Geotechnical Engineering

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Hydrogeology

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Building Science

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patersongroup

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

1966 Roger Stevens Drive
Ottawa, Ontario

Prepared For

Broccolini Development Group

July 10, 2019

Report PH3837-REP.02

TABLE OF CONTENTS

APPENDICES

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^2. 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.

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^2. 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 18th and 19th 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 + 12,000 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.

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^2/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 aquifer for quantity and quality will be completed.

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 aquifer 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.

Yours truly,

PATERSON GROUP INC.

Erik Ardley, Bsc. Geology
Junior Hydrogeologist

Michael S. Killam, P.Eng.
Hydrogeologist

Report Distribution:

- ❑ Broccolini Development Group (2 copies)
- ❑ Paterson Group (1 copy)

APPENDIX 1

PUBLISHED MECP WATER WELL RECORD FOR TW1, TW2 and TW3

WELL CERTIFICATION STATEMENT

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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

4 w (

County or District	Township/Borough/City/Town/Village	Con	block	tract	survey, etc.	Lot
Ottawa Carleton	Rideau		2			21
Owner's surname / First name	Address	Date completed	day	month	year	
JORdel ACRES #1	north Gower		18	05	99	

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		Dense	0	9
Grey	Till	Boulders	"	9	16
Grey	Gravel	Sand Boulders	Loose	16	24
Grey	limestone		Hard	24	30
Grey	limestone	Shale	Layered	30	122

WATER RECORD

Water found at – feet	Kind of water		
50	☒ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	
105	☒ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	
	☐ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	
	☐ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	
	☐ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
8 7/7	☐ Steel ☐ Galvanized ☐ Concrete ☒ Open hole ☐ Plastic		0	70
6 1/4	☒ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic	1.88	42	30
6"	☐ Steel ☐ Galvanized ☐ Concrete ☒ Open hole ☐ Plastic		30	122

SCREEN

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

PLUGGING & SEALING RECORD

☒ Annular space ☐ Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, ...)
0	30	Cement grout

PUMPING TEST

Pumping test method: ☐ Pump ☒ Bailer
Pumping rate: 35 GPM
Duration of pumping: 2 Hours 0 Mins

Static level	Water level end of pumping	Water levels during ☐ Pumping ☒ Recovery: 15 minutes	30 minutes	45 minutes	60 minutes
7 feet	122 feet	7 feet	7 feet	7 feet	7 feet

If flowing give rate: ____ GPM
Pump intake set at: 122 feet
Water at end of test: ☐ Clear ☒ Cloudy
Recommended pump type: ☐ Shallow ☒ Deep
Recommended pump setting: 100 feet
Recommended pump rate: 15 GPM

FINAL STATUS OF WELL

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

WATER USE

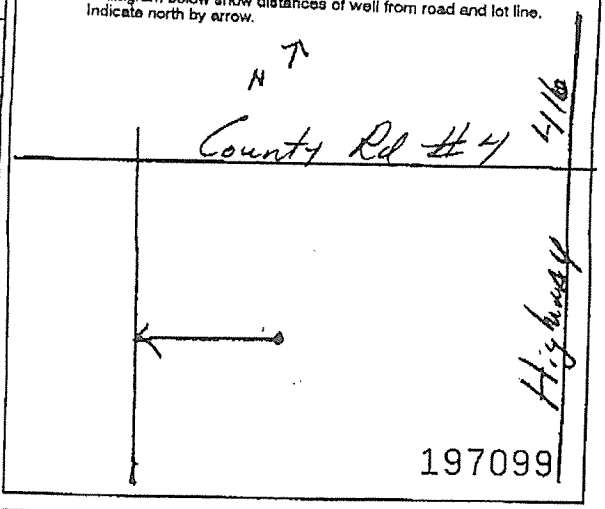
☒ Domestic ☐ Stock ☐ Irrigation ☐ Industrial
☐ Commercial ☐ Municipal ☐ Public supply ☐ Cooling & air conditioning
☐ Not used ☐ Other

METHOD OF CONSTRUCTION

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

LOCATION OF WELL

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



Name of Well Contractor	Well Contractor's Licence No.
Gilles Bourgeois Well Drill	1414
Address: St-ALBERT Ont	
Name of Well Technician: JACQUES RAYMOND	Well Technician's Licence No. 02164
Signature of Technician/Contractor	Submission date: day mo yr

MINISTRY USE ONLY

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1 - CONTRACTOR'S COPY

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

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

TW 2

County or District: Ottawa Carleton
Township/Borough/City/Town/Village: Rideau
Con block tract survey, etc.: 2
Lot: 21
Owner's surname: TORDel First name: Acres
Address: North Down
Date completed: 19 05 99 (day month year)

#2

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		Loose	0	7
Grey	Till	Boulders	"	7	18
Grey	Gravel	Sand Boulders	Loose	18	24
Grey	Limestone		Hard	24	39
Grey	"	Shale	layered	39	104

WATER RECORD

Water found at – feet	Kind of water		
85	Fresh / Salty	Sulphur / Minerals / Gas	
	Fresh / Salty	Sulphur / Minerals / Gas	
	Fresh / Salty	Sulphur / Minerals / Gas	
	Fresh / Salty	Sulphur / Minerals / Gas	
	Fresh / Salty	Sulphur / Minerals / Gas	

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
8 3/4"	Steel / Galvanized / Concrete / Open hole / Plastic		0	31
6 1/4"	Steel / Galvanized / Concrete / Open hole / Plastic	1.88	+2	31
6"	Steel / Galvanized / Concrete / Open hole / Plastic		31	104

SCREEN

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

PLUGGING & SEALING RECORD

Annular space / Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, etc.)
0	31	Cement grout

PUMPING TEST

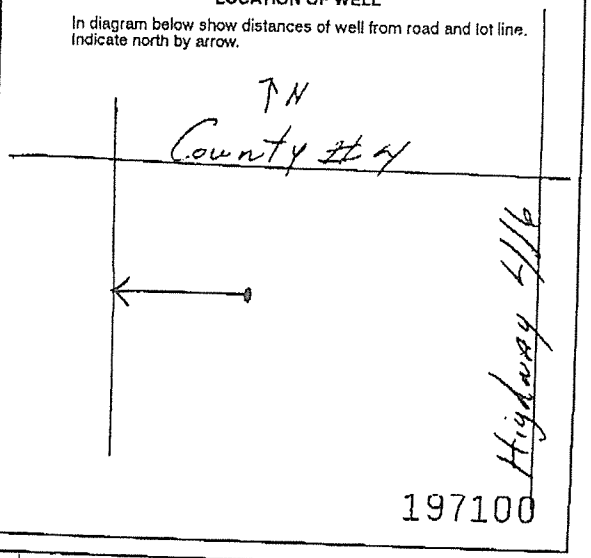
Pumping test method: Pump / Air / Bailer
Pumping rate: 40 GPM
Duration of pumping: 1 Hours 0 Mins

Static level	Water level end of pumping	Water levels during Pumping / Recovery: 15 minutes	30 minutes	45 minutes	60 minutes
6 feet	104 feet	6 feet	6 feet	6 feet	6 feet

If flowing give rate: GPM
Pump intake set at: 104 feet
Water at end of test: Clear / Cloudy
Recommended pump type: Shallow / Deep
Recommended pump setting: 80 feet
Recommended pump rate: 15 GPM

LOCATION OF WELL

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



FINAL STATUS OF WELL

Water supply / Observation well / Test hole / Recharge well
Abandoned, insufficient supply / Abandoned, poor quality / Abandoned (Other) / Dewatering
Unfinished / Replacement well

WATER USE

Domestic / Stock / Irrigation / Industrial
Commercial / Municipal / Public supply / Cooling & air conditioning
Not used / Other

METHOD OF CONSTRUCTION

Cable tool / Rotary (conventional) / Rotary (reverse) / Rotary (air)
Air percussion / Boring / Diamond / Jetting
Driving / Digging / Other

Name of Well Contractor: Gille's Bourgeois Well Drill — Well Contractor's Licence No.: 1414
Address: St-Albert Ont
Name of Well Technician: Jacques Raymond — Well Technician's Licence No.: 0264
Signature of Technician/Contractor
Submission date: 19 05 99 (day mo yr)

MINISTRY USE ONLY

1 - CONTRACTOR'S COPY

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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.

TW3

County or District	Township/Borough/City/Town/Village	Con	block	tract	survey, etc.	Lot
Ottawa Carleton	Rideau		2			21
Owner's surname / First Name	Address	Date completed	day	month	year	
Lordel Acres	North Gower		19	05	99	

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
Brown	Till	Boulders	Loose	0	8
Grey	"	"	"	8	36
Grey	limestone	Shale	Layered	36	58
Grey	limestone		Fined	58	79

WATER RECORD

Water found at - feet	Kind of water		
65	☒ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	
	☐ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	
	☐ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	
	☐ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	
	☐ Fresh ☐ Salty	☐ Sulphur ☐ Minerals ☐ Gas	

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
8 3/4"	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic		0	40
6 1/4"	☒ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic	1.88	+2	40
6"	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic		40	79

SCREEN

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

PLUGGING & SEALING RECORD

☒ Annular space ☐ Abandonment

Depth set at - feet From	Depth set at - feet To	Material and type (Cement grout, bentonite, etc.)
0	40	Cement grout

PUMPING TEST

Pumping test method: ☐ Pump ☒ Bailer

Pumping rate: 40 GPM

Duration of pumping: 1 Hours 0 Mins

Static level feet	Water level end of pumping feet	Water levels during ☐ Pumping ☒ Recovery: 15 minutes feet	30 minutes feet	45 minutes feet	60 minutes feet
24	79	24	24	24	24

If flowing give rate: GPM

Pump intake set at: 79 feet

Water at end of test: ☐ Clear ☒ Cloudy

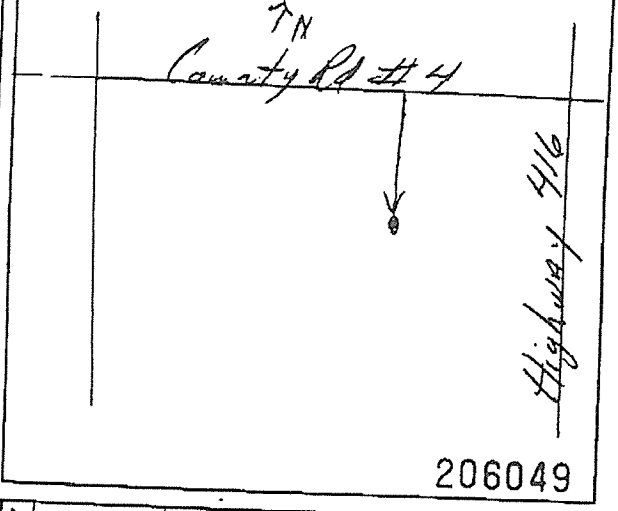
Recommended pump type: ☐ Shallow ☒ Deep

Recommended pump setting: 70 feet

Recommended pump rate: 15 GPM

LOCATION OF WELL

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



206049

FINAL STATUS OF WELL

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

WATER USE

☒ Domestic ☐ Stock ☐ Irrigation ☐ Industrial
☐ Commercial ☐ Municipal ☐ Public supply ☐ Cooling & air conditioning
☐ Not use ☐ Other

METHOD OF CONSTRUCTION

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

Name of Well Contractor	Well Contractor's Licence No.
Gille Bourgeois Well Drill	1414
Address: St-Albert Ont	
Name of Well Technician: James Raymond	Well Technician's Licence No. 0264
Signature of Technician/Contractor: [signature]	Submission date: 19 day 05 mo 99 yr

1 CONTRACTOR'S COPY

MINISTRY USE ONLY

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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 Jan 1999

J. David McManus, P. Eng.
CME

Dated: June 2/99

APPENDIX 2

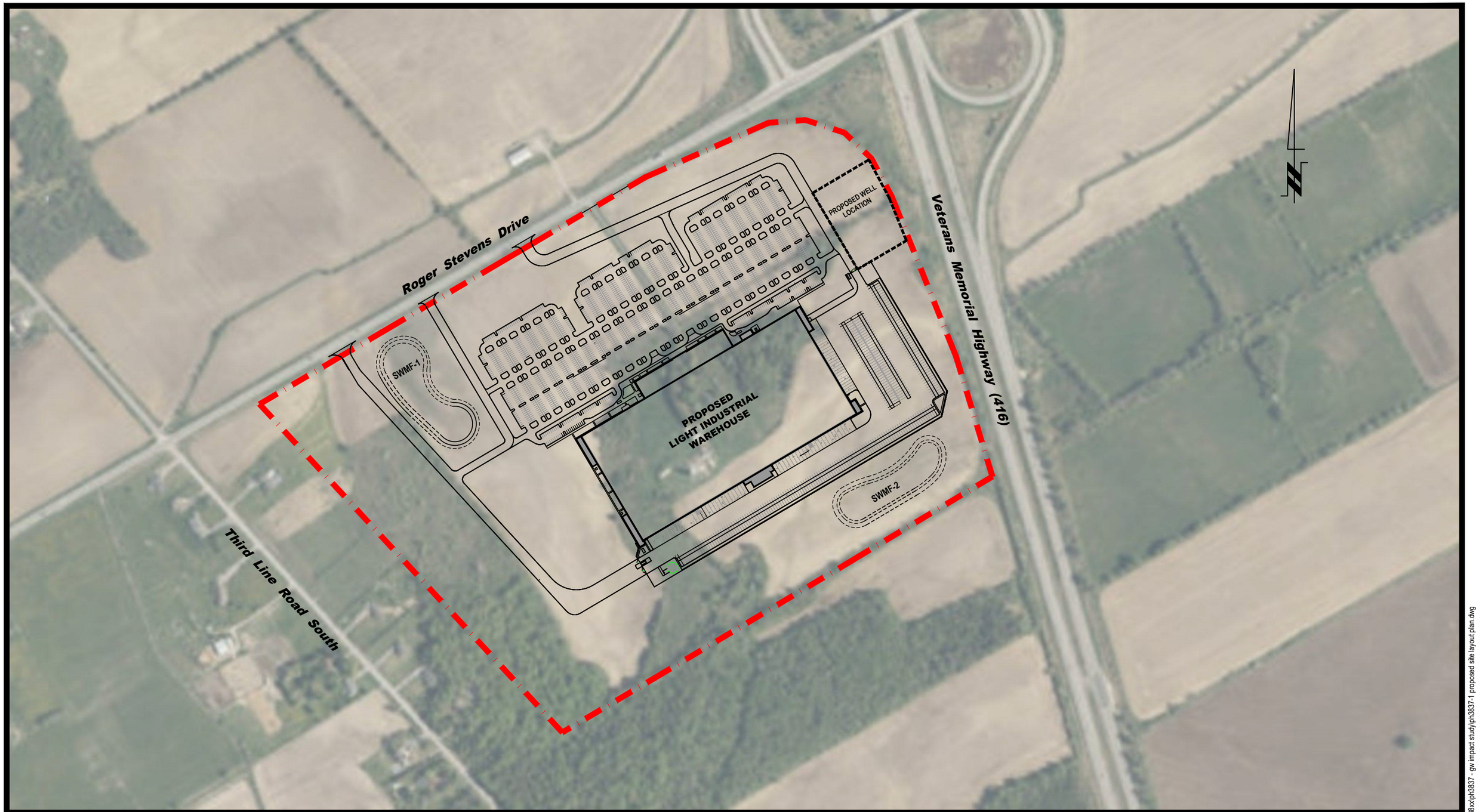
PH3837 - 1 - PROPOSED SITE LAYOUT PLAN

PH3837 - 2 - MUNICIPAL DRAIN PLAN

PH3837 - 4 - SURFICIAL GEOLOGY

PH3837 - 5 - BEDROCK GEOLOGY

JORDEL ACRES - SITE PLAN - SAURIOL ENVIRONMENTAL INC.



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NO.	REVISIONS	DATE	INITIAL
0			

BROCCOLINI DEVELOPMENT GROUP

GROUNDWATER IMPACT STUDY
PROP. WAREHOUSE BUILDING - 1966 ROGER STEVENS DRIVE
OTTAWA, ONTARIO

Title:

PROPOSED SITE LAYOUT PLAN

Scale: 1:5000	Date: 07/2019
Drawn by: MPG	Report No.: PH3837-REP.01
Checked by: NZ	PH3837-1
Approved by: CDS	Revision No.:

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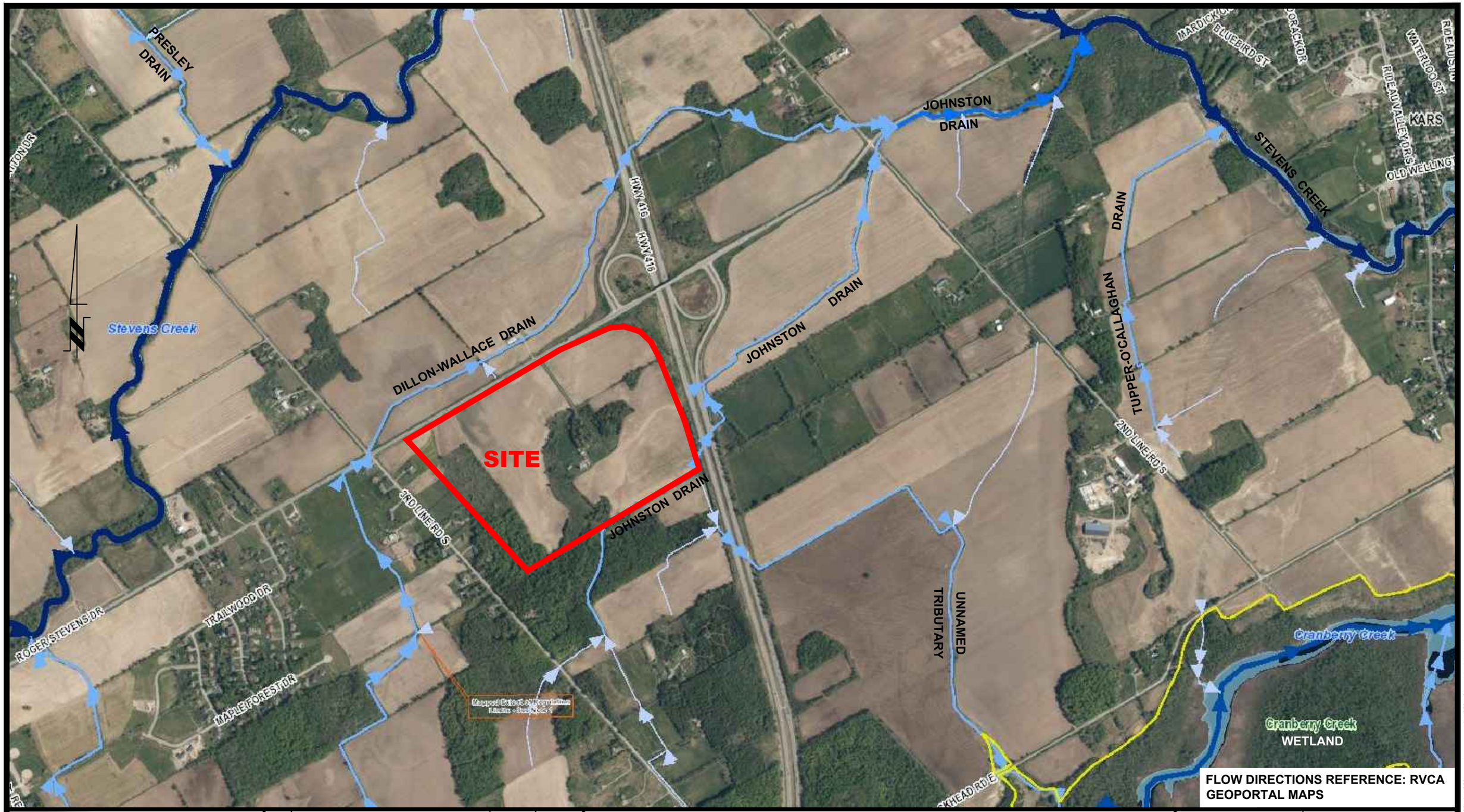

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BROCCOLINI DEVELOPMENT GROUP

GROUNDWATER IMPACT STUDY
PROP. WAREHOUSE BUILDING - 1966 ROGER STEVENS DRIVE
OTTAWA, ONTARIO

Title:

MUNICIPAL DRAIN PLAN

Scale: 1:12500	Date: 07/2019
Drawn by: MPG	Report No.: PH3837-REP.01
Checked by: NZ	PH3837-2
Approved by: CDS	Revision No.:

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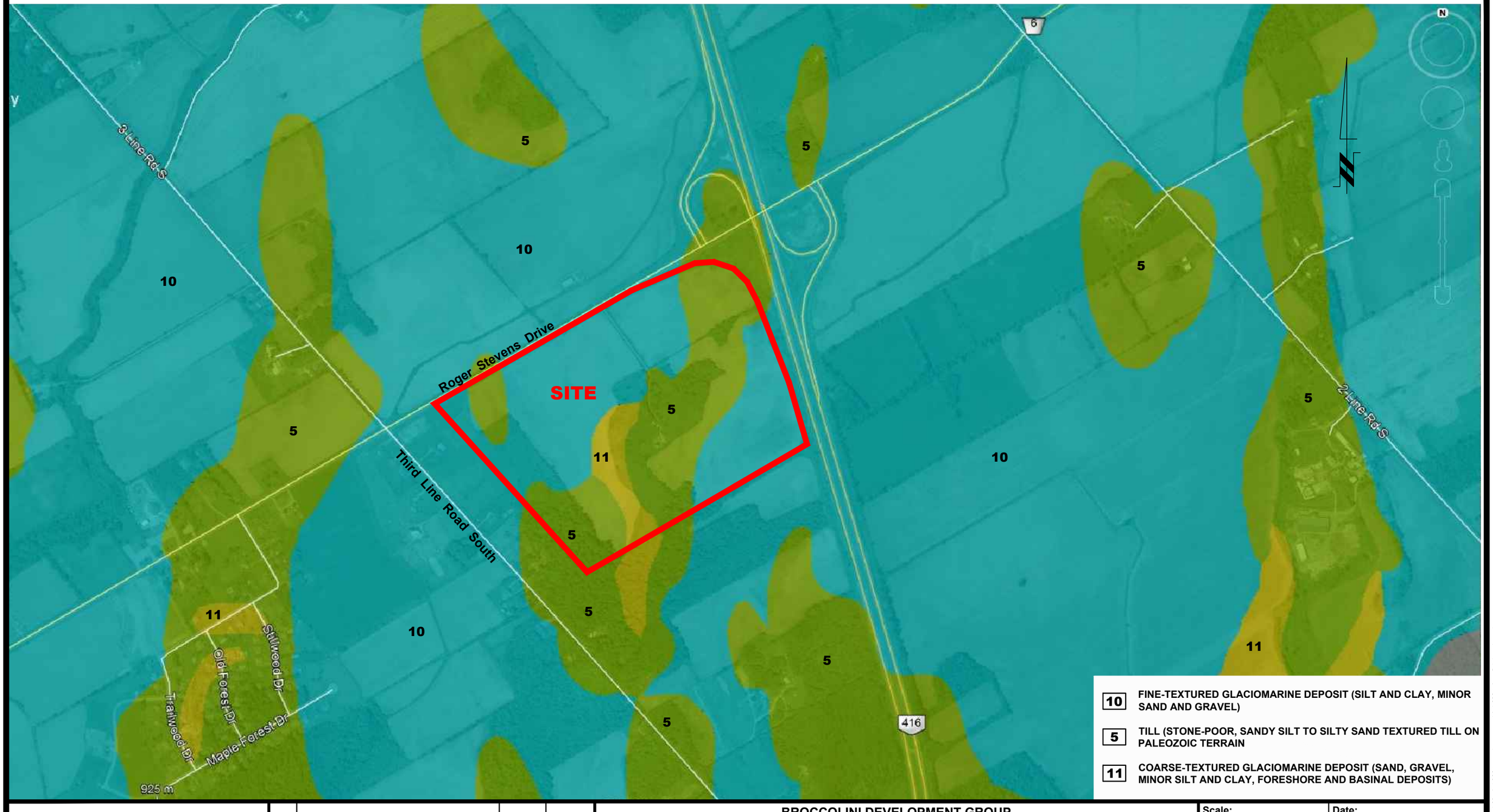

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BROCCOLINI DEVELOPMENT GROUP

GROUNDWATER IMPACT STUDY
PROP. WAREHOUSE BUILDING - 1966 ROGER STEVENS DRIVE
OTTAWA, ONTARIO

Title:

SURFICIAL GEOLOGY

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

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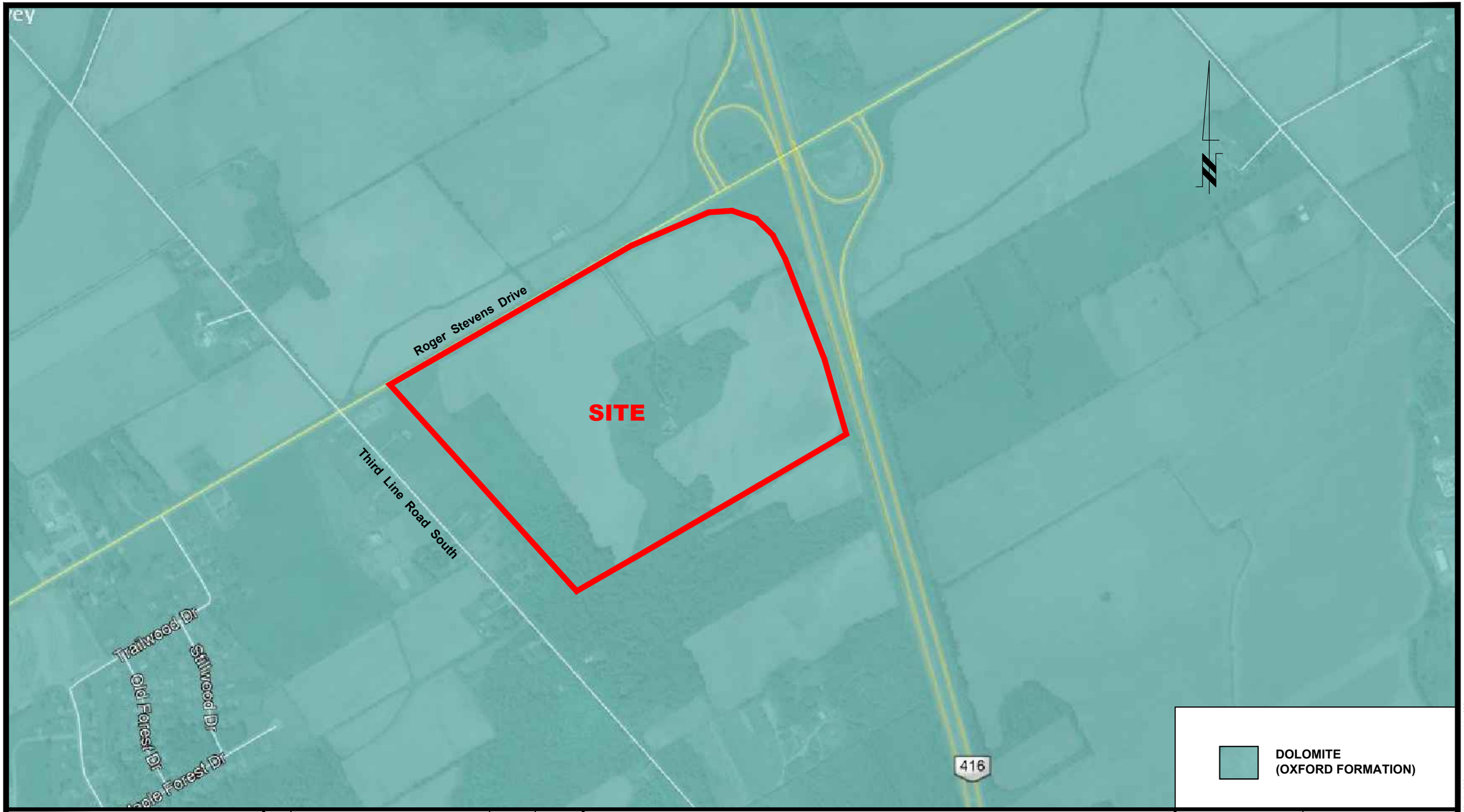

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BROCCOLINI DEVELOPMENT GROUP

GROUNDWATER IMPACT STUDY
PROP. WAREHOUSE BUILDING - 1966 ROGER STEVENS DRIVE
OTTAWA, ONTARIO

Title:

BEDROCK GEOLOGY

Scale: 1:8000	Date: 07/2019
Drawn by: MPG	Report No.: PH3837-REP.01
Checked by: NZ	PH3837-5
Approved by: CDS	Revision No.:

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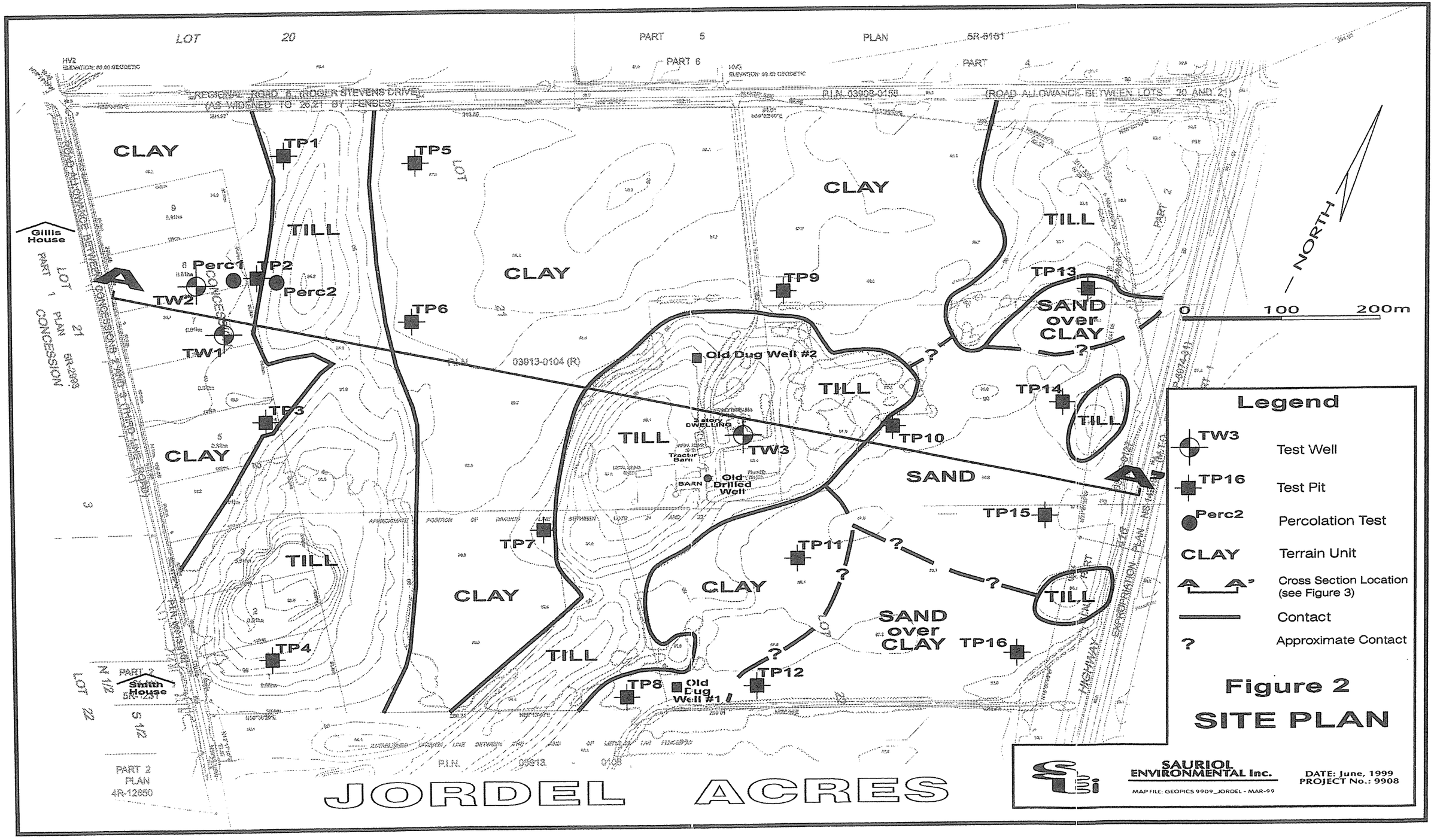
LOT 20
PART 5
PLAN 5R-6151
PART 6
PART 4
RECIDENT ROAD 5 - ROGER STEVENS DRIVE (AS WIDENED TO 20.1 BY FENCES)
P.I.N. 03908-0158
(ROAD ALLOWANCE BETWEEN LOTS 20 AND 21)
ROAD ALLOWANCE BETWEEN CONCESSIONS 2 AND 3
CONCESSION 2
CONCESSION 3
CLAY
TILL
SAND over CLAY
SAND
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
TP13
TP14
TP15
TP16
Perc1
Perc2
TW1
TW2
TW3
Old Dug Well #1
Old Dug Well #2
Old Drilled Well
Tractor Barn
BARN
DWELLING
Gillis House
Smith House
PART 1 PLAN 5R-2693
PART 2 PLAN 4R-12650
LOT 21
LOT 22
N 1/2
S 1/2
03913-0104 (R)
P.I.N. 03913 - 0108
HIGHWAY
NORTH
0 100 200m
A
A'
Legend
TW3 Test Well
TP16 Test Pit
Perc2 Percolation Test
CLAY Terrain Unit
A A' Cross Section Location (see Figure 3)
Contact
? Approximate Contact
Figure 2
SITE PLAN
JORDEL ACRES
SAURIOL ENVIRONMENTAL Inc.
MAP FILE: GEOPICS 9909_JORDEL - MAR-99
DATE: June, 1999
PROJECT No.: 9908