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## Preliminary Desktop Hydrogeological Review for a Private Water Well Supply Proposed Commercial Development

1966 Roger Stevens Drive Ottawa, Ontario

**Prepared For** 

Broccolini Development Group

#### Paterson Group Inc.

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Report PH3837-REP.02

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#### 1.0 INTRODUCTION

#### 1.1 **Terms of Reference**

Paterson Group Inc. (Paterson) was retained by Broccolini Development Group (Broccolini) to carry out a preliminary desktop water supply assessment for a proposed commercial building to be constructed at 1966 Roger Stevens Drive, Ottawa, Ontario. The proposed building is expected to consist of a single-storey, slab-on-grade warehouse building with a footprint of approximately 65,000 m<sup>2</sup>. Presently, the subject site is undeveloped and consists of agricultural land with a sparsely wooded farm compound that includes a dwelling, a barn and sheds. Reference should be made to Paterson Drawing PH3837 - 1 - Proposed Site Layout Plan in Appendix 2 for the site location and general proposed site layout.

The subject site is located in the rural area of the city where the water supplies of existing users are domestic wells. It is understood that the proposed development will be serviced by a private water well as no municipal water or wastewater services are available. The wastewater will be treated by an onsite private wastewater treatment plant with a direct discharge to the surface.

The purpose of this study has been to carry out a desktop hydrogeological review of the available information to determine the suitability of the water supply aquifer system underlying the site to adequately supply the proposed development for potable usage. Specifically, the intent of this report is not to design the water distribution system, but to determine the availability of a safe, reliable water supply having sufficient quantity and quantity to provide potable water for the proposed development.

This study was conducted in general accordance with Ontario Ministry of Environment guidance document Procedure D-5-5 - Technical Guideline for Private Wells; Water Supply Assessment.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and recommendations pertaining to the private services for the subject development as it is understood at the time of writing this report.



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#### 2.0 BACKGROUND

#### 2.1 Subject Site

The subject property fronts onto the south side of Roger Stevens Drive between the west side of Highway 416, a forested lot to the south, and residential lots on Third Line Road. Specifically, the property is located at 1966 Roger Stevens Drive, in the City of Ottawa, Ontario (refer to Paterson Drawing PH3837 - 1 in Appendix 2). The property is approximately rectangular in shape and has an approximate surface area of 48 ha with a section along the western boundary consisting of 6 ha slated to become future development. The property is currently zoned Rural Commercial and Rural General Industrial with an RC, RG and RC[55r] zoning designation.

Presently, the site is mostly undeveloped and consists of agricultural land with a sparsely wooded farm compound that includes a dwelling, a barn and sheds. The farm lands are relatively flat with a geodetic elevation of 87 to 88 m, whereas the farm compound is built on a hill which crosses between the southwest and northeast corners of the site at a geodetic elevation of 94 to 96 m.

The subject site is bounded to the north and south by the Dillon-Wallace and Johnston Municipal Drain, respectively, with roadside ditches transmitting surficial flows to the Drains on a seasonal (intermittent) basis. The Drains flow in a northeast direction where it empties into Stevens Creek. Stevens Creek is a tributary to the Rideau River. Refer to Paterson Drawing PH38378 - 2 - Municipal Drain Plan for the alignment of the existing municipal drains and ditches.

#### 2.2 **Neighbouring Properties**

The subject property is bordered by Highway 416 to the east, Roger Stevens Drive to the north, treed off residential properties to the west and a forested area along the south and southwest borders. See Paterson Drawing PH3837-1 - Proposed Site Layout Plan in Appendix 2.

#### 2.3 **Regional Geology**

Published surficial geology mapping for the area in the vicinity of the subject site indicate the site is underlain predominantly by an intermittent glacial till deposit or a brown to grey silty clay stratum. The silty clay is underlain by the glacial till deposit prior to encountering bedrock. Refer to Paterson Drawing PH3837 - 4 - Surficial Geology in Appendix 2 for the Ontario Geological Survey (OGS) mapping.



Based on site specific investigative works carried out by this firm (Paterson Report No. PG4870-1, dated July 2, 2019), the general subsoil profile encountered within the farmland area consisted of a topsoil layer overlying a silty clay or silty sand layer underlain by a silty clay deposit, which is in turn underlain by a glacial till deposit. The subsoil profile encountered within the farm compound generally consisted of a topsoil overlying a glacial till deposit. Reference should be made to Paterson Drawing PG4870-1 - Test Hole Location Plan and the associated Soil Profile and Test Data sheets in Appendix 3 for specific details of the soil profiles encountered at each test hole location.

The overburden across the site ranges in thickness from approximately 6.5 to 16.5 m based upon dynamic cone penetration testing and water well supply installation on the surrounding properties. This information closely coincides with the available mapping from Natural Resources Canada for Drift Thickness.

The OGS mapping indicates that the subject lands are underlain by dolostone bedrock of the Oxford Formation which coincides with the well drillers description on the MECP water well records (WWR) for the surrounding well supply's installed within the subject area. Refer to Paterson Drawing PH3837-5 - Bedrock Geology in Appendix 2 for the OGS mapping.

## 2.4 Proposed Development

The proposed building is expected to consist of a single-storey, slab-on-grade warehouse building with a footprint of approximately 65,000 m<sup>2</sup>. It is anticipated that associated paved access lanes, vehicle parking areas and landscaped areas will surround the proposed building, and that the building will be privately serviced. The estimated peak season employee count is 3,468 employees, with a estimated potential maximum daily flow volume of 273,820 L/day and has been provided by Novatech Engineering. A large volume holding tank is to be used to prevent requiring peak volume removal from the aquifer. The proposed location of the domestic water well is anticipated to be within the northeast portion of subject site. Refer to Paterson Drawing PH3837 - 1 - Proposed Site Layout Plan in Appendix 2 for the proposed location of the well.



## 3.0 METHOD OF STUDY

A previous hydrogeological report, titled Hydrogeological Study Report - Jordel Acres Proposed Subdivision by Sauriol Environmental Inc. dated June 1999 was analyzed for this preliminary desktop review.

### 3.1 Test Well Construction

### Old Wells (JAR - 1999)

Three test wells were drilled, with pumping tests and recovery tests conducted on all three wells as part of the Jordel Acres Report (JAR). Test Well 1 (TW1) has ID 197099, Test Well 2 (TW2) has ID 197100, and Test Well 3 (TW3) has ID 206049. The test well locations can be found on Sauriol Environmental Inc. plan titled Jordel Acres - Site Plan dated June 1999, with project number 9908, attached in Appendix 2. All three wells were constructed by Bourgeois Well Drilling on the 18<sup>th</sup> and 19<sup>th</sup> of May 1999. Copies of the Ministry of Environment, Conservation, and Parks (MECP) Water Well Record (WWR) for the wells are provided in Appendix 1. A WWR for the decommissioning of TW3 was found on the MECP Water Well website, and is attached in Appendix 1.

A representative from Sauriol Environmental Inc. prepared a Well Certification Statement regarding the construction of the test wells, and attested to the test wells being properly pressure grouted and installed in accordance with O.Reg 903. The Well Certification Statement is attached in Appendix 1. According to the WWR, the annular space was pressure grouted utilizing a cement grout. Based on the Well Certification Statement, and a review of the MECP WWR, the well was constructed in general conformance with Ontario Regulation 903 in 1999.

The relevant information regarding the construction of TW1, TW2 and TW3 appears in Table 1, below:

| TABLE 1: CONSTRUCTION SUMMARY OF TW1, TW2, and TW3 |               |      |      |  |  |  |  |  |  |
|--|---------------|------|------|--|--|--|--|--|--|
| PARAMETER TW1 TW2 TW3                              |               |      |      |  |  |  |  |  |  |
| Depth to Bedrock (m)                               | 7.3           | 7.3  | 11   |  |  |  |  |  |  |
| Depth of Bottom of Casing (m)                      | 9.1           | 9.4  | 12.2 |  |  |  |  |  |  |
| Depth of Aquifer Intercept (m)                     | 15.2 and 32.0 | 25.9 | 19.8 |  |  |  |  |  |  |
| Total Depth of Well (m)                            | 37.2          | 31.7 | 24.1 |  |  |  |  |  |  |

Note: Values in Table 1 are measured in metres below existing ground surface at the drilling location.

The well driller carried out a one hour constant rate pumping tests on each of the wells, as required by regulations.

## Proposed Well (Future)

A new well (TW4) will be installed as per O.Reg 903 and will be tested in general accordance with Guideline D-5-5. Prior to the commencement of the new well installation and testing program, pre-consultation will occur with the City of Ottawa (City) as well as the Rideau Valley Conservation Authority (RVCA). The new test well construction, monitoring and pumping program will depend on the results of the pre-consultation. TW1 and TW2 are still existing and may be available for monitoring during the pumping test of the new well.

## 3.2 Pumping Test

### Old Wells (JAR - 1999)

For the one hour pumping test required by O.Reg 903, the WWR indicated that Bourgeois Well Drilling pumped the test wells at either 160 or 180 L/min for the hour timeframe. All three test wells were drawn down to the base of the well during the one hour test with 100% recovery observed in all three test wells in under 15 minutes.

TW1, TW2, and TW3 were each subjected to a 6 hour pumping test performed for the JAR.

Sauriol Environmental Inc. conducted the 6 hour pumping test on each of the test wells. The three wells were pumped at 16 L/min, and drawdown was recorded to range 0.02 to 0.16 m at the end of the 6 hour test. One hundred percent recovery was recorded ranging from 1 to 30 minutes. All three wells experienced negligible to minimal drawdown over the 6 hour period.

It was reported in the JAR that turbidity was initially measured at 8 NTU as the highest value the 3 hour mark of the 6 hour pumping tests. Turbidity steadily decreased to below 2 NTU at the 5 hour mark of the pumping test, and continued to decrease until the completion of the test. Turbidity was recorded to be below 2 NTU after the 5 hour interval of the pump test in all wells. According to the JAR, between 8 and 13 hours of well development was required before producing acceptable turbidity levels (i.e. below 1 NTU).

A distance-drawdown relationship was observed between two test wells, TW1 and

TW2. After 6 hours of pumping, 4 cm of drawdown was measured in the observation well.

## Proposed Well (Future)

The pumping rate for the JAR is inadequate to support the proposed development.

After the pre-consultation process has been completed with the City of Ottawa and RVCA, a new drilled well will be installed and subjected to a minimum 12 hour pumping test. The length of the test, and the rate of pumping for the test will be determined at that time.

## Peak Season Maximum Daily Water Demand

Novatech Engineering completed daily water demand calculations for the proposed development. In order to determine the peak season maximum daily water demand, the follow parameters have been used. Using an average demand per employee of 75 L/day, with 3468 employees, a demand of 260,100 L/day is expected. A water demand associated with truck drivers accessing the facility was calculated at 215 trucks times 8 L/day for a total of 1,720 L/day. Hose bibs are to be installed in the building, with flows estimated at 40 L/minute for 5 hours of the day, which equates to 12,000 L/day. Maximum peak season daily flows result in a total of (260,1000 + 1,720 + 12,0000 L/day) 273,820 L/day.

Off-peak season values have also been calculated by Novatech Engineering. Average day water demand is based upon off-peak season daily flows and have been estimated to be approximately 173,874 L/day.



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#### 4.0 **AQUIFER ANALYSIS**

#### 4.1 Water Quantity

#### Old Wells (JAR - 1999)

TW1, TW2, and TW3 were pumped at a rate of 16 L/min for 6 hours. During the pumping test, drawdown was measured to be 0.02 to 0.16 m. Aquifer transmissivity was estimated at 280 m<sup>2</sup>/day. As a result of the one hour pumping tests performed by Bourgeouis Well Drilling, the recommended pump rate was 57 L/min for all test wells.

#### **Proposed Well (Future)**

Testing of the new drilled well will determine the current quantity of water available. Based upon the JAR, the pumping rate may require in excess of the 12 hour pumping window to complete the test without drawing down the water in the proposed well to below the test pump. Additionally, a larger diameter well may be used to provide higher volumes. The proposed development will use a large storage tank to limit peak pumping required.

#### 4.2 **Groundwater Geochemistry**

#### Field Water Quality Data

#### Old Wells (JAR - 1999)

Ground water samples were collected at the beginning and at the end of each of the pumping tests in TW1, TW2, and TW3. All samples were submitted to Accutest Laboratories Ltd.

Several parameters measured were recorded as elevated, such as Total Dissolved Solids (TDS), Hardness, and Iron.

Sodium levels were low, however, would require written notice to the Medical Officer of Health for people on sodium restricted diets.

### **Proposed Well (Future)**

The future drilled well will be subjected to a comprehensive analytical test at the halfway mark of the future pumping test, as well as at the end of the pumping test. The testing is anticipated to comprise of a standard "Subdivision Package" with



bacteriological testing (E.Coli and Total Coliform). Additional parameters may be required based on the pre-consultation process.



#### 5.0 RECOMMENDATIONS

- 1. Additional consultations with the RVCA and City of Ottawa should be performed prior to proceeding with a Hydrogeological Study.
- 2. MECP to be pre-consulted for the on-site sewage system Environmental Compliance Approval.
- 3. A new well should be constructed and subjected to a minimum 12 hour pumping test in order to adequately assess the quantity and quality of the underlying aquifer.
- 4. Additional wells should be monitored to determine the potential effects of longer term pumping and measure the distance-drawdown relationship, where possible.
- 5. Existing on-site wells and test wells should be decommissioned as per O.Reg. 903 if they are not to be maintained for future usage in accordance with O.Reg. 903.
- 6. Further analysis will be required subsequent to the completion of the required pumping test and a full hydrogeological analysis/report of the aguifer for quantity and quality will be completed.

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#### 6.0 CONCLUSIONS

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

- 1. A new test well, TW4, is to be constructed and completed in general accordance with the requirements of Ontario Regulation 903.
- 2. Analysis of the aquifer intercepted by the test wells indicates the wells have intercepted a water supply capable of providing large quantities of water removal and have a high rate of recharge.
- 3. The water supply aguifer is considered to be generally of good quality, as per the JAR.
- 4. In consideration of the low exceedances of the aesthetic parameters, minimal water treatment is anticipated to provide a potable water source.
- 5. An on-site storage tank is anticipated to mitigate peak pumping volumes. The storage volume may be in excess of 90,000L and is to be determined based upon the available quantity within the aquifer.

Based on the results of this review, the test wells from JAR have intercepted a water supply which indicates high quantities, however, additional testing is required to determine its adequacy for the proposed development. The quality of the water supply appears to be good for potable use, with minimal treatment necessary.

In consideration of the limited scope of a preliminary desktop hydrogeological study, a new test well and further testing is recommended.



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 Broccolini Development Group, or their agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

We trust that this report satisfies your present requirements. Should you have any questions regarding this report, do not hesitate to contact us.

AND PROFESSIONAL ELES

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Yours truly,

## PATERSON GROUP INC.

All in

Erik Ardley, Bsc. Geology Junior Hydrogeologist

#### **Report Distribution:**

Michael S. Killam, P.Eng. Hydrogeologist

Broccolini Development Group (2 copies)

Paterson Group (1 copy)

## **APPENDIX 1**

PUBLISHED MECP WATER WELL RECORD FOR TW1, TW2 and TW3

WELL CERTIFICATION STATEMENT

0013111223 IN:00 9875291

BOURGOIS WELL DRILL\*

*.*-

| Ontario | Ministry of<br>Environme<br>and Energ |
|---------|---------------------------------------|
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PAGE Ø1 The Ontario Water Resources Act WATER WELL RECORD

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| WATER USE       Commercial       Not used         11 Stock       Municipal       Other         12 Industrial       Cooling & as conditioning         METHOD OF CONSTRUCTION       Aff percussion       Other         11 Adjustrial       Cooling & as conditioning       Driving         12 Cable tool       Aff percussion       Other         13 Reary (conventional)       Aff percussion       Oriving         14 Reary (conventional)       Boring       Diagone         14 Reary (conventional)       Boring       Other         14 Reary (conventional)       Boring       Diagone         12 Reary (conventional)       Boring       Diagone         13 Stock       Other       Diagone         14 Reary (conventional)       Jetting       Diagone         19 Road (contractor       Other       Homod         14 Social Spoint State Cont       Homod       Homod         Address       Homod       Homod       Homod         Scientifican       Weil Technician's Licence No.       Homod         Maddress       Homod       Budmiteston and<br>asy ma       Mod         14 Count Address       Budmiteston and<br>asy ma       Budmiteston and<br>asy ma       Mod         14 CONTRACTOR'S COPY   |      | C Recharg                      | o<br>(* ws))        | D Dewatering                | Other)             |   | 11         |         |               |          |                   |             |                     | NI               |        |
| WATER USE         I brownestic       Contractal         I brownestic       Munkipal         I brownestic       Public supply         I content       Public supply         I contracter       Well Contracter's Licence No.         Karters       Public supply         I contracter       Public supply         I contracter       Public supply         I contracter       Public supply         I contracter       Public contracter         I contracter <td< td=""><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>W.</td><td></td></td<>  | 1    |                                |                     |                             |                    |   |            |         |               |          |                   |             |                     | W.               |        |
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| Image ton       Public supply       If the transmission         If Industrial       Cooling & all conditioning         METHOD OF CONSTRUCTION       If an end of the percussion         If able tool       Boring         If able tool       Boring         If able tool       If arrowship         If able tool       Boring         If able tool       If arrowship         If adapting (average)       Boring         If arrowship       If arrowship         If arrowship       If arrowship         Name of Well Contractor       Well Contractor's Licence No.         Grad transmid       If arrowship         Marrie of Well Contractor       Well Technician's Licence No.         Address       Address         Address       Methods and the licence No.         If arrowship       Bubmission awas         If address       If arrowship         If an end       If arrowship         If address       If arrowshi  |      | 1) Stock                       | r <b>v</b>          | U Commercial<br>U Municipal |                    | D Notused                                       |            |         |               |          |                   |             |                     | 12               |        |
| METHOD OF CONSTRUCTION       Alf percussion       Driving         I Cable tool       Alf percussion       Driving         I Cable tool       I Alf percussion       Driving         I Cable tool       I Driving       Digging         I Cable tool       I Driving       Digging         I Contary (everse)       I Driving       Digging         I Driving       I Driving       I Driving         I Contary (everse)       I Driving       I Driving         I Driving       I Driving       I Driving         I Arme of Well Contractor       I Driving       I Driving         Critical Science Statistical Driving       I Driving       I Driving         Name of Well Contractor       Well Contractor's Uscence No.       I Driving         Grad ress       I Driving       I Driving       I Driving         Address       I Driving       I Driving       I Driving         Mame of Well Contractor       Well Contractor's Uscence No.       I Driving       I Driving         Marte of tref inclean       I Driving       I Driving       I Driving       I Driving         Marte of Well Techniclan       Bubmitelon aver       I Driving       I Driving       I Driving         Signetoura of Terf inclean Contartor  |      | <ol> <li>Industria</li> </ol>  | 1                   | C Public supply             | conditioning       | () Only   |            |         | K             |          |                   |             |                     | N.               |        |
| METHOD OF CONSTRUCTION       Image: Address for the percentation       Image: Driving       Image:   |      |                                |                     |                             | enteranting        |   |            |         |               |          |                   |             |                     | NP1              |        |
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| 12 Rotary ferverse)       Bolanding       Disaling       197099         Name of Wall Contractor       Well Contractor's Licence No.       197099         Address       Well Contractor       Well Contractor is Licence No.         Address       Well Contractor       Well Contractor is Licence No.         Name of Well Contractor       Well Contractor is Licence No.       Image of the state is the  |      | Cable to<br>Rotary (c          | oi<br>conventional) | Li Air parcussion           | n                  | C Driving                                       |            |         | f f           |          |                   |             |                     | 11               |        |
| Name of Well Contractor     Userce No.       City III     Jetting       Name of Well Contractor     Well Contractor's Userce No.       City III     Jetting       Second Status     Jetting       Jetting     Jetting       Jetting     Jetting <tr< td=""><td></td><td>1) Rotary (</td><td>everse)</td><td>Diamond</td><td></td><td>Digging<br/>O Other</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1070</td><td></td><td></td></tr<>  |      | 1) Rotary (                    | everse)             | Diamond                     |                    | Digging<br>O Other                              |            |         |               |          |                   |             | 1070                |                  |        |
| Name of Well Contractor<br>Crt II - 3 Bout a space Milling iII II - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -   |      |                                | ••7                 | 🗋 Jetting                   |                    |   |            |         | ł             |          |                   |             | TA ((               | 1931             |        |
| Image of Well Contractor     Well Contractor's Licence No.       Image of Well Contractor's Licence No.     Image of Well Contractor's Licence No.       Image of Well Technician     Image of Well Technician's Licence No.       Image of Well Technician     Well Technician's Licence No.       Image of Well Technician     Well Technician's Licence No.       Image of Well Technician     Well Technician's Licence No.       Image of Technician     Well Technician's Licence No.       Image of Technician     Bubmission data       Significate of Technician Contractor     Bubmission data       Image of Technician     Bubmission data       Image of Technician Contractor     Bubmission data       Image of Technician Contractor     Bubmission data       Image of Technician     Bubmission data <td>Ma</td> <td></td> <td>-</td> <td></td> <td></td>   | Ma   |                                |                     |                             |                    |   |            |         |               |          |                   |             | -                   |                  |        |
| Address<br>S-ALBERT Ont<br>Name of Well Technician Contractor<br>JALGUBO A YNO FOR BUDGERNE LIOPAGE NG<br>Signaus of Terknician Contractor<br>Budgitasian data<br>1 - CONTRACTOR'S COPY   | 1    | tie of wall Confr              | 2                   | 11100                       | tax . 11           | Well Contractor's L                             | Icence No. | >       |               |          |                   |             |                     |                  |        |
| Signaus of Terrinician Contractor's COPY  | Adi  | 7// C ) / C                    | POURSED             | is Bell                     | Doill              | 1414  |            | Z       |               |          |                   |             |                     |                  |        |
| Name of Well Technician Well Technician's Liberate No.<br>Signaus et Terknician Conference<br>Signaus et Terknician Conference<br>1 - CONTRACTOR'S COPY   |      | . Fr - x                       | ALIZI               | FOT.                        | n-t-               | -   |            | ů,      |               |          |                   |             |                     |                  |        |
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|   |      | 1                              | - CONTR             | ACTOR'S C                   | :OPY               |   |            |         | ÷             |          |                   |             |                     |                  |        |

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|            |       |      |

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BOURGOIS WELL DRILL\*



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

| County or District     Townshlaßorough/City/Town/Nilage     Con E       Diffoura     General colour     First name     Address       Dorner's surname     Address     Darth     Dorner       Jord Del     Ackes     Darth     Dorner       #=2     1     LOG OF OVERBURDEN AND BEDROCK MATERIALS (see Instructione)       General colour     Most common material     Other material |   |
|--|---|
| General colour Most common material Other materials  | lock tract survey, etc. Lot<br>2<br>Date<br>completed |
|  | day month year  |
| BRENN CAY<br>GREN CAY<br>GREY Till Beklelogs<br>GREY GRAVEL SANG Bouldaes<br>GREY Linestone Hore<br>GREY IS Shale hayer eq   |   |

| WATER RECORD                          | CASING &                         | OPEN HOL     | ERECORD       | 2           | Sizes of opening          | Diameter Length                         |               |
|---------------------------------------|----------------------------------|--------------|---------------|-------------|---------------------------|---|---------------|
| Water found Kind of water             | inside<br>diam Material          | Wall         | Depth -       | - faet      | Z (Slot No.)              | inches                                  | 100+          |
| at test Polici of which               | Inches                           | inches       | From          | To          | <u>الله</u>               |   | 1             |
| H Fresh II Sulphur                    | [] Steel                         |              |               |             | G Material and type       | Depth at top of s                       | Green         |
| 85 Il Salty Il Gas                    | O34. 1 Galvanized                |              |               | 2/          | 0                         |   | feet          |
| Fresh Sulphur                         | O Za - Doen hole                 |              | $\mathcal{O}$ | 21          | Landana and a second      |   |               |
| Saity   Gas                           | / I Plastic                      |              |               |             | PLUGGING                  | & SEALING RECORD                        |               |
| Li curti Il Sulphur                   | H Steel                          |              |               |             | Annular space             | [] Abandonment                          |               |
| Li Salty Li Minerals                  | Concrete                         | 100          | 421           | 31          | Depth set at - feet       |   |               |
| Gas                                   | 194 1) Open hole                 | 1.00         | 1             |             | From To Materia           | and type (Cement grout, bento           | nite, etc.)   |
| Fresh Sulphur                         | / I) Plastic                     |              |               |             | 0316                      | a put a part                            | 1-1           |
| Salty I) Gas                          |                                  |              |               |             |                           | a ora grow                              |               |
| I Fresh I Sulphur                     | 11 Concrete                      |              | 3/ 1          | ID4         |                           |   |               |
| . Salty Gas                           | D Plastic                        |              |               | 101         |                           |   |               |
|                                       |                                  | l            |               |             |                           |   |               |
| Mumping test method Pumping rate      | Curation of pumpin               | 19           |               |             |                           |   |               |
| 1. Pump+/LKBaller                     | GPM Hours                        | O Mins       |               |             | LOCATION OF V             | /ELL                                    |               |
| Static level Water level Water level  | during i Dumaina                 | K a          |               | In diagram  | below show distances of w | ell from road and int line              |               |
| end of pumping that tere.             | addining promoting 2             | V Hecovery   |               | Indicate no | with by arrow.            | or rom road and for line                | •             |
| in Local Is minutes                   | 30 minutes 45 minutes 1          | 50 minutes   |               |             |                           |   |               |
| F 6 107 6                             | 6 6                              | 6            |               |             | スル                        |   |               |
| C leet teet feet                      | feet feet                        | teet         | j             | 1           | ). N                      |   |               |
| a i comp intake se                    | Water at end of tes              |              |               |             |                           |   |               |
| D Beconverged nume has Becommended    | Z leet Clear                     | Cloudy       | l             |             | County 2                  | + 61                                    |               |
| pump setting                          | PD pump rate                     |              |               |             | Country 2                 |   |               |
| Shallow & Deep                        | OU level                         | 5            | 1             |             |                           | ,                                       |               |
|                                       |                                  | e <u>u m</u> | 1             |             |                           | $\sim$                                  |               |
| FINAL STATUS OF WELL                  |                                  |              |               |             |                           | No. | 4             |
| Ubservation wall                      | insufficient supply () Unfinishi | ed           |               |             |                           |   | NI            |
| est hole () Abangoned                 | (Other) [ Replaced               | ment well    |               |             |                           | V                                       | XI            |
| 1 fischerge well 1: Dawetering        |                                  | 1            |               | K           |                           | · ·                                     | r I           |
|                                       |                                  |              |               | l'          |                           | ×                                       |               |
| WATER USE                             |                                  |              |               |             |                           |   | $X \parallel$ |
| 11 Stock 11 Municipal                 | U Notused                        |              |               |             |                           | 2                                       |               |
| I Intigation IJ Public supp           | ly Li Other                      |              |               |             |                           | 1                                       | 2             |
| Cooling & a                           | ir conditioning                  |              |               |             |                           |   | 3             |
| METHOD OF CONSTRUCT                   |                                  | 11           |               |             |                           | . 3                                     |               |
| LI Critic Ind                         |                                  |              |               | 1           |                           | N N                                     | 1 2           |
| Rolary (conventional)                 | on C Driving                     | 11           |               | 1           |                           | 1                                       | 1             |
| Hotary (roverse) II Diamond           | [] Digging                       | []           |               |             |                           | <b>`</b>                                |               |
| [ ] Jetting                           |                                  |              |               |             |                           | 107100                                  |               |
| · · · · · · · · · · · · · · · · · · · |                                  |              |               |             |                           | T0110(                                  | J             |
| Neine of Well Contractor              | I Well Construct                 |              |               |             |                           |   |               |
| Gilles Bard sonis 1111                | 101 . Il ILIII                   | Licence No.  | >             |             |                           |   |               |
| Auriless Auril 2 1944                 | 2 (RIM 1717                      |              | Z I           |             |                           |   |               |
| St-ALREDT                             | - Art                            |              | · · · · · ·   | ••••••      | ا                         |   |               |
| Name of Woll Technician               | UN                               |              | ŝ             |             |                           |   |               |
| SALGULA PASI-                         | Woll Technician's I              | Inama No.    | <u>ا</u>      |             |                           |   | 1             |
| Signature opticchalcian contractor    | va odby                          |              |               |             |                           |   |               |
| 1-1-the the                           | Submission deter                 | 90           | Ž             |             |                           |   | 1             |
| - www. for f                          | day mo                           | <u>yi  </u>  | 22            |             |                           |   |               |
| 1 - CONTRACTOR'E                      | OPY                              |              |               |             |                           | 0506 (07/04) Front E.                   |               |
|                                       |                                  |              |               |             |                           | (                                       | 1111.10       |

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BUUKGUIS WELL DRILL\*

#### Ontario Ministry of the Environment

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#### The Ontario Water Resources Act WATER WELL RECORD

TW3

| Courte or Dissilat  |                       |                     |
|---|-----------------------|---------------------|
| Others Construction Townshipporough/City/Town/Vikage Con bk | ck tract survey, etc. | Lot<br>21           |
| argue barniel   | completed day         | 05 99<br>month year |

|                | LOG O                | F OVERBURDEN AND BEDROCK MAT | ERIAL R Jan 1                           |      |             |
|----------------|----------------------|------------------------------|---|------|-------------|
| Ganaral colour | Most common material | Other materials              | General description                     | Dec  | oth + levet |
| BROWN          | Till                 | Bauldan.                     |   | From | 1001        |
| Grant          | 11                   | V                            | - obuse                                 | -10  | 8           |
| GRey           | limestone,           | Shale                        | ( augaal                                | - 8  | 50          |
| true           | limestope            |                              |   | 50   | 79          |
|                |                      |                              |   |      |             |
|                |                      |                              |   |      | <u> </u>    |
|                |                      |                              |   |      |             |
|                |                      |                              |   |      |             |
|                |                      |                              |   |      |             |
|                |                      |                              | *************************************** |      |             |
|                |                      |                              |   |      |             |

| W  | ATER RECO   | RD   |                                       | CASING & O                                       | PEN HOLE      | RECORD   |                         | Sizes of coeplog                               | Diamator                                 |
|--|---|--|---------------------------------------|--|---------------|----------|-------------------------|--|--|
| Water found  | Kind o  | water  | Inside                                |  | Wall          | Dept     | - foot                  | Z (Skot No.)                                   | Lengen                                   |
| al - 166t  |   | mator  | diam                                  | Material   | thicknese     | From     | To                      |  | inches test                              |
| 65   | C Salty   | Sulphur     Minerals     Gas     Sulphur     Minerals        | 83/"                                  | U Steel<br>Galvanized<br>Concrete<br>Open hole   | 17,2163       | 0        | 40                      | C Maleriel and type                            | Depth at top of screen<br>test           |
|  | LI Sarty  | [] Gas   |                                       | Orkeit   |               |          |                         | PLUGGING 8                                     | SEALING RECORD                           |
|  | 니 Fresh<br>[] Salty                                   | □ Sulphur<br>□ Minerals<br>□ Gas                             | 64"                                   | Galvanized                                       | 188           | 42       | 40                      | Depth set al - teet                            |  |
|  | C Fresh   | Sulphur  |                                       | Open hole     Devic     Plautic     Sinel        | 1.00          | 1 n      | 10                      | From To Materia                                | and type (Cement grout, benionite, etc.) |
|  | □ Fresh<br>□ Salty                                    | □ Sulphur<br>□ Minerals<br>□ Gâs                             | 6"                                    | Galvanized     Concrete     Concrete     Plastic |               | 40       | 79                      |  | nem grow                                 |
| Pumping to   | est methody   | Pumping rate 2   | 10.                                   | Duration of pumps                                | 19/1          | 1        |                         |  |  |
| Signa laure  | Water level   |  | C GPM                                 | Hours  | Mine          |          |                         | LOCATION OF W                                  | ELL                                      |
| Static level   | end of pumpin   | Water levels d   | Uring (                               | Pumping  | Recovery      |          | In diagra<br>Indicate ( | m below show distances of a<br>north by arrow. | well from road and lot line.             |
| SZ 24  | 79  | 21/  | 24                                    | 24   | 2.4           |          | f                       | ŤN   | 1  |
| I nowing gi  | ivs rətç  | Pump intake set a  | 1                                     | Water at end of that                             | feet          |          |                         | A in   |  |
| Recommende   | OFM<br>ed pump type                                   | Barrowski  | 2 1000                                | L) Cisar   | Cloudy        | <u>+</u> |                         | Lawrity 6.4.                                   | II4                                      |
| 1 ! Shallow  | Deep  | pump sotting   | 20                                    | Fiecommended<br>pump rate                        |               |          |                         |  |  |
|  | . <u></u>   |  | U bet                                 |  | 5 GPM         | 1        |                         |  |  |
| FINAL STAT   | US OF WELL<br>supply<br>valion well<br>de<br>'ge well | Abandoned, in<br>Abandoned, pc<br>Abandoned (O<br>Dewatering | sufficient sup<br>or quality<br>ther) | pły ⊡ Unfinishec<br>∏ Replacem                   | i<br>ont wali |          |                         |  |  |
| WATER USE  |   |  |                                       |  | _             |          |                         |  | 115                                      |
| IT Stock<br>I' Irrigatio<br>I Industri                   | -<br>lic<br>Mal                                       | Commercial Municipal Deblic supply Cooling & sir ce          | onditionIng                           | Not use     Other                                |               |          |                         |  | a h uts                                  |
| METHOD OF  | CONSTRUC  | TION   | -                                     |  |               |          |                         |  |  |
| LJ Cable to<br>11 Rotary (<br>11 Rotary (<br>17 Rotary ( | oci<br>(convantional)<br>(reversa)<br>(alr)           | Air percussion Boring Diamond Jetting                        |                                       | Driving     Digging     Other                    |               |          |                         |  | 2  |
| Name of Well Coo   | trades  |  |                                       |  |               |          |                         |  | 206049                                   |
| Lillo I  |   | : 1.1 AA   | A 11                                  | Well Commenter's L                               | konce No.     | 2        |                         |  |  |
| Address 7  | A 17  | 215 HULL   | Paill                                 | 14/14  |               | S S      |                         |  |  |
| Vaine of Wall Tech                                       | HL/   | ERT  | Det                                   | 2  |               | 3        |                         |  |  |
| JALL   | IIIA K  | 1  |                                       | Well Technician's L                              | cance No.     | ≥⊢       |                         |  |  |
| Uplature of Techni                                       | Cigit/Contractor                                      | Syrno  | 2024                                  | 0261   | 21            | 5        |                         |  |  |
| () Jul   | a-13  | sin fre  |                                       | a a b mo   | 99            | Ī        |                         |  |  |
|  | 1 L CO  | NTRACTO  | R'S CO                                | Þγ   |               |          | ······                  |  | 0508 (11/98) Front Form 9                |

## WELL CERTIFICATION STATEMENT

#### Property:

Jordel Acres Proposed Subdivision Lot 21 Con 3 (North Gower) Rideau Township 3 test wells constructed for the purpose of completing a Hydrogeological and Terrain Analysis Report

#### Certification:

We hereby agree that the three test wells constructed on the above captioned property, have been completed in accordance to MOE Regulation 903, and in particular the well casings have been properly pressure grouted.

Jacques Sauriol M. Sc. Sauriol Environmental Inc

Dated: 28 (hay 1999

J. David McManus, P. Eng. CME

June 2/99 Dated:

## **APPENDIX 2**

PH3837 - 1 - PROPOSED SITE LAYOUT PLAN

PH3837 - 2 - MUNICIPAL DRAIN PLAN

PH3837 - 4 - SURFICIAL GEOLOGY

PH3837 - 5 - BEDROCK GEOLOGY

JORDEL ACRES - SITE PLAN - SAURIOL ENVIRONMENTAL INC.





:\autocad drawings\hydrogeology\ph38xx\ph3837 - gw impact study\ph3837-2 municipal drain plan.dwg



|    |         | Scale:       | 1:10000 | Date:<br>06/2019 |
|----|---------|--------------|---------|------------------|
|    |         | Drawn by:    |         | Report No.:      |
| /E |         | -            | MPG     | PH3837-REP.01    |
|    | ONTARIO | Checked by:  |         |                  |
|    |         |              | NZ      | PH3837-4         |
|    |         | Approved by: |         |                  |
|    |         |              | CDS     | Revision No.:    |



