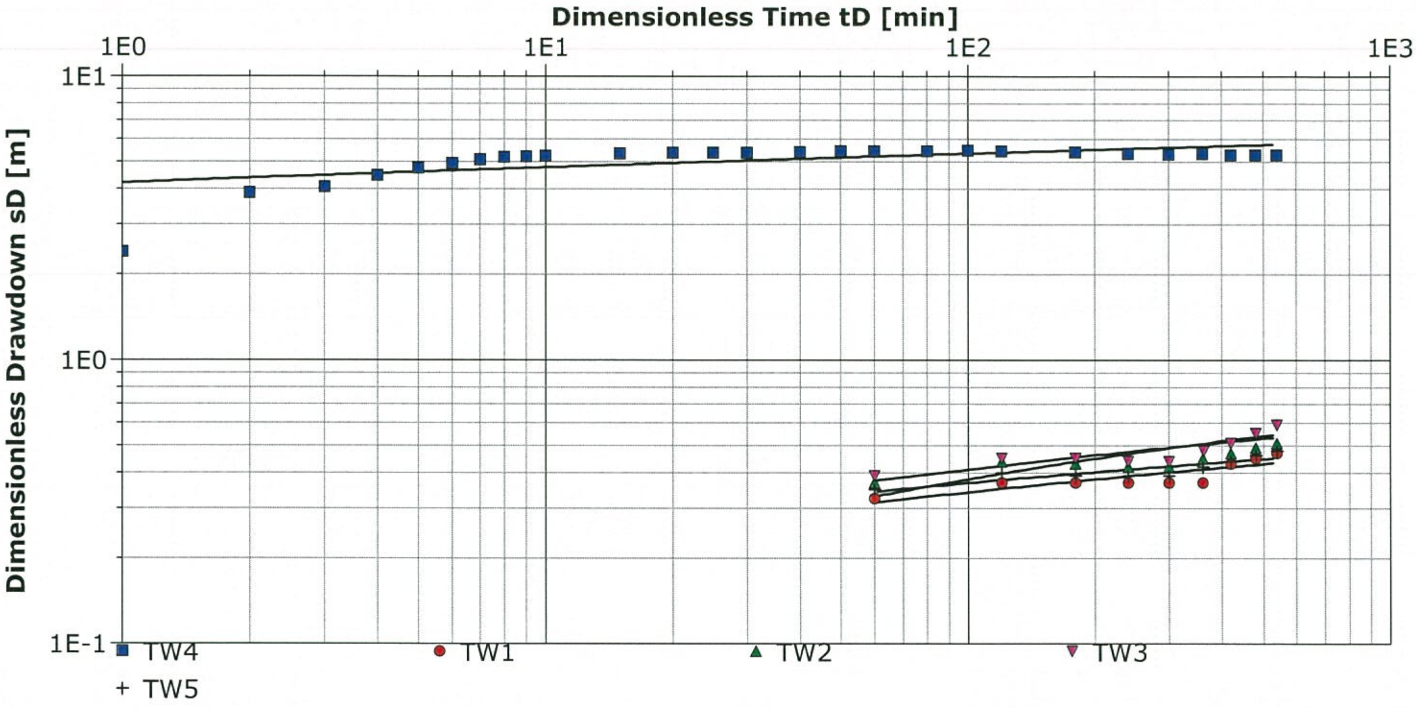
Pumping Test Analysis Report

Project: Talos- Deep Well Analysis

Number: PH1292

Client:

Location:	Pumping Test: Pumping Test 1	Pumping Well: TW4
Test Conducted by:		Test Date: 8/26/2011
Analysis Performed by:	Theis	Analysis Date: 10/23/2013
Aquifer Thickness:	Discharge Rate: 1.26 [l/s]	



Calculation using Theis

Observation Well	Transmissivity [m²/d]	Storage coefficient	Radial Distance to PW [m]	
TW4	3.51×10^{1}	3.91×10^{-7}	0.07	
TW1	1.59×10^{2}	1.48×10^{-5}	56.26	
TW2	8.64×10^{1}	1.00×10^{-4}	55.54	
TW3	1.19×10^{2}	7.56×10^{-5}	29.27	
TW5	1.77×10^{2}	1.57×10^{-6}	97.19	
Average	1.15×10^{2}	3.85×10^{-5}		

TW4

Paterson Group Inc.
154 Colonnade Road South
Ottawa, Ontario K2E 7J5

Pumping Test Analysis Report

Project: Talos- Deep Well Analysis

Number: PH1292

Client:

Location:

Pumping Test: Pumping Test 1

Pumping Well: TW4

Test Conducted by:

Test Date: 8/26/2011

Aquifer Thickness:

Discharge Rate: 1.26 [l/s]

	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well	T [m²/d]	S
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}

TW5

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154 Colonnade Road South
Ottawa, Ontario, K2E 7J5

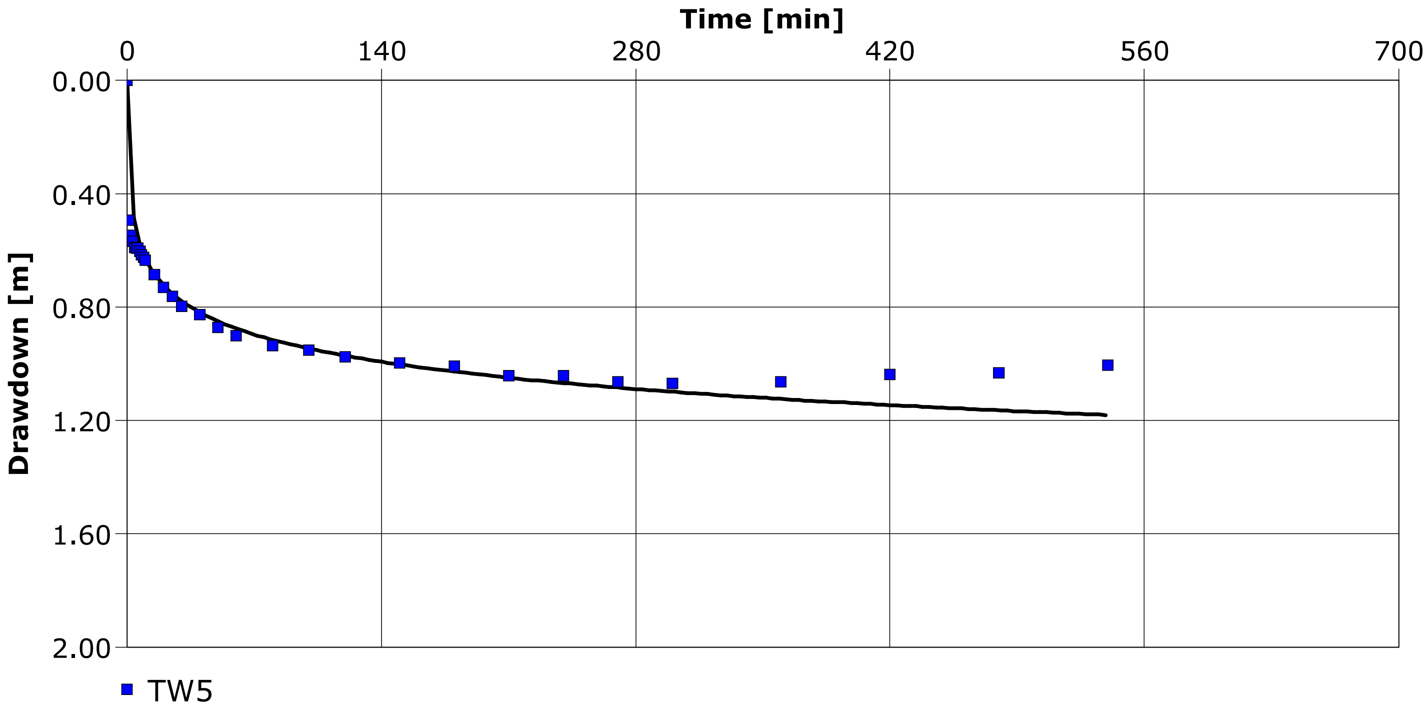
Pumping Test Analysis Report

Project: 11 King Street

Number: PH1292

Client: Toscano Land Corp

Location: Richmond ON	Pumping Test: Pumping Test at TW5	Pumping Well: TW5
Test Conducted by: RP		Test Date: 30/09/2011
Analysis Performed by:	Theis (linear)	Analysis Date: 01/12/2015
Aquifer Thickness: 15.00 m	Discharge Rate: 1.36 [l/s]	



Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
TW5	6.72×10^{1}	4.48×10^{0}		0.25	

TW5

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154 Colonnade Road South
Ottawa, Ontario, K2E 7J5

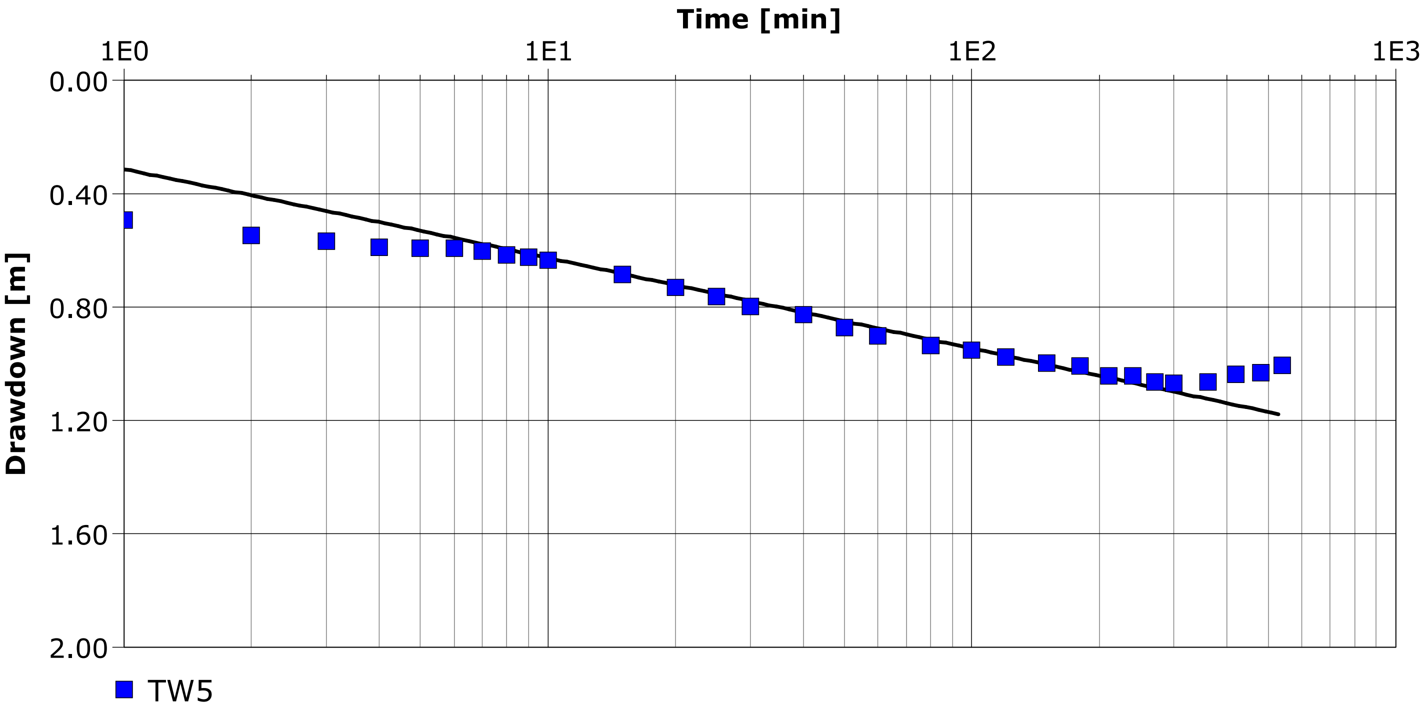
Pumping Test Analysis Report

Project: 11 King Street

Number: PH1292

Client: Toscano Land Corp

Location: Richmond ON	Pumping Test: Pumping Test at TW5	Pumping Well: TW5
Test Conducted by: RP		Test Date: 30/09/2011
Analysis Performed by:	Theis (semi log)	Analysis Date: 19/11/2015
Aquifer Thickness: 15.00 m	Discharge Rate: 1.36 [l/s]	



Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
TW5	6.72×10^1	4.48×10^0		0.25	

TW5

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154 Colonnade Road South
Ottawa, Ontario, K2E 7J5

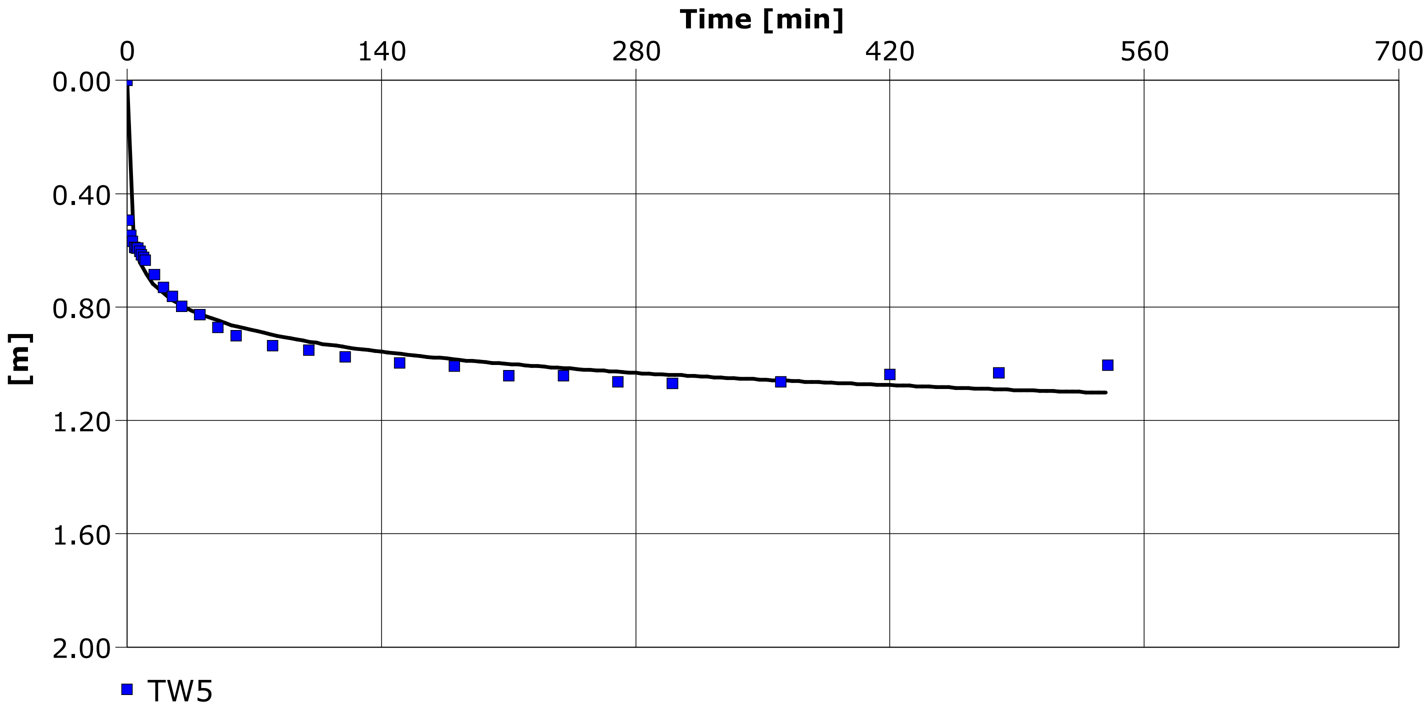
Pumping Test Analysis Report

Project: 11 King Street

Number: PH1292

Client: Toscano Land Corp

Location: Richmond ON	Pumping Test: Pumping Test at TW5	Pumping Well: TW5
Test Conducted by: RP		Test Date: 30/09/2011
Analysis Performed by:	Theis Jacob (linear)	Analysis Date: 19/11/2015
Aquifer Thickness: 15.00 m	Discharge Rate: 1.36 [l/s]	



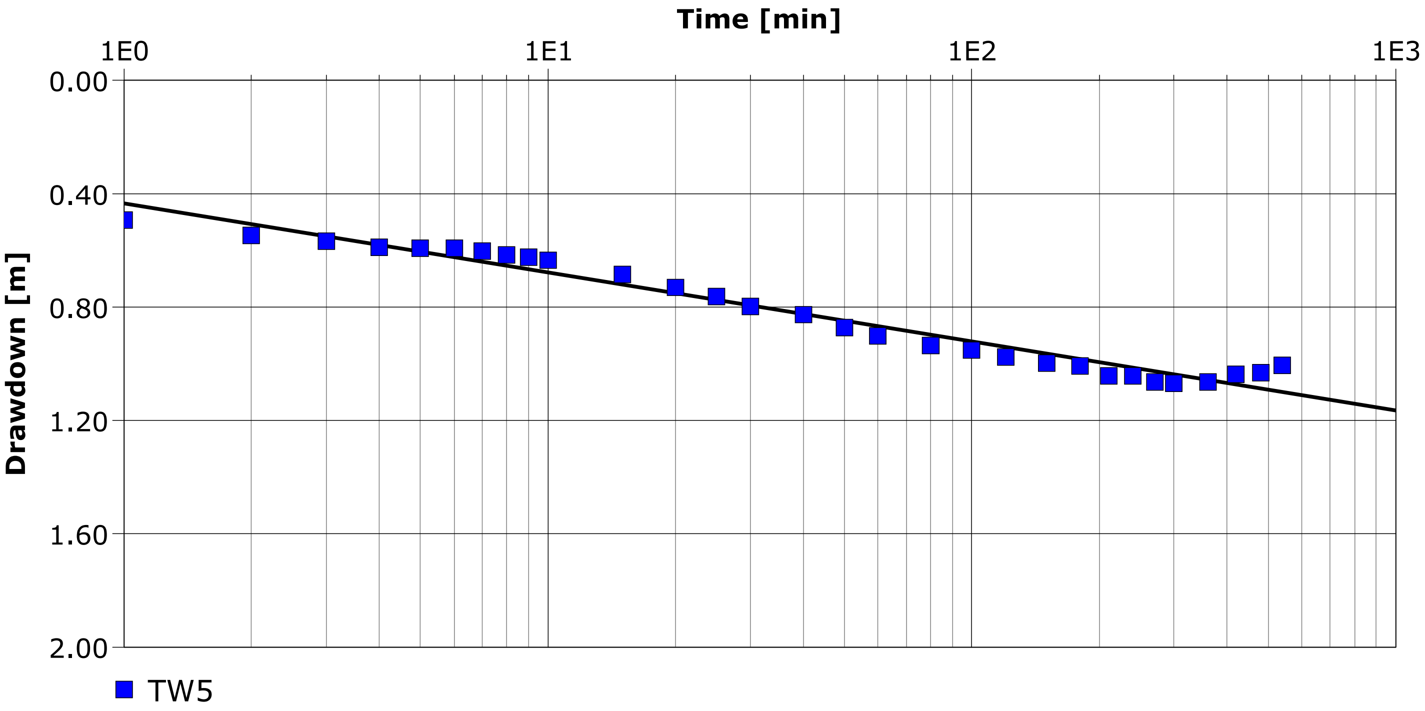
Calculation using Theis with Jacob Correction

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
TW5	9.33×10^1	6.22×10^0		0.25	

TW5

patersongroup hydrogeology 154 Colonnade Road South Ottawa, Ontario, K2E 7J5	**Pumping Test Analysis Report** Project: 11 King Street Number: PH1292 Client: Toscano Land Corp

Location: Richmond ON	Pumping Test: Pumping Test at TW5	Pumping Well: TW5
Test Conducted by: RP		Test Date: 30/09/2011
Analysis Performed by:	Cooper Jacob I	Analysis Date: 20/11/2015
Aquifer Thickness: 15.00 m	Discharge Rate: 1.36 [l/s]	



Calculation using COOPER & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
TW5	8.83×10^{1}	5.89×10^{0}		0.25	

TW5

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154 Colonnade Road South
Ottawa, Ontario, K2E 7J5

Pumping Test Analysis Report

Project: 11 King Street

Number: PH1292

Client: Toscano Land Corp

Location: Richmond ON

Pumping Test: Pumping Test at TW5

Pumping Well: TW5

Test Conducted by: RP

Test Date: 30/09/2011

Aquifer Thickness: 15.00 m

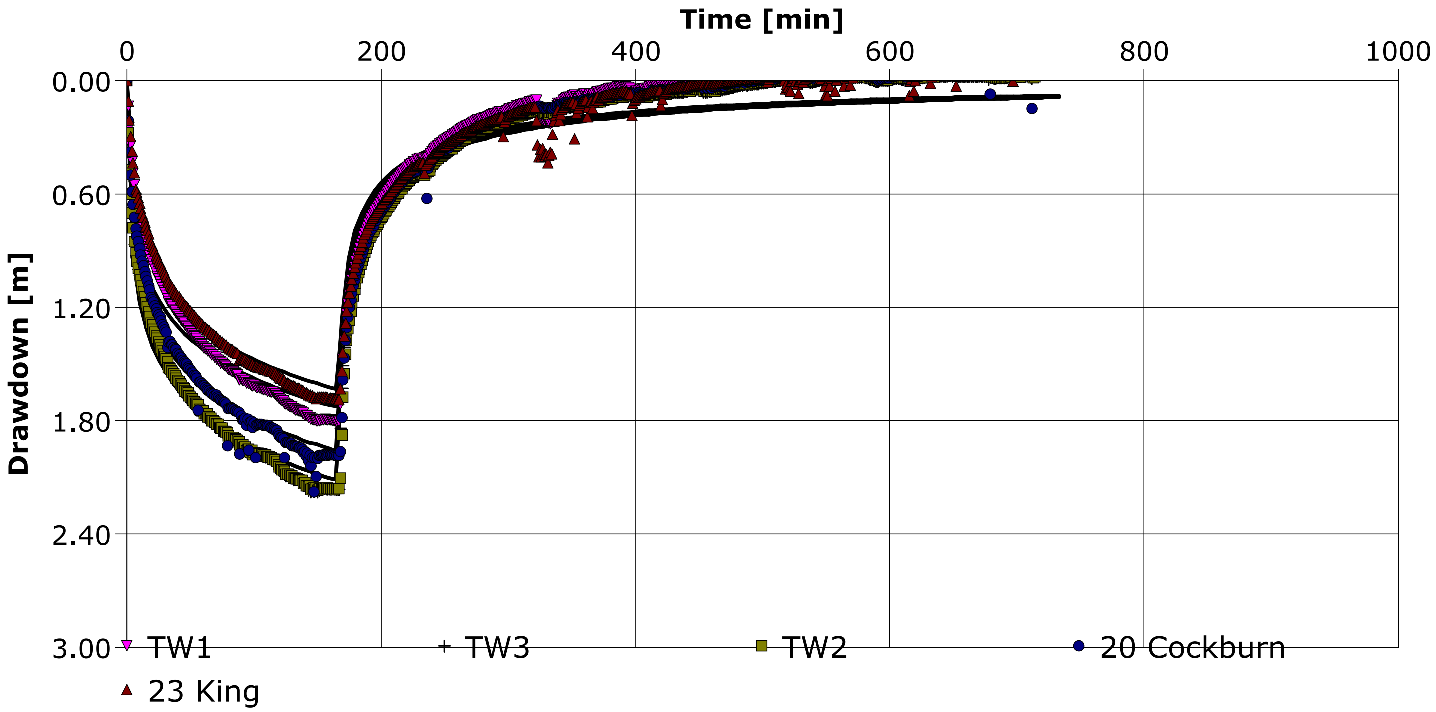
Discharge Rate: 1.36 [l/s]

	Analysis Name	Analysis Performed by	Analysis Date	Method 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 with Jacob Correc	TW5	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 with Jacob Correc	TW5	9.33×10^{1}	6.22×10^{0}	NAN
					Average	8.19×10^{1}	5.46×10^{0}	NAN

SIMULTANEOUS TEST

Paterson Group Consulting Engineers 154 Colonnade Road South Ottawa - Ontario - K2E 7J5	**Pumping Test Analysis Report**
	Project: 11 King St
	Number: PH1292
	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	Analysis Date: 28/10/2015
Aquifer Thickness: 15.00 m		



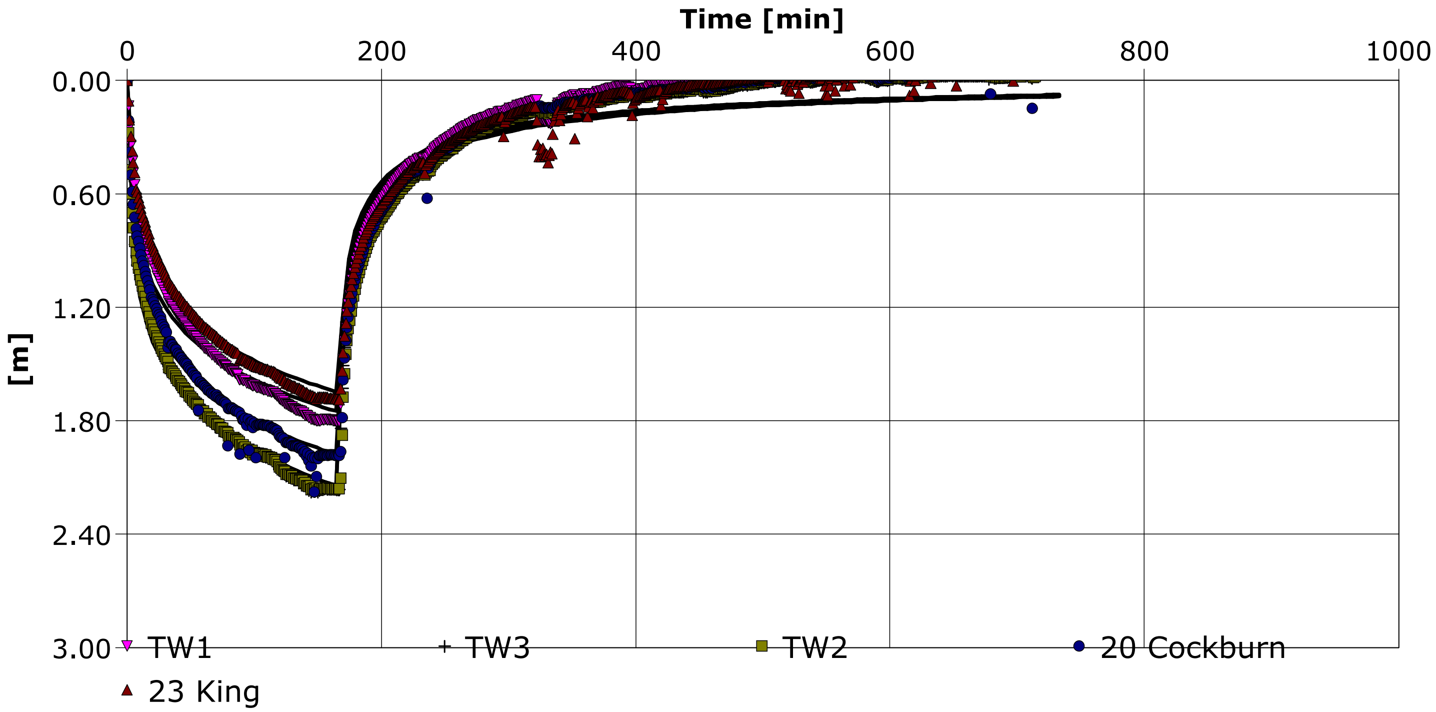
Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	
TW1	1.13×10^{2}	7.55×10^{0}	2.25×10^{-5}	
TW3	1.00×10^{2}	6.69×10^{0}	1.50×10^{-5}	
TW2	1.00×10^{2}	6.67×10^{0}	3.12×10^{-5}	
20 Cockburn	1.02×10^{2}	6.79×10^{0}	9.70×10^{-6}	
23 King	1.08×10^{2}	7.17×10^{0}	1.11×10^{-5}	
Average	1.05×10^{2}	6.97×10^{0}	1.79×10^{-5}	

SIMULTANEOUS TEST

Paterson Group Consulting Engineers 154 Colonnade Road South Ottawa - Ontario - K2E 7J5	**Pumping Test Analysis Report** Project: 11 King St Number: PH1292 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 with Jacob correction	Analysis Date: 29/10/2015
Aquifer Thickness: 15.00 m		



Calculation using Theis with Jacob Correction

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	
TW1	1.16×10^{2}	7.75×10^{0}	2.58×10^{-5}	
TW3	1.06×10^{2}	7.04×10^{0}	1.68×10^{-5}	
TW2	1.04×10^{2}	6.91×10^{0}	3.75×10^{-5}	
20 Cockburn	1.09×10^{2}	7.28×10^{0}	9.75×10^{-6}	
23 King	1.15×10^{2}	7.65×10^{0}	1.09×10^{-5}	
Average	1.10×10^{2}	7.33×10^{0}	2.02×10^{-5}	

SIMULTANEOUS TEST

Paterson Group
Consulting Engineers
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5

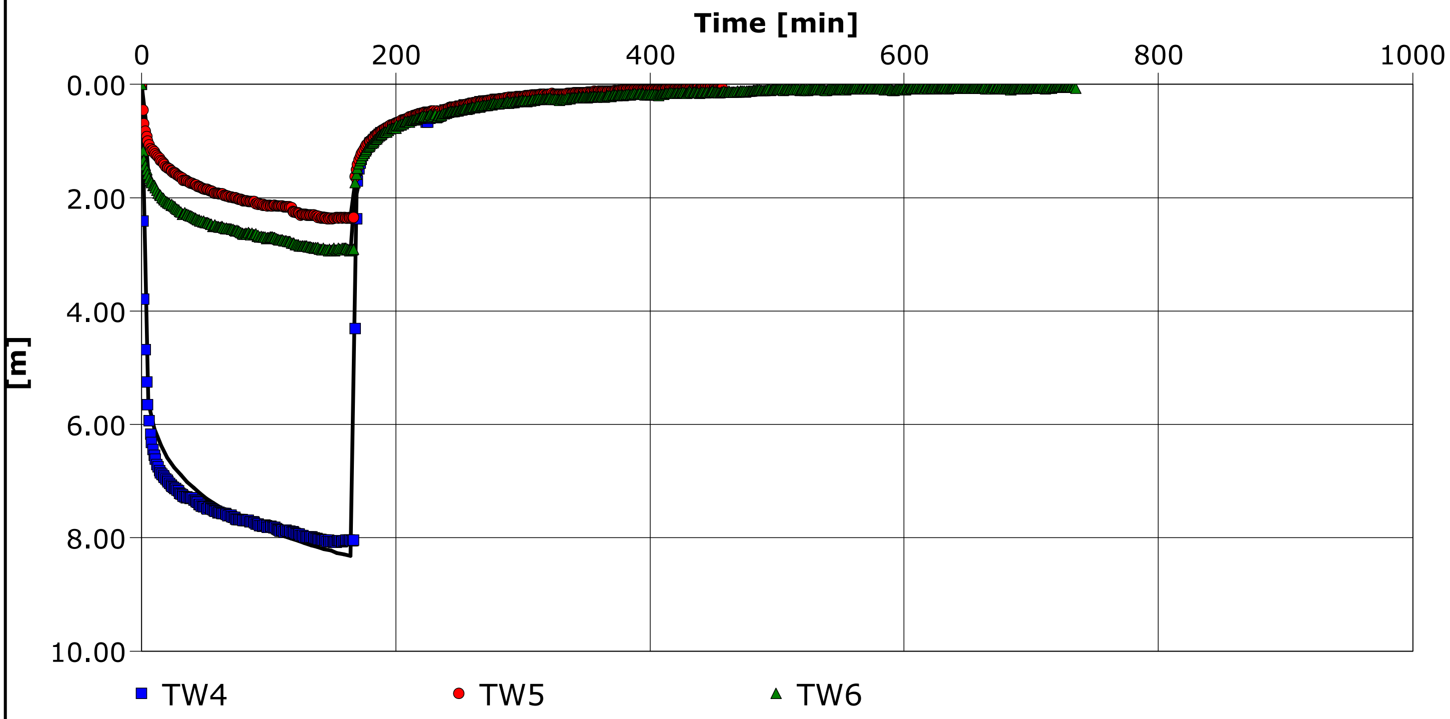
Pumping Test Analysis Report

Project: 11 King St

Number: PH1292

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		



Calculation using Theis with Jacob Correction

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	
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		

SIMULTANEOUS TEST

Paterson Group
Consulting Engineers
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5

Pumping Test Analysis Report

Project: 11 King St

Number: PH1292

Client: Talos

Location: Richmond ON

Pumping Test: Simultaneous Test

Pumping Well: TW4, TW5, TW6

Test Conducted by: RAP

Test Date: 31/10/2014

Aquifer 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 correction		29/10/2015	Theis with Jacob Correc	TW1	1.16×10^{2}	7.75×10^{0}	2.58×10^{-5}
7	Theis with Jacob correction		29/10/2015	Theis with Jacob Correc	TW3	1.06×10^{2}	7.04×10^{0}	1.68×10^{-5}
8	Theis with Jacob correction		29/10/2015	Theis with Jacob Correc	TW2	1.04×10^{2}	6.91×10^{0}	3.75×10^{-5}
9	Theis with Jacob correction		29/10/2015	Theis with Jacob Correc	20 Cockburn	1.09×10^{2}	7.28×10^{0}	9.75×10^{-6}
10	Theis with Jacob correction		29/10/2015	Theis with Jacob Correc	23 King	1.15×10^{2}	7.65×10^{0}	1.09×10^{-5}
11	Theis Jacob (TW4, TW5, TW6)		24/11/2015	Theis with Jacob Correc	TW4	8.17×10^{1}	5.45×10^{0}	NAN
12	Theis Jacob (TW4, TW5, TW6)		24/11/2015	Theis with Jacob Correc	TW5	3.35×10^{1}	2.24×10^{0}	NAN
13	Theis Jacob (TW4, TW5, TW6)		24/11/2015	Theis with Jacob Correc	TW6	9.08×10^{1}	6.05×10^{0}	NAN
					Average	9.84×10^{1}	6.56×10^{0}	NAN

SIMULTANEOUS TEST

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154 Colonnade Road South
Ottawa, Ontario, K2E 7J5

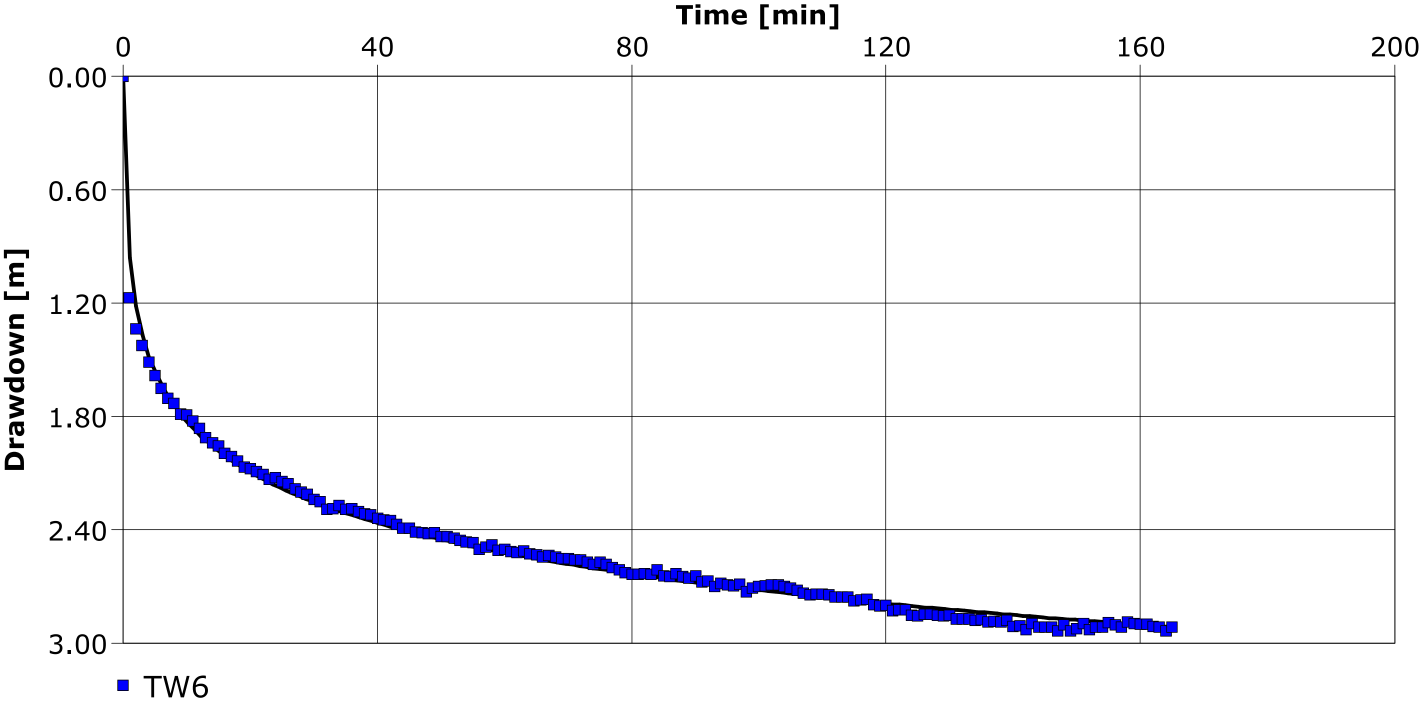
Pumping Test Analysis Report

Project: 11 King St

Number: PH1292

Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW6
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	Theis (linear)	Analysis Date: 01/12/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 1.66 [l/s]	



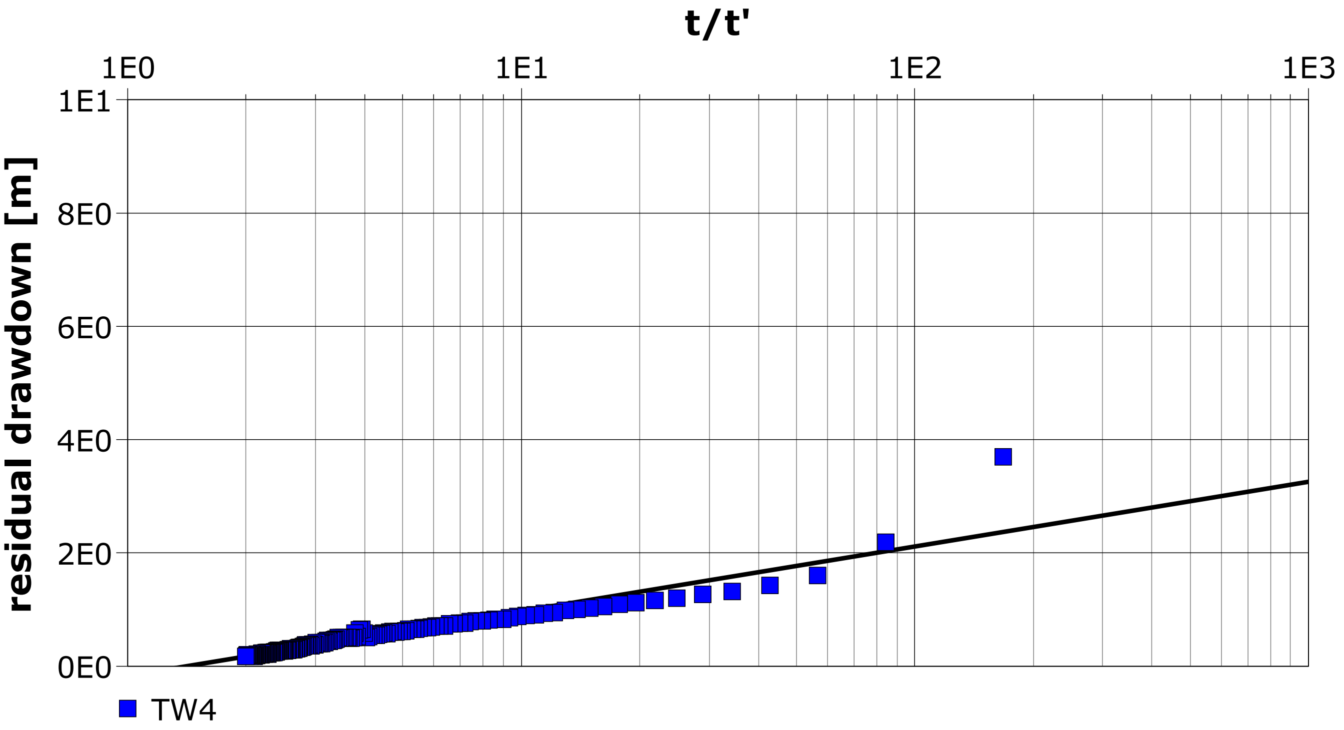
Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
TW6	4.90×10^{0}	3.27×10^{-1}		0.25	

SIMULTANEOUS TEST

Paterson Group Consulting Engineers 154 Colonnade Road South Ottawa - Ontario - K2E 7J5	**Pumping Test Analysis Report** Project: 11 King St Number: PH1292 Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW4
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	Theis RECOVERY (TW4)	Analysis Date: 24/11/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 1.66 [l/s]	



Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
TW4	2.29×10^{1}	1.53×10^{0}	0.25	

SIMULTANEOUS TEST

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154 Colonnade Road South
Ottawa, Ontario, K2E 7J5

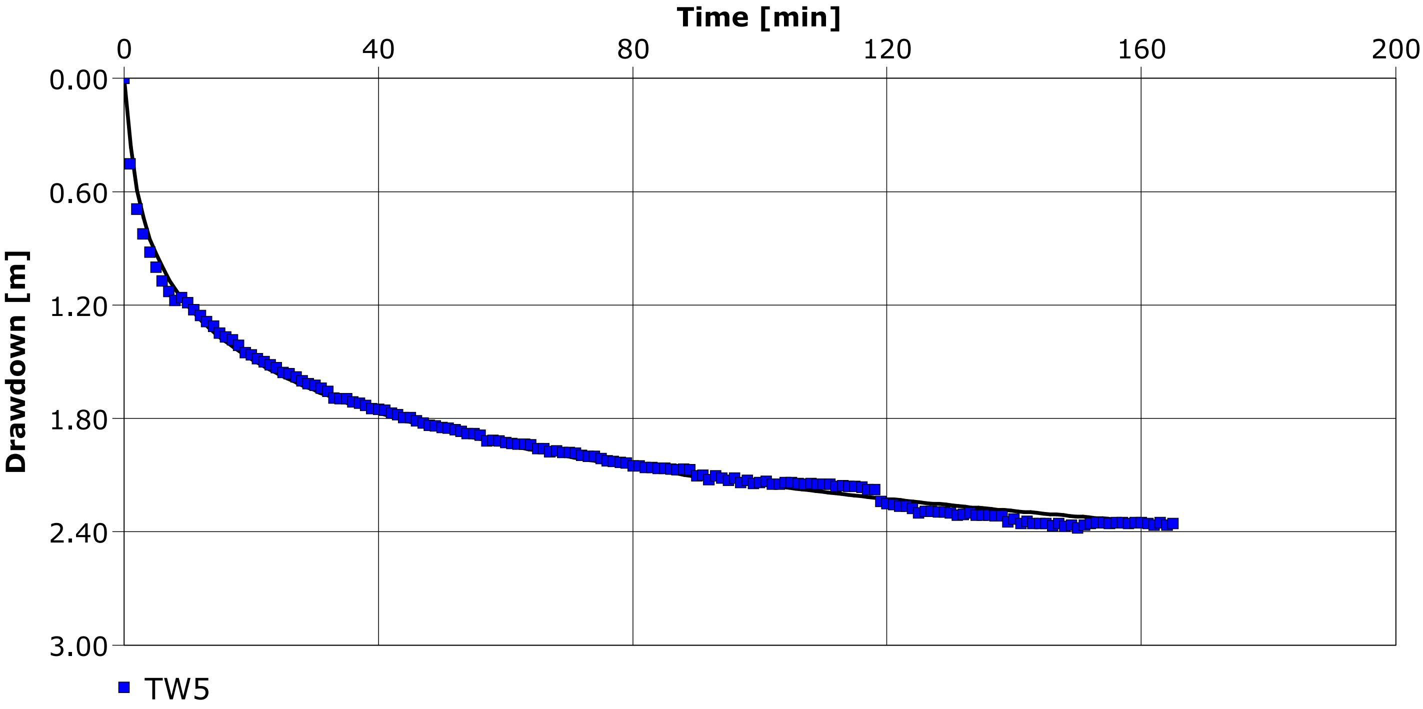
Pumping Test Analysis Report

Project: 11 King St

Number: PH1292

Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW5
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	Theis (linear)	Analysis Date: 01/12/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 1.66 [l/s]	



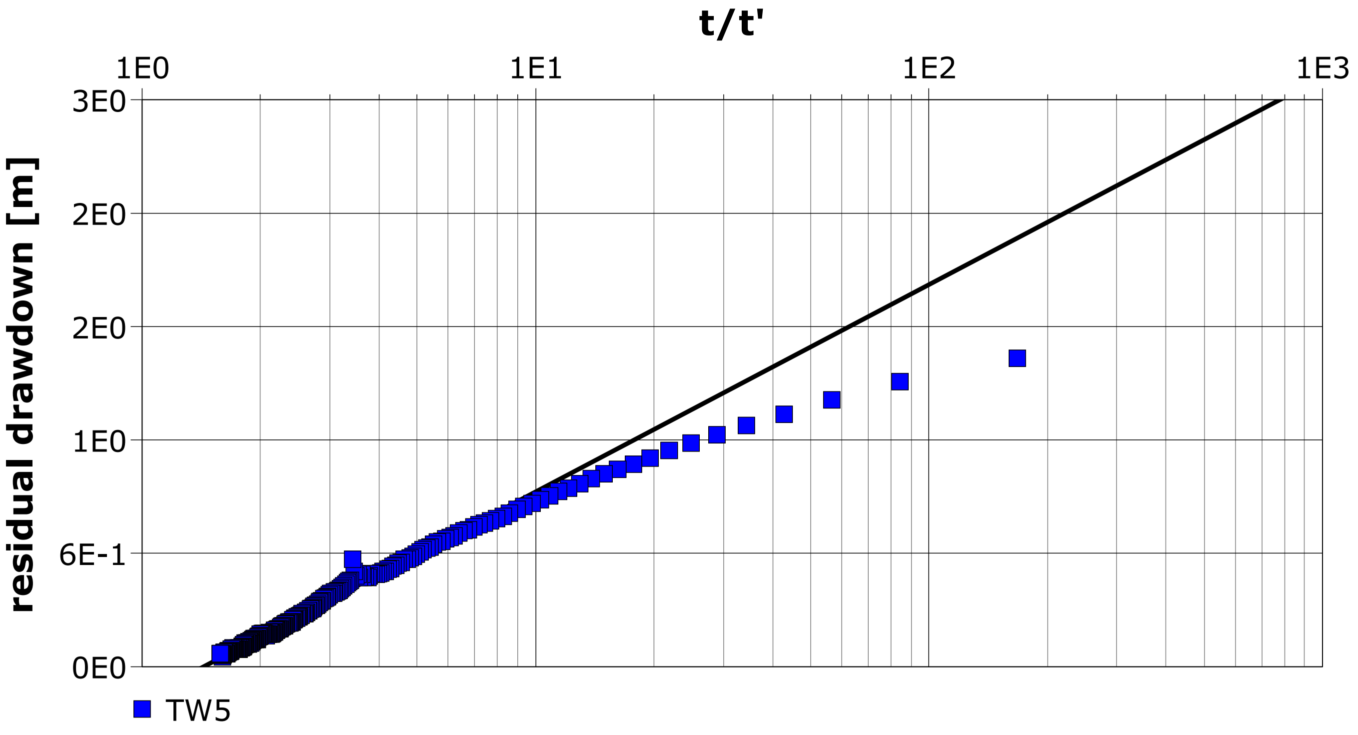
Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
TW5	4.58×10^{0}	3.05×10^{-1}		0.25	

SIMULTANEOUS TEST

Paterson Group Consulting Engineers 154 Colonnade Road South Ottawa - Ontario - K2E 7J5	**Pumping Test Analysis Report**
	Project: 11 King St
	Number: PH1292
	Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW5
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	Theis RECOVERY	Analysis Date: 01/12/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 1.66 [l/s]	



Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
TW5	2.39×10^{1}	1.60×10^{0}	0.25	

SIMULTANEOUS TEST

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154 Colonnade Road South
Ottawa, Ontario, K2E 7J5

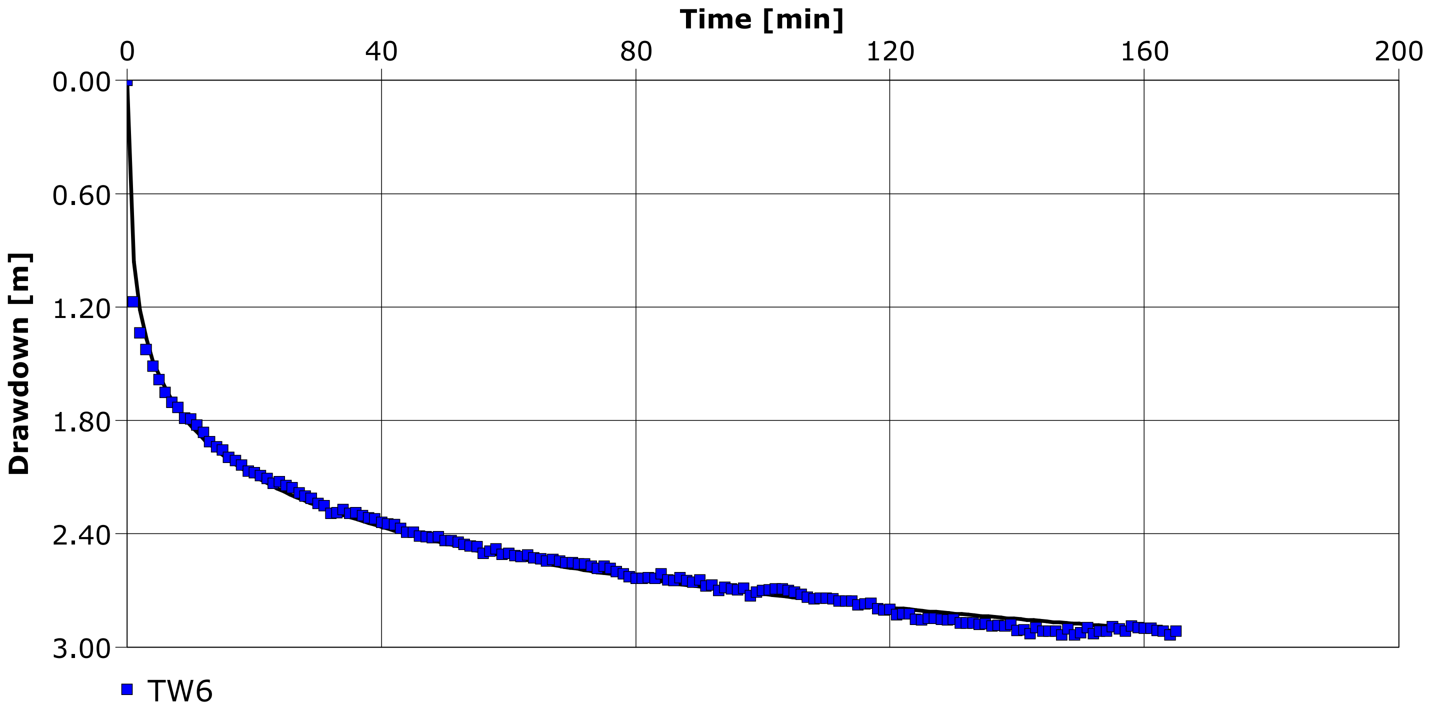
Pumping Test Analysis Report

Project: 11 King St

Number: PH1292

Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW6
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	Theis (linear)	Analysis Date: 01/12/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 1.66 [l/s]	



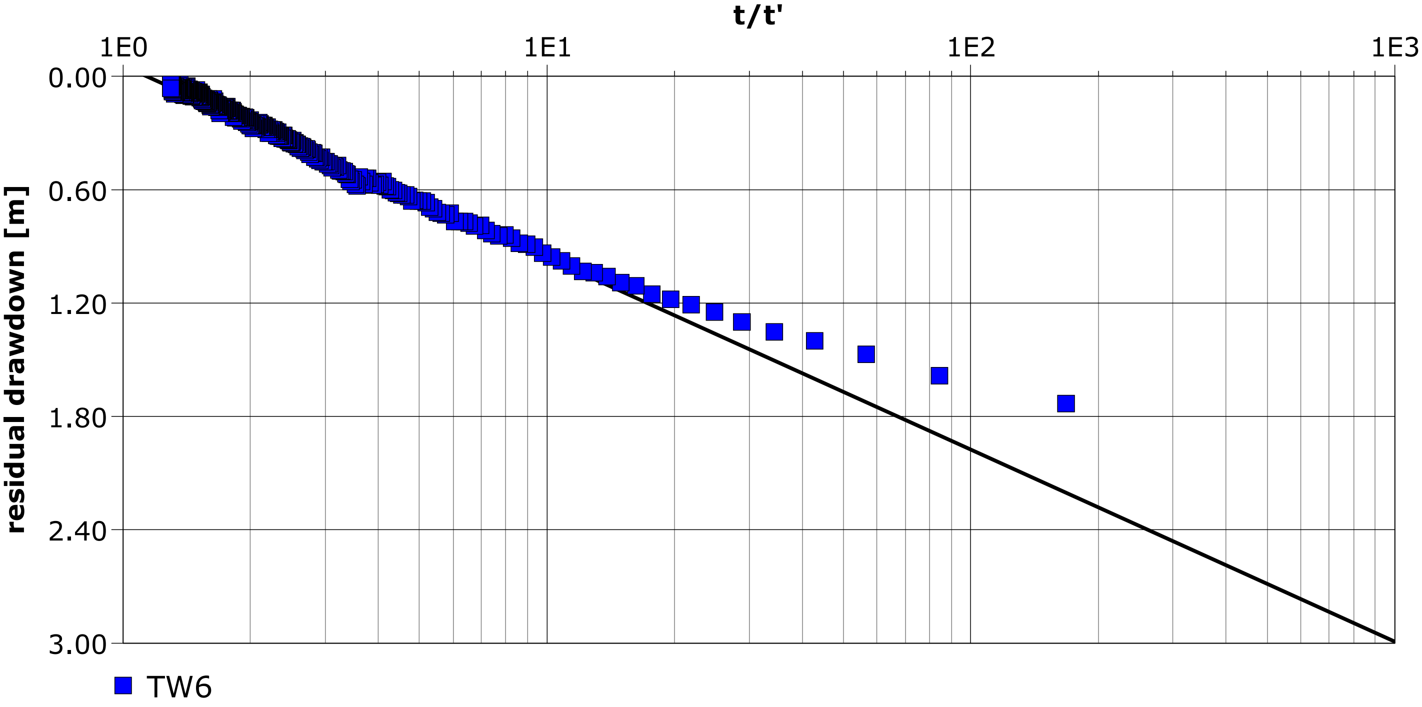
Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
TW6	4.90×10^{0}	3.27×10^{-1}		0.25	

SIMULTANEOUS TEST

Paterson Group Consulting Engineers 154 Colonnade Road South Ottawa - Ontario - K2E 7J5	**Pumping Test Analysis Report**
	Project: 11 King St
	Number: PH1292
	Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW6
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	New analysis 1	Analysis Date: 01/12/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 1.66 [l/s]	



Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
TW6	2.59×10^{1}	1.72×10^{0}	0.25	

EXTENDED TEST (TW6)

Paterson Group
Consulting Engineers
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5

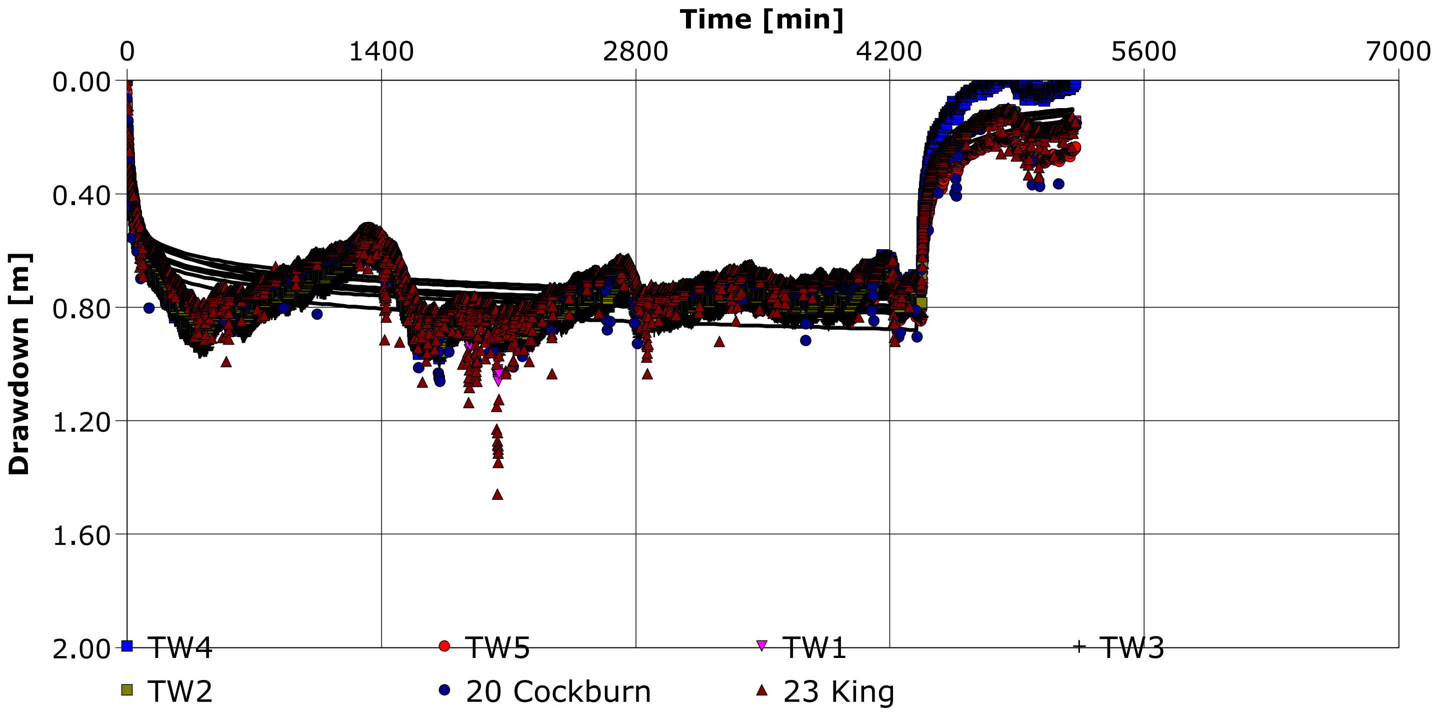
rlc

Project: 11 King St

Number: PH1292

Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW6
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	Theis	Analysis Date: 28/10/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 0.56667 [l/s]	



Calculation using Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Radial Distance to PW [m]	
TW4	6.79×10^{1}	4.53×10^{0}	1.00×10^{-7}	58.52	
TW5	5.12×10^{1}	3.41×10^{0}	2.33×10^{-6}	55.0	
TW1	7.08×10^{1}	4.72×10^{0}	1.00×10^{-7}	50.57	
TW3	5.97×10^{1}	3.98×10^{0}	1.00×10^{-7}	75.8	
TW2	7.10×10^{1}	4.73×10^{0}	1.37×10^{-7}	33.14	
20 Cockburn	6.88×10^{1}	4.59×10^{0}	1.17×10^{-7}	68.59	
23 King	6.65×10^{1}	4.43×10^{0}	1.00×10^{-7}	101.02	
Average	6.51×10^{1}	4.34×10^{0}	4.26×10^{-7}		

EXTENDED TEST (TW6)

Paterson Group
Consulting Engineers
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5

rlc

Project: 11 King St

Number: PH1292

Client: Talos

Location: Richmond ON

Pumping Test: Simultaneous Test

Pumping Well: TW6

Test Conducted by: RAP

Test Date: 31/10/2014

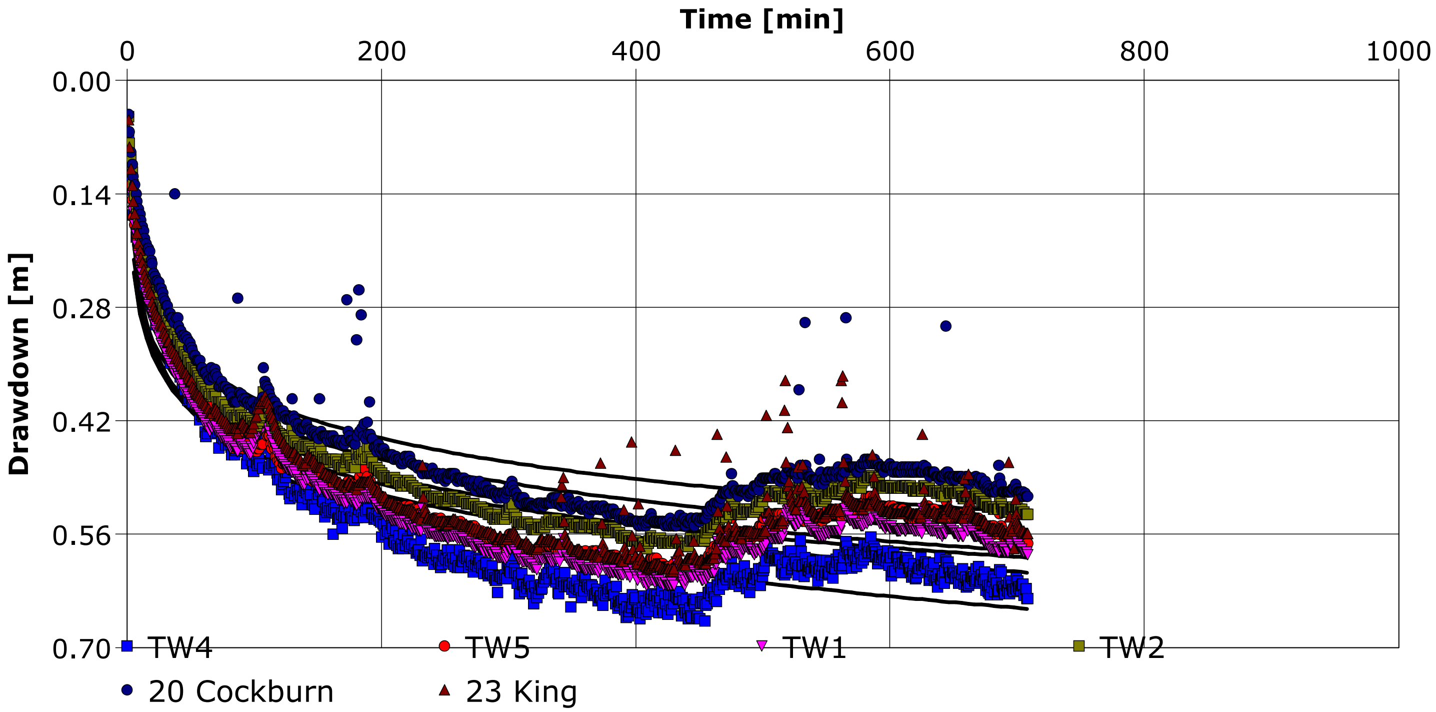
Analysis Performed by:

Agarwal + Theis RECOVERY

Analysis Date: 29/10/2015

Aquifer Thickness: 15.00 m

Discharge: variable, average rate 0.56667 [l/s]



Calculation using AGARWAL + Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Ratio K(v)/K(h)	Radial Distance to PW [m]
TW4	4.21×10^{1}	2.81×10^{0}	1.19×10^{-5}	3.02×10^{-1}	58.52
TW5	5.44×10^{1}	3.63×10^{0}	5.35×10^{-6}	1.13×10^{-1}	55.0
TW1	5.16×10^{1}	3.44×10^{0}	7.20×10^{-6}	3.15×10^{-1}	50.57
TW2	5.32×10^{1}	3.54×10^{0}	2.57×10^{-5}	1.19×10^{-1}	33.14
20 Cockburn	5.38×10^{1}	3.58×10^{0}	8.04×10^{-6}	1.58×10^{-1}	68.59
23 King	5.31×10^{1}	3.54×10^{0}	2.10×10^{-6}	1.22×10^{-1}	101.02
Average	5.13×10^{1}	3.42×10^{0}	1.00×10^{-5}	1.88×10^{-1}	

EXTENDED TEST (TW6)

Paterson Group
Consulting Engineers
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5

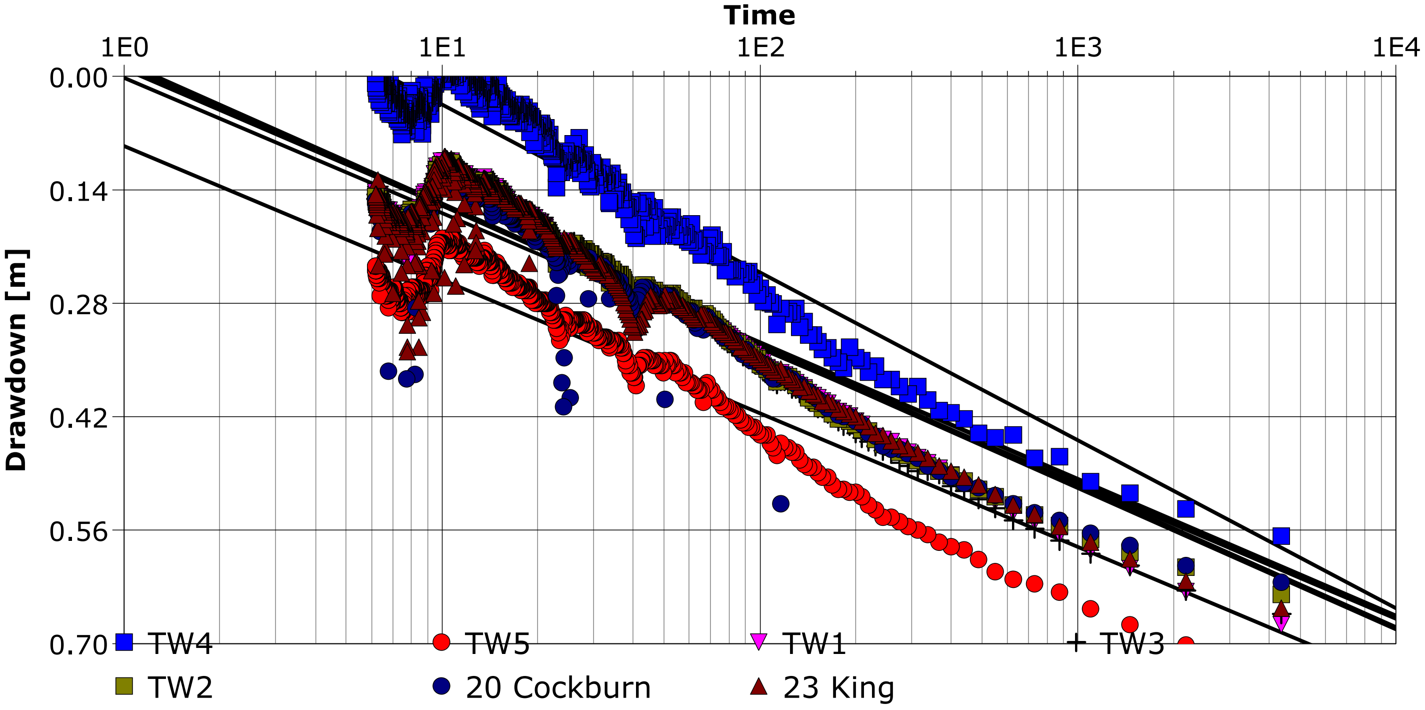
rlc

Project: 11 King St

Number: PH1292

Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW6
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	Theis RECOVERY	Analysis Date: 23/11/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 0.56667 [l/s]	



Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
TW4	4.33×10^{1}	2.88×10^{0}	58.52	
TW5	5.43×10^{1}	3.62×10^{0}	55.0	
TW1	5.14×10^{1}	3.43×10^{0}	50.57	
TW3	5.14×10^{1}	3.43×10^{0}	75.8	
TW2	5.30×10^{1}	3.54×10^{0}	33.14	
20 Cockburn	5.37×10^{1}	3.58×10^{0}	68.59	
23 King	5.29×10^{1}	3.53×10^{0}	101.02	
Average	5.14×10^{1}	3.43×10^{0}		

EXTENDED TEST (TW6)

Paterson Group
Consulting Engineers
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5

Pumping Test Analysis Report

Project: 11 King St

Number: PH1292

Client: Talos

Location: Richmond ON

Pumping Test: Simultaneous Test

Pumping Well: TW6

Test Conducted by: RAP

Test Date: 31/10/2014

Aquifer Thickness: 15.00 m

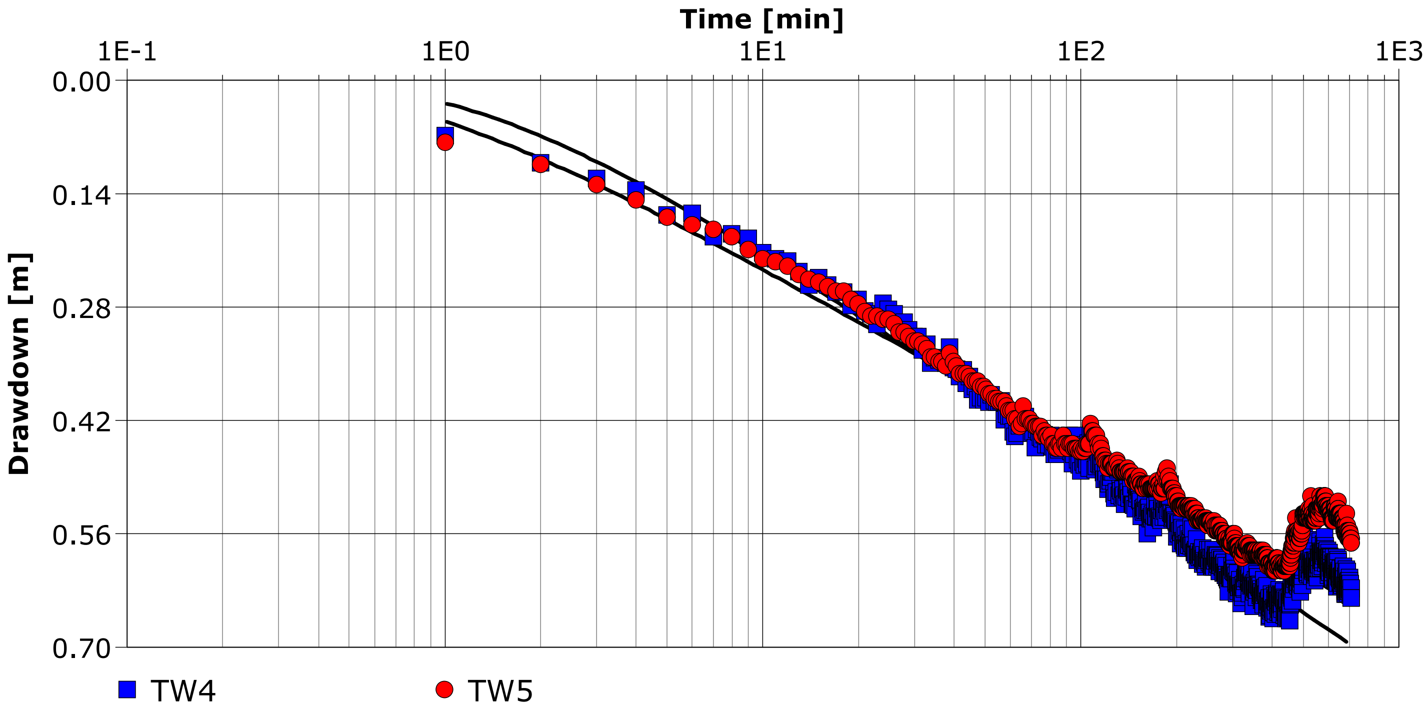
Discharge: variable, average rate 0.56667 [l/s]

	Analysis Name	Analysis Performed by	Analysis Date	Method name	Well	T [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	7.08×10^{1}	4.72×10^{0}	1.00×10^{-7}
4	Theis		28/10/2015	Theis	TW3	5.97×10^{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 Cockburn	6.88×10^{1}	4.59×10^{0}	1.17×10^{-7}
7	Theis		28/10/2015	Theis	23 King	6.65×10^{1}	4.43×10^{0}	1.00×10^{-7}
8	Agarwal + Theis RECOVERY		29/10/2015	AGARWAL + Theis	TW4	5.11×10^{1}	3.41×10^{0}	1.19×10^{-5}
9	Agarwal + Theis RECOVERY		29/10/2015	AGARWAL + Theis	TW5	5.44×10^{1}	3.63×10^{0}	5.35×10^{-6}
10	Agarwal + Theis RECOVERY		29/10/2015	AGARWAL + Theis	TW1	5.16×10^{1}	3.44×10^{0}	7.20×10^{-6}
11	Agarwal + Theis RECOVERY		29/10/2015	AGARWAL + Theis	TW2	5.32×10^{1}	3.54×10^{0}	2.57×10^{-5}
12	Agarwal + Theis RECOVERY		29/10/2015	AGARWAL + Theis	20 Cockburn	5.38×10^{1}	3.58×10^{0}	8.04×10^{-6}
13	Agarwal + Theis RECOVERY		29/10/2015	AGARWAL + Theis	23 King	4.33×10^{1}	3.54×10^{0}	2.10×10^{-6}
14	Theis RECOVERY		23/11/2015	Theis Recovery	TW4	5.33×10^{1}	3.55×10^{0}	NAN
15	Theis RECOVERY		23/11/2015	Theis Recovery	TW5	5.43×10^{1}	3.62×10^{0}	NAN
16	Theis RECOVERY		23/11/2015	Theis Recovery	TW1	5.14×10^{1}	3.43×10^{0}	NAN
17	Theis RECOVERY		23/11/2015	Theis Recovery	TW3	5.14×10^{1}	3.43×10^{0}	NAN
18	Theis RECOVERY		23/11/2015	Theis Recovery	TW2	5.30×10^{1}	3.54×10^{0}	NAN
19	Theis RECOVERY		23/11/2015	Theis Recovery	20 Cockburn	5.37×10^{1}	3.58×10^{0}	NAN
20	Theis RECOVERY		23/11/2015	Theis Recovery	23 King	5.29×10^{1}	3.53×10^{0}	NAN
					Average		3.81×10^{0}	NAN

EXTENDED TEST (TW6)

Paterson Group Consulting Engineers 154 Colonnade Road South Ottawa - Ontario - K2E 7J5	**rlc** Project: 11 King St Number: PH1292 Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW6
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	Agarwal + Theis RECOVERY (semilog)	Analysis Date: 29/10/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 0.56667 [l/s]	



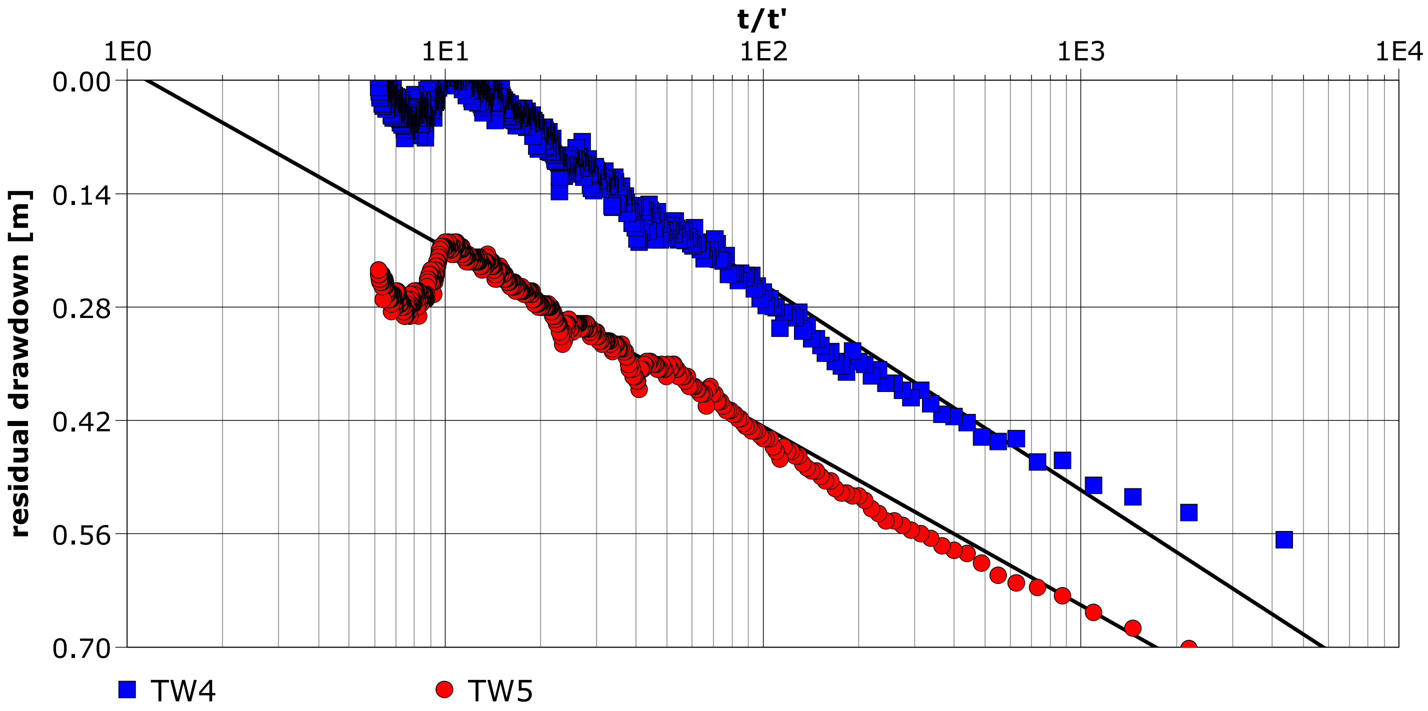
Calculation using AGARWAL + Theis

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Storage coefficient	Ratio K(v)/K(h)	Radial Distance to PW [m]
TW4	3.38×10^{1}	2.25×10^{0}	2.58×10^{-5}	4.87×10^{-1}	58.52
TW5	4.01×10^{1}	2.67×10^{0}	1.96×10^{-5}	4.98×10^{-1}	55.0
Average	3.70×10^{1}	2.46×10^{0}	2.27×10^{-5}	4.92×10^{-1}	

EXTENDED TEST (TW6)

Paterson Group Consulting Engineers 154 Colonnade Road South Ottawa - Ontario - K2E 7J5	**rlc**
	Project: 11 King St
	Number: PH1292
	Client: Talos

Location: Richmond ON	Pumping Test: Simultaneous Test	Pumping Well: TW6
Test Conducted by: RAP		Test Date: 31/10/2014
Analysis Performed by:	Theis RECOVERY	Analysis Date: 23/11/2015
Aquifer Thickness: 15.00 m	Discharge: variable, average rate 0.56667 [l/s]	



Calculation using THEIS & JACOB

Observation Well	Transmissivity [m²/d]	Hydraulic Conductivity [m/d]	Radial Distance to PW [m]	
TW4	3.52×10^{1}	2.35×10^{0}	58.52	
TW5	4.06×10^{1}	2.71×10^{0}	55.0	
Average	3.79×10^{1}	2.53×10^{0}		

EXTENDED TEST (TW6)

Paterson Group
Consulting Engineers
154 Colonnade Road South
Ottawa - Ontario - K2E 7J5

Pumping Test Analysis Report

Project: 11 King St

Number: PH1292

Client: Talos

Location: Richmond ON

Pumping Test: Simultaneous Test

Pumping Well: TW6

Test Conducted by: RAP

Test Date: 31/10/2014

Aquifer Thickness: 15.00 m

Discharge: variable, average 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 RECOVERY (semilog)		29/10/2015	AGARWAL + Theis	TW4	3.38×10^{1}	2.25×10^{0}	2.58×10^{-5}
2	Agarwal + Theis RECOVERY (semilog)		29/10/2015	AGARWAL + Theis	TW5	4.01×10^{1}	2.67×10^{0}	1.96×10^{-5}
3	Theis RECOVERY		23/11/2015	Theis Recovery	TW4	3.52×10^{1}	2.35×10^{0}	NAN
4	Theis RECOVERY		23/11/2015	Theis Recovery	TW5	4.06×10^{1}	2.71×10^{0}	NAN
					Average	3.74×10^{1}	2.49×10^{0}	NAN

PH1292

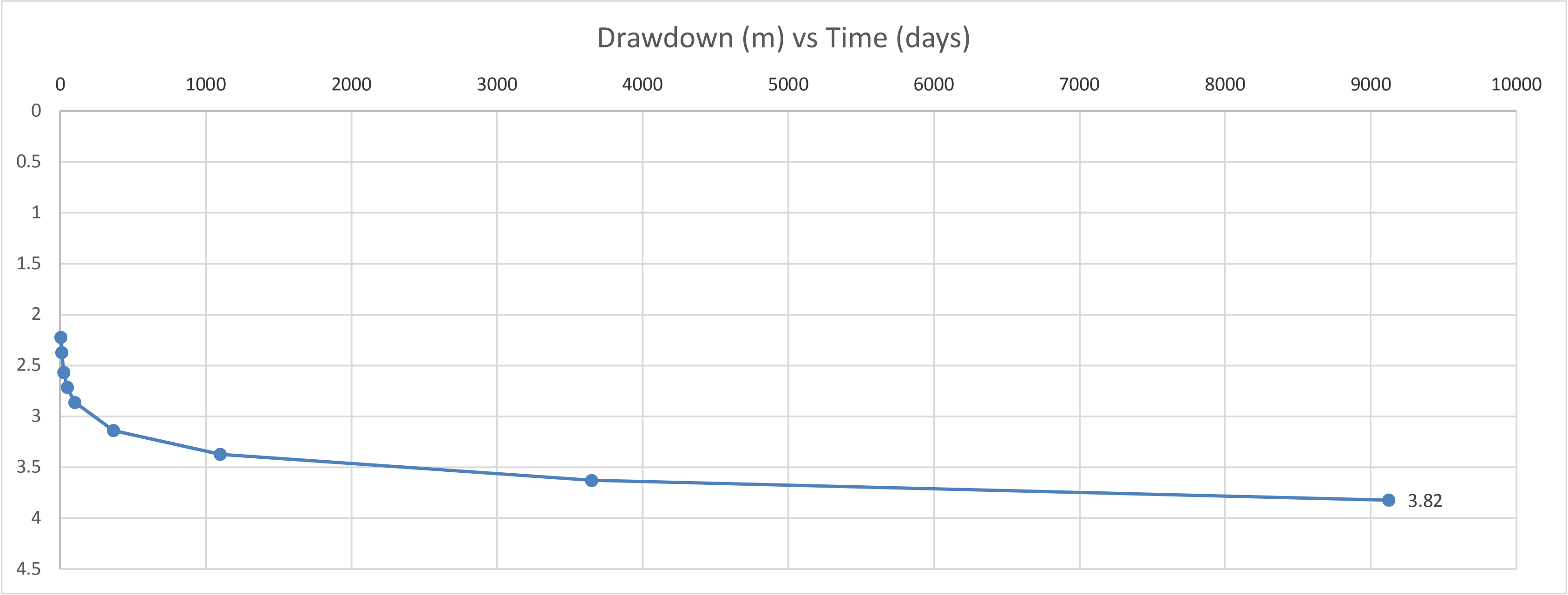
11 King St, Richmond

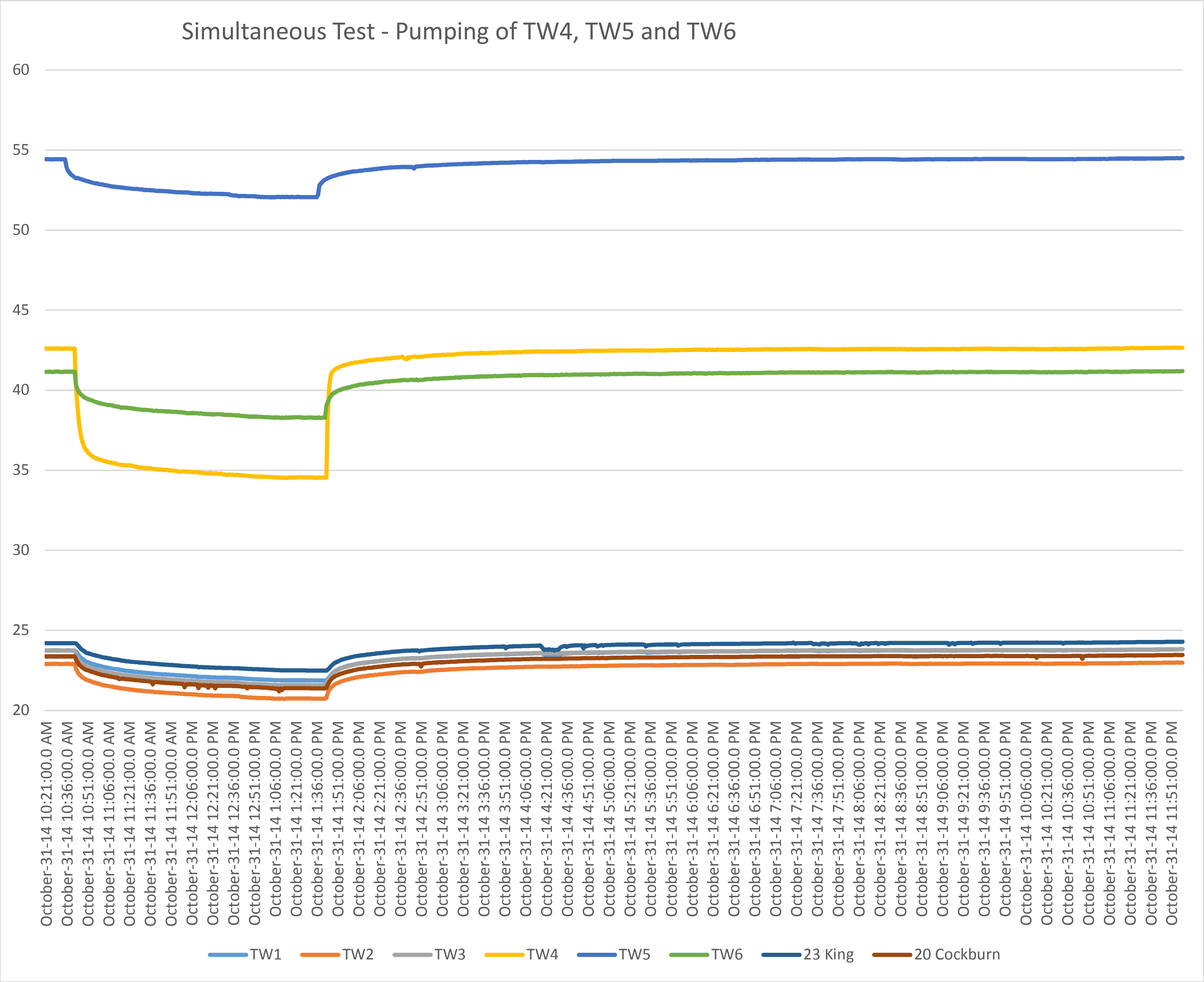
Determination of Potential Well Interference

Pumping Rate (Q) m3/day	2
Transmissivity (T) m2/day	37
Average Well Spacing (m) r	15
Coefficient of Storage S	2.27E-05

Notes: Analysis Assumes Continuous Pumping of 50 Wells

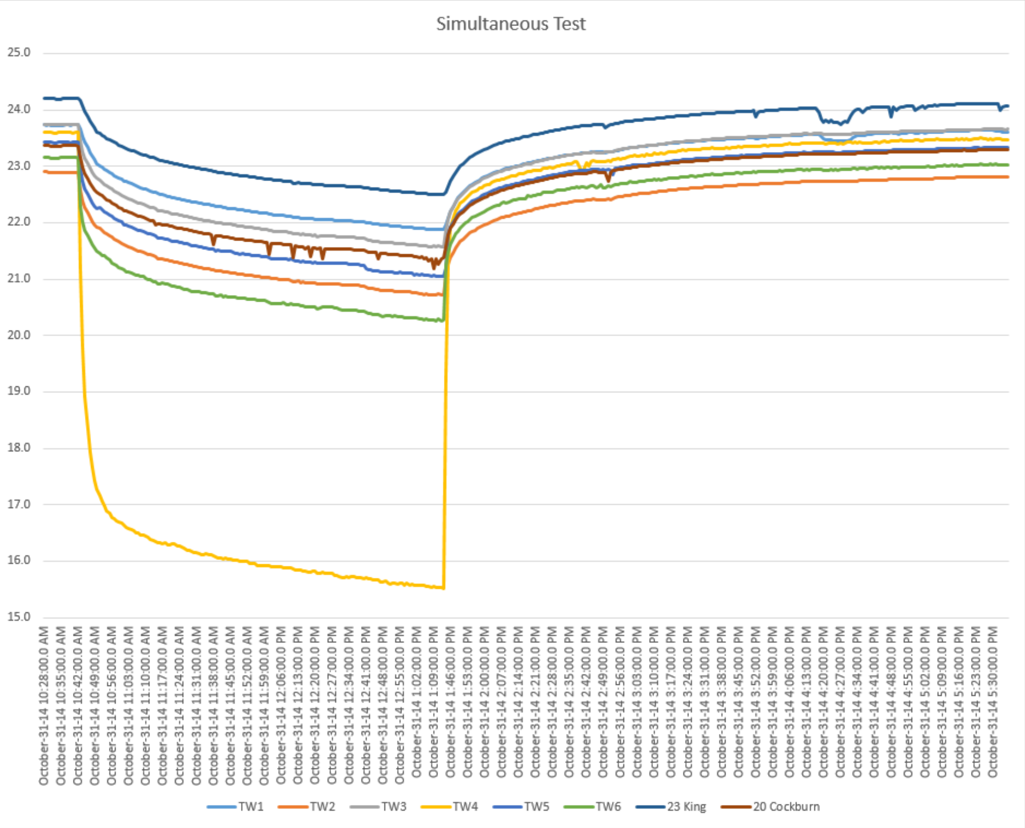
	1st Well Grouping		2nd Well Grouping		3rd Well Grouping		4th Well Grouping		
Time (days)	u	W(u)	u	W(u)	u	W(u)	u	W(u)	Drawdown
5	3.4E-06	12.01	1.0E-05	10.91	1.7E-05	10.40	2.4E-05	10.06	2.23
10	1.7E-06	12.70	5.1E-06	11.60	8.5E-06	11.09	1.2E-05	10.76	2.37
25	6.8E-07	13.62	2.0E-06	12.52	3.4E-06	12.01	4.8E-06	11.67	2.57
50	3.4E-07	14.31	1.0E-06	13.21	1.7E-06	12.70	2.4E-06	12.37	2.72
100	1.7E-07	15.01	5.1E-07	13.91	8.5E-07	13.40	1.2E-06	13.06	2.86
365	4.7E-08	16.30	1.4E-07	15.20	2.3E-07	14.69	3.3E-07	14.35	3.14
1100	1.6E-08	17.40	4.7E-08	16.31	7.8E-08	15.79	1.1E-07	15.46	3.37
3650	4.7E-09	18.60	1.4E-08	17.50	2.3E-08	16.99	3.3E-08	16.66	3.63
9125	1.9E-09	19.52	5.6E-09	18.42	9.4E-09	17.91	1.3E-08	17.57	3.82

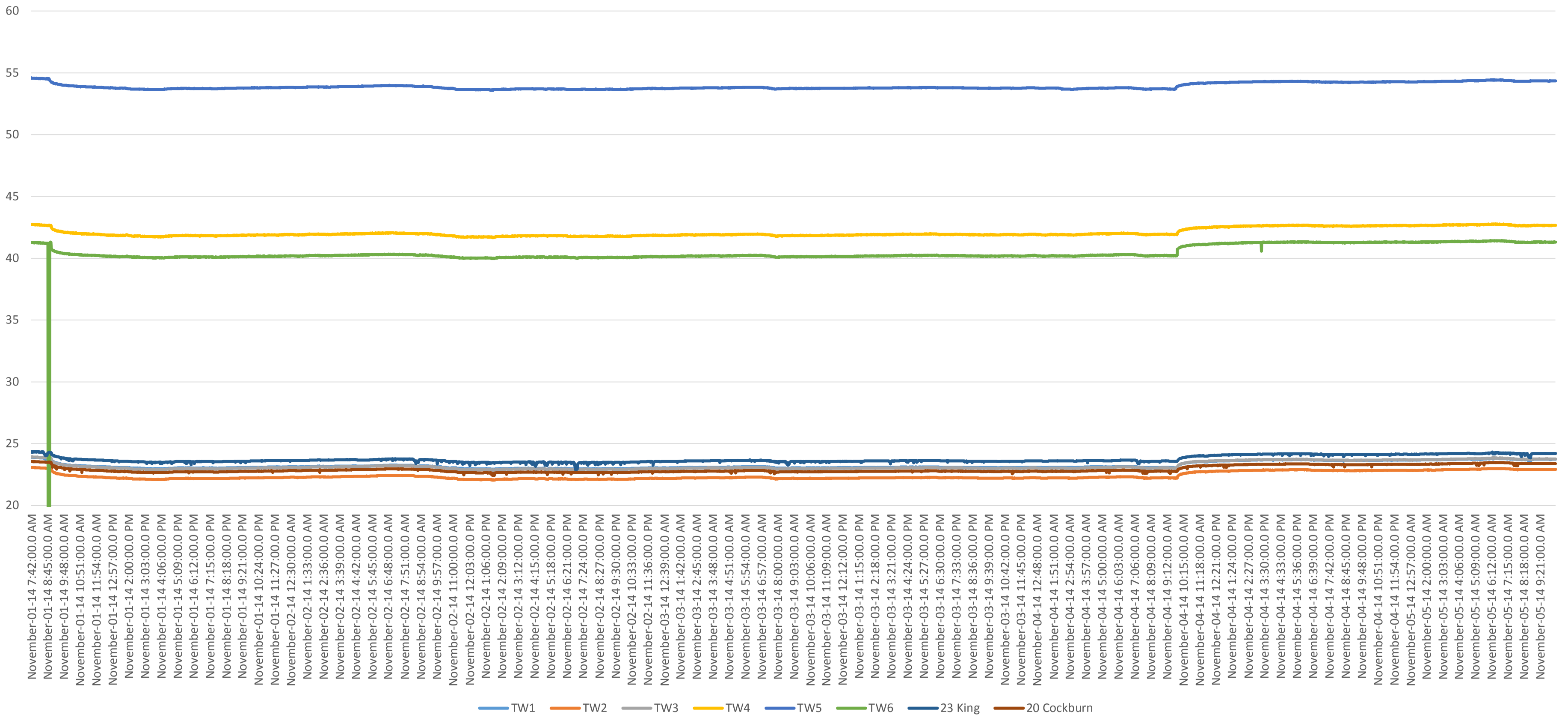



Simultaneous Test - Pumping of TW4, TW5 and TW6

Start of Simultaneous Pumping Test

time	TW1	TW2	TW3	TW4	TW5	TW6	23 King	20 Cockburn
October-31-14 10:28:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:29:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:30:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:31:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.1	24.2	23.4
October-31-14 10:32:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.1	24.2	23.4
October-31-14 10:33:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.1	24.2	23.4
October-31-14 10:34:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.1	24.2	23.4
October-31-14 10:35:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:36:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:37:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:38:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:39:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:40:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:41:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.2	24.2	23.4
October-31-14 10:42:00.0 AM	23.7	22.9	23.7	23.6	23.4	23.1	24.2	23.4
October-31-14 10:43:00.0 AM	23.7	22.6	23.5	21.2	23.0	22.3	24.2	23.2
October-31-14 10:44:00.0 AM	23.5	22.4	23.3	19.8	22.7	22.0	24.1	23.0
October-31-14 10:45:00.0 AM	23.4	22.3	23.1	18.9	22.6	21.9	24.0	22.9
October-31-14 10:46:00.0 AM	23.3	22.2	23.0	18.3	22.5	21.8	23.9	22.8
October-31-14 10:47:00.0 AM	23.2	22.1	23.0	17.9	22.4	21.7	23.8	22.7
October-31-14 10:48:00.0 AM	23.2	22.0	22.9	17.7	22.4	21.6	23.7	22.6
October-31-14 10:49:00.0 AM	23.1	22.0	22.8	17.4	22.3	21.5	23.7	22.6
October-31-14 10:50:00.0 AM	23.0	21.9	22.8	17.3	22.2	21.5	23.6	22.5
October-31-14 10:51:00.0 AM	23.0	21.9	22.7	17.2	22.3	21.5	23.6	22.5
October-31-14 10:52:00.0 AM	23.0	21.9	22.7	17.1	22.2	21.4	23.6	22.5
October-31-14 10:53:00.0 AM	23.0	21.8	22.7	17.0	22.2	21.4	23.5	22.4
October-31-14 10:54:00.0 AM	22.9	21.8	22.7	16.9	22.2	21.4	23.5	22.4
October-31-14 10:55:00.0 AM	22.9	21.8	22.6	16.9	22.1	21.3	23.5	22.4
October-31-14 10:56:00.0 AM	22.9	21.7	22.6	16.8	22.1	21.3	23.4	22.4
October-31-14 10:57:00.0 AM	22.8	21.7	22.6	16.8	22.1	21.3	23.4	22.3
October-31-14 10:58:00.0 AM	22.8	21.7	22.5	16.7	22.1	21.2	23.4	22.3
October-31-14 10:59:00.0 AM	22.8	21.7	22.5	16.7	22.0	21.2	23.4	22.3
October-31-14 11:00:00.0 AM	22.8	21.6	22.5	16.7	22.0	21.2	23.4	22.3
October-31-14 11:01:00.0 AM	22.7	21.6	22.5	16.6	22.0	21.2	23.3	22.2
October-31-14 11:02:00.0 AM	22.7	21.6	22.4	16.6	22.0	21.1	23.3	22.2
October-31-14 11:03:00.0 AM	22.7	21.6	22.4	16.6	21.9	21.1	23.3	22.2
October-31-14 11:04:00.0 AM	22.7	21.6	22.4	16.6	21.9	21.1	23.3	22.2
October-31-14 11:05:00.0 AM	22.7	21.5	22.4	16.5	21.9	21.1	23.3	22.2



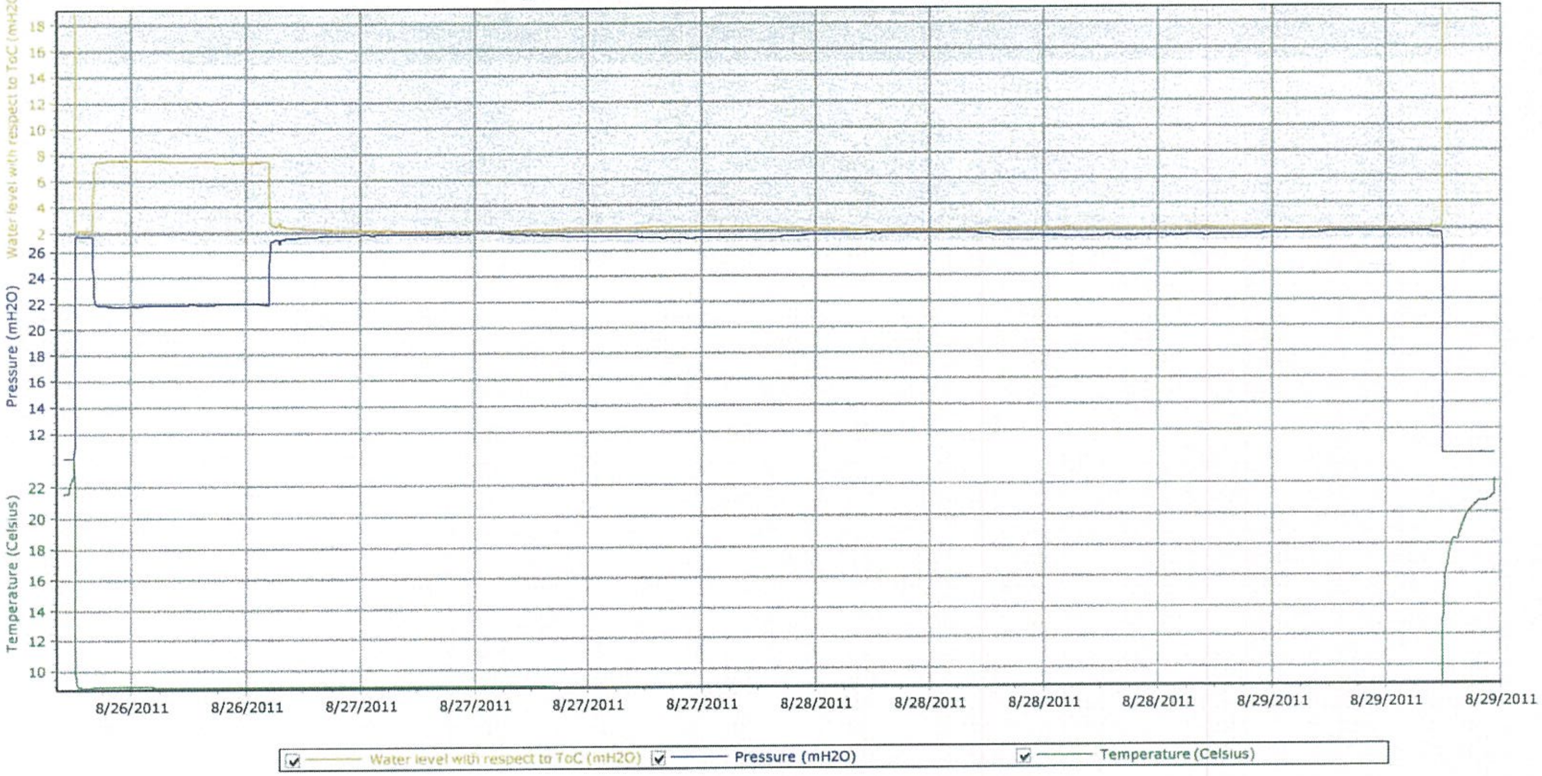


Long Term Test TW6 - 9am 1-Nov-14 to 9:53 am 4-Nov-14

TW4 Test

Pumping Well (TW4)

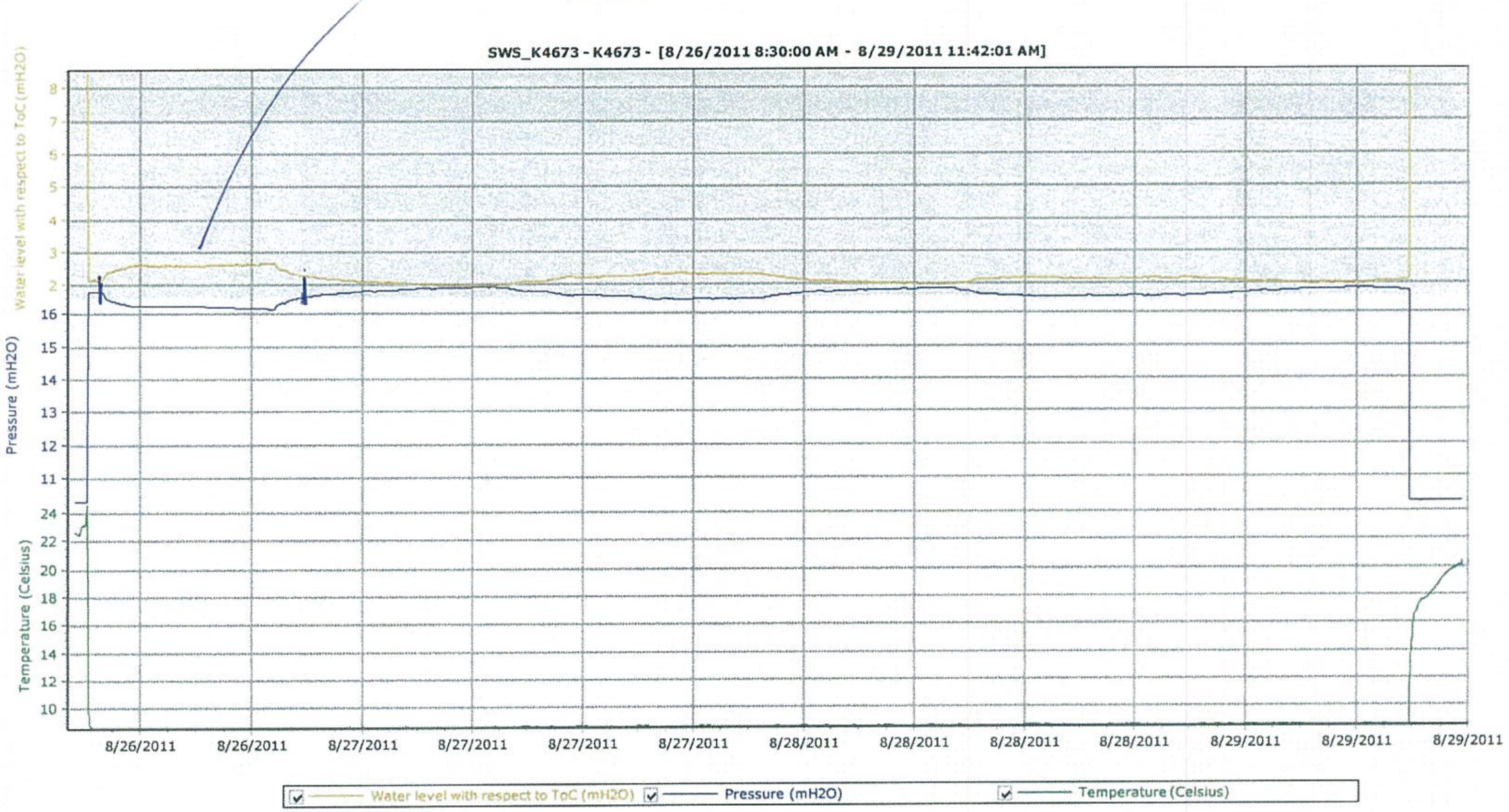
SWS_D6676 - D6676 - [8/26/2011 8:30:00 AM - 8/29/2011 11:40:01 AM]



TW4 Test

Response

TW3.

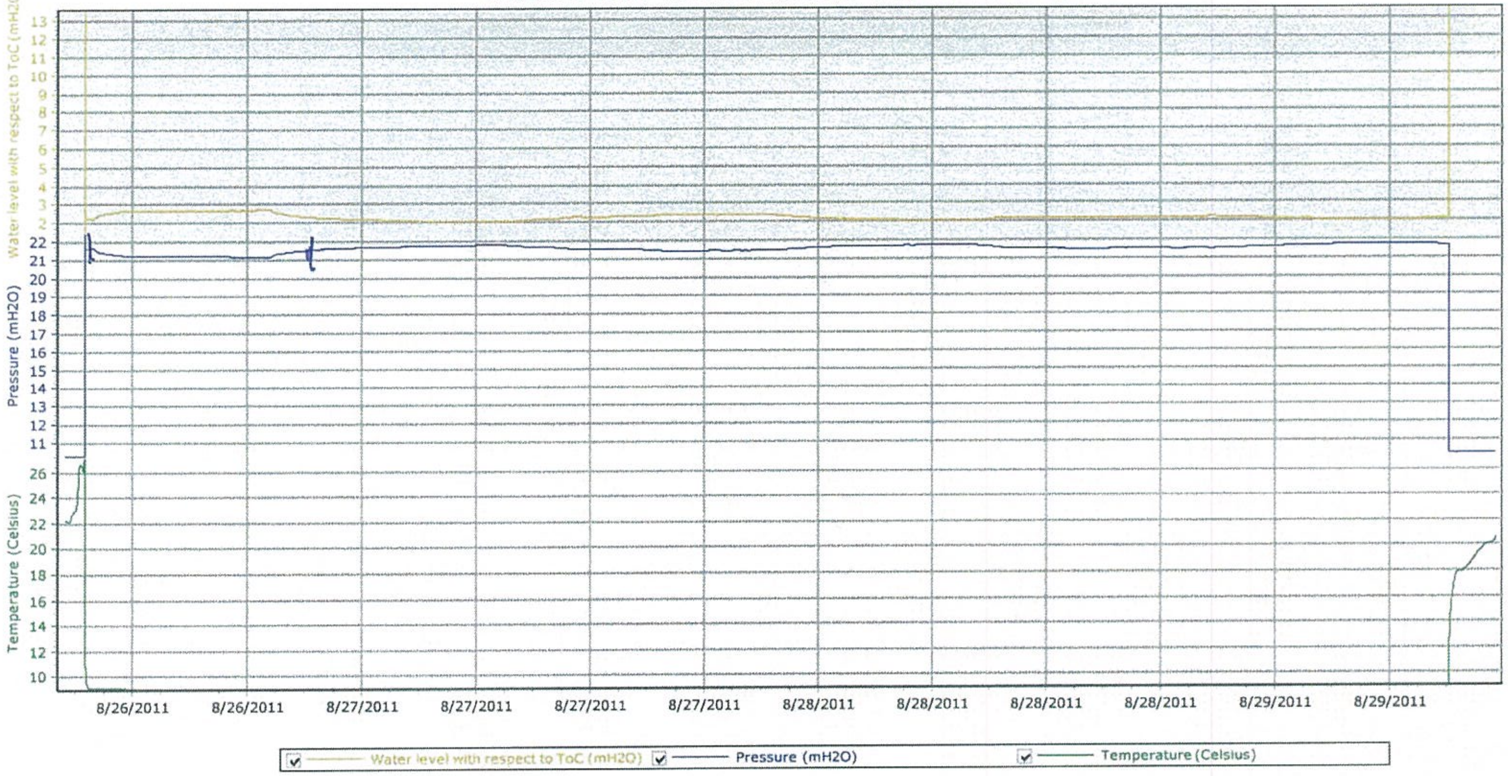


SWS_K4673 - K4673 - [8/26/2011 8:30:00 AM - 8/29/2011 11:42:01 AM]

Response. ✓

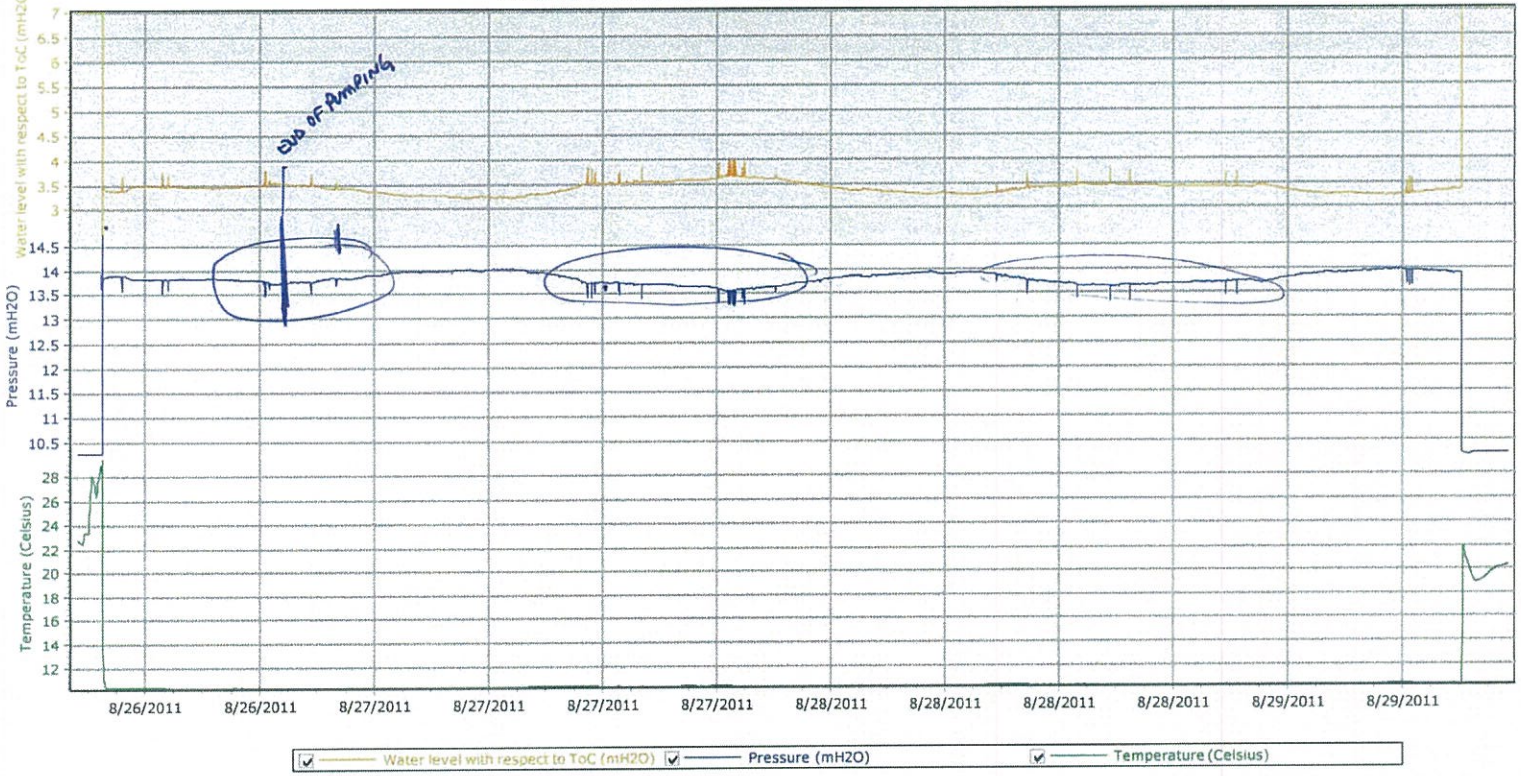
TW5 (DEEP CASED)

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



#13 COCKBURN

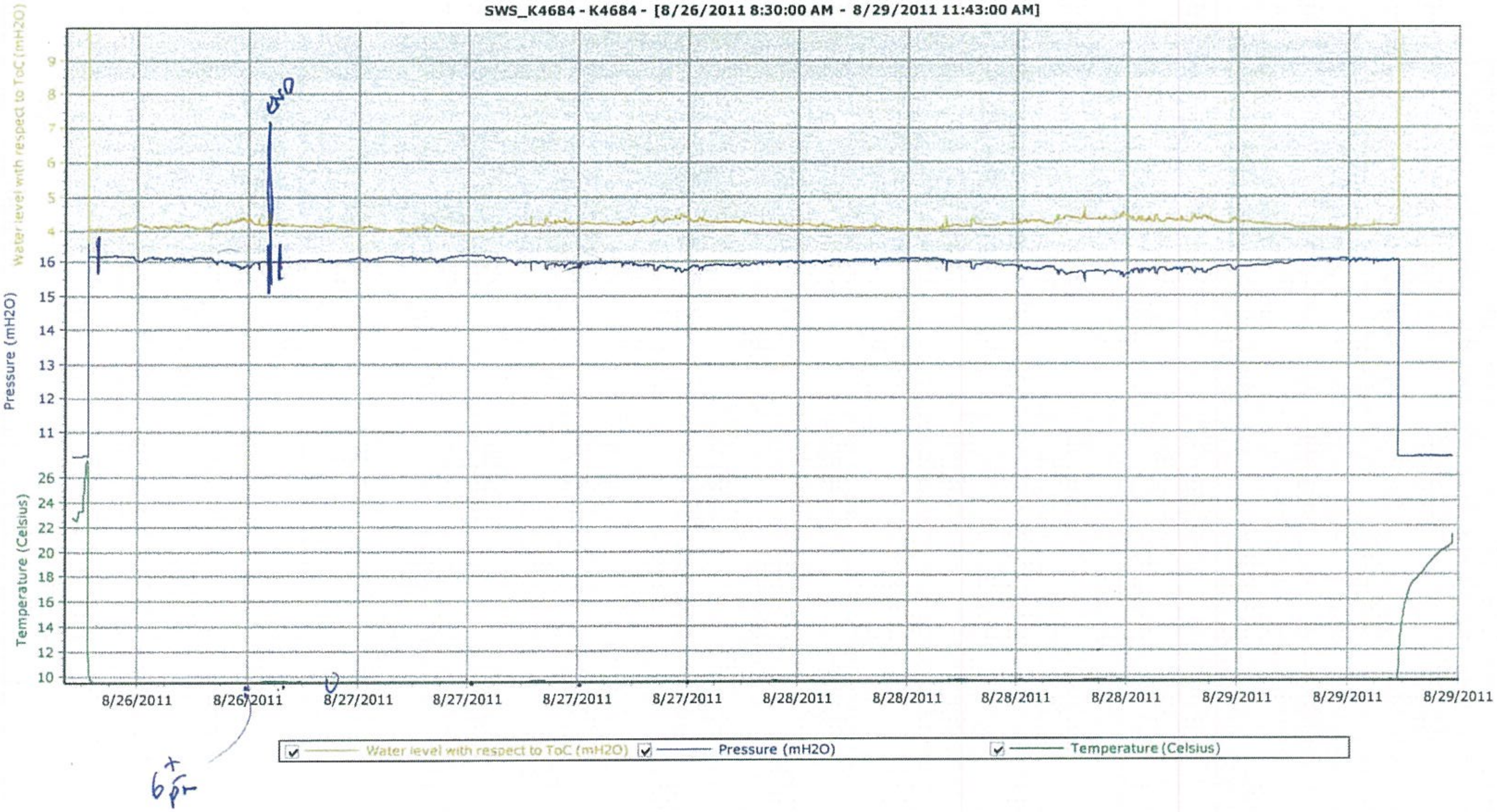
SWS_K4679 - K4679 - [8/26/2011 8:30:00 AM - 8/29/2011 11:34:01 AM]



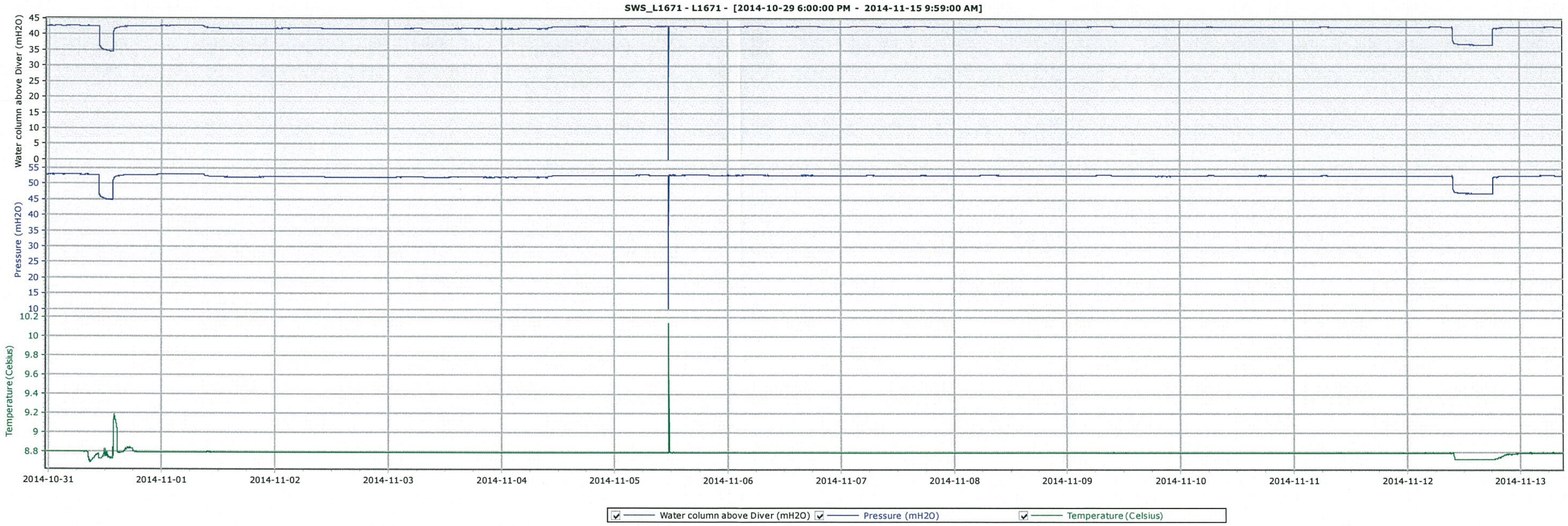
TW4 Test

#6 KING ST.

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



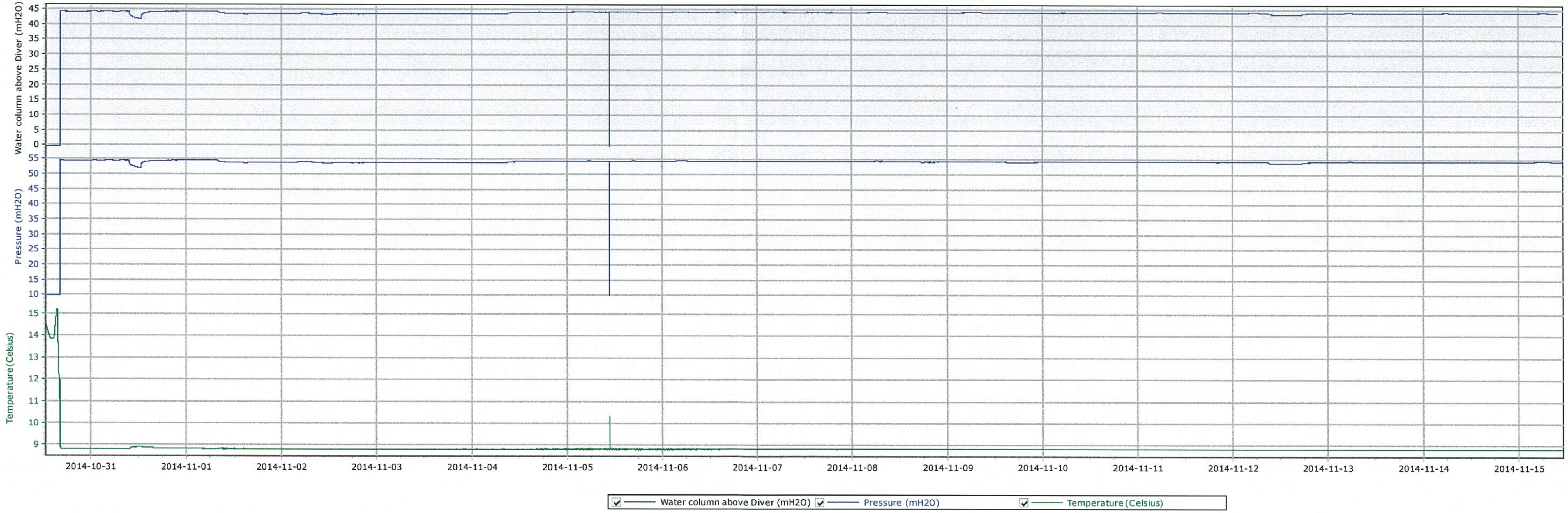
Simultaneous Test and Extended Test



TW4

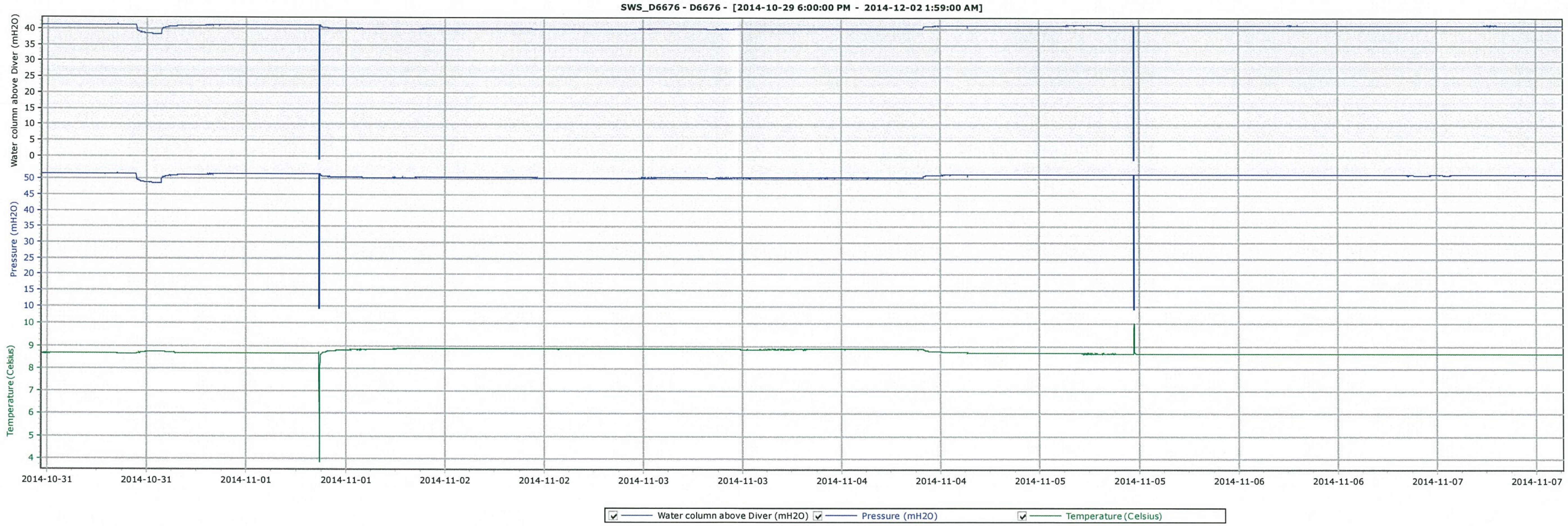
Simultaneous Test and Extended Test

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

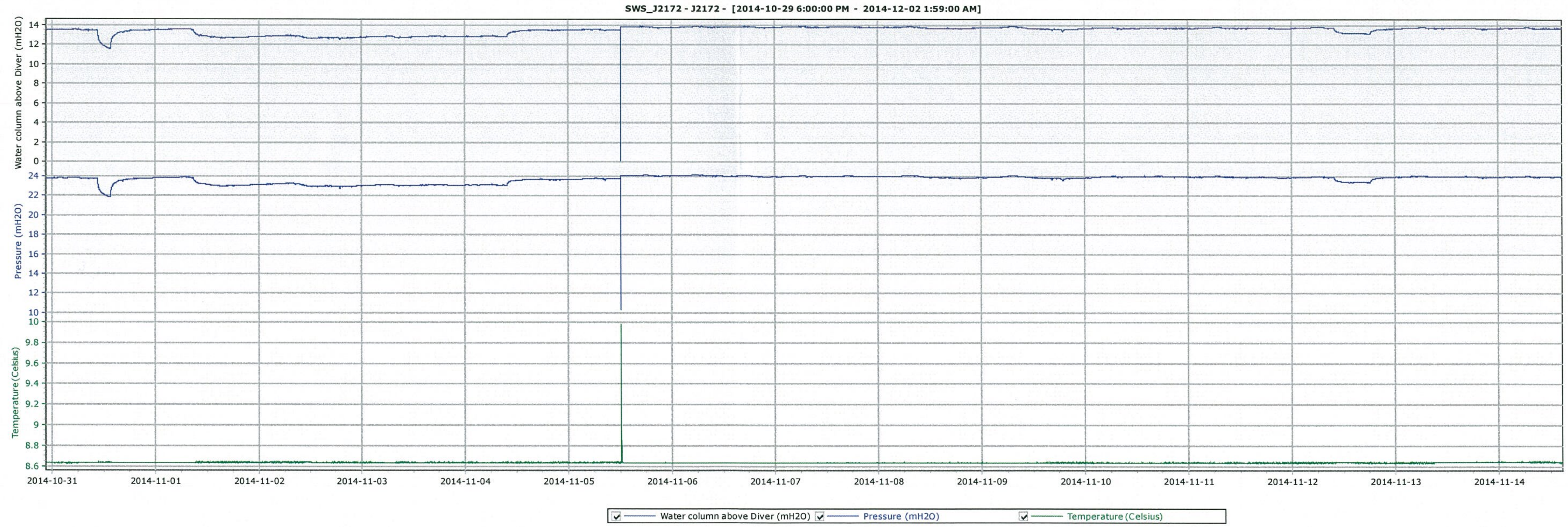


TW5

Simultaneous Test and Extended Test

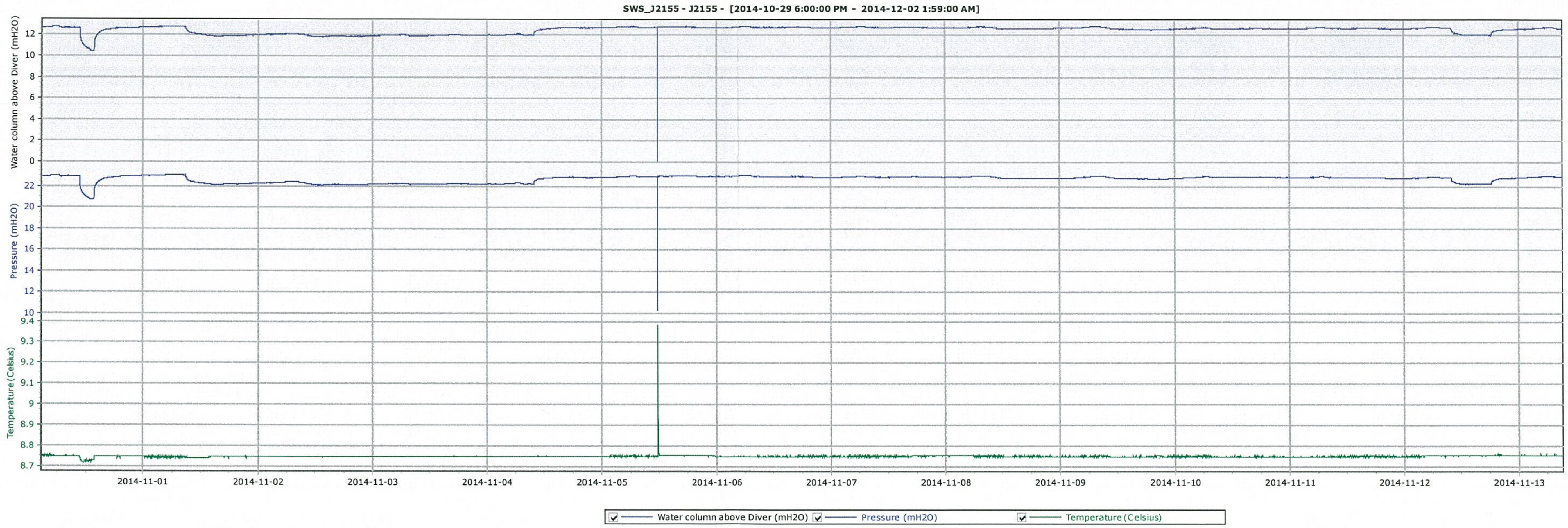


TW6


SWS_J2172 - J2172 - [2014-10-29 6:00:00 PM - 2014-12-02 1:59:00 AM]
Water column above Diver (mH2O)
14
12
10
8
6
4
2
0
Pressure (mH2O)
24
22
20
18
16
14
12
10
Temperature (Celsius)
10
9.8
9.6
9.4
9.2
9
8.8
8.6
2014-10-31
2014-11-01
2014-11-02
2014-11-03
2014-11-04
2014-11-05
2014-11-06
2014-11-07
2014-11-08
2014-11-09
2014-11-10
2014-11-11
2014-11-12
2014-11-13
2014-11-14
☑ Water column above Diver (mH2O)
☑ Pressure (mH2O)
☑ Temperature (Celsius)

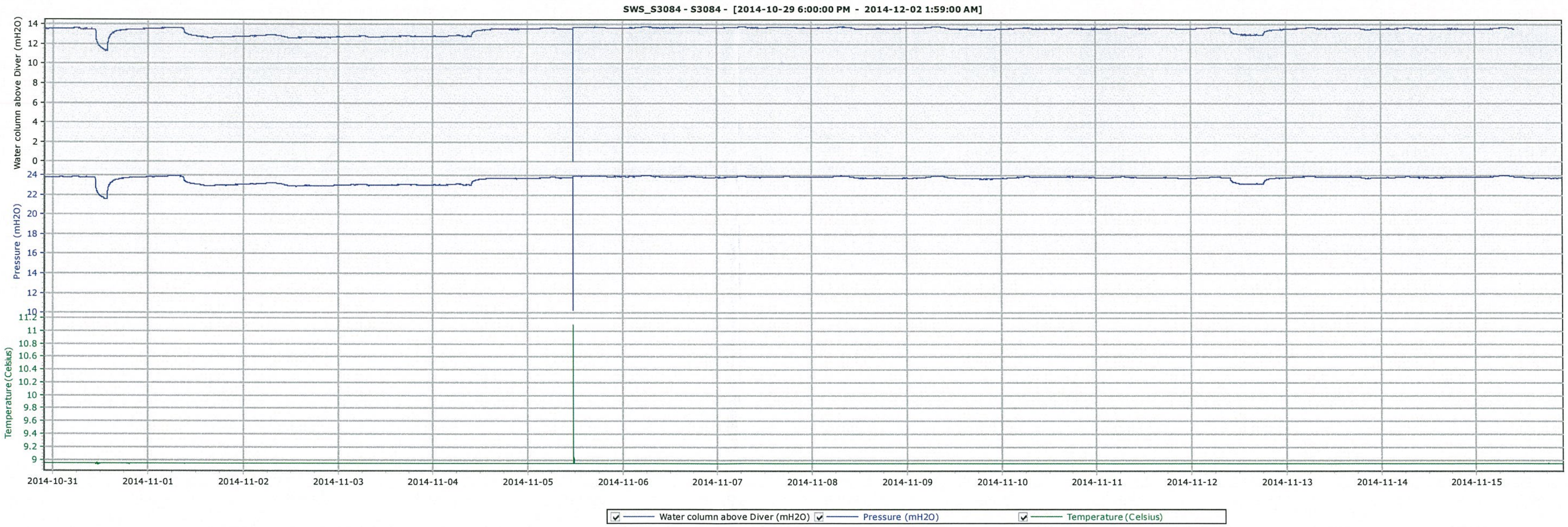
TW 1

Simultaneous Test and Extended Test



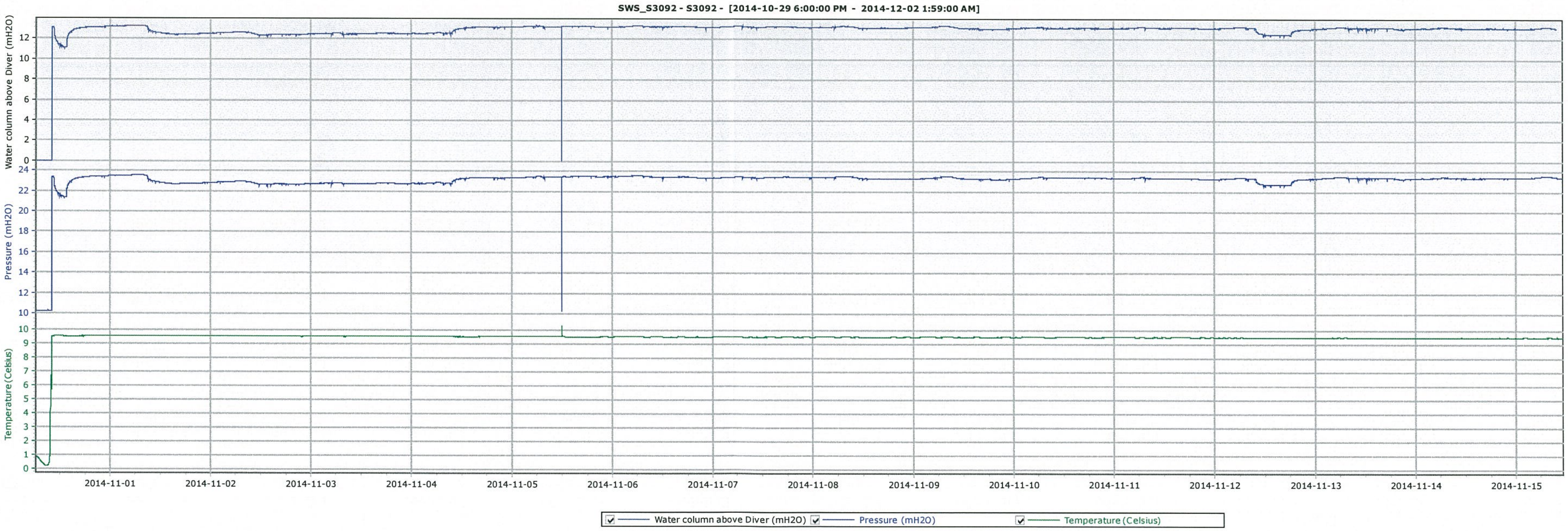
TW 2

Simultaneous Test and Extended Test

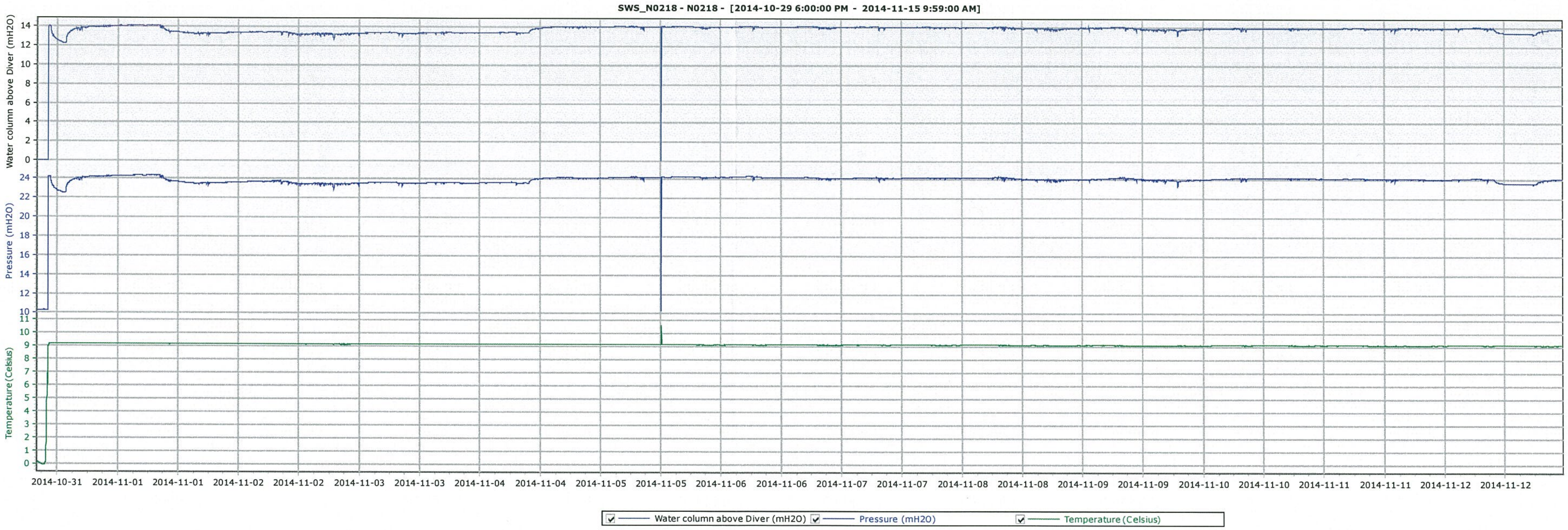


TW3

Simultaneous Test and Extended Test

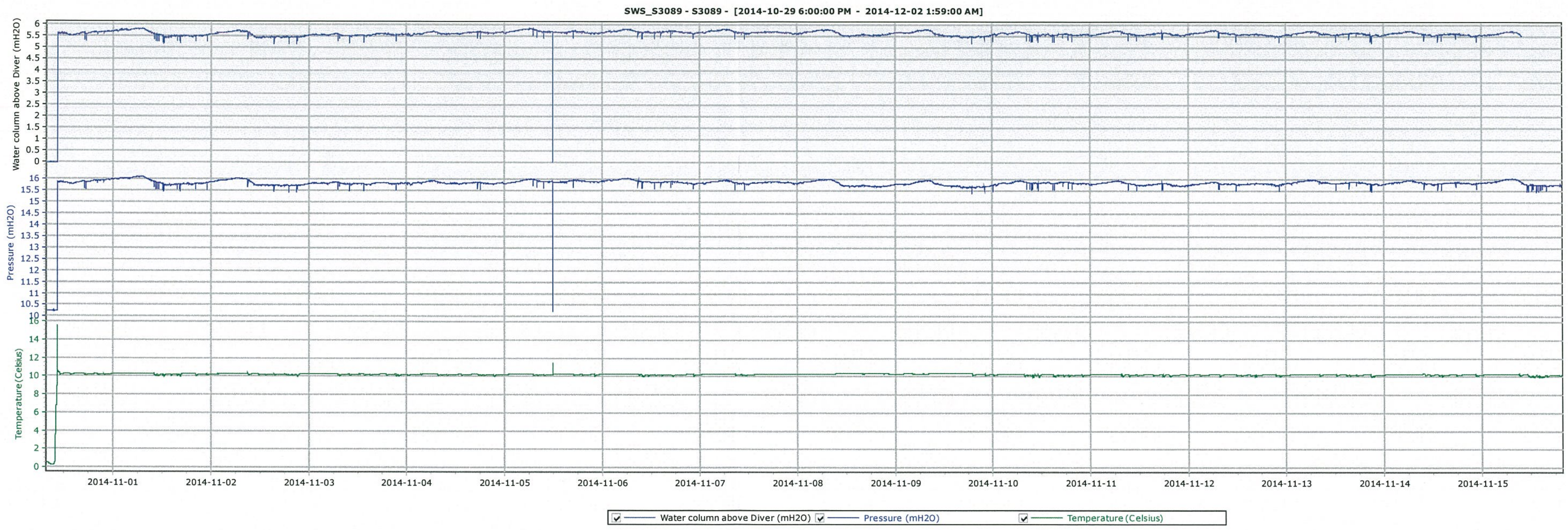


20 Cockburn


SWS_N0218 - N0218 - [2014-10-29 6:00:00 PM - 2014-11-15 9:59:00 AM]
Water column above Diver (mH2O)
14
12
10
8
6
4
2
0
Pressure (mH2O)
24
22
20
18
16
14
12
10
Temperature (Celsius)
11
10
9
8
7
6
5
4
3
2
1
0
2014-10-31
2014-11-01
2014-11-01
2014-11-02
2014-11-02
2014-11-03
2014-11-03
2014-11-04
2014-11-04
2014-11-05
2014-11-05
2014-11-06
2014-11-06
2014-11-07
2014-11-07
2014-11-08
2014-11-08
2014-11-09
2014-11-09
2014-11-10
2014-11-10
2014-11-11
2014-11-11
2014-11-12
2014-11-12
☑ Water column above Diver (mH2O)
☑ Pressure (mH2O)
☑ Temperature (Celsius)

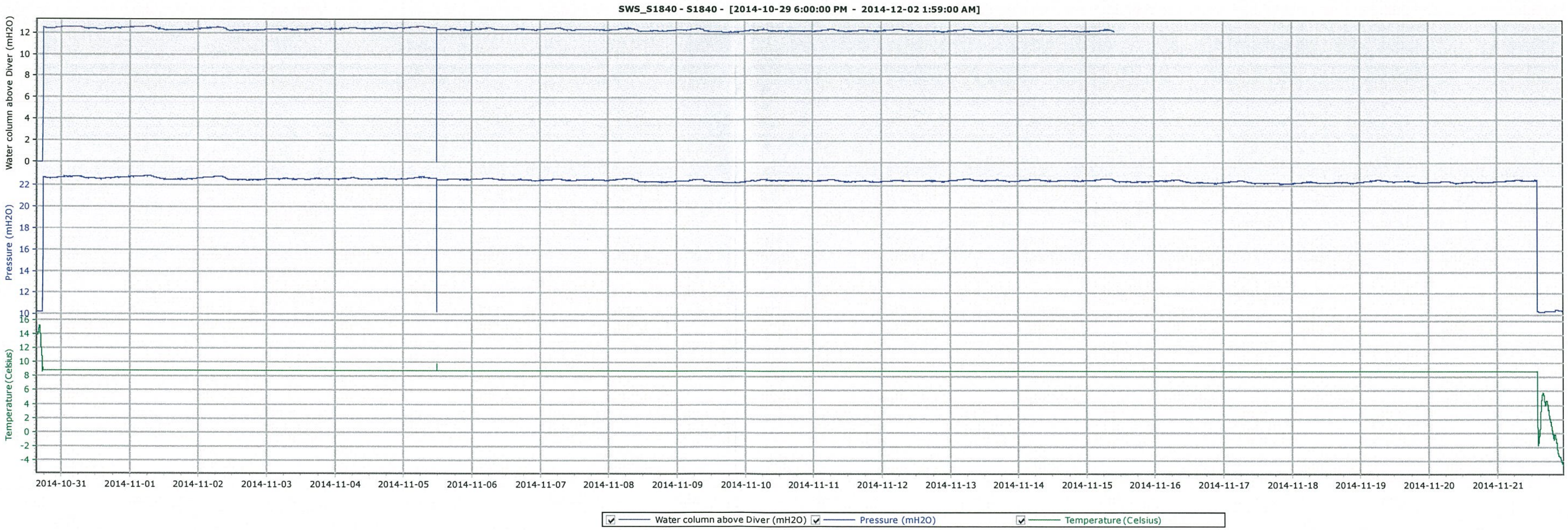
23 King

Simultaneous Test and Extended Test



13 COCKBURN

Simultaneous Test and Extended Test

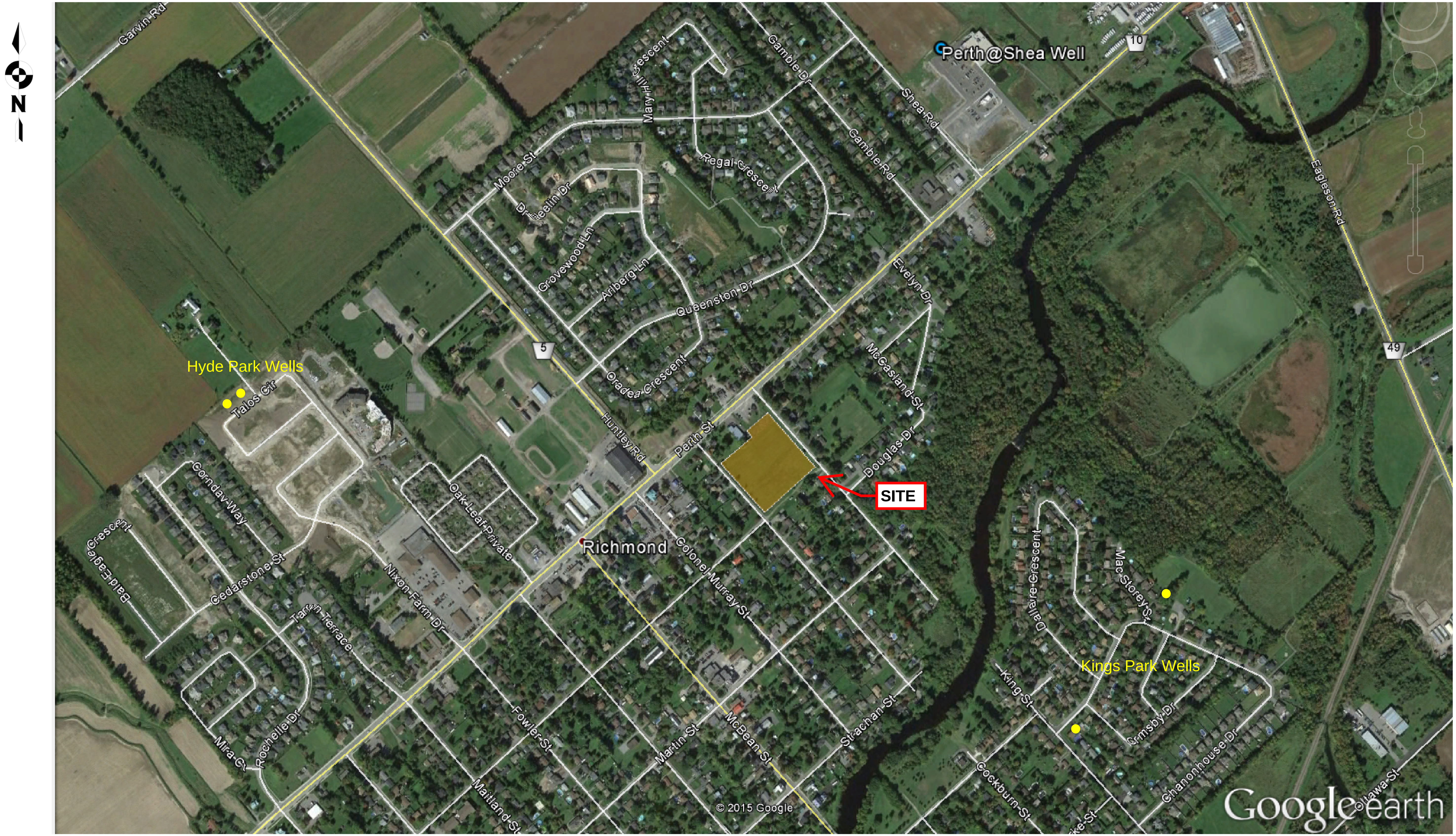


SWS_S1840 - S1840 - [2014-10-29 6:00:00 PM - 2014-12-02 1:59:00 AM]

EW

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**



patersongroup
consulting engineers
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Scale:	Not specified
Des.:	PH1292
Dwn:	RLC
Chkd:	SW

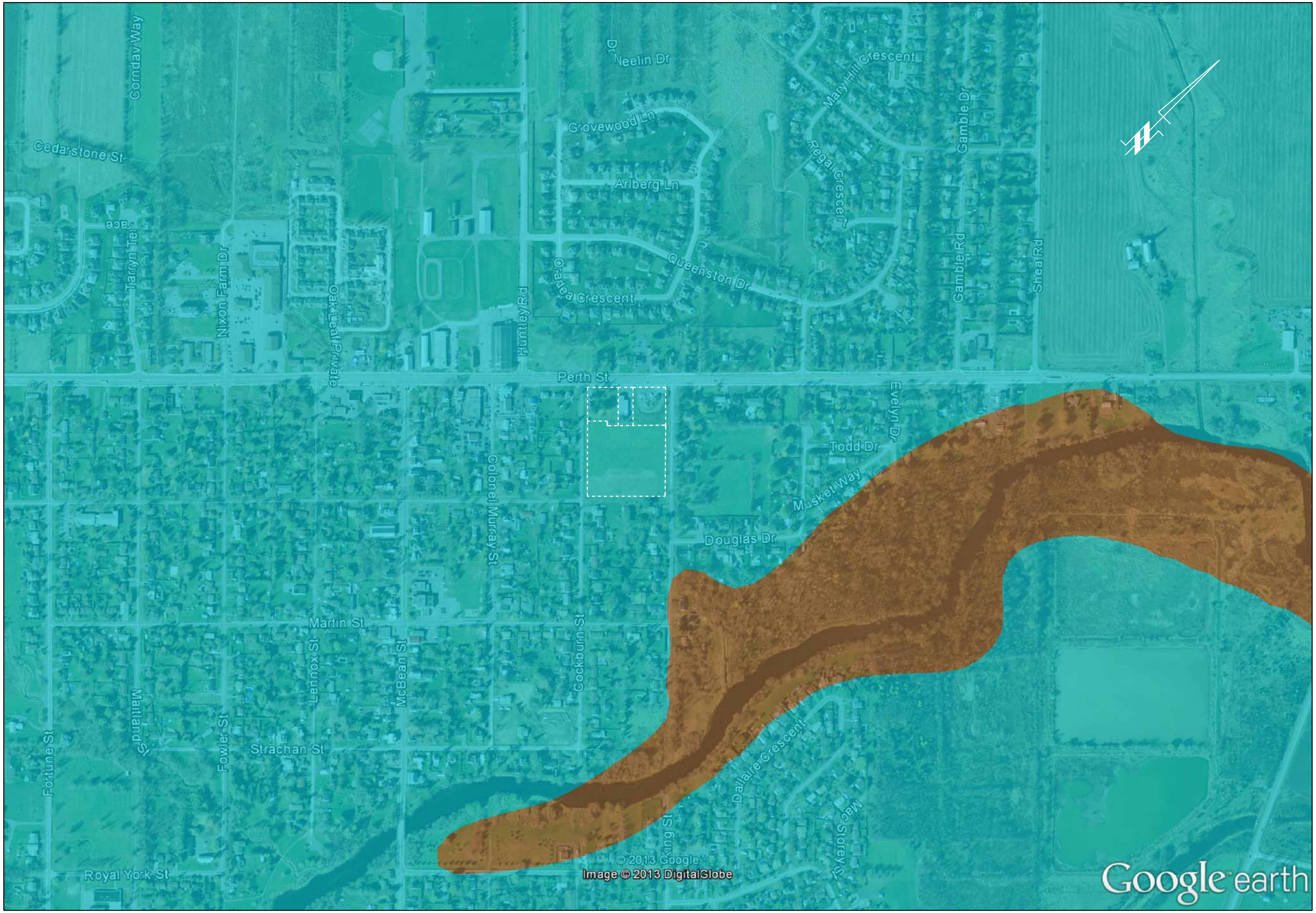
PROPOSED RESIDENTIAL
SUBDIVISION
11 King Street, Richmond, Ontario

SITE LOCATION PLAN

FIGURE 1

Report No.: PH1292 - REP.01-R3

Date: 27-Nov-2015



NOTE: INFORMATION REPRODUCED FROM ONTARIO GEOLOGICAL SURVEY G.I.S. OVERLAY FOR GOOGLE EARTH
REFERENCE SHOULD BE MADE TO SITE SPECIFIC GEOTECHNICAL INVESTIGATION FINDINGS BY PATERSON GROUP INC.

LEGEND:

🟫 MODERN ALLUVIAL DEPOSITS

🟦 FINE TEXTURED
GLACIOMARINE DEPOSITS

Client:

**TOSCANO
CUSTOM HOMES**

Consultant:

**patersongroup
consulting engineers**

Project:

**PROPOSED RESIDENTIAL
SUBDIVISION**

**11 KING STREET
OTTAWA (CUMBERLAND), ONTARIO**

Drawing:

**SURFICIAL SOIL
DELINEATION MAPPING**

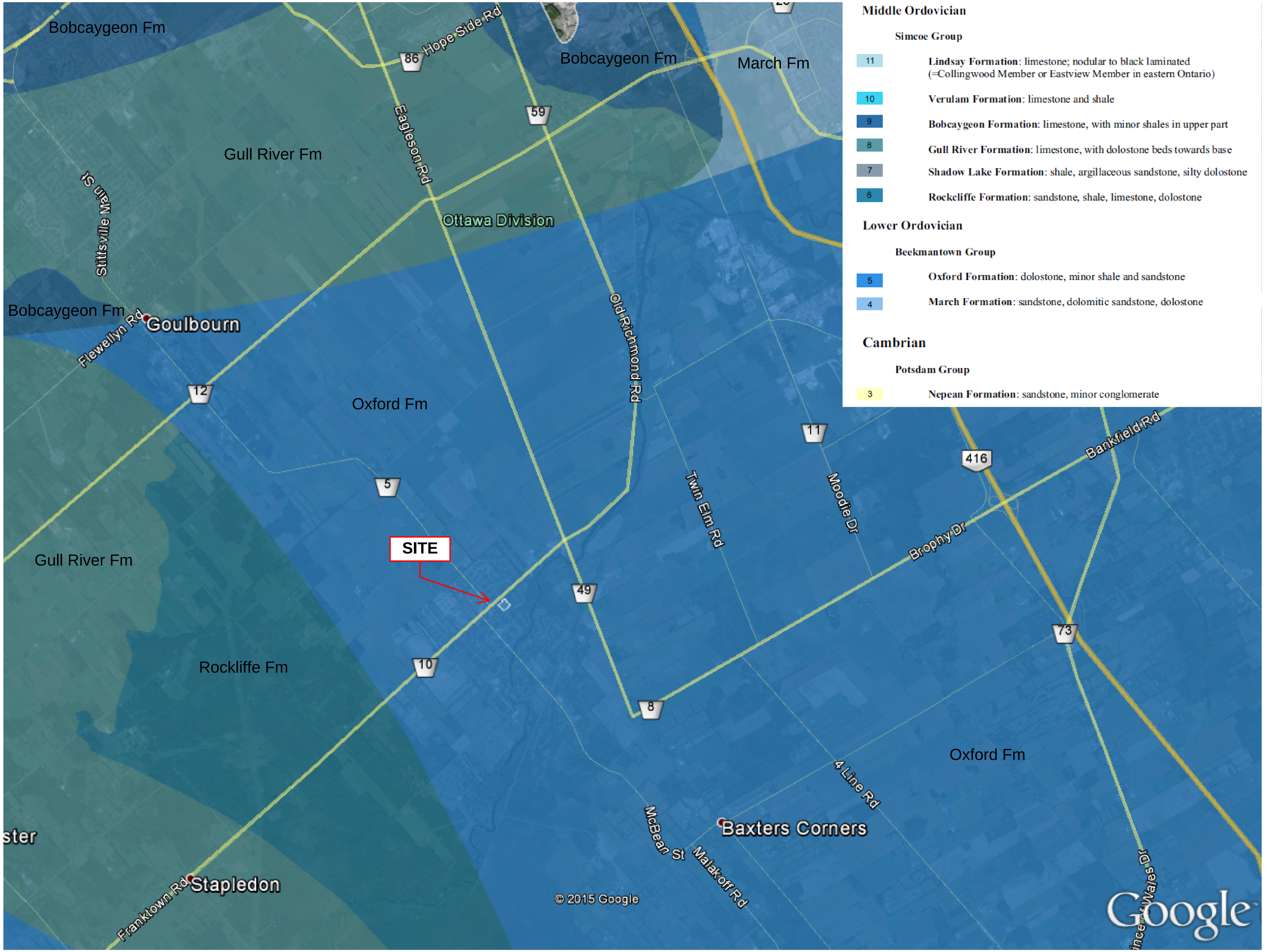
Scale: N.T.S.
Date: 04/2013
Drawn by: BA
Checked by: RAP
File: PH1292
Seal:

FIGURE 2

Drawing No.:

PH1292-FIG.2

p:\autocad drawings\hydrogeology\ph12xx\ph1292\ph1292-figures.dwg



Bedrock information is from Ontario Geological Survey, OGS Earth Website (http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth
(Armstrong, D.K. and Dodge, J.E.P. Paleozoic Geology Map of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 21, 2007)

Bedrock information is displayed on Google Earth (http://www.google.com/earth/), 2015.

DD/MM/YY	DESCRIPTION	REV.

Consultant:

patersongroup
consulting engineers

Client:

TOSCANO
CUSTOM HOMES

Project:

PROPOSED RESIDENTIAL
SUBDIVISION
11 King Street, Richmond, Ontario

REGIONAL
BEDROCK MAPPING

Scale: Not specified
Drawn by: RLC
File: PH1292
Checked by: SW

FIGURE 3

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344
www.patersongroup.ca

PROPOSED RESIDENTIAL SUBDIVISION
11 King Street, Richmond, Ontario

Title:

SURROUNDING WELL INFORMATION PLAN

Date: 27-Nov-15

Report No.: PH1292-REP.01R3

Scale: Not specified

Drawing No.: **FIGURE 4**

Drawn by: RLC

Checked by: SW

LEGEND:

⦿ WATER WELL RECORD - (PUBLISHED MOE RECORDS)

NOTE: WATER WELL INFORMATION REPRODUCED FROM THE ONTARIO GROUND WATER INFORMATION NETWORK (GIN)

Client:
TOSCANO
CUSTOM HOMES

Consultant:
patersongroup
consulting engineers

Project:
PROPOSED RESIDENTIAL SUBDIVISION

11 KING STREET
OTTAWA (RICHMOND), ONTARIO

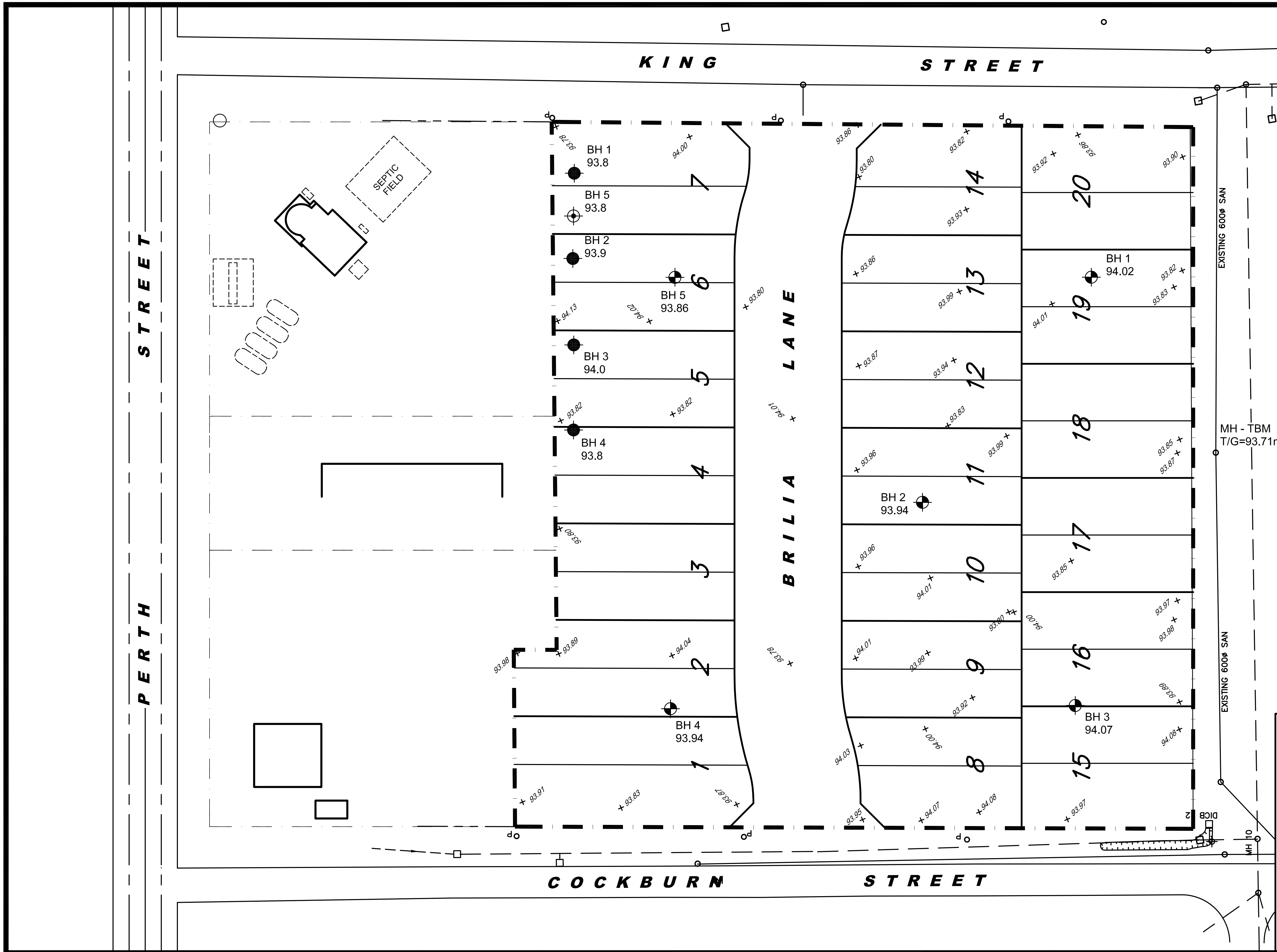
Drawing:
REGIONAL WELLS PLAN

Scale: N.T.S.
Date: 04/2013
Drawn by: BA
Checked by: RAP
File: PH1292
Seal:

FIGURE 5

Drawing No.:
PH1292-FIG.5

p:\autocad drawings\hydrogeology\ph12xx\ph1292\may 2015\ph1292-figures.dwg



LEGEND:

⊕ BOREHOLE LOCATION, CURRENT INVESTIGATION

● BOREHOLE LOCATION, PATERSON GROUP REPORT NO. PE1623-1, JULY 2009

⊕ BOREHOLE WITH MONITORING WELL INSTALLED, PATERSON GROUP REPORT NO. PE1623-1, JULY 2009

94.02 GROUND SURFACE ELEVATION (m)

TBM - TOP OF GRATE OF MANHOLE, GEODETIC ELEVATION = 93.71m.

patersongroup
consulting engineers
28 Concourse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Scale: 1:750
Des.: DG
Dwn: MPG
Chkd: DG

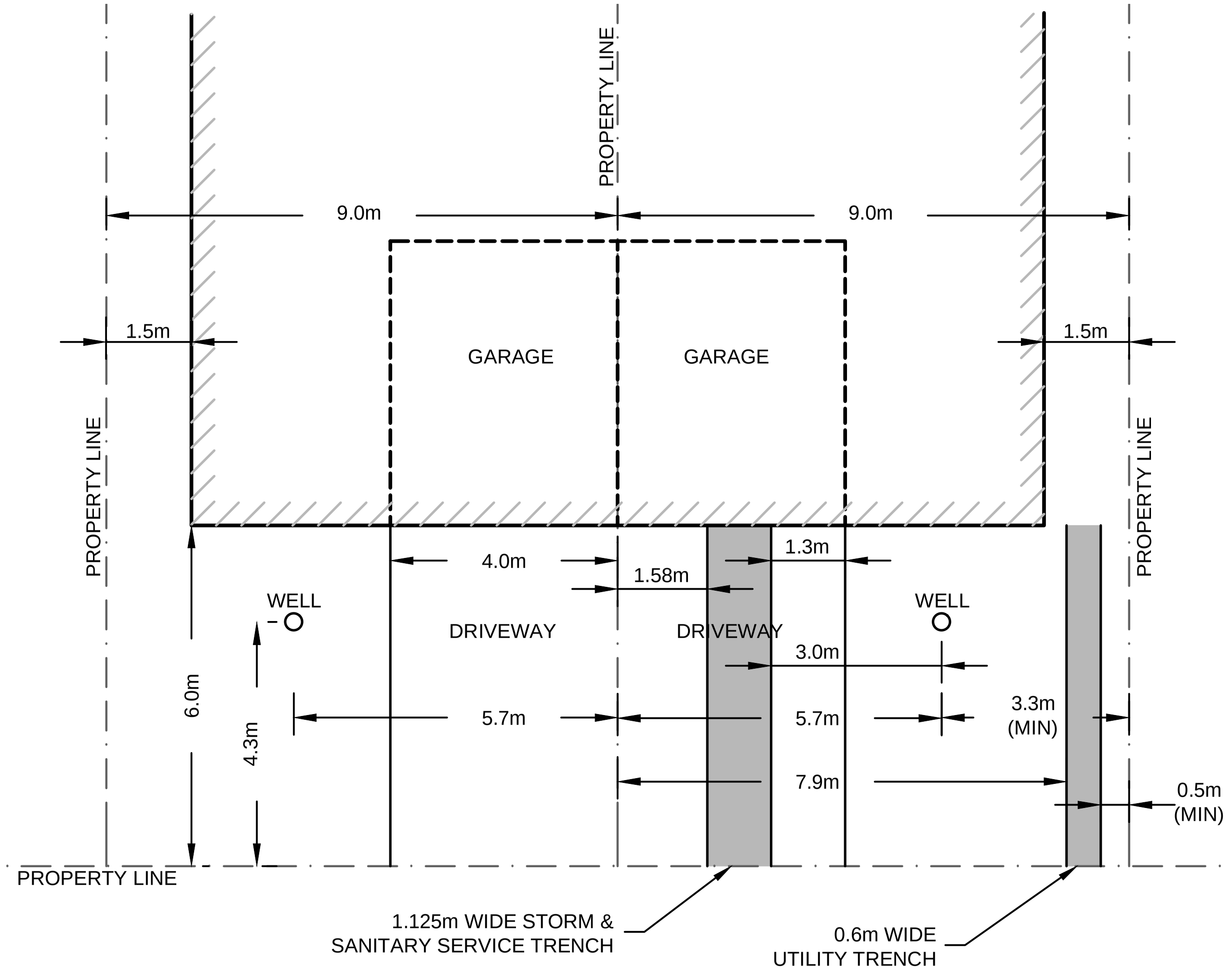
TOSCANO CUSTOM HOMES
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT–KING STREET
OTTAWA (RICHMOND), ONTARIO

FIGURE 6

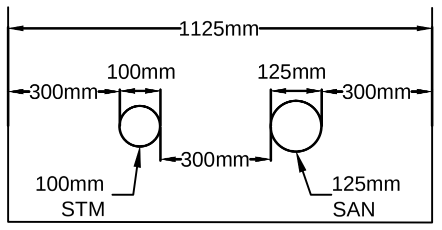
GEOTECHNICAL INVESTIGATION

Dwg. No. PG2022–1
Report No.: PG2022–1
Date: 02/2010

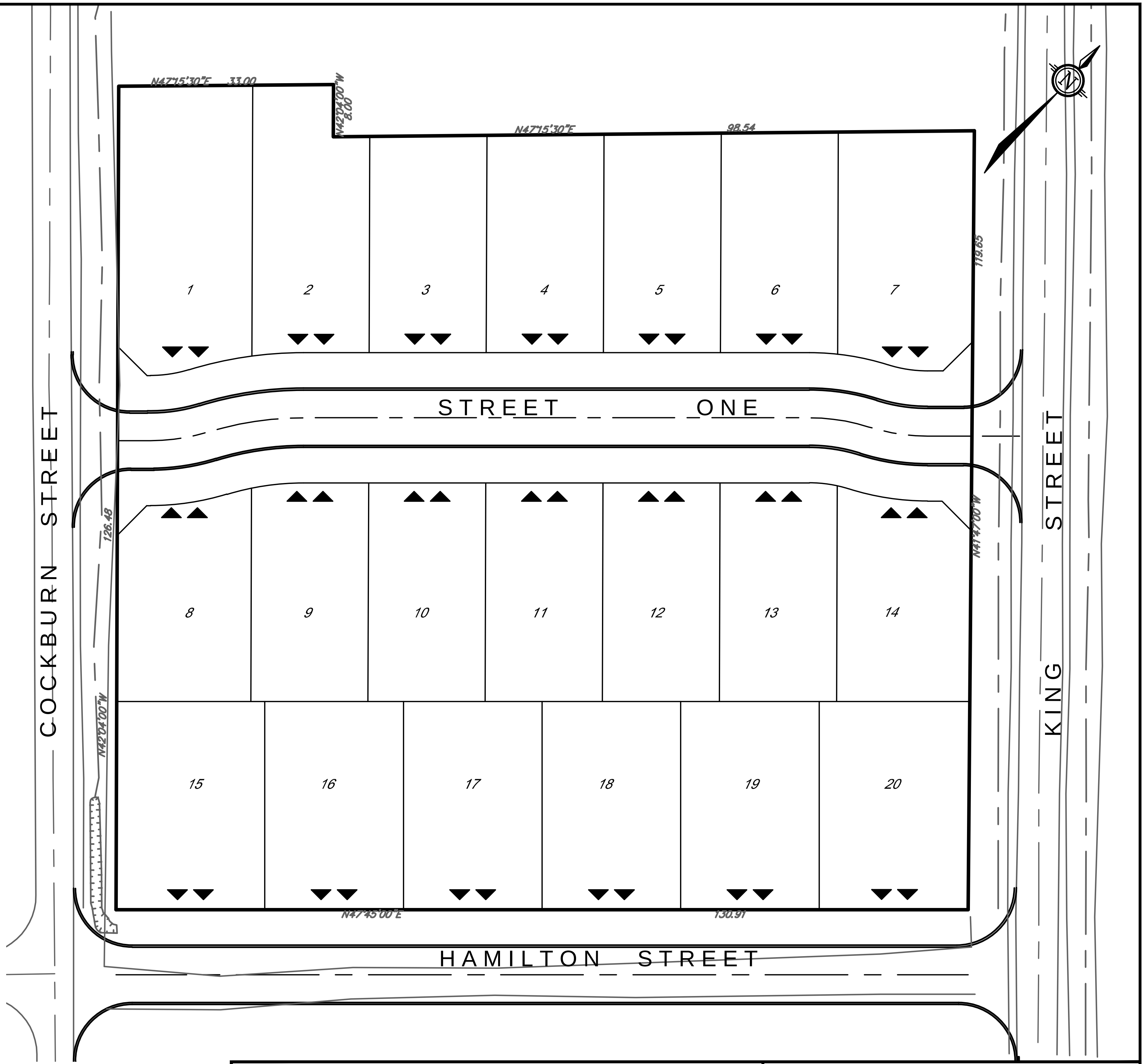
11x17



PROPOSED SERVICING LAYOUT (SAMPLE UNITS)



TYPICAL SERVICE TRENCH



NOVATECH

Engineers, Planners & Landscape Architects

Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone	(613) 254-9643
Facsimile	(613) 254-5867
Website	www.novatech-eng.com

LEGEND

▼	PROPOSED SANITARY AND STORM LOT SERVICES LOCATION
WELL ○	PROPOSED WELL LOCATION

RICHMOND SQUARE
SUBDIVISION

LOT DEVELOPMENT PLAN

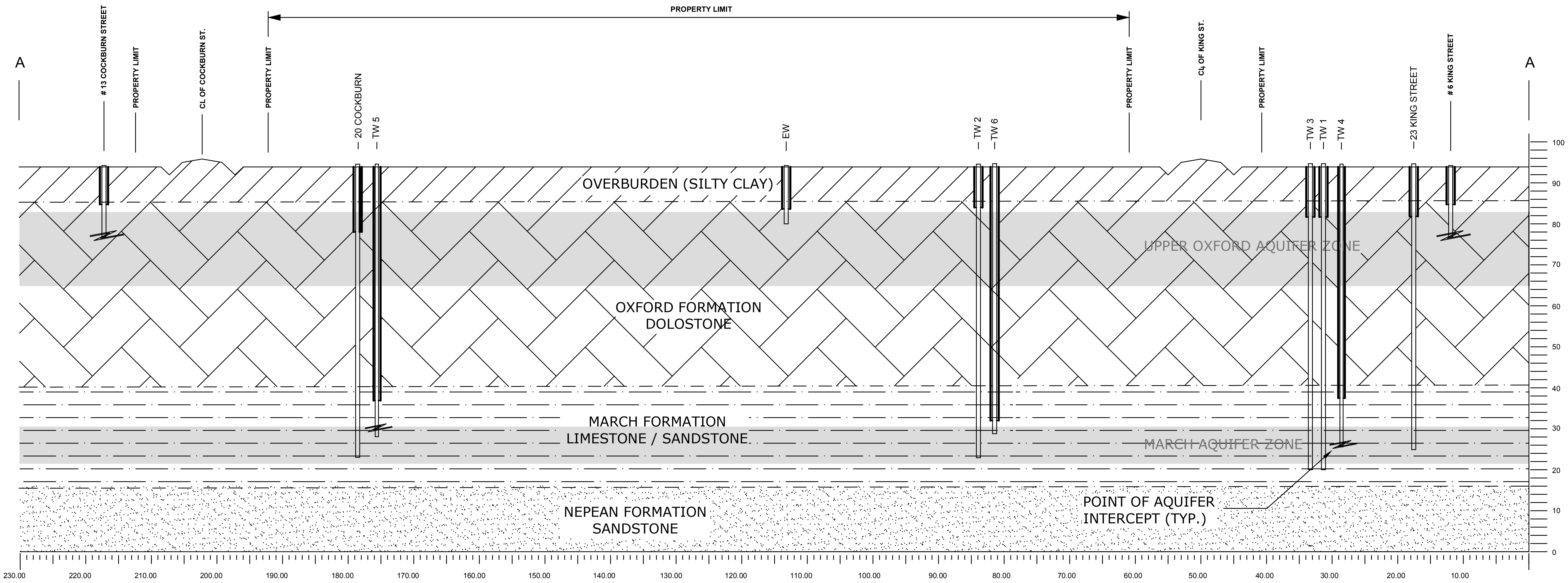
FEB 2015

109222

FIGURE 7

SHT11X17.DWG - 279mmX432mm

M:\2009\109222\CAD\Design\109222-GP.dwg, Well & Service Trench, Feb 24, 2015 - 2:26pm, smatthews



HYDROGEOLOGICAL CROSS-SECTION

FIGURE 8

patersongroup

154 Colonnade Road, Ottawa, Ontario K2E 7J5

Scale: V= 1:1000 H= 1:600

Des.: RAP

Dwn: RAP

Chkd: RAP

TOSCANO CUSTOM HOMES
PRELIMINARY HYDROGEOLOGICAL STUDY
PROPOSED RESIDENTIAL SUBDIVISION, 11 KING ST.
OTTAWA (RICHMOND), ONTARIO

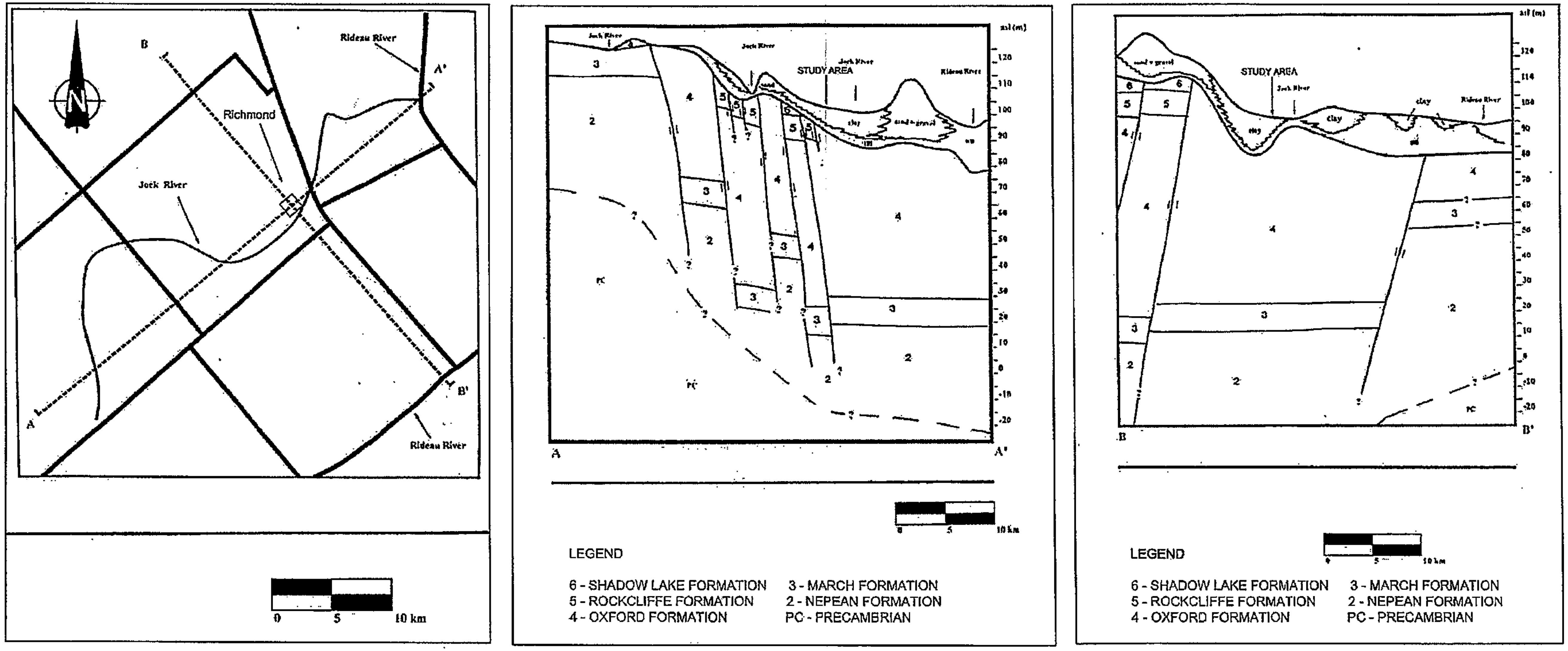
CONCEPTUAL
HYDROGEOLOGICAL MODEL

Dwg. No. PH1292–2

Report No.: PH1292-REP.01

Date: 10/2015

SCHEMATIC GEOLOGICAL CROSS SECTION



REFERENCE:

B.J. VELDERMAN M.Sc. THESIS, UNIVERSITY OF OTTAWA, 1993

SPECIAL NOTE
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT

Date: August 27, 2007

Project: 06-1122-181

Golder Associates

Drawn: M.L.F.

Chkd: V

FIGURE 9

n:\active\2006\1122 - Environmental\06-1122-181 Couryard Water Supply\ACAD\Phase 2000\061122181-2000-03.dwg

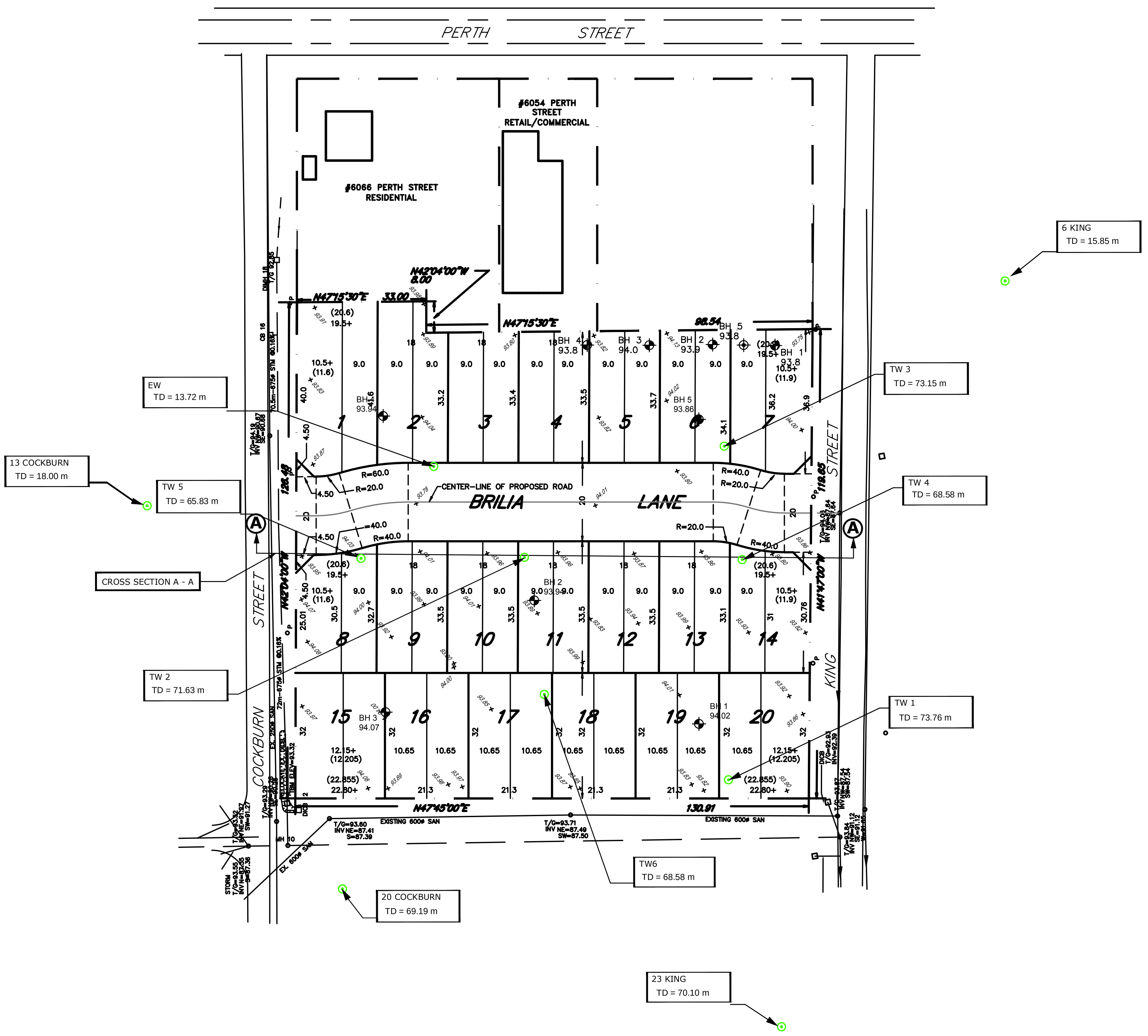


FIGURE 10

patersongroup

154 Colonnade Road, Ottawa, Ontario K2E 7J5

Scale:	1:1250
Des.:	RAP
Dwn:	RAP
Chkd:	RAP

TOSCANO CUSTOM HOMES .
PROPOSED RESIDENTIAL SUBDIVISION
11 KING STREET
OTTAWA (RICHMOND), ONTARIO

TEST WELL & OBSERVATION WELL LOCATION PLAN

Dwg. No. PH1292-1

Report No.: PH1292-REP.01

Date: 10/2015

TABLE 1: SUMMARY OF DRAWDOWN MEASUREMENTS IN WELLS FOLLOWING COMPLETION OF SIMULTANEOUS PUMPING OF TW4, TW5 &TW6			
TEST WELL NO.	SWL (PRE TEST)	SWL (POST HIGH RATE TEST)	DRAWDOWN (m)
1	93.40	91.51	1.89
2	93.30	91.11	2.19
3	93.61	91.42	2.19
4	93.51	85.44	8.06
5	93.74	91.35	2.39
6	93.45	90.57	2.88
EW	92.71	92.81	-0.10
13 COCKBURN	93.52	n/a	n/a
20 COCKBURN	93.70	91.71	1.99
23 KING ST.	93.35	91.61	1.74

TABLE 2: SUMMARY OF DRAWDOWN MEASUREMENTS IN WELLS FOLLOWING COMPLETION OF EXTENDED PUMPING OF TW6			
TEST WELL NO.	SWL (PRE TEST)	SWL (POST HIGH RATE TEST)	DRAWDOWN (m)
1	93.40	92.71	0.69
2	93.30	92.58	0.72
3	93.61	92.84	0.77
4	93.51	92.77	0.73
5	93.74	92.96	0.78
6	93.45	92.37	1.08
EW	92.71	92.63	0.08
13 COCKBURN	93.52	93.44	0.08
20 COCKBURN	93.70	93.04	0.66
23 KING ST.	93.35	92.70	0.65

LEGEND

🟩 – – –	Static
🟧 – – –	Extended Test
🟦 – – –	Simultaneous Test

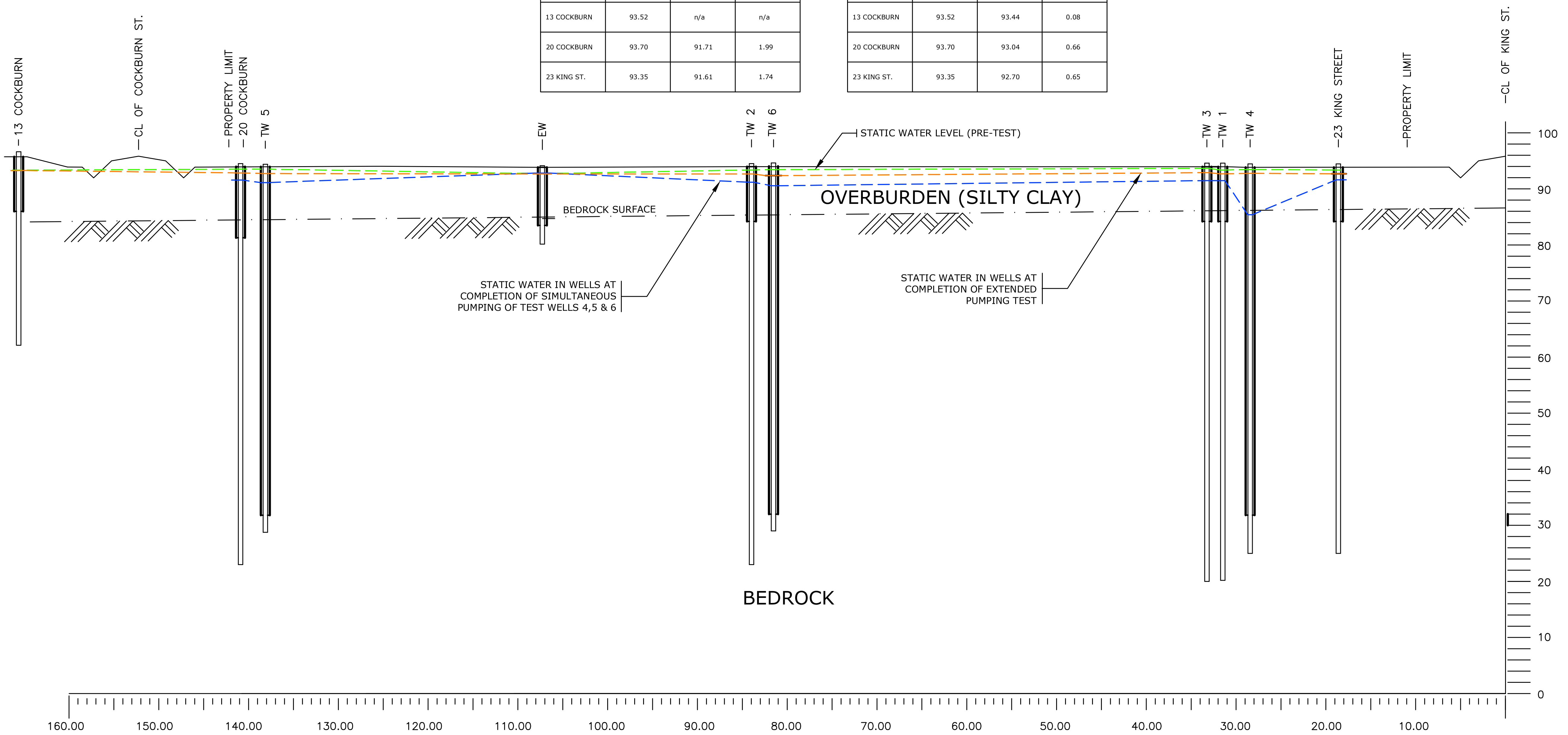
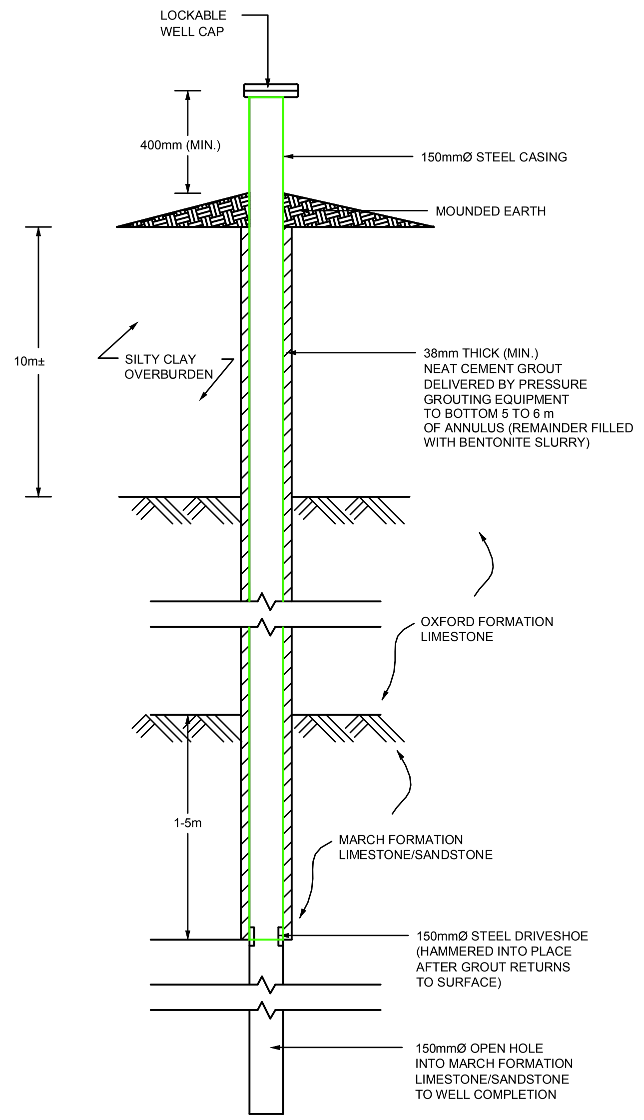


FIGURE 11

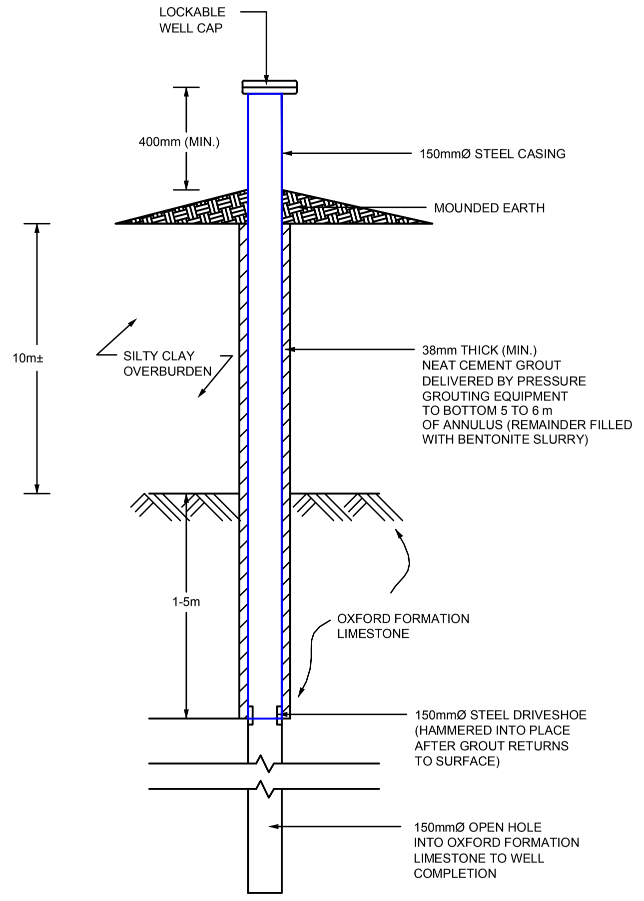
patersongroup

154 Colonnade Road, Ottawa, Ontario K2E 7J5

Scale: H: 1:500 V: 1:800	TOSCANO CUSTOM HOMES PROPOSED RESIDENTIAL SUBDIVISION 11 KING STREET	DRAWDOWN DURING SIMULTANEOUS AND EXTENDED PUMPING TESTS	**Dwg. No.**	PH1292–2
Des.: RAP			**Report No.:**	PH1292–REP.01
Dwn: RAP				
Chkd: RAP	OTTAWA (RICHMOND), ONTARIO		**Date:**	10/2015



PREFERRED WELL CONSTRUCTION METHODOLOGY
(ON SUBJECT SITE)



TYPICAL WELL CONSTRUCTION METHODOLOGY
(IN THE AREA)

FIGURE 12

patersongroup

154 Colonnade Road, Ottawa, Ontario K2E 7J5

Scale: N.T.S
Des.: RAP
Dwn: RAP
Chkd: RAP

TOSCANO CUSTOM HOMES
PRELIMINARY HYDROGEOLOGICAL STUDY
PROPOSED RESIDENTIAL SUBDIVISION, 11 KING ST.
OTTAWA (RICHMOND), ONTARIO

WELL CONSTRUCTION DETAIL

Dwg. No. PH1292-2
Report No.: PH1292-REP.01
Date: 10/2015