Kollaard Associates
Engineers

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Kemptville, Ontario K0G 1J0

Civil • Geotechnical •
Structural • Environmental •
Hydrogeology •

(613) 860-0923

FAX: (613) 258-0475

REPORT ON

HYDROGEOLOGICAL STUDY PROPOSED COACH HOUSE 4915 LIMEBANK ROAD OSGOODE WARD CITY OF OTTAWA, ONTARIO

Submitted to:

Mr. Daniel O'Brien
4915 Limebank Road
Ottawa, Ontario
K1X 1E8

DATE August 26, 2019

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August 26, 2019 190522

Mr. Daniel O'Brien
4915 Limebank Road
Ottawa, Ontario
K1X 1E8

RE: HYDROGEOLOGICAL AND TERRAIN STUDY
PROPOSED COACH HOUSE
4915 LIMEBANK ROAD
OSGOODE WARD
CITY OF OTTAWA, ONTARIO

Kollaard Associates Inc. was retained by Mr. Daniel O'Brien to undertake a hydrogeological and terrain study for a proposed coach house on Limebank Road in Ottawa, Ontario (Key Plan, Figure 1).

It is understood that it is being proposed to construct a coach house on the existing 6.2 hectare (~15.4 acre) property. It is the intention of the owner that the existing well services are to be shared between the coach house and the existing dwelling. A new sewage system is to be constructed to service the coach house. The attached Site Plan, Figure 2, indicates the approximate location of the proposed coach house, the existing dwelling, septic bed and well and the proposed sewage system location.

Kollaard Associates Inc. carried out a six hour pumping test on the existing well at the site and obtained a water sample that was tested for the subdivision list of parameters to confirm that there was sufficient water of acceptable quality to service the existing and proposed residential development. Kollaard Associates Inc. put down two test pits in the area of the proposed sewage system to establish soil conditions with consideration for sewage system design and the potential for sewage system impacts.

This report consists of an evaluation of the water quality and quantity of the existing well at the subject site, and an assessment of the sewage system impact, to ensure that the water quality and quantity of the existing well is acceptable using the following guidelines; Ministry of the Environment, Conservation and Parks (MECP) Guideline D-5-5 and the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG). Consideration has also been given to the groundwater impact assessment guidelines under MECP D-5-4. The scope of work carried out for this assessment was prepared in consideration of the City of Ottawa document "Terms of Reference Scoped Hydrogeological Study for Coach Houses".

HYDROGEOLOGICAL STUDY

Background

A bedrock geology map for the site area indicates the bedrock at the site consists of dolomite and limestone of the Oxford Formation.

The surficial geology map indicates that the predominant soil type at the site consists of Paleozoic Bedrock. The other soil type is glacial till (described as stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain) which is indicated to occupy part of the south side of the side and east and south of the site.

Two test pits were put down at the site on July 24, 2019, using a backhoe that was supplied by the property owner. The approximate locations of the test pits are shown on the attached Site Plan, Figure 2. The test pits encountered topsoil overlying glacial till, described as grey brown silty sand, some gravel, cobbles and clay. There was no groundwater intrusion into the test pits which were both terminated at a depth of 1.4 metres below existing ground surface on refusal on rock. The test pit logs are provided as Table I.

A well record for the existing well that services the dwelling at 4915 Limebank Road was provided by the client (Attachment A). The well record indicates that the well was drilled in 1979 by Capital Water Supply Ltd. of Stittsville, Ontario. The well was drilled to a depth of about 22.9 metres into a sandstone aquifer consisting with about 6.4 metres of casing set into the ground. The overburden depth at the well is indicated to be 0.9 metres.

Area Well Records

A review of five area well records was carried out. The well depths are indicated to be between 9.8 to 42 metres depth obtaining water from a limestone bedrock aquifer. These area wells are considered to be in the same formation as the subject well which is about 22.9 metres (75 feet) in depth. Test pumping rates indicated on the well records for wells were between 4 and 12 igpm (15 to 45 litres/minute). Overburden depth in area wells varied greatly. Wells indicated to be close to the subject site were described as loam or clay of between 0.0 to 4.3 metres thickness. Two wells located south of the site indicated overburden thickness of 12.5 to 17.4 metres, consisting of clay and sand, glacial till or gravelly boulders.

Water Quantity

A pumping test was carried out on June 27, 2019, at the existing well on the site that services the dwelling at 4915 Viewbank Road (TW1). The well is a drilled, cased well with about 0.6 metres of casing above the ground surface.

The testing consisted of a 6 hour duration pumping test. During the pumping test, manual water level measurements were made on a regular basis to monitor the drawdown of the water level in the well in response to pumping and water levels were monitored at one minute intervals using a pressure transducer. Groundwater samples were collected from the well after six hours to characterize groundwater quality. Hourly field water quality readings were recorded for the water temperature, pH, total dissolved solids (conductivity) and turbidity. Chlorine residuals were measured prior to obtaining water samples for lab submission and free chlorine was measured to

be zero. After the pump was shut off, the recovery of the water level in the well was measured until 95% recovery of static water level had been achieved or for 24 hours, whichever was less.

The well was pumped for about 360 minutes at a pumping rate of about 20.4 litres per minute. Over the course of the pumping test, the water level in the well dropped some 0.07 metres. At the end of pumping, 100 percent recovery of the total drawdown in the static water level created during pumping was measured after about 3 minutes.

The pumping test drawdown and recovery data and plots for TW1 are provided as Attachment B. The drawdown and recovery data provided were measured with reference to the top of the well casing at the test well location.

The pumping test data for the test well was analyzed using the method of Cooper and Jacob (1946). Although the assumptions on which these equations are based are not strictly met, this method provides a reasonable estimate of the aquifer transmissivity.

Transmissivity was calculated using the following relationship:

$$T = \frac{2.3Q}{4\pi ds}$$

where Q is the pump rate, m^3/day
ds is the change in drawdown over one time log cycle, m
T is the transmissivity, m^2/day

Based on the pumping test drawdown and recovery data, the transmissivity of the aquifer is estimated to be about 280 to 1790 m^2/day. However, the transmissivity value from the test is not reliable as the duration of the test and the pump rate used are not sufficient to accurately determine the aquifer transmissivity.

The test was sufficient to demonstrate that at a flow rate of 20.4 litres per minute, very little drawdown occurred in the well, indicating that the well could likely sustain a higher flow rate. Based on the data obtained during the six hour pumping test, it can be concluded that the well is capable of sustaining a short term yield of at 20.4 litres per minute. During the course of the six hour pumping period less than 1 percent of the available drawdown in the test well was utilized, based on the pump depth at 20.7 metres.

The expected water demand for the site was calculated using the total expected residential occupancy. It is understood that the main (existing) house has one bedroom and that the proposed coach house will contain two bedrooms. It is presumed that the occupancy will consist of two people in the main house and up to three people in the coach house (assuming number of bedrooms plus one for each dwelling). The peak water demand (obtained from MECP D-5-5) is taken as 3.75 litres/person/minute, equivalent to 18.75 litres/minute. This peak demand rate is assumed to occur for a period of two hours each day. The pump rate used for the test was above this minimum test rate.

It is considered that sufficient available drawdown exists at the well for sustained pumping at 18.75 litres per minute without causing excessive drawdown at the well.

Water Quality

To determine the water quality of the groundwater supply, groundwater samples were obtained from the well after six hours during the pumping test and prepared/preserved in the field using appropriate techniques and submitted to Eurofins Environmental Testing in Ottawa, Ontario, for the chemical, physical and bacteriological analyses listed in the Ministry of the Environment (MECP) guideline entitled Procedure D-5-5, Technical Guideline for Private Wells: Water Supply Assessment, August 1996. The results of the chemical, physical and bacteriological analyses of the water samples obtained from the test well are provided in Attachment C. A summary of the water quality measured in the field are provided as Table I, Water Quality Measurements for Test Well.

The water quality as determined from the results of the analyses is favourable. The water meets all the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG) health and aesthetic parameters tested for at the test well except for hardness and organic nitrogen.

The water is considered to be hard by water treatment standards. Water with hardness above 80 to 100 milligrams per litre as $CaC0_3$ is often softened for domestic use. The hardness at the well is 477 milligrams per litre. Water softening by conventional sodium ion exchange may introduce relatively high concentrations of sodium into the drinking water, which may contribute a significant percentage to the daily sodium intake for a consumer on a sodium restricted diet. Where ion exchange water softeners are used, a separate unsoftened water supply could be used for drinking and culinary purposes.

Organic nitrogen was measured at 0.29 mg/l. The operational guideline of 0.15 mg/l is established by the ODWSOG for the following reason. Higher levels of organic nitrogen can contain amine groups which react with chlorine and reduce its disinfectant power and can affect the taste and odour of chlorine treated water. Groundwater servicing a single family dwelling is not generally treated using chlorine. There is no bacteriological contamination of the water supply so no chlorine treatment is expected for the site. There are no concerns with the level of organic nitrogen in the water at the site.

Total coliforms were measured at a level of 4 counts per 100 millitres after the pumping test. The water sample was obtained directly from a discharge hose after the pumping test. Due to the removal of the well pumping equipment, there was significant disturbance of sediments within the well casing at the time of the pumping test. After the pumping test, a well technician carried out a chlorination procedure to reduce the potential for water carrying sediment and possible bacteria to enter the dwelling. The homeowner was advised to submit a water sample to the City of Ottawa Public Health Unit to recheck the water quality. The results of that additional testing indicate that there is no bacteriological contamination of the water supply. The home owner carried out the bacteriological sampling on July 23, 2019. The results of the additional testing indicated that E.coli was absent and total coliforms was 0 counts per 100 millitres. There are no concerns with regards to the bacteriological water quality of the water supply.

Groundwater Impact Assessment

The Ministry of the Environment, Conservation and Parks (MECP) in the MOE Procedure D-5-4 provides guidelines for evaluating "the ability of the lands identified by and restricted to the development to treat sewage effluent to meet acceptable limits". The guideline requires that the representative background nitrate levels in the receiving groundwater be determined. Where background levels are greater than 10 milligrams per litre the ministry indicates development of the

site should not be supported unless it can be demonstrated that existing levels of nitrates are the results of historical agricultural practices on the site. In addition, the guideline requires demonstration that the site is not obviously hydrogeologically sensitive such as karstic areas, areas of fractured bedrock exposed at the surface, areas of thin soil cover or areas of highly permeable soils.

The guideline indicates that the assessment involves a three step process.

Step 1 regards lot size considerations. Where the lot size for each private residence within the development is an average of one hectare or larger and no lot is smaller than 0.8 hectares, and provided the site is not hydrogeologically sensitive, the risk that impact limits may be exceeded by individual systems is considered acceptable.

The existing residential lot occupies an area of over 15 acres (6.2 hectares). Test pits put down in the proposed sewage system area encountered about 1.4 metres of soils including topsoil and glacial till and encountered refusal on rock at that depth. Surficial geology maps, combined with well records for area wells indicate that the soil thickness increases south and east of the site. The lot size is greater than one hectare which is large enough to accommodate the sewage effluent impacts within the allowable limits, without the need to carry out detailed analyses.

The soil thickness in the proposed sewage system area is between 1.0 and 2.0 metres in thickness, consisting of glacial till, which is of medium to low permeability. However, the water quality from the water sample obtained from the well had no bacterial issues and the level of nitrates measured was about 1.8 mg/l $N\text{-}NO_3$, which is within the reasonable use guideline limit of 2.5 mg/l for nitrate. The well is an older well and the site and adjacent lands are currently and historically used for agriculture. Other possible indicators of surface water impacting the well, such as sodium, chlorides, DOC, organic nitrogen, etc. were all within reasonable limits and not indicative of significant surface water impacts. The proposed sewage system to service the coach house is at least 30 or more metres from the water supply well and is down gradient with respect to the topography at the site. Based on this, it is considered that there are sufficient mitigative measures in place to ensure that the well will not be affected by the proposed sewage system to service the coach house at the site.

Results and Recommendations

The water is considered to be hard by water treatment standards. Water with hardness above 80 to 100 milligrams per litre as $CaC0_3$ is often softened for domestic use. The hardness at the well is 477 milligrams per litre. Water softening by conventional sodium ion exchange may introduce relatively high concentrations of sodium into the drinking water, which may contribute a significant percentage to the daily sodium intake for a consumer on a sodium restricted diet. Where ion exchange water softeners are used, a separate unsoftened water supply could be used for drinking and culinary purposes.

The site may be considered to be hydrogeologically sensitive, due to the shallow soils (which are expected to be about 1.4 metres in thickness at the proposed sewage bed location). The grading plan, 190522-2, indicates that the proposed sewage system is greater than 30 metres from the existing well and is down gradient with respect to the topography. This mitigative measure will ensure that the sewage system effluent is not directed towards the water supply well at the site.

Based on the above noted site conditions, Kollaard Associates Inc. considers that the groundwater impact of the proposed development is within the impact limits established by the MECP and the water supply is adequate to provide for the existing dwelling and the proposed coach house.

We trust this letter provides sufficient information for your purposes. If you have any questions concerning this letter, please do not hesitate to contact our office.

Yours truly,

Kollaard Associates Inc.

Colleen Vermeersch, P. Eng.

Attachments:

	Table I	Summary of Hourly Field Water Quality
	Table 2	Test Pit Logs
	Figure 1	Key Plan
	Figure 2	Site Plan
	Attachment A	TW1-Well Record for Site and Area Wells
	Attachment B	TW1-Pumping Test Data
	Attachment C	TW1-Laboratory Water Testing Results

TABLE I

FIELD WATER QUALITY MEASUREMENTS
FOR TEST WELL

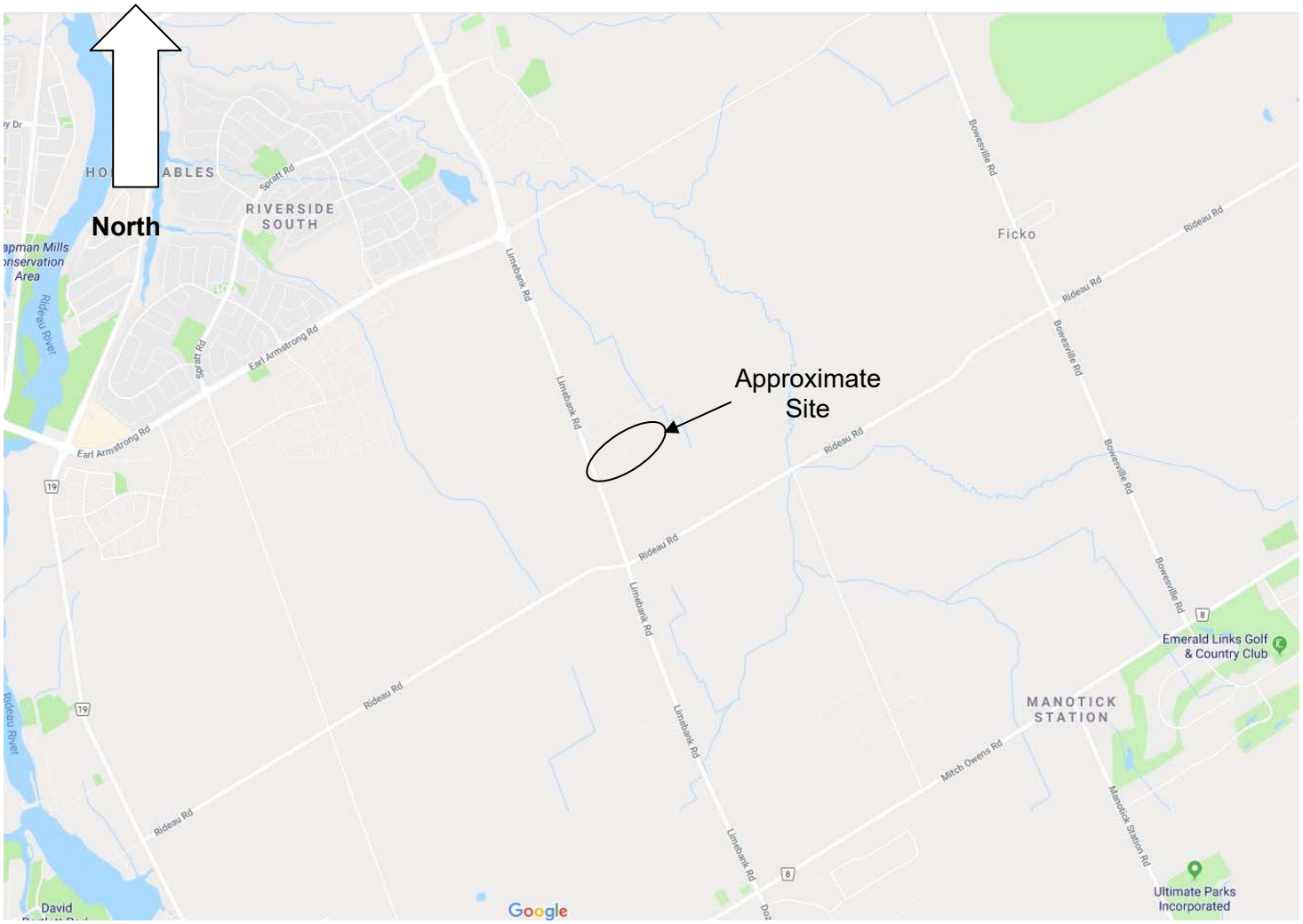
Time Since Pumping Test Started (min)	Temp. (^{0}C)	pH	Turbidity (NTU)	Total Dissolved Solids (ppm)	Conductivity (µS)	Free chlorine (ppm)
60	11.0	8.3	-	392	790	-
120	11.1	7.1	-	390	760	-
180	11.2	7.6	0.0	390	790	0.0
240	11.4	7.6	-	380	786	-
300	11.6	7.0	-	390	775	-
360	11.6	7.6	0.0	390	785	0.0

TABLE II

RECORD OF TEST PITS
4915 LIMEBANK ROAD
CITY OF OTTAWA, ONTARIO

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP1	0.0 – 0.6	TOPSOIL
	0.6 – 1.4	Grey brown silty sand, some gravel, cobbles and clay (GLACIAL TILL)
	1.4	End of test pit, refusal on rock
Test pit dry, July 24, 2019.		
TP2	0.0 – 0.3	TOPSOIL
	0.3 – 1.4	Grey brown silty sand, some gravel, cobbles and clay (GLACIAL TILL)
	1.4	End of test pit, refusal on rock
Test pit dry, July 24, 2019.		

KEY PLAN	FIGURE 1



NOT TO SCALE

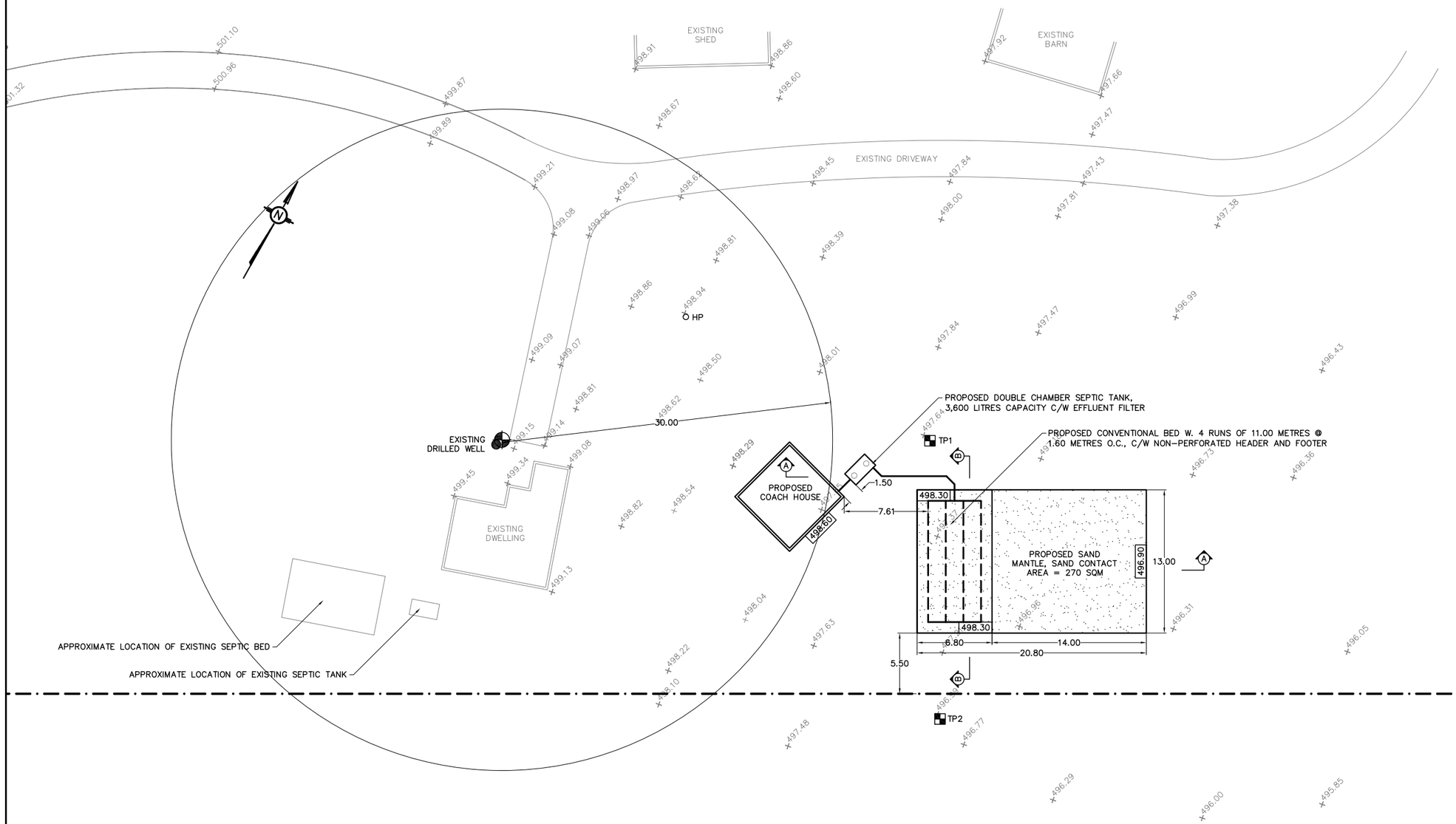
Kollaard Associates Engineers

Project No. 190522

Date August 2019

DRAWING NUMBER:

FIGURE 2, SITE PLAN



LEGEND

XX.XX	EXISTING ELEVATIONS
XX.XX	PROPOSED ELEVATIONS
	TEST PIT LOCATION
	SEPTIC BED OUTLINE
	PERFORATED PVC PIPE
	SOLID PVC PIPE
HP	HYDRO POLE
	TEMPORARY BENCHMARK

REV.	NAME	DATE	DESCRIPTION

Kollaard Associates Engineers

(613) 860-0923

210 PRESCOTT STREET
PO BOX 189
KEMPTVILLE ONTARIO
K0G 1J0

FAX (613) 258-0475
www.kollaard.ca
info@kollaard.ca

CLIENT:
DANIEL O'BRIEN

PROJECT:
PROPOSED COACH HOUSE

LOCATION:
4915 LIMEBANK ROAD
LOT 24, CONC. 2,
GLOUCESTER (R.F.),
CITY OF OTTAWA, ONTARIO

DESIGNED BY:	DATE:
PV	AUG 28, 2019
DRAWN BY:	SCALE:
PV	1:400

KOLLAARD FILE NUMBER:
190522

ATTACHMENT A

MOE WELL RECORD
FOR TEST WELL
AND
MOE AREA WELL RECORDS

Ministry of the Environment
Ontario

4915 Limebank Road

The Ontario Water Resources Act 31956

WATER WELL RECORD

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

(11) 1517054 MUNICIP 15002 CON. RF 02

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC	LOT
Carleton	Gloucester	Conc. 2 RF II	024 24

[redacted] R. # 1, Manotick, Ontario KOA 2N0

DATE COMPLETED: DAY 24 MO 07 YR. 79

...ING 0128991 RC. 4 ELEVATION 0350 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	TO
Brown	Sand	Stones		0	3
Gray	Limestone	Brown Layers		3	16
Gray	Limestone		Hard	16	50
Gray	Sandstone		Hard	50	75

31: 0003628 12 | 0016215 7 1 | 0050 215 73 | 0075 1873

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0058'	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
0074'	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
06 6¼	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188	0	0021
06	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		21	0075
	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: 0030 GPM
DURATION OF PUMPING: 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
025 FEET	050 FEET	050 FEET	050 FEET	050 FEET	050 FEET

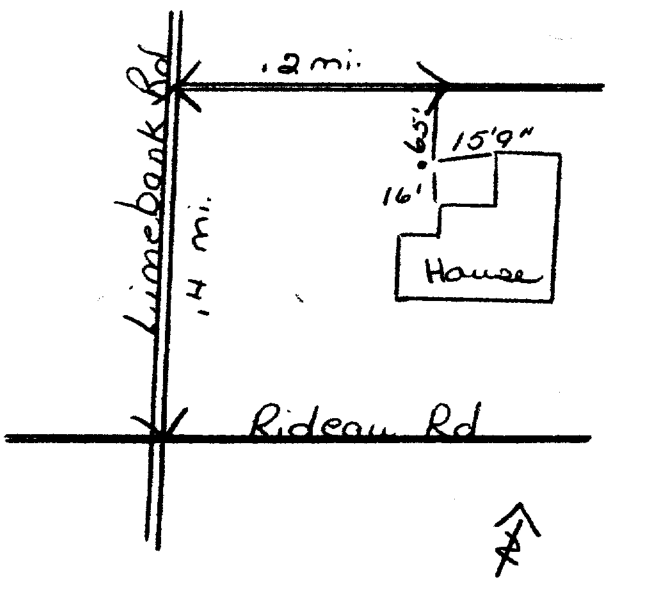
WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

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: 070 FEET
RECOMMENDED PUMPING RATE: 0005 GPM

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
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

CONTRACTOR

NAME OF WELL CONTRACTOR: Capital Water Supply Ltd. LICENCE NUMBER: 1558
ADDRESS: Box 490, Stittsville, Ontario K0A 3G0
NAME OF DRILLER OR BORER: S. Miller LICENCE NUMBER:
SIGNATURE OF CONTRACTOR: W Kavanagh SUBMISSION DATE: DAY 25 MO 07 YR 79

OFFICE USE ONLY

DATA SOURCE: 1 CONTRACTOR: 1558 DATE RECEIVED: 130879
DATE OF INSPECTION: INSPECTOR:
REMARKS: CSS.S8

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506-4-77

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

|5| R |5|0|1|2|9|3|0| N

Elev |1|4|R |4|6|2|2|8| Rideau East

Basin |2|5| | | | |

Lot 24

316/56

ONTARIO

GROUND WATER BRANCH
15 № 1713
DEC 12 1958
ONTARIO WATER RESOURCES COMMISSION

The Water-well Drillers Act, 1954
Department of Mines

Water-Well Record

County or Territorial District Carleton Township, Village, Town or City Gloucester

[redacted] in Village, Town or City)

[redacted] Address R.R. 4 Ottawa

(day) (month) (year)

Pipe and Casing Record

Casing diameter(s) 4"
Length(s) 12'
Type of screen
Length of screen

Pumping Test

Static level 15 ft
Pumping rate 160 gal PER HR
Pumping level 25
Duration of test 1 hr

Well Log

Overburden and Bedrock Record	From ft.	To ft.
Black loamy Ground	0	2
hard Grey Lime Stone	2	9
Soft blue Lime Stone	9	32

Water Record

Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
32 ft	17 ft	fresh

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

Is water clear or cloudy? Clear

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

Drilling firm

Address

Name of Driller James Kettles

Address Hawthorne (?)

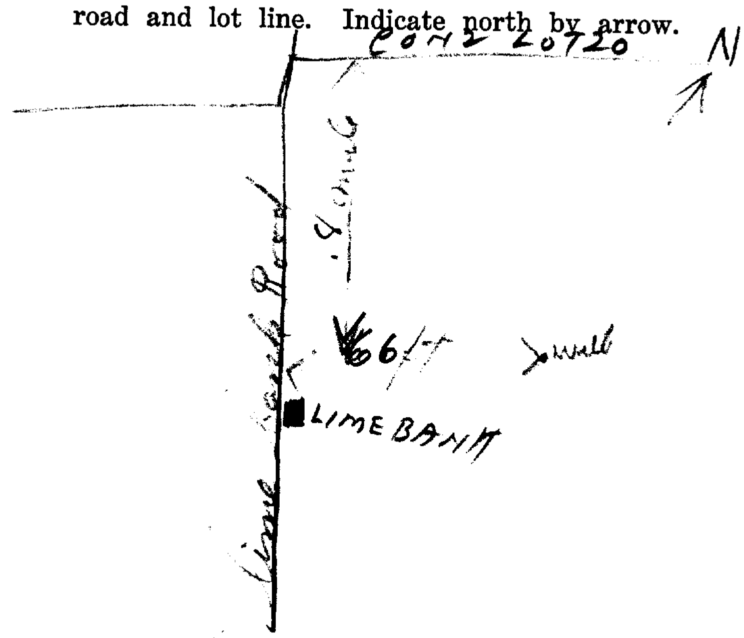
Licence Number 537

I certify that the foregoing statements of fact are true.

Date Oct 23 Jas Kettles
Signature of Licensee

Location of Well

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



Form 5

CSS.53

316/56.

UTM 118 Z 4481710 E

15 R 50 V 2 8 2 0 N

Elev 14 R 0 3 3 8

Basin 2 5 2 4

The Ontario Water Resources Commission Act, 1957

15 No. 1714

GROUND WATER BRANCH
JAN 1960
RESOURCES COMMISSION

WATER WELL RECORD

County or District: CARLTON — Township, Village, Town or City: GLOUCESTER

Con. 2 RF Lot 24 — Date completed: 5 NOV 59 (day month year)

[redacted]ress: LIMEBANK

Pumping Test

Inside diameter of casing: 4"	Static level: 24
Total length of casing: 14	Test-pumping rate: 4 G.P.M.
Type of screen: —	Pumping level: 40
Length of screen: —	Duration of test pumping: 2HRS
Depth to top of screen: —	Water clear or cloudy at end of test: CLEAR
Diameter of finished hole: 4"	Recommended pumping rate: 4 G.P.M.
	with pumping level of: 40

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)
LOAM	0	14			
LIMESTONE	14	52	52	28	FRESH

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

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

Drilling Firm: M MEAGHER

Address: OTTAWA

Licence Number:

Name of Driller: SAME

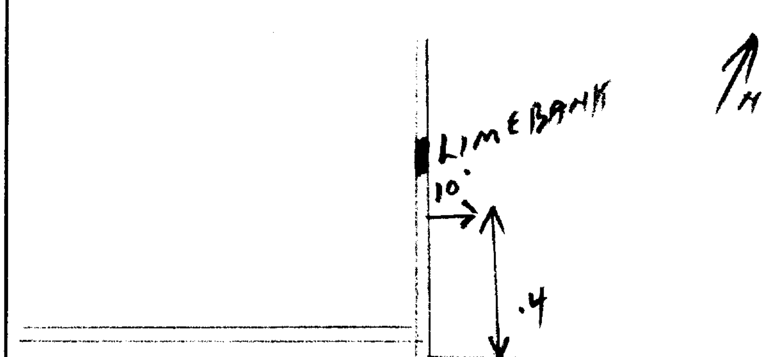
Address:

Date: JAN 4/59

M Meagher
(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

CSS.S8

316/56

UTM | 18 | Z | 414815810 | E
| 5 | R | 5101124310 | N
Elev | 4 | R | 03415 |
Basin | 215 |

Rideau Front
Con II
Lot 25

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

15 No 1716

GROUND WATER BRANCH
DEC 16 1957
ONTARIO WATER RESOURCES COMMISSION

Water-Well Record

[redacted]

...hip, Village, Town or City ... GLOUCESTER
...n Village, Town or City) ...
... Address ...

Date completed ... 14 (day) NOV (month) 57 (year)

Pipe and Casing Record

Casing diameter(s) ... 2"
Length(s) ... 56
Type of screen ... NONE
Length of screen ...

Pumping Test

Static level ... 43
Pumping rate ... 400 GPH
Pumping level ... 60
Duration of test ... 1 HR

Well Log

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)
GRAVELY BOULDERS	0	56			
GREY LIMESTONE	56	138	138	95	FRESH

Water Record

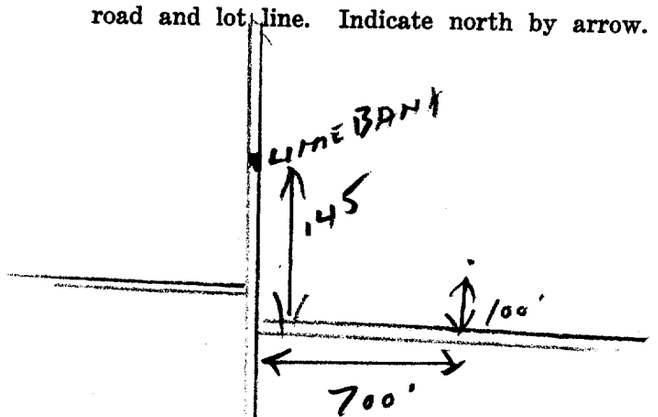
For what purpose(s) is the water to be used? ... House + Barn
Is water clear or cloudy? ... CLEAR
Is well on upland, in valley, or on hillside? ... UPLAND
Drilling firm ... F R Cassette
Address ... 1652 BASELINE
Name of Driller ... SAME
Address ...
Licence Number ... 395

I certify that the foregoing statements of fact are true.

Date ... DEC 7/57 ... F R Cassette
Signature of Licensee

Location of Well

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



Form 5

CSS.58

JTM 18 Z 448140 E

Con II R.F. Lot 23

CODED

15096

1 | 5 | 0 | 9 | 6 | 1 | 7

R 5012970 N

Elev. 3 R 0320

Basin 21 5

WATER RESOURCES DIVISION
JUN 11 1968
ONTARIO WATER RESOURCES COMMISSION

B

The Ontario Water Resources Commission Act

WATER WELL RECORD

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

Con. 2 RF   Lot 23   Date completed 27th (day) May (month) 1968 (year)

[redacted] dress 31 Ste. Claire Ave. - Ottawa 5

Casing and Screen Record	
Inside diameter of casing	6 3/16
Total length of casing	12'9"
Type of screen	-
Length of screen	-
Depth to top of screen	-
Diameter of finished hole	6

Pumping Test	
Static level	6
Test-pumping rate	1000 GPH ~~G.P.M.~~
Pumping level	35
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	38 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)
LIMESTONE rock	0	40	25-35	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
J.B. DUFRESNE & CO. LIMITED

Address 1014 Maitland Ave.,
Ottawa 5, Ont.

Licence Number 2999

Name of Driller or Borer R. Laniel

Address 6 Bellevue Cr. - Lucerne, Que.

Date May 27th 1968

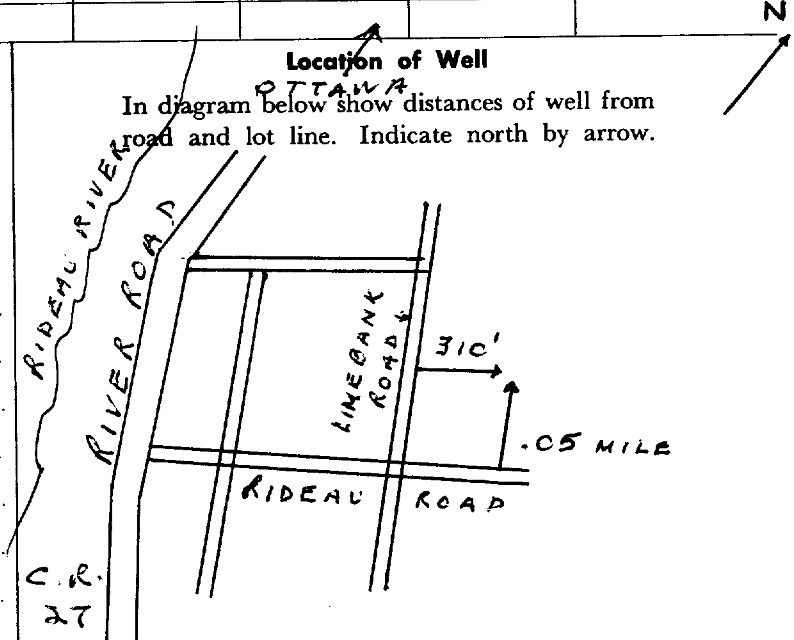
R. Laniel
(Signature of Licensed Drilling or Boring Contractor)
for: J.B. Dufresne & Co. Limited

Form 7 5M 60-20912

OWRC COPY

Location of Well

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



3/6 Sb

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 1518630 MUNICIP. 15002 CON. RF 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC	LOT
Ottawa-Carleton	Gloucester	Conc. 1 RFI	025 -25

[redacted] # 1; Limebank Rd.; Manotick, Ont. DATE COMPLETED DAY 29 MO 08 YR 83

UTM 12299 4 ELEVATION 0325 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
Brown	Sand	Gravel & Boulders	Fill	0	12
		& Clay			
Brown	Sand	Gravel & Boulders	Packed	12	40
Gray	Hardpan	Boulders	packed	40	51
Gray	Limestone		Medium	51	60
Gray	Sandstone		Hard	60	122

MOE VF-18

31 00124 28013 00406 28113 00512 41379 00602 15578 01222 18773

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0095	1 ☒ FRESH 3 ☐ SULPHUR; 2 ☐ SALTY 4 ☐ MINERAL
0119	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
6 1/4	1 ☒ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☐ OPEN HOLE	188	0	0055
5 15/16	1 ☐ STEEL; 2 ☐ GALVANIZED; 3 ☐ CONCRETE; 4 ☒ OPEN HOLE		55	0122
	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

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
020 FEET	060 FEET	060 FEET	060 FEET	060 FEET	060 FEET

IF FLOWING, GIVE RATE: GPM

PUMP INTAKE SET AT: FEET

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

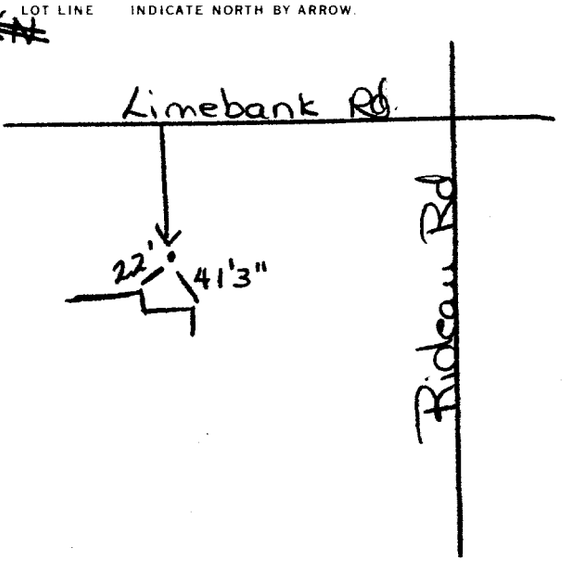
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP

RECOMMENDED PUMP SETTING: 080 FEET

RECOMMENDED PUMPING RATE: 0005 GPM

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 54: 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 55-56: 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 57: 5

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 Water Supply Ltd. LICENCE NUMBER: 1558

ADDRESS: Box 490; Stittsville, Ont. K0A 3G0

NAME OF DRILLER OR BORER: E. Kavanagh LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: E. Kavanagh SUBMISSION DATE: DAY 30 MO. 08 YR. 83

OFFICE USE ONLY

DATA SOURCE 58: 1 CONTRACTOR 59-62: 1558 DATE RECEIVED 63-68: 24 11 83

DATE OF INSPECTION: INSPECTOR:

REMARKS:

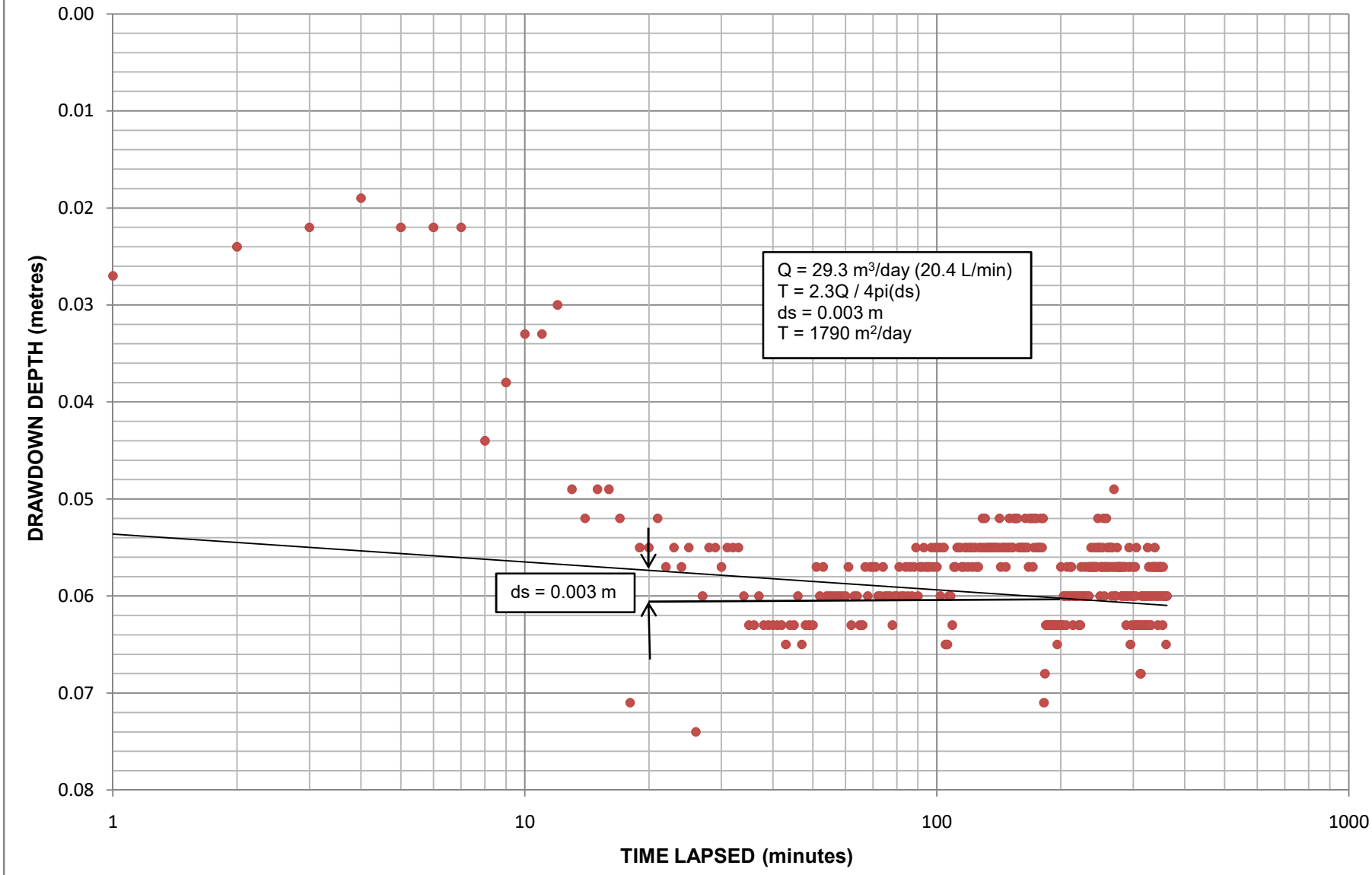
MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506—4—77 FORM 7

ATTACHMENT B

PUMPING TEST DATA

TW1-WELL DRAWDOWN VS. TIME-KOLLAARD FILE 190522



Kollaard File 190522 Pump Rate 20.4 litres/minute

DRAWDOWN DATA TW-1

Time Lapsed (minutes)	Abs Pres (kPa)	Temp (°C)	Water Level (m)	Drawdown (m)
0	191.556	8.879	-13.77	0.00
1	191.29	8.879	-13.797	0.03
2	191.317	8.879	-13.794	0.02
3	191.339	8.779	-13.792	0.02
4	191.366	8.779	-13.789	0.02
5	191.339	8.779	-13.792	0.02
6	191.339	8.779	-13.792	0.02
7	191.339	8.779	-13.792	0.02
8	191.127	8.779	-13.814	0.04
9	191.18	8.779	-13.808	0.04
10	191.233	8.779	-13.803	0.03
11	191.233	8.779	-13.803	0.03
12	191.26	8.779	-13.8	0.03
13	191.074	8.779	-13.819	0.05
14	191.048	8.779	-13.822	0.05
15	191.074	8.779	-13.819	0.05
16	191.074	8.779	-13.819	0.05
17	191.048	8.779	-13.822	0.05
18	190.862	8.779	-13.841	0.07
19	191.021	8.779	-13.825	0.05
20	191.021	8.779	-13.825	0.05
21	191.048	8.779	-13.822	0.05
22	190.995	8.779	-13.827	0.06
23	191.021	8.779	-13.825	0.05
24	190.995	8.779	-13.827	0.06
25	191.021	8.779	-13.825	0.05
26	190.835	8.779	-13.844	0.07
27	190.968	8.779	-13.83	0.06
28	191.021	8.779	-13.825	0.05
29	191.021	8.779	-13.825	0.05
30	190.995	8.779	-13.827	0.06
31	191.021	8.779	-13.825	0.05
32	191.021	8.779	-13.825	0.05
33	191.021	8.779	-13.825	0.05
34	190.968	8.779	-13.83	0.06
35	190.941	8.779	-13.833	0.06
36	190.941	8.779	-13.833	0.06
37	190.968	8.779	-13.83	0.06
38	190.941	8.779	-13.833	0.06
39	190.941	8.779	-13.833	0.06
40	190.941	8.779	-13.833	0.06
41	190.941	8.779	-13.833	0.06
42	190.941	8.779	-13.833	0.06
43	190.915	8.779	-13.835	0.07
44	190.941	8.779	-13.833	0.06
45	190.941	8.779	-13.833	0.06
46	190.968	8.779	-13.83	0.06
47	190.915	8.779	-13.835	0.07
48	190.941	8.779	-13.833	0.06
49	190.941	8.779	-13.833	0.06
50	190.941	8.779	-13.833	0.06
51	190.995	8.779	-13.827	0.06
52	190.968	8.779	-13.83	0.06
53	190.995	8.779	-13.827	0.06
54	190.968	8.779	-13.83	0.06
55	190.968	8.779	-13.83	0.06
56	190.968	8.779	-13.83	0.06
57	190.968	8.779	-13.83	0.06
58	190.968	8.779	-13.83	0.06
59	190.968	8.779	-13.83	0.06
60	190.968	8.779	-13.83	0.06
61	190.995	8.779	-13.827	0.06
62	190.941	8.779	-13.833	0.06
63	190.968	8.779	-13.83	0.06
64	190.968	8.779	-13.83	0.06
65	190.941	8.779	-13.833	0.06
66	190.941	8.779	-13.833	0.06
67	190.995	8.779	-13.827	0.06
68	190.968	8.779	-13.83	0.06
69	190.995	8.779	-13.827	0.06
70	190.995	8.779	-13.827	0.06
71	190.995	8.779	-13.827	0.06
72	190.968	8.779	-13.83	0.06
73	190.968	8.779	-13.83	0.06
74	190.995	8.779	-13.827	0.06
75	190.968	8.779	-13.83	0.06
76	190.968	8.779	-13.83	0.06
77	190.968	8.779	-13.83	0.06
78	190.941	8.779	-13.833	0.06
79	190.968	8.779	-13.83	0.06
80	190.968	8.779	-13.83	0.06
81	190.995	8.779	-13.827	0.06
82	190.968	8.779	-13.83	0.06
83	190.968	8.779	-13.83	0.06
84	190.995	8.779	-13.827	0.06
85	190.968	8.779	-13.83	0.06
86	190.995	8.779	-13.827	0.06
87	190.968	8.779	-13.83	0.06
88	190.995	8.779	-13.827	0.06

89	191.021	8.779	-13.825	0.05
90	190.968	8.779	-13.83	0.06
91	190.995	8.779	-13.827	0.06
92	190.995	8.779	-13.827	0.06
93	191.021	8.779	-13.825	0.05
94	190.995	8.779	-13.827	0.06
95	190.995	8.779	-13.827	0.06
96	190.995	8.779	-13.827	0.06
97	191.021	8.779	-13.825	0.05
98	190.995	8.779	-13.827	0.06
99	191.021	8.779	-13.825	0.05
100	190.995	8.779	-13.827	0.06
101	191.021	8.779	-13.825	0.05
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103	191.021	8.779	-13.825	0.05
104	191.021	8.779	-13.825	0.05
105	190.915	8.779	-13.835	0.07
106	190.915	8.779	-13.835	0.07
107	190.968	8.779	-13.83	0.06
108	190.968	8.779	-13.83	0.06
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110	190.995	8.779	-13.827	0.06
111	190.995	8.779	-13.827	0.06
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113	191.021	8.779	-13.825	0.05
114	191.021	8.779	-13.825	0.05
115	190.995	8.779	-13.827	0.06
116	190.995	8.779	-13.827	0.06
117	191.021	8.779	-13.825	0.05
118	191.021	8.779	-13.825	0.05
119	190.995	8.779	-13.827	0.06
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121	191.021	8.779	-13.825	0.05
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123	191.021	8.779	-13.825	0.05
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126	190.995	8.779	-13.827	0.06
127	191.021	8.779	-13.825	0.05
128	191.021	8.779	-13.825	0.05
129	191.048	8.779	-13.822	0.05
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141	191.021	8.779	-13.825	0.05
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143	190.995	8.779	-13.827	0.06
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145	191.021	8.779	-13.825	0.05
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171	190.995	8.779	-13.827	0.06
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215	190.968	8.779	-13.83	0.06
216	190.968	8.779	-13.83	0.06
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231	190.968	8.779	-13.83	0.06
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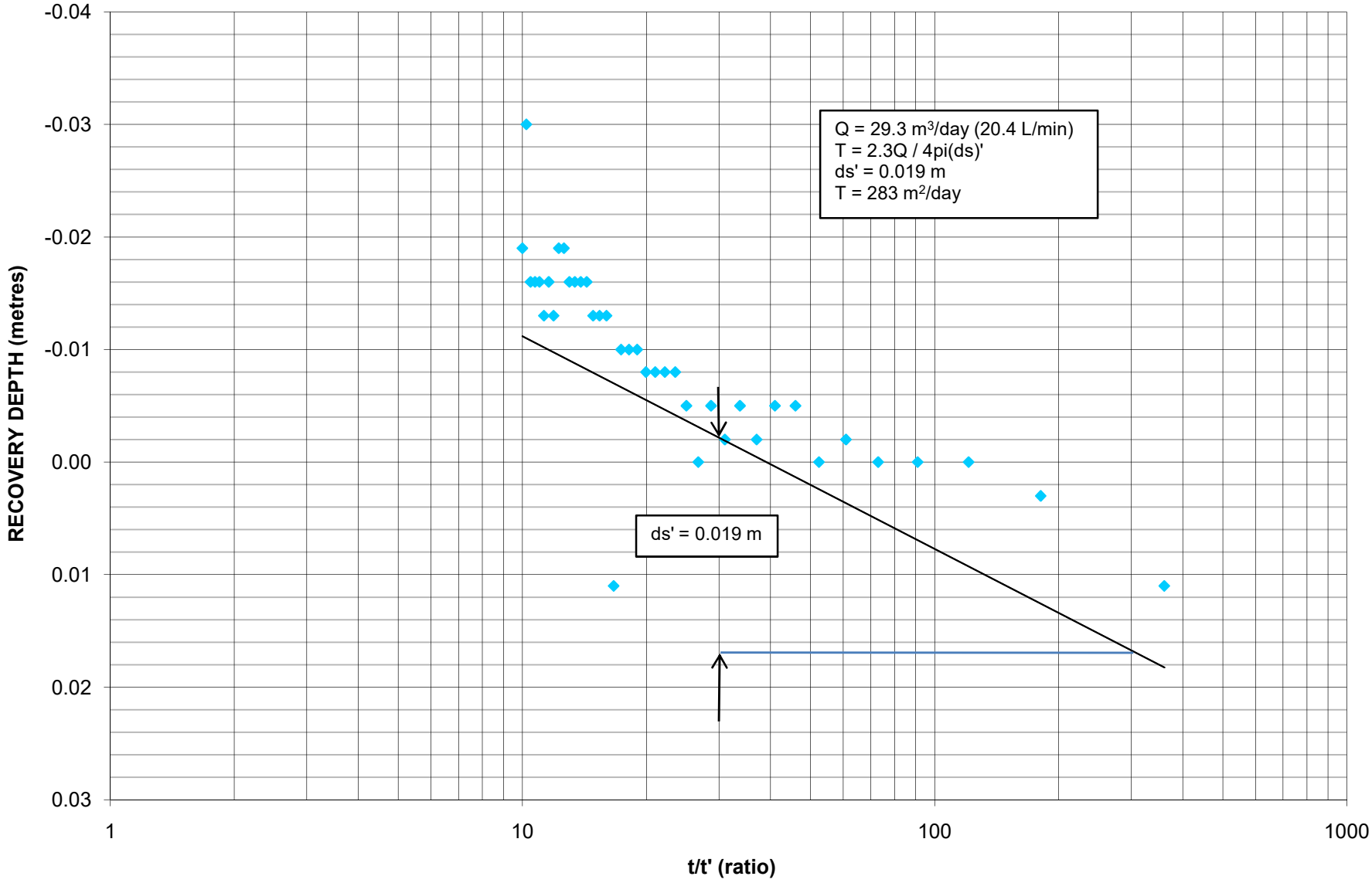
234	190.968	8.779	-13.83	0.06
235	190.995	8.779	-13.827	0.06
236	190.995	8.779	-13.827	0.06
237	191.021	8.779	-13.825	0.05
238	190.995	8.779	-13.827	0.06
239	190.995	8.779	-13.827	0.06
240	190.995	8.779	-13.827	0.06
241	191.021	8.779	-13.825	0.05
242	190.995	8.779	-13.827	0.06
243	190.995	8.779	-13.827	0.06
244	190.995	8.779	-13.827	0.06
245	191.021	8.779	-13.825	0.05
246	191.048	8.779	-13.822	0.05
247	191.021	8.779	-13.825	0.05
248	191.021	8.779	-13.825	0.05
249	190.968	8.779	-13.83	0.06
250	190.995	8.779	-13.827	0.06
251	190.995	8.779	-13.827	0.06
252	191.021	8.779	-13.825	0.05
253	190.995	8.779	-13.827	0.06
254	191.048	8.779	-13.822	0.05
255	190.968	8.779	-13.83	0.06
256	190.995	8.779	-13.827	0.06
257	190.995	8.779	-13.827	0.06
258	191.048	8.779	-13.822	0.05
259	191.021	8.779	-13.825	0.05
260	190.995	8.779	-13.827	0.06
261	190.995	8.779	-13.827	0.06
262	191.021	8.779	-13.825	0.05
263	191.021	8.779	-13.825	0.05
264	191.021	8.779	-13.825	0.05
265	190.995	8.779	-13.827	0.06
266	190.968	8.779	-13.83	0.06
267	191.021	8.779	-13.825	0.05
268	190.995	8.779	-13.827	0.06
269	191.074	8.779	-13.819	0.05
270	190.995	8.779	-13.827	0.06
271	190.968	8.779	-13.83	0.06
272	190.968	8.779	-13.83	0.06
273	190.995	8.779	-13.827	0.06
274	191.021	8.779	-13.825	0.05
275	190.995	8.779	-13.827	0.06
276	190.995	8.779	-13.827	0.06
277	190.995	8.779	-13.827	0.06
278	190.995	8.779	-13.827	0.06

279	190.995	8.779	-13.827	0.06
280	190.995	8.779	-13.827	0.06
281	190.968	8.779	-13.83	0.06
282	190.968	8.779	-13.83	0.06
283	190.995	8.779	-13.827	0.06
284	190.968	8.779	-13.83	0.06
285	190.995	8.779	-13.827	0.06
286	190.995	8.779	-13.827	0.06
287	190.968	8.779	-13.83	0.06
288	190.941	8.779	-13.833	0.06
289	190.968	8.779	-13.83	0.06
290	190.968	8.779	-13.83	0.06
291	190.968	8.779	-13.83	0.06
292	190.995	8.779	-13.827	0.06
293	191.021	8.779	-13.825	0.05
294	190.995	8.779	-13.827	0.06
295	190.915	8.779	-13.835	0.07
296	190.968	8.779	-13.83	0.06
297	190.941	8.779	-13.833	0.06
298	190.968	8.779	-13.83	0.06
299	190.995	8.779	-13.827	0.06
300	190.968	8.779	-13.83	0.06
301	190.968	8.779	-13.83	0.06
302	190.941	8.779	-13.833	0.06
303	190.995	8.779	-13.827	0.06
304	190.968	8.779	-13.83	0.06
305	191.021	8.779	-13.825	0.05
306	190.941	8.779	-13.833	0.06
307	190.941	8.779	-13.833	0.06
308	190.941	8.779	-13.833	0.06
309	190.941	8.779	-13.833	0.06
310	190.941	8.779	-13.833	0.06
311	190.941	8.779	-13.833	0.06
312	190.888	8.779	-13.838	0.07
313	190.888	8.779	-13.838	0.07
314	190.968	8.779	-13.83	0.06
315	190.941	8.779	-13.833	0.06
316	190.968	8.779	-13.83	0.06
317	190.968	8.779	-13.83	0.06
318	190.968	8.779	-13.83	0.06
319	190.941	8.779	-13.833	0.06
320	190.968	8.779	-13.83	0.06
321	190.941	8.779	-13.833	0.06
322	190.968	8.779	-13.83	0.06
323	190.968	8.779	-13.83	0.06
324	190.941	8.779	-13.833	0.06
325	191.021	8.779	-13.825	0.05
326	190.968	8.779	-13.83	0.06
327	190.995	8.779	-13.827	0.06
328	190.941	8.779	-13.833	0.06
329	190.968	8.779	-13.83	0.06
330	190.968	8.779	-13.83	0.06
331	190.941	8.779	-13.833	0.06
332	190.995	8.779	-13.827	0.06
333	190.968	8.779	-13.83	0.06
334	190.968	8.779	-13.83	0.06
335	190.995	8.779	-13.827	0.06
336	190.995	8.779	-13.827	0.06
337	190.995	8.779	-13.827	0.06
338	191.021	8.779	-13.825	0.05
339	190.968	8.779	-13.83	0.06
340	190.995	8.779	-13.827	0.06
341	190.995	8.779	-13.827	0.06
342	190.968	8.779	-13.83	0.06
343	190.968	8.779	-13.83	0.06
344	190.941	8.779	-13.833	0.06
345	190.995	8.779	-13.827	0.06
346	190.968	8.779	-13.83	0.06
347	190.995	8.779	-13.827	0.06
348	190.995	8.779	-13.827	0.06
349	190.968	8.779	-13.83	0.06
350	190.995	8.779	-13.827	0.06
351	190.995	8.779	-13.827	0.06
352	190.968	8.779	-13.83	0.06
353	190.941	8.779	-13.833	0.06
354	190.995	8.779	-13.827	0.06
355	190.968	8.779	-13.83	0.06
356	190.968	8.779	-13.83	0.06
357	190.968	8.779	-13.83	0.06
358	190.968	8.779	-13.83	0.06
359	190.968	8.779	-13.83	0.06
360	190.915	8.779	-13.835	0.07
361	190.968	8.779	-13.83	0.06
362	190.968	8.779	-13.83	0.06

TW1- WELL RECOVERY VS. TIME - KOLLAARD FILE 190522



Kollaard File 190522

RECOVERY DATA TW-1 (PRESSURE TRANSDUCER)

t'	t / t'	Abs Pres (kPa)	Temp (°C)	Water Level (m)	Drawdown (m)	Recovery (%)
1	361.0	191.446	8.779	-13.781	0.01	82%
2	181.0	191.525	8.779	-13.773	0.00	95%
3	121.0	191.552	8.779	-13.77	0.00	100%
4	91.0	191.552	8.779	-13.77	0.00	100%
5	73.0	191.552	8.779	-13.77	0.00	100%
6	61.0	191.578	8.779	-13.768	0.00	103%
7	52.4	191.552	8.779	-13.77	0.00	100%
8	46.0	191.605	8.779	-13.765	0.00	108%
9	41.0	191.605	8.779	-13.765	0.00	108%
10	37.0	191.578	8.779	-13.768	0.00	103%
11	33.7	191.605	8.779	-13.765	0.00	108%
12	31.0	191.578	8.779	-13.768	0.00	103%
13	28.7	191.605	8.779	-13.765	0.00	108%
14	26.7	191.552	8.779	-13.77	0.00	100%
15	25.0	191.605	8.779	-13.765	0.00	108%
16	23.5	191.631	8.779	-13.762	-0.01	113%
17	22.2	191.631	8.779	-13.762	-0.01	113%
18	21.0	191.631	8.779	-13.762	-0.01	113%
19	19.9	191.631	8.779	-13.762	-0.01	113%
20	19.0	191.658	8.779	-13.76	-0.01	117%
21	18.1	191.658	8.779	-13.76	-0.01	117%
22	17.4	191.658	8.779	-13.76	-0.01	117%
23	16.7	191.446	8.779	-13.781	0.01	82%
24	16.0	191.684	8.779	-13.757	-0.01	122%
25	15.4	191.684	8.779	-13.757	-0.01	122%
26	14.8	191.684	8.779	-13.757	-0.01	122%
27	14.3	191.711	8.779	-13.754	-0.02	127%
28	13.9	191.711	8.779	-13.754	-0.02	127%
29	13.4	191.711	8.779	-13.754	-0.02	127%
30	13.0	191.711	8.779	-13.754	-0.02	127%
31	12.6	191.738	8.779	-13.751	-0.02	132%
32	12.3	191.738	8.779	-13.751	-0.02	132%
33	11.9	191.684	8.779	-13.757	-0.01	122%
34	11.6	191.711	8.779	-13.754	-0.02	127%
35	11.3	191.688	8.879	-13.757	-0.01	122%
36	11.0	191.715	8.879	-13.754	-0.02	127%
37	10.7	191.715	8.879	-13.754	-0.02	127%
38	10.5	191.715	8.879	-13.754	-0.02	127%
39	10.2	191.848	8.879	-13.74	-0.03	150%
40	10.0	191.741	8.879	-13.751	-0.02	132%

ATTACHMENT C

WATER QUALITY RESULTS

Certificate of Analysis

Client: Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention: Ms. Colleen Vermeersch
PO#: 190521
Invoice to: Kollaard Associates Inc.

Report Number: 1910950
Date Submitted: 2019-06-28
Date Reported: 2019-07-08
Project: 190521
COC #: 198960

Dear Colleen Vermeersch:

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

Report Comments:

APPROVAL: _____
Addrine Thomas, Inorganics Supervisor

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at: http://www.cala.ca/scopes/2602.pdf.

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Certificate of Analysis

eurofins | Environment Testing

Client: Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention: Ms. Colleen Vermeersch
PO#: 190521
Invoice to: Kollaard Associates Inc.

Report Number: 1910950
Date Submitted: 2019-06-28
Date Reported: 2019-07-08
Project: 190521
COC #: 198960

				Lab I.D.	1436544
				Sample Matrix	Water
				Sample Type	
				Sampling Date	2019-06-27
				Sample I.D.	4915 Limebank Rd 6Hr
Group	**Analyte**	**MRL**	**Units**	**Guideline**	
Anions	Cl	1	mg/L	AO 250	26
	F	0.10	mg/L	MAC 1.5	<0.10
	N-NO2	0.10	mg/L	MAC 1.0	<0.10
	N-NO3	0.10	mg/L	MAC 10.0	1.83
	SO4	1	mg/L	AO 500	62
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 500	410
	Colour	2	TCU	AO 5	<2
	Conductivity	5	uS/cm		760
	pH	1.00		6.5-8.5	8.12
	S2-	0.01	mg/L	AO 0.05	<0.01
	TDS (COND - CALC)	1	mg/L	AO 500	494
	Turbidity	0.1	NTU	AO 5.0	0.7
Hardness	Hardness as CaCO3	1	mg/L	OG 100	477*
Indices/Calc	Ion Balance	0.01			0.98
Metals	Ca	1	mg/L		117
	Fe	0.03	mg/L	AO 0.3	<0.03
	K	1	mg/L		3
	Mg	1	mg/L		45
	Mn	0.01	mg/L	AO 0.05	0.01
	Na	2	mg/L	AO 200	12
Subcontract-Inorg	DOC	0.5	mg/L	AO 5	0.9
	N-NH3	0.01	mg/L		0.01
	Phenols	0.001	mg/L		<0.001
	Tannin & Lignin	0.1	mg/L		<0.1
	Total Kjeldahl Nitrogen	0.1	mg/L		0.3

Guideline = ODWSOG *** = Guideline Exceedence**

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: Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention: Ms. Colleen Vermeersch
PO#: 190521
Invoice to: Kollaard Associates Inc.

Report Number: 1910950
Date Submitted: 2019-06-28
Date Reported: 2019-07-08
Project: 190521
COC #: 198960

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 368348 **Analysis/Extraction Date** 2019-06-29 **Analyst** K J **Method** C SM2130B			
Turbidity	0.1 NTU	104	70-130
Run No 368349 **Analysis/Extraction Date** 2019-07-02 **Analyst** K J **Method** C SM2120C			
Colour	<2 TCU	100	90-110
Run No 368421 **Analysis/Extraction Date** 2019-07-02 **Analyst** SKH **Method** M SM3120B-3500C			
Calcium	<1 mg/L	98	90-110
Potassium	<1 mg/L	94	87-113
Magnesium	<1 mg/L	94	76-124
Sodium	<2 mg/L	104	82-118
Run No 368447 **Analysis/Extraction Date** 2019-07-03 **Analyst** K J **Method** C SM2510B			
Conductivity	<5 uS/cm	99	95-105
Run No 368455 **Analysis/Extraction Date** 2019-07-03 **Analyst** H D **Method** EPA 200.8			
Iron	<0.03 mg/L	97	91-109
Manganese	<0.01 mg/L	98	92.9-107

Guideline = ODWSOG *** = Guideline Exceedence**

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Certificate of Analysis

Client: Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention: Ms. Colleen Vermeersch
PO#: 190521
Invoice to: Kollaard Associates Inc.

Report Number: 1910950
Date Submitted: 2019-06-28
Date Reported: 2019-07-08
Project: 190521
COC #: 198960

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 368532 **Analysis/Extraction Date** 2019-07-04 **Analyst** K J **Method** SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	98	90-110
F	<0.10 mg/L	100	90-110
pH		100	90-110
Run No 368534 **Analysis/Extraction Date** 2019-07-03 **Analyst** SKH **Method** SM 4110			
Chloride	<1 mg/L	100	90-110
N-NO2	<0.10 mg/L	96	90-110
N-NO3	<0.10 mg/L	100	90-110
SO4	<1 mg/L	95	90-110
Run No 368555 **Analysis/Extraction Date** 2019-07-04 **Analyst** AET **Method** C SM4500-S2-D			
S2-	<0.01 mg/L	87	80-120
Run No 368567 **Analysis/Extraction Date** 2019-07-04 **Analyst** AET **Method** C SM2340B			
Hardness as CaCO3			
Ion Balance			
TDS (COND - CALC)			

Guideline = ODWSOG *** = Guideline Exceedence**

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

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Client: Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention: Ms. Colleen Vermeersch
PO#: 190521
Invoice to: Kollaard Associates Inc.

Report Number: 1910950
Date Submitted: 2019-06-28
Date Reported: 2019-07-08
Project: 190521
COC #: 198960

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 368688 **Analysis/Extraction Date** 2019-07-03 **Analyst** AET **Method** SUBCONTRACT P-INORG			
DOC	<0.5 mg/L	75	
N-NH3	<0.01 mg/L	98	
Phenols	<0.001 mg/L	84	69-132
Tannin & Lignin	<0.1 mg/L	100	
Total Kjeldahl Nitrogen	<0.1 mg/L	101	81-126

Guideline = ODWSOG *** = Guideline Exceedence**

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

eurofins | Environment Testing

Client: Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention: Ms. Colleen Vermeersch
PO#: 190521
Invoice to: Kollaard Associates Inc.

Report Number: 1910943
Date Submitted: 2019-06-28
Date Reported: 2019-06-30
Project: 190521
COC #: 198960

Dear Colleen Vermeersch:

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

Report Comments:

APPROVAL: _____
Dragana Dzeletovic, Team Leader

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise indicated.

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eurofins | Environment Testing

Certificate of Analysis

Client: Kollaard Associates Inc.
210 Prescott St., Box 189
Kemptville, ON
K0G 1J0
Attention: Ms. Colleen Vermeersch
PO#: 190521
Invoice to: Kollaard Associates Inc.

Report Number: 1910943
Date Submitted: 2019-06-28
Date Reported: 2019-06-30
Project: 190521
COC #: 198960

				Lab I.D.	1436528
				Sample Matrix	Water
				Sample Type	-
				Sampling Date	2019-06-27
				Sample I.D.	4915 Limebank - 6 hr
Group	**Analyte**	**MRL**	**Units**	**Guideline**	
Microbiology	Escherichia Coli	0	ct/100mL	MAC 0	0
	Faecal Coliforms	0	ct/100mL		0
	Heterotrophic Plate Count	0	ct/1mL		46
	Total Coliforms	0	ct/100mL	MAC 0	4*

Guideline = ODWSOG *** = Guideline Exceedence**

Results relate only to the parameters tested on the samples submitted.
Analytical Method: AMBCOLM1
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

Public Health Ontario | Santé publique Ontario

Public Health Laboratory - Ottawa
2380 St. Laurent Blvd
Ottawa, ON K1G 6C4

Bacteriological Analysis of Drinking Water for Private Citizen, Single Household Only
Analyse bactériologique de l'eau potable - Particuliers, Ménages unifamiliaux seulement

Submitter's Name and Mailing Address / Nom et adresse postale de l'auteur de la demande d'analyse	Location of Water Source / Emplacement de la source d'eau
First Name, Last Name / Prénom, Nom de famille **DAN OBRIEN** Street address / Adresse municipale **4915 LIMEBANK RD** **RR1** **GLOUCESTER, ON K1X 1E8**	Lot, Concession / ou lot, concession — Emergency Locator # / 911# Street address / Adresse municipale **4915 LIMEBANK RD** **RR 1** **OTTAWA ON K1X1E8** County / Comté: **NOT PROVIDED** Health Unit # / # du bureau de santé: **2251**

Specimen details / Détails sur l'échantillon:

Barcode / Code à barres: 009414136

Phone # / # tél.: **613 791 3588**

Purification system used (e.g. UV, filtration, etc.)? / Système d'épuration utilisé (p. ex. rayons UV, filtration, etc.)? **No / Non**

Date/Time Collected / Date/heure du prélèvement*: 2019-07-23 10:30:00

Authorized by / Autorisé par

Date/Time Received / Date/heure Reçu le*: 2019-07-24 14:38:00

Chief, Medical Microbiology or Designate

Specimen Note / Note sur l'échantillon:
This specimen was received in good condition unless otherwise stated./À moins d'avis contraire, l'échantillon était en bonne condition au moment de la réception.

Test results / Résultats d'analyse:

Total Coliform CFU/100 mL / Coliformes totaux UFC/100 mL	**0**
E.coli CFU/100 mL / E. coli UFC/100 mL	**0**

Interpretation / Interprétation:
There is no evidence of fecal contamination. If the results show the presence of coliforms it may be indicative of a contaminated water supply. Given the vulnerability of well water to external influences, it is important to test water frequently. Consult local health unit for information if required.
Il n'y a aucune preuve de contamination fécale. Si les résultats indiquent la présence de coliformes, cela peut être révélateur d'une source d'eau polluée. L'eau des puits étant susceptible d'être dégradée par des facteurs externes, il est important de la faire analyser fréquemment. Consultez le bureau local de santé publique pour plus de détails, si nécessaire.

Date of Analysis / Date de l'analyse: 2019-07-24 **Date Read / Analyse effectuée le: 2019-07-25**

Please Note / Prière de noter ce qui suit :

These results relate only to the sample tested. / Le résultat obtenu se rapporte seulement à cet échantillon d'eau analysé.

Note : This water sample was only tested for the presence of both Total Coliforms and E. coli (ISO/IEC 17025 accredited tests) bacterial indicators of contamination by Membrane Filtration. The sample was not tested for other contaminants, including chemical contaminants, and therefore may be unsafe to drink even when there is no significant evidence of bacterial contamination. Contact your local public health unit for information on testing for other contaminants./ Remarque: Cet é chantillon d'eau n'a été analysé que pour déceler (par un laboratoire accrédité conformément à la norme ISO/IEC 17025) la présence des coliformes totaux et des bactéries collibacillaires, indicateurs de contamination par filtration sur membrane. L'échantillon n'a pas été testé pour d'autres contaminants, y compris les contaminants chimiques et, par conséquent, l'eau peut être impropre à la consommation même lorsqu'il n'y a aucune preuve significative de contamination bacté rienne. Veuillez communiquer avec le bureau de santé publique de votre localité pour vous renseigner au sujet de l'analyse visant à détecter la présence d'autres contaminants.

If the reported client information does not match the information you supplied on the form please contact the PHO Customer Service Centre. Telephone: 1-877-604-4567 or 416-235-6556 or E-mail: customerservicecentre@oahpp.ca. For operating hours see our website www.publichealthontario.ca/labs. / Si les informations sur le client indiquées ne correspondent pas aux informations que vous avez fournies sur le formulaire, veuillez communiquer avec le Service à la clientèle de SPO par télé phone au 1-877-604-4567 ou 416-235-6556, ou par courriel au customerservicecentre@oahpp.ca. Pour connaître les heures d'ouverture, veuillez consulter notre site Web à www.publichealthontario.ca/labs.

End of report / Fin du rapport

**All time values are EST /EDT/Toutes les heures sont exprimées en HNE ou en HAE.*