Kollaard Associates
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REPORT ON

HYDROGEOLOGICAL STUDY PROPOSED RESIDENTIAL LOT SEVERANCE 27 DAVID STREET SPENCERVILLE, ONTARIO

Submitted to:

Ed Broniszeski
27 David Street
Spencerville, Ontario
K0E 1X0

DATE October 28, 2022

DISTRIBUTION

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220996

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October 28, 2022 220996

Ed Broniszeski
27 David Street
Spencerville, ON
K0E 1X0

RE: HYDROGEOLOGICAL STUDY
PROPOSED RESIDENTIAL LOT SEVERANCE
27 DAVID STREET
SPENCERVILLE, ONTARIO

Kollaard Associates Inc. was retained by Mr. Ed Broniszeski to undertake a hydrogeological and terrain study for a proposed residential lot severance with frontage on Charles Street in Spencerville, Ontario (Key Plan, Figure 1).

It is understood that it is being proposed to sever one residential lot of 0.09 acres, which is currently vacant. The retained parcel consists of about 0.09 hectares and is occupied by a single residence. It is identified as 27 David Street. A Lot Development Plan is provided as Figure 2.

The purpose of the severance is to allow single family dwelling on the proposed severed lot that is to be serviced by a well and the existing municipal sewer. It is understood that all residential dwellings within 500 metres are serviced by sanitary sewer, with the exception of the rural properties that are located on the opposite side of the South Nation River.

This report consists of an evaluation of the water quality and quantity for the existing well on the property.

The assessment was carried out on an existing drilled well to ensure that the water quality and quantity 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).

HYDROGEOLOGICAL STUDY

Background

A bedrock geology map for the site area indicates the bedrock at the site consists of dolostone and sandstone of the Beekmantown Group.

The surficial geology map indicates that the proposed severed lot is located within an area of glacial till. Most of the well records for the area wells indicate that there is between 0 and 2 metres of overburden, consisting of glacial till or sand and clay.

A review of topographical information from the Province of Ontario online mapping indicates that the site topography is sloped towards the south of the proposed severed lot.

No well record was available for the existing drilled well at 27 David Street. The well depth was measured to be about 59.8 metres, and the casing was indicated by the owner to extend to about 30.5 metres deep. The static water level measured at the day of the test was about 7.43 metres.

The well record and Certificate of Well Compliance for the test well and area well records are provided herein as Attachment A.

Area Well Records

It is understood from information provided by the owner that the well that services the existing dwelling was installed when the municipal sanitary system was put into place. The well was constructed with recommendations from a private well and sewage system study completed by MS Thomson and Associates in 1984. A review of three other well records also installed at this time was carried out. The well records are provided (Attachment A). The depths of the wells are indicated to be between 61 and 70 metres, obtaining water from a dolomite aquifer. Test pumping rates were between 19 and 45 litres per minute. Recommended pumping rates were between 15 and 38 litres per minute. Overburden thickness was between 1.8 and 2.1 metres of sand or clay. The wells had 31.1 metres of casing. Specific capacity was between 0.3 and 0.8 litres per minute per metre of drawdown.

A review of eleven area well records constructed not due to the installation of the municipal sanitary system was also carried out. The well records are provided (Attachment A). The depths of the wells are indicated to be between 12 and 55 metres, obtaining water from a limestone aquifer. Test pumping rates for the area wells were 24 to 76 litres per minute. Recommended pumping rates were between 11 and 46 litres per minute. One well record indicated no overburden. In the other ten well records, overburden was identified as between 0.6 to 2.0 metres of till, topsoil, sand or clay. All area wells had between 4.0 to 9.5 metres of casing below the ground surface. Specific capacity for area wells is between 5 and 1050 litres per minute per metre of drawdown.

The test well is considered to be representative of the expected well yields based on other area wells, specifically those installed due to the municipal sanitary system.

Review of MECP Report

A review of the MECP Potable Well Water Quality Survey for the Village of Spencerville, dated November 6, 2020, was carried out as a part of this report. The MECP report details an investigation completed in 2020 regarding water quality and bacteria contamination in Spencerville, and focuses on a subject property at 32 David Street.

This report contains recommendations on well construction in Spencerville, based on a previous report from 1985, due to poor water quality (from shallow contamination sources) particularly with regards to bacteria and sewage impacts from the private sewage systems. The recommended well construction was that wells should be cased to depths exceeding 25 to 32 metres. The 2020 sampling by the MOE indicated that fewer of the deeper cased wells (2 of 9 wells) had adverse bacteria results compared to some 6 of 9 wells with short casing lengths where some 67% had adverse bacteria results. The MOE indicated the following based on their 2020 well water sampling results:

Well owners with wells not conforming to the recommendations provided by Thompson (1985) and with chronic adverse water quality issues could also consider obtaining the services of a licensed well contractor to replace their existing well with one that is cased into the deeper less vulnerable aquifer. It should be noted that this recommendation is not a guarantee that potable water will be obtained; however, it would be expected to reduce the vulnerability (magnitude and frequency of adverse water quality) of the water supply and those recommendations provide above should still be followed. It should also be noted that the deeper bedrock units may produce water with elevated concentrations of iron and/or sulphur and additional treatment may be required to address them.

The well that was sampled does comply with the recommendations of the Thompson report. As such, it is highly recommended that the future well servicing the severed lot should also be constructed similarly.

Water Quantity

A pumping test was carried out on October 14, 2022, on the existing drilled well at the retained lot on the subject property (27 David Street).

The testing consisted of a 6 hour duration pumping test. During the pumping test, 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. Hourly field water quality readings were recorded for the water temperature, pH, total dissolved solids (conductivity) and turbidity. After the pump was shut off, the recovery of the water level in the well was measured until about 95% recovery of static water level had been achieved or for 24 hours.

The well was pumped for about 360 minutes at a pumping rate of about 30 litres per minute. Over the course of the pumping test, the water level in the well dropped 0.31 metres in response to that rate. At the end of pumping, 100 percent recovery of the total drawdown in the static water level created during pumping was measured after about 13 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 data, the transmissivity of the aquifer is estimated to be about 395 m^2/day. Based on the recovery data from the pumping test, the transmissivity is

estimated to be about 132 m^2/day. The aquifer parameters, such as transmissivity, can be determined more accurately by using a higher flow rate and a longer duration to establish hydraulic boundaries for the aquifer. The pumping rate and duration that were used were sufficient to confirm that the well yield is sufficient for the proposed use.

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 least 30 litres per minute. During the course of the pumping period, less than 1 percent of the available drawdown in the test well was utilized, based on an estimated pump depth of 56 metres and the static water level recorded the day of the pumping test (7.43 metres). The specific capacity of the well based on the pumping rate used is 81 litres per minute per metre of drawdown.

The typical residential peak demand rate is 22.5 litres per minute for a five bedroom dwelling. It is considered that the pumping rate used was sufficient to meet peak residential demands.

Based on the above noted assessment of the test well and what is known about the aquifer from adjacent wells, it is considered that future wells constructed in the same aquifer (to similar depths) on the proposed severed lots will provide sufficient water for domestic use for a residential dwelling.

Water Quality

During the pumping test, hourly field readings of pH, temperature, turbidity and total dissolved solids (conductivity) were recorded.

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.

Groundwater samples were prepared and preserved in the field using appropriate techniques. Chlorine residuals were measured prior to obtaining water samples for lab submission and free chlorine was measured to be zero. The water samples were submitted to Eurofins Environmental Laboratory in Ottawa, Ontario, for the chemical, physical and bacteriological analyses listed in the MECP guideline entitled Procedure D-5-5, Technical Guideline for Private Wells: Water Supply Assessment, August 1996.

The water quality as determined from the results of the analyses is acceptable. 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, hydrogen sulphide, turbidity, iron and TDS. Sodium is above the medical advisory level of 20 milligrams per litre for those who require a sodium reduced diet. The sodium level is about 57 milligrams per litre. When sodium levels exceed 20 mg/l, the local Medical Officer of Health should be informed so that the information can be relayed to local physicians.

Hardness
The water is considered to be moderately 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 417 to 420 milligrams per litre, which is considered poor but tolerable. Treatment using ion exchange water softeners is effective to reduce hardness.

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.

Iron
Iron was measured at a level of 2.20 to 2.28 mg/l, compared to the aesthetic objective of 0.3 mg/l. Excessive iron levels may cause brown or black discolouration of laundry and fixtures, affect the taste and colour of water, and iron precipitation in pipes and hot water tank can also promote the growth of iron bacteria. For iron levels of up to 5.0 mg/L, a manganese greensand iron filters (or other proprietary iron filter) is effective in removing iron from the water supply.

Turbidity
Turbidity at the well was initially recorded at less than 5 NTU (during the first two hours of the pumping test), which is acceptable for groundwater at the point of consumption. However, turbidity became elevated and even increased between about three six hours (8.0 and 20.6 NTU). The elevated turbidity measured in the field during the test was likely due to the iron deposits in the well casing and the agitation of the well surfaces created during the pumping test. Given the depth of well casing, there is significant well surface and the iron in the water and in the casing could contribute to the turbidity.

The lab based turbidity measurements for the three and six hour samples were 14.6 and 24.8 NTU, respectively. This is consistent with the field readings and also higher due to the presence of iron which can cause turbidity to exceed due to precipitation that occurs as the water sample changes temperatures and is exposed to air during storage and transportation prior to the laboratory sampling.

Water treated through an iron filter is expected to meet the required turbidity levels of less than 5 NTU in the treated water. It is considered that the untreated water has a turbidity level of less than 5 NTU (based on the first two hours of water tested using field equipment) and that treatment to reduce iron will also cause the turbidity to be less than 5 NTU in the treated water.

Sulphide
Sulphide was measured at levels of 0.09 and 0.12 mg/L as hydrogen sulphide, compared to the aesthetic objective of 0.05 mg/L. Excessive sulphide levels may produce black deposits on pipes and fixtures and black stains on laundered items. The sulphide can be removed using the same manganese filter that is needed for iron reduction. Proprietary filters for iron and sulphide removal as well as manganese greensand filters are effective at reducing sulphide levels of up to 1.0 and 2.5 mg/L.

Total Dissolved Solids
Total dissolved solids (TDS) were elevated above the aesthetic objective of 500 mg/l, about 607 to 610 mg/l. The Ryznar Stability Index (RSI) and Langelier Saturation Index (LSI) were calculated for both water samples. The RSI values for the water samples were 6.81 and 6.67 for the three and six hour samples, respectively. The LSI values for the water samples were 0.32 and 0.44 for the three and six hour samples, respectively. RSI values less than 6 indicate that the scale potential increases and values greater than 7 indicate that a calcium carbonate formation does not lead to a protective corrosion inhibiting film. In this case, the water is mildly scale forming and not corrosive. Positive values for LSI indicate that scale can form and calcium carbonate precipitation may occur, while values close to zero indicate borderline scale potential. In this case, the LSI values are positive, indicating borderline scale potential. Combined with the RSI values, it is likely that the water is slightly scale forming and is not corrosive. According to the Support Document for the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG), the palatability of drinking water with a TDS level less than 500 mg/l is generally considered to be good. The effect of

elevated TDS levels on drinking water depends on the individual components, which are principally chlorides, sulphates, calcium, magnesium and bicarbonates. Depending on which parameters are elevated, TDS exceedances can include hardness, taste, mineral deposition or corrosion. In this case, the water samples had high hardness. Sodium and chloride are both well within the aesthetic objectives and are unlikely to significantly affect the taste of the water. Hardness generally increases the mineral deposition. However, in this case, the water is not indicated to be scale forming. Based on the above noted information, it is considered that treatment to reduce hardness will reduce the potential for scale forming as it affects TDS.

Total Coliforms
The water samples obtained after 3 and 6 hours of pumping on October 14, 2022 both had total coliforms of 4 counts/ 100 mL with E. Coli and faecal coliforms absent.

MECP Procedure D-5-5 states the following with regards to total coliforms:

> *While the stated ODWS for Total Coliforms is 0 counts per 100 ml of sample, it is recognized that the objective had been set as an indicator of inadequate disinfection within the distribution systems associated with water works. For private water wells not subject to approval under the OWRA, the MOEE and Health Units have historically used the limit of <5 counts per 100 ml in the absence of a chlorine residual as indicating acceptable water quality.*

As the total coliforms were within the wells allowed for existing wells and E. Coli was absent, the presence of total coliforms is considered acceptable. The owner was informed and recommendations were provided to test at least quarterly for bacteria through the public health unit.

RECOMMENDATIONS

The following is recommended for the construction of the future well to service the proposed severed lot with frontage on Charles Street:

- The well construction should conform with the recommended construction in the Thomson report from 2005 that was supported through the MOE report from 2020, as follows:
  - well should be cased to a depth of at least 25 to 32 metres; AND
  - the annulus of the well shall be sealed using suitable grouting and sealant for its entire length to the ground surface.

The following should be considered for expected water quality and well construction for the future well on the severed lot.

- 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 ~420 milligrams per litre. Treatment using ion exchange water softeners is effective to reduce hardness. 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. Sodium level in the untreated water is 57 mg/L, which is above the 20 mg/l medical advisory limit and well within the aesthetic objective of 200 mg/L. When sodium levels exceed 20 mg/l, the local Medical Officer of Health should be informed so that the information can be relayed to local physicians.

- Total dissolved solids (TDS) may be present above the aesthetic objective of 500 mg/l in the future well. It is likely that the water is slightly scale forming. According to the Support Document for the Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG), the palatability of drinking water with a TDS level less than 500 mg/l is generally considered to be good. There is no treatment recommendation for TDS. Treatment to reduce hardness will reduce scale potential associated with elevated TDS.
- Iron was measured at between 2.2 and 2.28 mg/L, compared to the aesthetic objective of 0.3 mg/L. Sulphide was measured at a level of 0.09 to 0.12 mg/L, compared to the aesthetic objective of 0.05 mg/L. Excess iron and sulphide levels may produce coloured deposits on pipes and fixtures and stains on laundered items. It also produces an unpleasant taste and odour. Both iron and sulphide may be reduced using manganese greensand filters or other proprietary filter at iron levels up to 5.0 mg/L and sulphide levels of up to 1.0 to 2.5 mg/L.

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.

Regards,

Kollaard Associates Inc.

Colleen Vermeersch, P. Eng.

Attachments:

	Table I	Summary of Hourly Field Water Quality
	Figure 1	Key Plan
	Figure 2	Site Plan Sketch
	Attachment A	Well Records
	Attachment B	TW1-Pumping Test Data
	Attachment C	TW1-Laboratory Water Testing Results

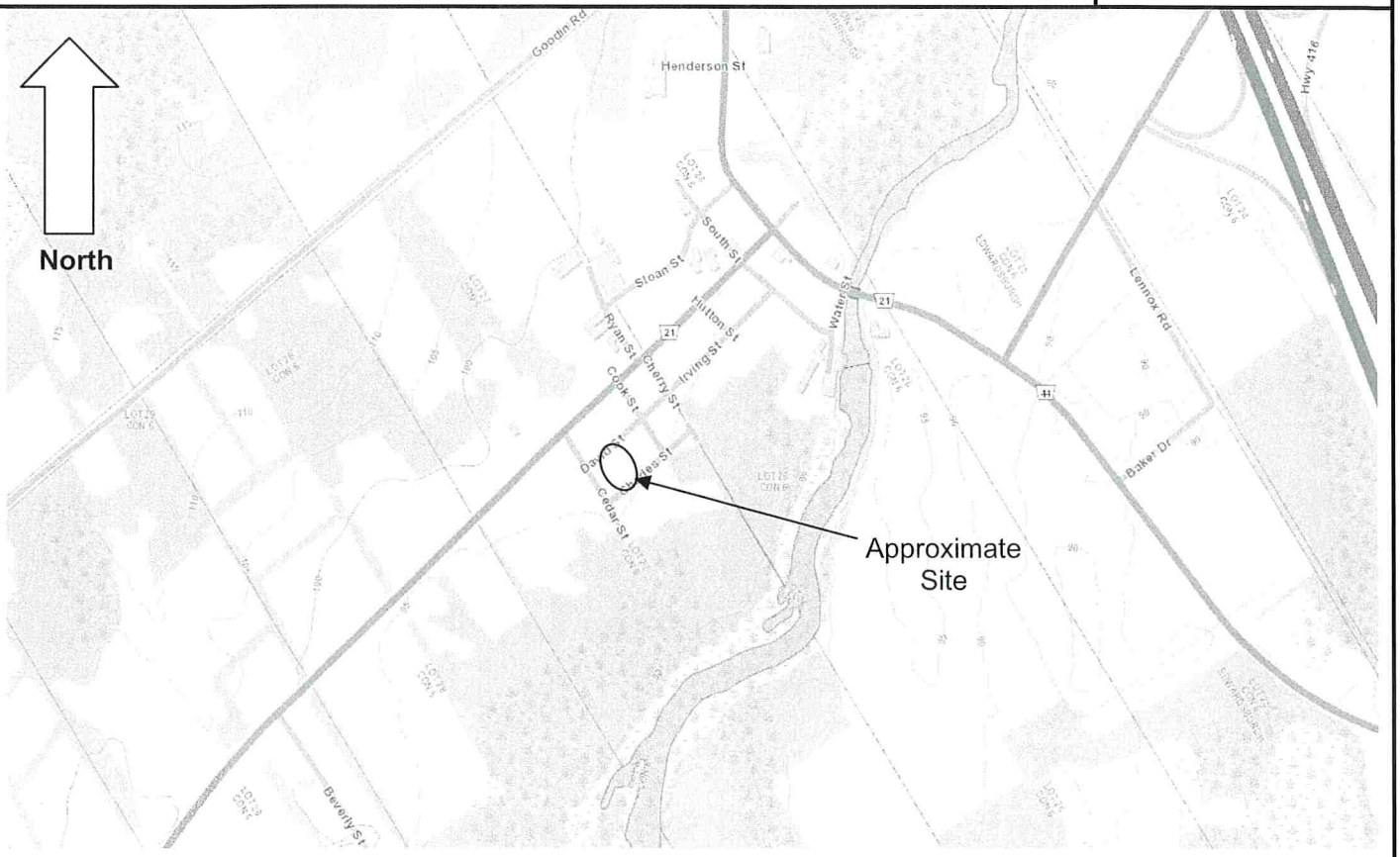
TABLE I

FIELD WATER QUALITY MEASUREMENTS
FOR TEST WELL 1

Time Since Pumping Test Started (min)	**Temperature** (^{0}C)	**pH**	**Turbidity** (NTU)	**Total Dissolved Solids** (ppm)	**Conductivity** (µS)	**Free Chlorine** (ppm)
60	10.4	6.84	4.81	515	1034	0.00
120	10.8	7.18	4.61	498	996	-
180	11.3	7.35	8.05	488	966	-
240	11.8	7.43	15.0	476	950	-
300	11.4	7.60	13.2	481	960	-
360	12.1	7.58	20.6	490	978	-

KEY PLAN

FIGURE 1



NOT TO SCALE

Kollaard Associates
Engineers

Project No. 220996

Date October 2022

DRAWING NUMBER:
FIGURE 2

LEGEND:

Approximate well location

NOTE: THIS DRAWING TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING REPORT.

REFERENCE: PLAN SUPPLIED BY CITY OF OTTAWA EMAPS

REV.	NAME	DATE	DESCRIPTION

Kollaard Associates
Engineers
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KEMPTVILLE ONTARIO
K0G 1J0 FAX (613) 258-0475
http://www.kollaard.ca
(613) 860-0923
info@kollaard.ca

CLIENT:
ED BRONISZESKI

TITLE:
SITE PLAN SKETCH

LOCATION:
27 DAVID STREET
SPENCERVILLE, ONTARIO

DESIGNED BY:	DATE:
--	OCTOBER 2022
DRAWN BY:	SCALE:
CV	AS SHOWN

KOLLAARD FILE NUMBER:
220996

ATTACHMENT A

MECP AREA WELL RECORDS

UTM | | |Z | | | | | | | | |E

Co 5 R V4 | | | | | | | | |N

Elev. 95 R 7 0 3 1 5

Basin 12 5

The Ontario Water Resources Commission Act

WATER RESOURCES DIVISION
24 No 01066
JAN 19 1965
ONTARIO WATER RESOURCES COMMISSION

WATER WELL RECORD

County or District Grenville Township, Village, Town or City Edwardsburgh

Con. 6 Lot Part 27 Date completed 1 (day) OCT (month) 64 (year)

[redacted]ress Spencerville, Ontario.

Casing and Screen Record

Inside diameter of casing 6 3/16"

Total length of casing 13 feet

Type of screen None

Length of screen -

Depth to top of screen -

Diameter of finished hole 6"

Pumping Test

Static level 20 feet

Test-pumping rate $3\frac{1}{2}$ G.P.M.

Pumping level 35 feet

Duration of test pumping 1 hour

Water clear or cloudy at end of test clear

Recommended pumping rate 3 G.P.M.

with pump setting of 35 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)
Grey limestone	0	40	38	fresh

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

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

Drilling or Boring Firm J. B. Dufresne & Co. Ltd., 1014 Maitland Ave.,

Address OTTAWA 5, Ont.

Licence Number 1307

Name of Driller or Borer R. Laniel

Address Ironside, Quebec.

Date 5 October, 1964

(Signature of Licensed Drilling or Boring Contractor)

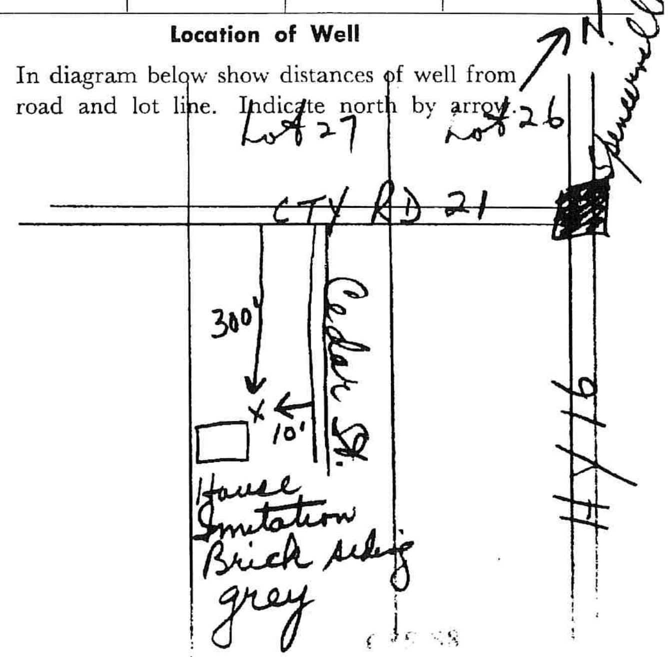
for J B Dufresne

Form 7 10M-62-1152

OWRC COPY

Location of Well

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



UTM Z E
9 R N
Elev. 9 R 0 3 1 1 0
CON VI
Basin 2 8
-37 27

ONTARIO

The Water-well Drillers Act, 1954
Department of Mines

GROUND WATER BRANCH
24 SEP 18 1958 No. 01074
ONTARIO WATER RESOURCES COMMISSION

Water-Well Record

[redacted] ...hip, Village, Town or City. Edwardsburg Twp.
...n Village, Town or City)
...Address Spencerville

Date completed 2 (day) 06 (month) 1958 (year)

Pipe and Casing Record

Casing diameter(s) 5 inch
Length(s) 20 ft.
Type of screen
Length of screen

Pumping Test

Static level 18 ft.
Pumping rate 1000 gal. per hr.
Pumping level 22 ft.
Duration of test 3 hours

Well Log

Water Record

Overburden and Bedrock Record	From ft.	To ft.	Depth(s) at which water(s) found	No. of feet water rises	Kind of water (fresh, salty, or sulphur)
hardpan	0	4	65	47	fresh
limestone rock	4	65			

yes

For what purpose(s) is the water to be used?
house
Is water clear or cloudy? clear
Is well on upland, in valley, or on hillside? upland

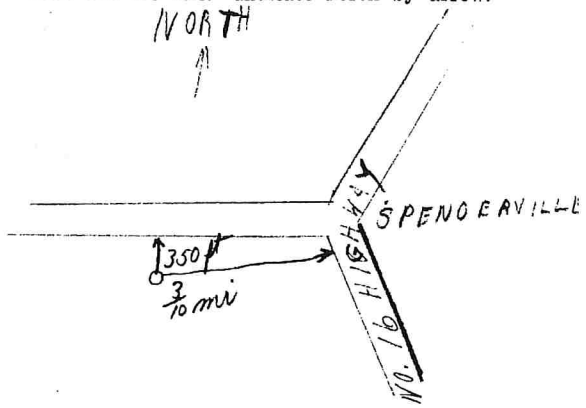
Drilling firm
Address
Name of Driller
Address
Licence Number

I certify that the foregoing statements of fact are true.

Date June 7 Gerald Lemay
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

Ministry of the Environment
Ontario

2406531

The Ontario Water Resources Act

WATER WELL RECORD

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

11

~~2404967~~ AB. MUNICIP 24002 CON CON 06

COUNTY OR DISTRICT: Grenville [redacted]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Edwardsburg
CON, BLOCK, TRACT, SURVEY, ETC.: Conc. #6 Lot #4
DATE COMPLETED: DAY 11 MO 9 YR 91
File # 2-18
ELEVATION: Kemptville
BASIN CODE:

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Clay	Sand Gravel	Soft	0	6
Black	Dolomite	Fractured	Hard	6	151
Grey	Sandstone	Dolomite	Hard	151	202

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
48	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
89	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
153	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
190	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
8 1/2	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		0	102
6 1/4	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	102
6 1/8	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		102	202

SCREEN

SIZE/SLOT 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.)
102	0	Cement Grout

71 PUMPING TEST

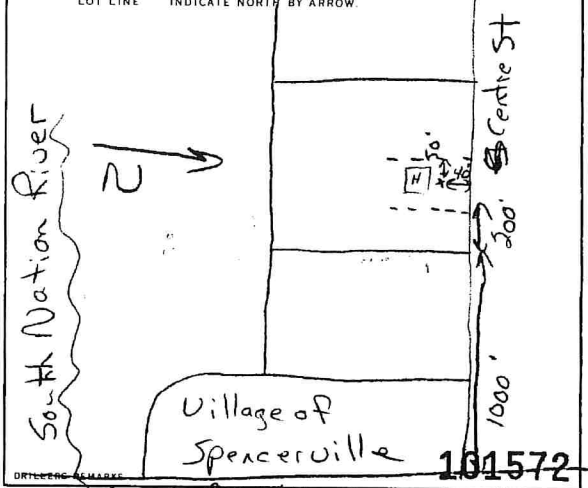
PUMPING TEST METHOD: 1 ☒ AIR 2 ☐ BAILER
PUMPING RATE: 8 GPM
DURATION OF PUMPING: 1 HOURS 30 MINS
STATIC LEVEL: 30 FEET
WATER LEVEL END OF PUMPING: 190 FEET
WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
190 FEET	190 FEET	190 FEET	190 FEET

IF FLOWING GIVE RATE: GPM
PUMP INTAKE SET AT: 190 FEET
WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 190 FEET
RECOMMENDED PUMPING RATE: 7 GPM

LOCATION OF WELL

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



DRILLING REMARKS: 101572

FINAL STATUS OF WELL

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

WATER USE

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 CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Splash Well Drilling
WELL CONTRACTOR'S LICENCE NUMBER: 4877
ADDRESS: Box 1083 Prescott
NAME OF WELL TECHNICIAN: Todd Ferguson
WELL TECHNICIAN'S LICENCE NUMBER: T-09478
SIGNATURE OF TECHNICIAN/CONTRACTOR: Todd Ferguson
SUBMISSION DATE: 05 10 91

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 4877 | DATE RECEIVED OCT 11 1991
DATE OF INSPECTION | INSPECTOR
REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

2406532

The Ontario Water Resources Act

WATER WELL RECORD

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

11

~~2405219~~ AS. MUNICIP. 24002 CON. CON 06

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Gren[redacted]	Ed[redacted]wardsburg	Conc. #6	Part Lot #2

[redacted] Centre St.

DATE COMPLETED DAY 22 MO 4 YR 92

RC. ELEVATION RC. BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	Clay	Wood Fragments	Packed	0	5
Brown	Shale	Fractured	Hard	5	6.5
Black	Dolomite		Hard	6.5	231

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
57	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
163	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS — 2 gal per min
221	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS — 8 gal per min
	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
8 1/2	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		0	102
6 1/4	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	105
6 1/8	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		105	231

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.)
102	0	Cement Grout

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 Air 2 ☐ BAILER	15 GPM	1 HOURS 0 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
15 FEET	200 FEET	25 FEET	15 FEET	15 FEET	15 FEET

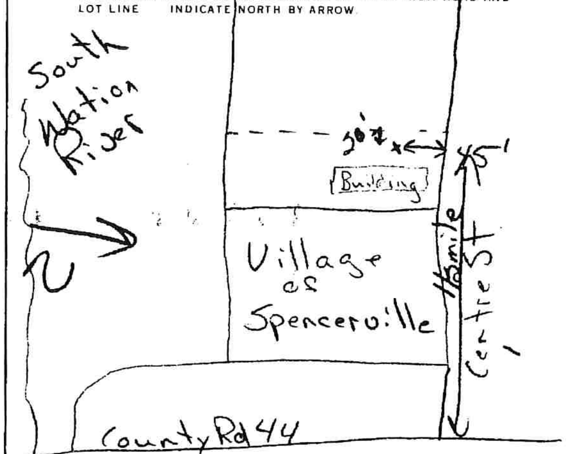
1 ☐ PUMPING 2 ☒ RECOVERY

IF FLOWING, GIVE RATE: GPM | PUMP INTAKE SET AT: 220 FEET | WATER AT END OF TEST: 1 ☐ CLEAR 2 ☒ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP | RECOMMENDED PUMP SETTING: 220 FEET | RECOMMENDED PUMPING RATE: 10 GPM

LOCATION OF WELL

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



DRILLERS REMARKS

113957

FINAL STATUS OF WELL

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

WATER USE

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 CONSTRUCTION

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

CONTRACTOR

NAME OF WELL CONTRACTOR: Splash Well Drilling | WELL CONTRACTOR'S LICENCE NUMBER: 4877
ADDRESS: Box 1683 Prescott
NAME OF WELL TECHNICIAN: Todd Ferguson | WELL TECHNICIAN'S LICENCE NUMBER: T-0478
SIGNATURE OF TECHNICIAN/CONTRACTOR: Todd Ferguson | SUBMISSION DATE DAY 21 MO 4 YR 92

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 4877 | DATE RECEIVED APR 29 1992
DATE OF INSPECTION | INSPECTOR
REMARKS

CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

2406534 WATER WELL RECORD

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

11 | ~~2405181~~ AS. | MUNICIP 24002 | CON. CON 06

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	Edwardsburg	Con. B. 6	Lot. 5

[redacted] DATE COMPLETED DAY 28 MO 11 YR 91

Ont | ELEVATION | BASIN CODE | File #2-19

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Black	Top Soil		Soft	0	1
Brown	Clay	Stones	Packed	1	7
Grey	Dolomite	Limestone	Hard	7	222

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
52	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
79	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
154	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
207	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
8 1/2	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		0	102
6 1/4	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	105
6 1/8	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		105	222

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.)
102	0	Cement Grout

71 PUMPING TEST

PUMPING TEST METHOD	1 ☒ PUMP 2 ☐ BAILER — Air
PUMPING RATE	5 GPM
DURATION OF PUMPING	1 HOURS 30 MINS
STATIC LEVEL	30 FEET
WATER LEVEL END OF PUMPING	210 FEET
WATER LEVELS DURING	1 ☐ PUMPING 2 ☒ RECOVERY
15 MINUTES	130 FEET
30 MINUTES	60 FEET
45 MINUTES	40 FEET
60 MINUTES	30 FEET
IF FLOWING GIVE RATE	GPM
PUMP INTAKE SET AT	210 FEET
WATER AT END OF TEST	1 ☐ CLEAR 2 ☒ CLOUDY
RECOMMENDED PUMP TYPE	☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING	210 FEET
RECOMMENDED PUMPING RATE	4 GPM

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED 8 ☐ DEWATERING

WATER USE

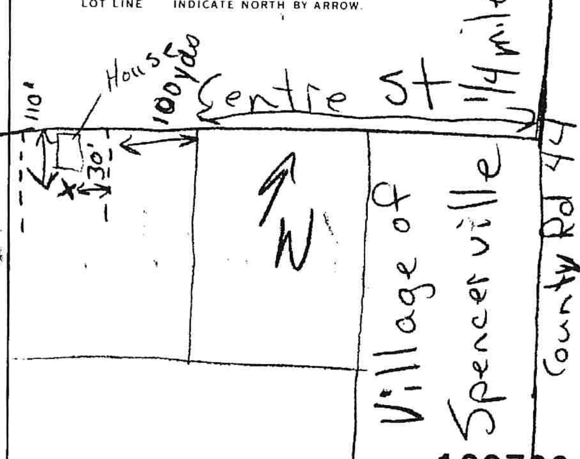
1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION

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

LOCATION OF WELL

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



DRILLERS REMARKS
102783

CONTRACTOR

NAME OF WELL CONTRACTOR: Splash Well Drilling
WELL CONTRACTOR'S LICENCE NUMBER: 4877
ADDRESS: Box 1083 Prescott
NAME OF WELL TECHNICIAN: Todd Ferguson
WELL TECHNICIAN'S LICENCE NUMBER: T-0478
SIGNATURE OF TECHNICIAN/CONTRACTOR: Todd Ferguson
SUBMISSION DATE: DAY 31 MO 01 YR 92

OFFICE USE ONLY

DATA SOURCE | CONTRACTOR 4877 | DATE RECEIVED FEB 03 1992
DATE OF INSPECTION | INSPECTOR
REMARKS
CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ontario Ministry of the Environment

Well Tag No. A038362 (below) A038362

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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

Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

RR#/Street Number/Name: Leader Street Spenceville & Edwardsburg 21 6

City/Town/Village: Leader Street Spenceville

Site/Compartment/Block/Tract etc.

GPS Reading | NAD 83 | Zone 18 | Easting 445944 | Northing 4965237 | Unit Make/Model E Tex | Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To
Brown	Top Soil	Hard Pan		0	1.8
Gray	Limestone			1.8	6.6
Gray	Limestone			6.6	44.8

Hole Diameter

Depth From	Depth To	Diameter Centimetres
0	6.6	25.400

Water Record

Water found at ___ Metres / Kind of Water

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

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

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

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To
	Casing			
15.24	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	0.48	0	6.6
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	Screen			
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		

No Casing or Screen

☐ Open hole

Test of Well Yield

Pumping test method: Pump

	Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Pump intake set at (metres) 20	Static Level	3.2		3.9
Pumping rate (litres/min) 44	1		1	3.01
Duration of pumping 1 hrs + ___ min	2	3.4	2	~
Final water level end of pumping 38 metres	3	3.6	3	~
Recommended pump type. ☐ Shallow ☒ Deep	4	3.9	4	~
Recommended pump depth. 40 metres	5	~	5	~
Recommended pump rate. 44 (litres/min)	10	~	10	~
If flowing give rate - 0 (litres/min)	15	~	15	~
If pumping discontinued, give reason. 0	20	~	20	~
	25	~	25	~
	30	~	30	~
	40	~	40	~
	50	~	50	~
	60	~	60	~

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	Depth set at - Metres To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)

Method of Construction

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

Water Use

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

Final Status of Well

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

Well Contractor/Technician Information

Name of Well Contractor: Dave's Well Drilling — Well Contractor's Licence No.: 6565

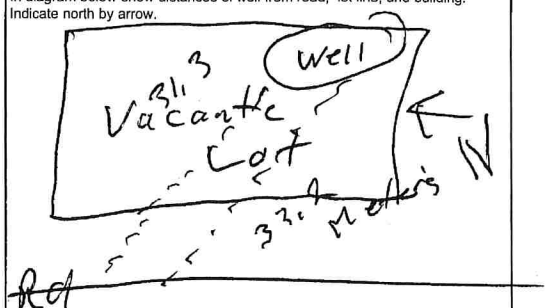
Business Address (street name, number, city etc.): RR 3 North Augusta

Name of Well Technician (last name, first name): Dave Fisk — Well Technician's Licence No.: T0-144

Signature of Technician/Contractor: x [signature] — Date Submitted: 2006 08 03

Location of Well

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



Audit No. Z 38136 — Date Well Completed: 2006 08 03

Was the well owner's information package delivered? ☐ Yes ☐ No — Date Delivered: 2006 08 03

Ministry Use Only

Data Source — Contractor: 6565

Date Received: OCT 11 2006 — Date of Inspection

Remarks — Well Record Number

0506E (09/03) Contractor's Copy ☐ Ministry's Copy ☐ Well Owner's Copy ☐ *Cette formule est disponible en français*

Ontario Ministry of the Environment

Well Tag A 052725 (enter below) A052725

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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- All Sections **must** be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Help Desk (Toll Free) at 1-888-396-9355.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

06 CHARLES ST. SPENCERVILLE Edwardsburg 0 6

RR#/Street Number/Name: 6 D Charles St Spencerville

City/Town/Village: Spencerville

Site/Compartment/Block/Tract etc.:

GPS Reading: ✓ NAD 83 Zone 18 Easting 0456614 Northing 4965354

Unit Make/Model: E Trex

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

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To (Metres)
Brown	Top Soil			0	1.2
Gray	Limestone	Black Dolomite		1.2	6.6
Gray	Limestone	Black Dolomite		6.6	54.5

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0	6.6	25.40

Water Record

Water found at Metres / Kind of Water

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

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth From	Depth To (Metres)
Casing				
15.24	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	0.48	0	6.6
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☐ Open hole			

Test of Well Yield

Pumping test method: Pump

	Draw Down Time (min)	Draw Down Water Level (Metres)	Recovery Time (min)	Recovery Water Level (Metres)
Pump intake set at - (metres) 40	Static Level	4.6		4.9
Pumping rate - (litres/min) 44	1		1	
Duration of pumping 1 hrs + — min	2	4.8	2	4.6
Final water level end of pumping 9 ft metres	3	4.9	3	4.5
Recommended pump type. ☐ Shallow ☒ Deep	4	—	4	4.5
Recommended pump depth. 40 metres	5	—	5	—
Recommended pump rate. 44 (litres/min)	10	—	10	—
If flowing give rate - 0 (litres/min)	15	—	15	—
If pumping discontinued, give reason. 0	20	—	20	—
	25	—	25	—
	30	—	30	—
	40	—	40	—
	50	—	50	—
	60	—	60	—

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	6.6	Quick Grout	2 Bags

Method of Construction

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

Water Use

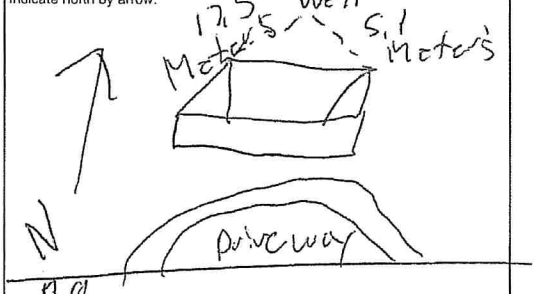
☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

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

Location of Well

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



Audit No. Z 55705

Date Well Completed: 2007 07 06

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

Date Delivered: 2007 07 06

Well Contractor/Technician Information

Name of Well Contractor: Dave's Well Drilling — Well Contractor's Licence No.: 6565

Business Address (street name, number, city etc.): RR 3 North Augusta

Name of Well Technician (last name, first name): Davey, Dave — Well Technician's Licence No.: 10-144

Signature of Technician/Contractor: X [signature] — Date Submitted: 2007 07 06

Ministry Use Only

Data Source | Contractor

Date Received: January 2008 | Date of Inspection

Remarks | Well Record Number

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

Ontario Ministry of the Environment

Well Tag (see below) A052726 / A052726

Well Record

Regulation 903 Ontario Water Resources Act

page ___ of ___

Instructions for Completing Form

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

Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

[redacted]

64 Charle Street Spencerville | Edwardsburg | 3 | 6

RR#/Street Number/Name: 64 Charle Street Spencerville | City/Town/Village: Spencerville | Site/Compartment/Block/Tract etc.

GPS Reading: NAD 83 | Zone 18 | Easting 0459598 | Northing 4965326 | Unit Make/Model: E Tlex | Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To (Metres)
Brown	Top Soil			0	1.2
Gray	Limestone	Black	Dolimite	1.2	6.6
Gray	Limestone	Black	Dolimite	6.6	38.7

Hole Diameter

Depth From	Depth To (Metres)	Diameter (Centimetres)
0	6.6	25.4

Water Record

Water found at Metres / Kind of Water

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

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

Chlorinated ☒ Yes ☐ No

Construction Record

Inside diam (centimetres)	Material	Wall thickness (centimetres)	Depth From	Depth To (Metres)
Casing				
15.24	☒ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	0.48	0	6.6
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized			
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☐ Open hole			

Test of Well Yield

Pumping test method: Pump

	Draw Down Time (min)	Draw Down Water Level (Metres)	Recovery Time (min)	Recovery Water Level (Metres)
Pump intake set at (metres) 40	Static Level	4.6		5.1
Pumping rate (litres/min) 44	1		1	4.8
Duration of pumping 1 hrs + ~ min	2	4.7	2	4.5
Final water level end of pumping 5.1 metres	3	4.8	3	4.4
Recommended pump type: ☐ Shallow ☒ Deep	4	4.4	4	—
Recommended pump depth. 30 metres	5	5.1	5	—
Recommended pump rate. 44 (litres/min)	10	—	10	—
If flowing give rate - 0 (litres/min)	15	—	15	—
If pumping discontinued, give reason.	20	—	20	—
	25	—	25	—
	30	—	30	—
	40	—	40	—
	50	—	50	—
	60	—	60	✓

Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
0	6.6	Quick Count	2 Bags

Method of Construction

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

Water Use

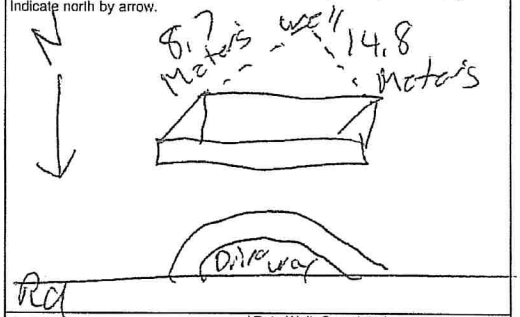
☒ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☐ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

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

Location of Well

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



Audit No. Z 55703 | Date Well Completed 2007 07 06

Was the well owner's information package delivered? ☐ Yes ☐ No | Date Delivered 2007 07 06

Well Contractor/Technician Information

Name of Well Contractor: Dave's well Drilling | Well Contractor's Licence No.: 6565

Business Address (Street name, number, city etc.): 1123 North Augusta

Name of Well Technician (last name, first name): Dave Lang | Well Technician's Licence No.: 10-144

Signature of Technician/Contractor: X [signature] | Date Submitted: 2007 07 06

Ministry Use Only

Data Source	Contractor
Date Received JAN 14 2008	Date of Inspection
Remarks	Well Record Number

0506E (08/2006)

Ministry's Copy

Cette formule est disponible en français

Ontario — Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Sticker): **A 091165**

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name: 1504107 Ontario Inc o/a Lockwood Brothers Construction | Last Name / Organization | E-mail Address | [ ] Well Constructed by Well Owner

Mailing Address (Street Number/Name): 2010 Totem Ranch Rd west | Municipality: Oxford Hills | Province: ON | Postal Code: K0G 1T0 | Telephone No. (inc. area code): 6132584225

Well Location

Address of Well Location (Street Number/Name): 12 Cedar St (~~Cedarcrest~~) | Township: Edwardsburg | Lot: | Concession: 6

County/District/Municipality: Grenville | City/Town/Village: Spencerville | Province: Ontario | Postal Code: K0E 1X0

UTM Coordinates: Zone | Easting | Northing | Municipal Plan and Sublot Number | Other

NAD 8 3 18 | 456467 | 4965287 | Part 3 on Plan 15R 10841

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay		Soft	0	0.91
Grey	Limestone		Hard	0.91	24.69

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
6.25	0	Cement Pressure Grouted	0.16

Method of Construction

[ ] Cable Tool [ ] Diamond
[X] Rotary (Conventional) [ ] Jetting
[ ] Rotary (Reverse) [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
25.40	Open Hole		0	6.25
15.88	Steel	0.48	0	6.25
15.55	Open Hole		6.25	24.69

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	Fresh	Untested
14.63	[ ] Gas [ ] Other, specify		[X]
21.03	[ ] Gas [ ] Other, specify		
(m/ft)	[ ] Gas [ ] Other, specify		

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	6.25	25.40
6.25	24.69	15.55

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 21.34

Pumping rate (l/min / GPM): 68.25

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 5.15

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

Recommended pump depth (m/ft): 21.34

Recommended pump rate (l/min / GPM): 45.5

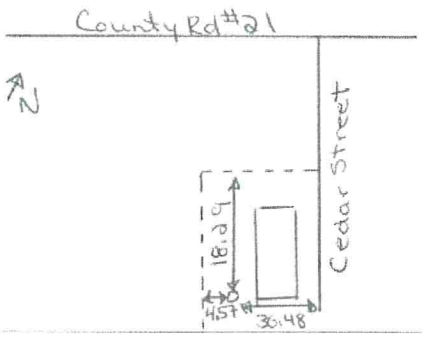
Well production (l/min / GPM):

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	5.04		5.15
1	5.07	1	5.13
2	5.09	2	5.12
3	5.10	3	5.11
4	5.10	4	5.10
5	5.11	5	5.09
10	5.12	10	5.08
15	5.12	15	5.04
20	5.13	20	
25	5.14	25	
30	5.14	30	
40	5.14	40	
50	5.15	50	
60	5.15	60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor: Splash Well Drilling | Well Contractor's Licence No.: 4877

Business Address (Street Number/Name): PO Box 1083 | Municipality: Prescott

Province: ON | Postal Code: K0E 1T0 | Business E-mail Address:

Bus. Telephone No. (inc. area code): 6139254885 | Name of Well Technician (Last Name, First Name): Ferguson, Todd

Well Technician's Licence No.: T478 | Signature of Technician and/or Contractor: Todd Ferguson | Date Submitted: 20100201

Well owner's information package delivered: [X] Yes [ ] No | Date Package Delivered: 20100126

Date Work Completed: 20100121

Ministry Use Only

Audit No.: Z 104993

Received: MAR 2 2 2010

0506E (12/2007)

Ministry's Copy

Ontario Ministry of the Environment

Measurements recorded in: ☒ Metric ☐ Imperial

Well Tag No. (If any): **A 091166**

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name: 1504107 Ontario Inc. | Last Name / Organization: o/a Lockwood Brothers Construction | E-mail Address: | ☐ Well Constructed by Well Owner

Mailing Address (Street Number/Name): 2010 Totem Ranch Rd West | Municipality: Oxford Hills | Province: ON | Postal Code: K0G 1T0 | Telephone No. (inc. area code): 6132584225

Well Location

Address of Well Location (Street Number/Name): 14 Cedar Street | Township: Augusta | Lot: | Concession: 6

County/District/Municipality: Grenville | City/Town/Village: Spencerville | Province: Ontario | Postal Code: K0E 1X0

UTM Coordinates: Zone: 18 | Easting: 456460 | Northing: 4965301 | Municipal Plan and Sublot Number: Part 2 on Plan 15R-10841 | Other:

NAD 8 3

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay		Soft	0	1.07
Grey	Limestone		Hard	1.07	24.69

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
6.25	0	Cement Pressure Grouted	0.16

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
25.40	Open Hole		0	6.25
15.88	Steel	.48	0	6.25
15.55	Open Hole		6.25	24.69

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From (m/ft)	Depth To (m/ft)	Diameter (cm/in)
13.72 (m/ft)	☐ Fresh ☒ Untested ☐ Gas ☐ Other, specify	0	6.25	25.40
19.20 (m/ft)	☐ Fresh ☒ Untested ☐ Gas ☐ Other, specify	6.25	24.69	15.55
(m/ft)	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify			

Results of Well Yield Testing

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

If pumping discontinued, give reason:

Pump intake set at (m/ft): 21.34

Pumping rate (l/min / GPM): 68.25

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 5.335

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

Recommended pump depth (m/ft): 21.34

Recommended pump rate (l/min / GPM): 45.5

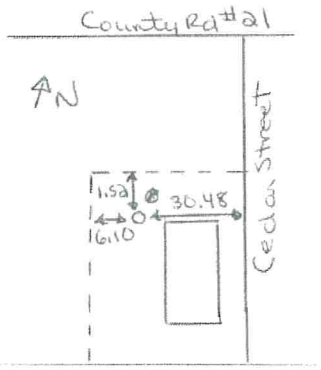
Well production (l/min / GPM):

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	5.29		5.335
1	5.29	1	5.31
2	5.29	2	5.30
3	5.295	3	5.295
4	5.30	4	5.29
5	5.30	5	5.29
10	5.31	10	5.285
15	5.32	15	5.28
20	5.32	20	5.275
25	5.32	25	5.27
30	5.325	30	
40	5.33	40	
50	5.33	50	
60	5.335	60	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor: Splash Well Drilling | Well Contractor's Licence No.: 4877

Business Address (Street Number/Name): PO Box 1083 | Municipality: Prescott

Province: ON | Postal Code: K0E 1T0 | Business E-mail Address:

Bus. Telephone No. (inc. area code): 6137254885 | Name of Well Technician (Last Name, First Name): Ferguson, Todd

Well Technician's Licence No.: T478 | Signature of Technician and/or Contractor: Todd Ferguson | Date Submitted: 20100201

Well owner's information package delivered: ☒ Yes ☐ No | Date Package Delivered: 20100127

Date Work Completed: 20100121

Ministry Use Only

Audit No.: Z 104994

MAR 22 2010

05(08)E (12/2007)

Ministry's Copy

Ontario Ministry of the Environment

Measurements recorded in: ☐ Metric ☒ Imperial

Well Tag No. *(Place Sticker and/or Print Below)* **Tag#: A133708**

Well Record

Regulation 903 Ontario Water Resources Act

Page _____ of _____

[redacted]

Address of Well Location (Street Number/Name)	Township	Lot	Concession
1 Cedar Street	Edwardsburgh	5+6	

County/District/Municipality	City/Town/Village	Province	Postal Code
Grenville	Spencerville	Ontario	K0E1X0

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456571	4365189	Plan 40	

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

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Red	Sand Fill		Soft	ϕ	5'
Brown	Sandy Clay		Packed	5'	6'6"
Grey	Limestone		Broken Soft	6'6"	25'
Grey	Limestone		Hard	25'	101'

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
31'	ϕ	Cement Pressure Grouted	20.3 l

Method of Construction

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

Well Use

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

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
10"	Open Hole		ϕ	31'
6¼"	Steel	.188	ϕ	31'
6⅛"	Open Hole		31'	101'

Construction Record - Screen

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

Status of Well

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

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
15'	☐ Fresh ☒ Untested	☐	
91'	☐ Fresh ☒ Untested	☐	
	☐ Fresh ☐ Untested	☐	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
ϕ	31'	10"
31'	101'	6⅛"

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
1425486 Ontario Ltd o/a Splash Well Drilling	4877

Business Address (Street Number/Name)	Municipality
PO BOX 1083	Prescott

Province	Postal Code	Business E-mail Address
ON	K0E1T0	

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6139254885	Ferguson, Todd

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T4718	Todd	2013042

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Ministry's Copy

Results of Well Yield Testing

After test of well yield, water was:
☒ Clear and sand free
☐ Other, *specify* _____

If pumping discontinued, give reason:

Pump intake set at (m/ft): 90'

Pumping rate (~~l/min~~ / GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (~~m/ft~~): 23.4

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 80'

Recommended pump rate (~~l/min~~ / GPM): 10

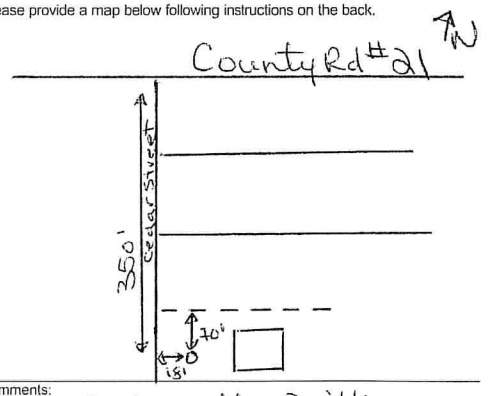
Well production (l/min / GPM)

Disinfected? ☒ Yes ☐ No 160

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	7.8		23.4
1	15	1	14
2	18	2	10.7
3	19.7	3	9.4
4	20.7	4	8.8
5	21.4	5	8.5
10	22.6	10	8.1
15	22.9	15	8
20	23.1	20	7.9
25	23.2	25	7.9
30	23.3	30	7.8
40	23.4	40	
50	23.4	50	
60	23.4	60	

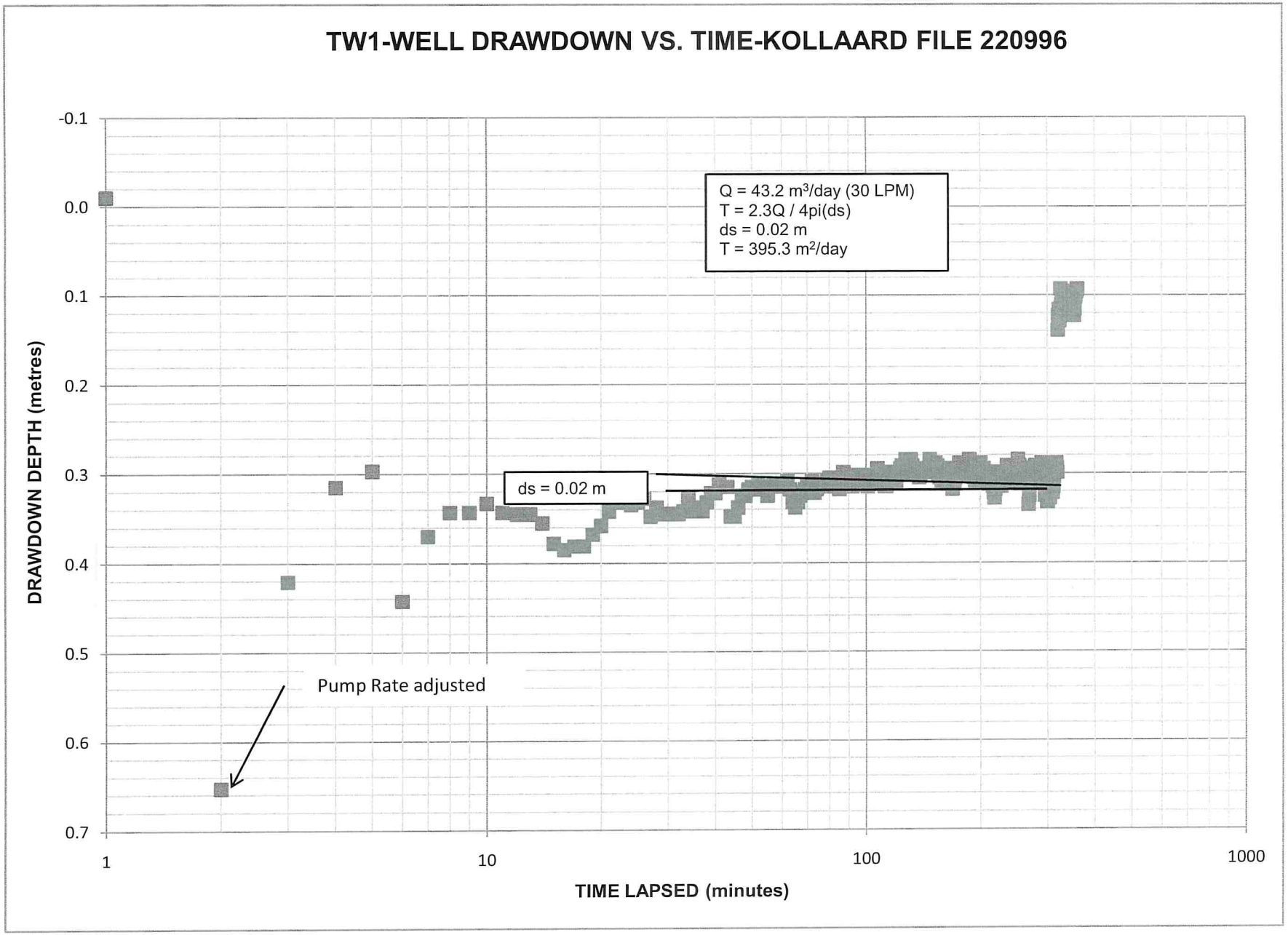
Map of Well Location

Please provide a map below following instructions on the back.



Comments:
160 chlorine after Drilling
ϕ chlorine after Yield Test

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☒ Yes ☐ No	2013041B	Audit No. Z 167094
	Date Work Completed	
	2013041 1	


TW1-WELL DRAWDOWN VS. TIME-KOLLAARD FILE 220996
-0.1
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
DRAWDOWN DEPTH (metres)
Q = 43.2 m³/day (30 LPM)
T = 2.3Q / 4pi(ds)
ds = 0.02 m
T = 395.3 m²/day
ds = 0.02 m
Pump Rate adjusted
1
10
100
1000
TIME LAPSED (minutes)

Kollaard File 220996 Pump Rate 30.0 litres/minute

DRAWDOWN DATA TW1

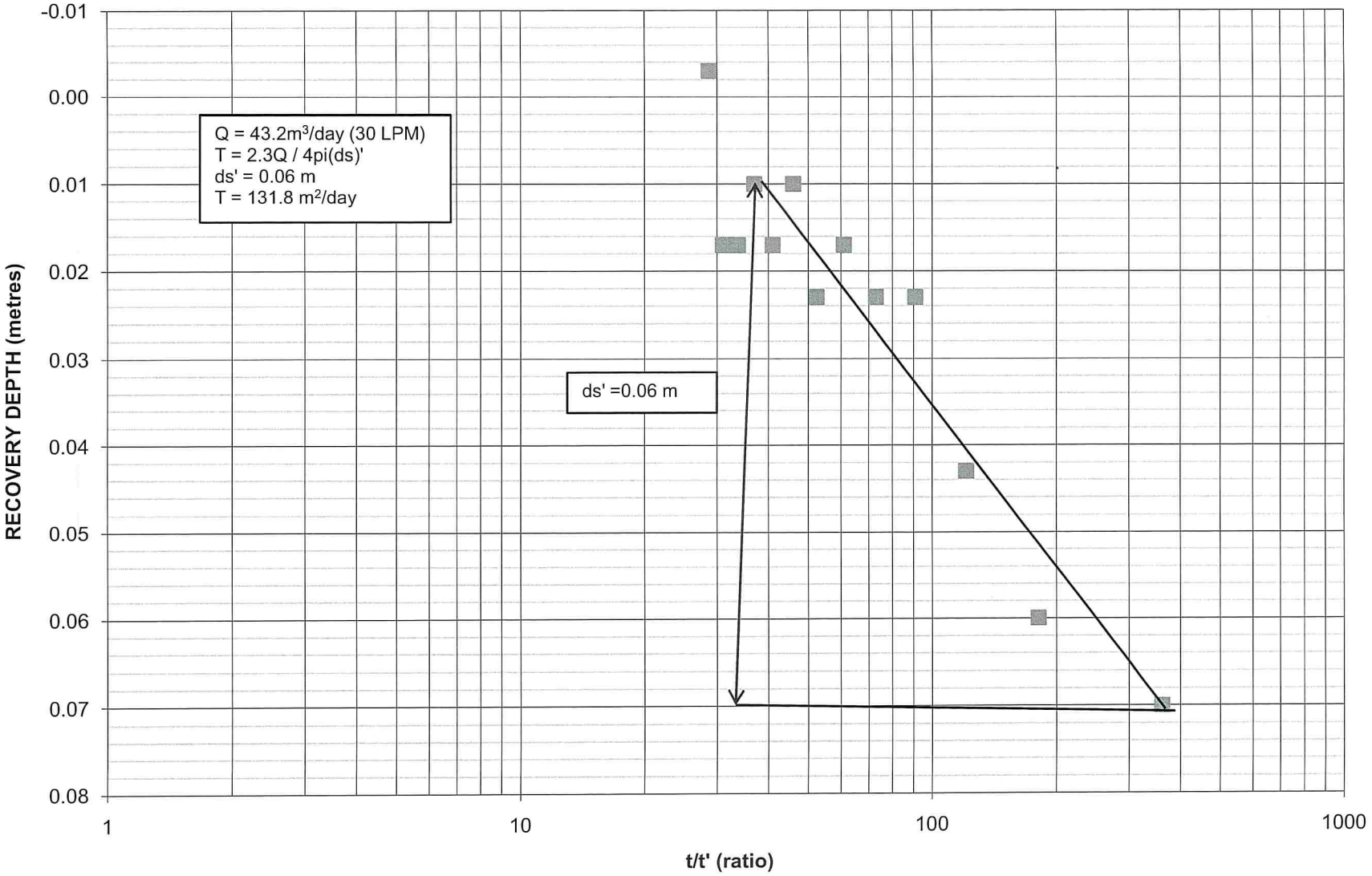
Time Lapsed (minutes)	Abs Pres (kPa)	Temp (°C)	Water Level (m)	Drawdown (m)
0	397.747	9.275	-7.412	0.00
1	397.844	9.275	-7.402	-0.01
2	391.342	9.275	-8.065	0.65
3	393.618	9.275	-7.833	0.42
4	394.658	9.275	-7.727	0.32
5	394.835	9.176	-7.709	0.30
6	393.405	9.176	-7.855	0.44
7	394.12	9.176	-7.782	0.37
8	394.38	9.176	-7.755	0.34
9	394.38	9.176	-7.755	0.34
10	394.478	9.176	-7.745	0.33
11	394.38	9.176	-7.755	0.34
12	394.363	9.077	-7.757	0.35
13	394.363	9.077	-7.757	0.35
14	394.265	9.077	-7.767	0.36
15	394.038	9.077	-7.79	0.38
16	393.973	9.077	-7.797	0.39
17	394.005	9.077	-7.793	0.38
18	394.005	9.077	-7.793	0.38
19	394.135	9.077	-7.78	0.37
20	394.233	9.077	-7.77	0.36
21	394.395	9.077	-7.754	0.34
22	394.493	9.077	-7.744	0.33
23	394.525	9.077	-7.74	0.33
24	394.46	9.077	-7.747	0.34
25	394.493	9.077	-7.744	0.33
26	394.525	9.077	-7.74	0.33
27	394.33	9.077	-7.76	0.35
28	394.428	9.077	-7.75	0.34
29	394.363	9.077	-7.757	0.35
30	394.363	9.077	-7.757	0.35
31	394.363	9.077	-7.757	0.35
32	394.363	9.077	-7.757	0.35
33	394.395	9.077	-7.754	0.34
34	394.525	9.077	-7.74	0.33
35	394.428	9.077	-7.75	0.34
36	394.395	9.077	-7.754	0.34
37	394.395	9.077	-7.754	0.34
38	394.493	9.077	-7.744	0.33
39	394.59	9.077	-7.734	0.32
40	394.59	9.077	-7.734	0.32
41	394.688	9.077	-7.724	0.31
42	394.655	9.077	-7.727	0.32
43	394.655	9.077	-7.727	0.32
44	394.33	9.077	-7.76	0.35
45	394.33	9.077	-7.76	0.35
46	394.428	9.077	-7.75	0.34
47	394.558	9.077	-7.737	0.33
48	394.558	9.077	-7.737	0.33
49	394.623	9.077	-7.73	0.32
50	394.655	9.077	-7.727	0.32
51	394.623	9.077	-7.73	0.32
52	394.688	9.077	-7.724	0.31
53	394.655	9.077	-7.727	0.32
54	394.655	9.077	-7.727	0.32
55	394.558	9.077	-7.737	0.33
56	394.655	9.077	-7.727	0.32
57	394.688	9.077	-7.724	0.31
58	394.655	9.077	-7.727	0.32
59	394.655	9.077	-7.727	0.32
60	394.655	9.077	-7.727	0.32
61	394.688	9.077	-7.724	0.31
62	394.72	9.077	-7.721	0.31
63	394.623	9.077	-7.73	0.32
64	394.493	9.077	-7.744	0.33
65	394.428	9.077	-7.75	0.34
66	394.493	9.077	-7.744	0.33
67	394.558	9.077	-7.737	0.33
68	394.59	9.077	-7.734	0.32
69	394.623	9.077	-7.73	0.32
70	394.655	9.077	-7.727	0.32
71	394.655	9.077	-7.727	0.32
72	394.72	9.077	-7.721	0.31
73	394.59	9.077	-7.734	0.32
74	394.623	9.077	-7.73	0.32
75	394.655	9.077	-7.727	0.32
76	394.688	9.077	-7.724	0.31
77	394.688	9.077	-7.724	0.31
78	394.688	9.077	-7.724	0.31
79	394.72	9.077	-7.721	0.31
80	394.753	9.077	-7.717	0.31
81	394.688	9.077	-7.724	0.31
82	394.655	9.077	-7.727	0.32
83	394.655	9.077	-7.727	0.32
84	394.655	9.077	-7.727	0.32
85	394.623	9.077	-7.73	0.32
86	394.753	9.077	-7.717	0.31
87	394.818	9.077	-7.711	0.30
88	394.72	9.077	-7.721	0.31

89	394.72	9.077	-7.721	0.31
90	394.753	9.077	-7.717	0.31
91	394.72	9.077	-7.721	0.31
92	394.655	9.077	-7.727	0.32
93	394.72	9.077	-7.721	0.31
94	394.785	9.077	-7.714	0.30
95	394.72	9.077	-7.721	0.31
96	394.72	9.077	-7.721	0.31
97	394.753	9.077	-7.717	0.31
98	394.785	9.077	-7.714	0.30
99	394.785	9.077	-7.714	0.30
100	394.785	9.077	-7.714	0.30
101	394.655	9.077	-7.727	0.32
102	394.688	9.077	-7.724	0.31
103	394.72	9.077	-7.721	0.31
104	394.753	9.077	-7.717	0.31
105	394.753	9.077	-7.717	0.31
106	394.785	9.077	-7.714	0.30
107	394.85	9.077	-7.707	0.30
108	394.785	9.077	-7.714	0.30
109	394.818	9.077	-7.711	0.30
110	394.785	9.077	-7.714	0.30
111	394.72	9.077	-7.721	0.31
112	394.655	9.077	-7.727	0.32
113	394.655	9.077	-7.727	0.32
114	394.72	9.077	-7.721	0.31
115	394.72	9.077	-7.721	0.31
116	394.818	9.077	-7.711	0.30
117	394.785	9.077	-7.714	0.30
118	394.818	9.077	-7.711	0.30
119	394.785	9.077	-7.714	0.30
120	394.72	9.077	-7.721	0.31
121	394.818	9.077	-7.711	0.30
122	394.818	9.077	-7.711	0.30
123	394.85	9.077	-7.707	0.30
124	394.883	9.077	-7.704	0.29
125	394.85	9.077	-7.707	0.30
126	394.883	9.077	-7.704	0.29
127	394.948	9.077	-7.697	0.29
128	394.85	9.077	-7.707	0.30
129	394.785	9.077	-7.714	0.30
130	394.85	9.077	-7.707	0.30
131	394.948	9.077	-7.697	0.29
132	394.883	9.077	-7.704	0.29
133	394.85	9.077	-7.707	0.30
134	394.818	9.077	-7.711	0.30
135	394.85	9.077	-7.707	0.30
136	394.818	9.077	-7.711	0.30
137	394.85	9.077	-7.707	0.30
138	394.753	9.077	-7.717	0.31
139	394.785	9.077	-7.714	0.30
140	394.85	9.077	-7.707	0.30
141	394.818	9.077	-7.711	0.30
142	394.818	9.077	-7.711	0.30
143	394.818	9.077	-7.711	0.30
144	394.85	9.077	-7.707	0.30
145	394.85	9.077	-7.707	0.30
146	394.85	9.077	-7.707	0.30
147	394.948	9.077	-7.697	0.29
148	394.818	9.077	-7.711	0.30
149	394.818	9.077	-7.711	0.30
150	394.915	9.077	-7.701	0.29
151	394.85	9.077	-7.707	0.30
152	394.915	9.077	-7.701	0.29
153	394.883	9.077	-7.704	0.29
154	394.883	9.077	-7.704	0.29
155	394.785	9.077	-7.714	0.30
156	394.753	9.077	-7.717	0.31
157	394.753	9.077	-7.717	0.31
158	394.72	9.077	-7.721	0.31
159	394.72	9.077	-7.721	0.31
160	394.753	9.077	-7.717	0.31
161	394.818	9.077	-7.711	0.30
162	394.818	9.077	-7.711	0.30
163	394.688	9.077	-7.724	0.31
164	394.753	9.077	-7.717	0.31
165	394.785	9.077	-7.714	0.30
166	394.85	9.077	-7.707	0.30
167	394.753	9.077	-7.717	0.31
168	394.753	9.077	-7.717	0.31
169	394.623	9.077	-7.73	0.32
170	394.688	9.077	-7.724	0.31
171	394.72	9.077	-7.721	0.31
172	394.753	9.077	-7.717	0.31
173	394.85	9.077	-7.707	0.30
174	394.818	9.077	-7.711	0.30
175	394.85	9.077	-7.707	0.30
176	394.915	9.077	-7.701	0.29
177	394.915	9.077	-7.701	0.29
178	394.785	9.077	-7.714	0.30
179	394.818	9.077	-7.711	0.30
180	394.85	9.077	-7.707	0.30
181	394.883	9.077	-7.704	0.29
182	394.883	9.077	-7.704	0.29
183	394.883	9.077	-7.704	0.29

184	394.85	9.077	-7.707	0.30
185	394.85	9.077	-7.707	0.30
186	394.85	9.077	-7.707	0.30
187	394.948	9.077	-7.697	0.29
188	394.883	9.077	-7.704	0.29
189	394.915	9.077	-7.701	0.29
190	394.785	9.077	-7.714	0.30
191	394.85	9.077	-7.707	0.30
192	394.753	9.077	-7.717	0.31
193	394.818	9.077	-7.711	0.30
194	394.72	9.077	-7.721	0.31
195	394.883	9.077	-7.704	0.29
196	394.818	9.077	-7.711	0.30
197	394.883	9.077	-7.704	0.29
198	394.915	9.077	-7.701	0.29
199	394.883	9.077	-7.704	0.29
200	394.915	9.077	-7.701	0.29
201	394.818	9.077	-7.711	0.30
202	394.818	9.077	-7.711	0.30
203	394.85	9.077	-7.707	0.30
204	394.85	9.077	-7.707	0.30
205	394.785	9.077	-7.714	0.30
206	394.753	9.077	-7.717	0.31
207	394.753	9.077	-7.717	0.31
208	394.753	9.077	-7.717	0.31
209	394.785	9.077	-7.714	0.30
210	394.688	9.077	-7.724	0.31
211	394.753	9.077	-7.717	0.31
212	394.753	9.077	-7.717	0.31
213	394.818	9.077	-7.711	0.30
214	394.785	9.077	-7.714	0.30
215	394.785	9.077	-7.714	0.30
216	394.655	9.077	-7.727	0.32
217	394.59	9.077	-7.734	0.32
218	394.525	9.077	-7.74	0.33
219	394.623	9.077	-7.73	0.32
220	394.655	9.077	-7.727	0.32
221	394.72	9.077	-7.721	0.31
222	394.72	9.077	-7.721	0.31
223	394.753	9.077	-7.717	0.31
224	394.785	9.077	-7.714	0.30
225	394.753	9.077	-7.717	0.31
226	394.818	9.077	-7.711	0.30
227	394.655	9.077	-7.727	0.32
228	394.785	9.077	-7.714	0.30
229	394.753	9.077	-7.717	0.31
230	394.753	9.077	-7.717	0.31
231	394.785	9.077	-7.714	0.30
232	394.818	9.077	-7.711	0.30
233	394.818	9.077	-7.711	0.30
234	394.818	9.077	-7.711	0.30
235	394.883	9.077	-7.704	0.29
236	394.72	9.077	-7.721	0.31
237	394.72	9.077	-7.721	0.31
238	394.785	9.077	-7.714	0.30
239	394.85	9.077	-7.707	0.30
240	394.785	9.077	-7.714	0.30
241	394.818	9.077	-7.711	0.30
242	394.85	9.077	-7.707	0.30
243	394.85	9.077	-7.707	0.30
244	394.883	9.077	-7.704	0.29
245	394.785	9.077	-7.714	0.30
246	394.753	9.077	-7.717	0.31
247	394.85	9.077	-7.707	0.30
248	394.85	9.077	-7.707	0.30
249	394.85	9.077	-7.707	0.30
250	394.818	9.077	-7.711	0.30
251	394.948	9.077	-7.697	0.29
252	394.818	9.077	-7.711	0.30
253	394.883	9.077	-7.704	0.29
254	394.85	9.077	-7.707	0.30
255	394.688	9.077	-7.724	0.31
256	394.72	9.077	-7.721	0.31
257	394.753	9.077	-7.717	0.31
258	394.818	9.077	-7.711	0.30
259	394.785	9.077	-7.714	0.30
260	394.85	9.077	-7.707	0.30
261	394.85	9.077	-7.707	0.30
262	394.85	9.077	-7.707	0.30
263	394.85	9.077	-7.707	0.30
264	394.72	9.077	-7.721	0.31
265	394.72	9.077	-7.721	0.31
266	394.818	9.077	-7.711	0.30
267	394.72	9.077	-7.721	0.31
268	394.46	9.077	-7.747	0.34
269	394.558	9.077	-7.737	0.33
270	394.72	9.077	-7.721	0.31
271	394.818	9.077	-7.711	0.30
272	394.818	9.077	-7.711	0.30
273	394.72	9.077	-7.721	0.31
274	394.72	9.077	-7.721	0.31
275	394.818	9.077	-7.711	0.30
276	394.818	9.077	-7.711	0.30
277	394.85	9.077	-7.707	0.30
278	394.785	9.077	-7.714	0.30

279	394.883	9.077	-7.704	0.29
280	394.818	9.077	-7.711	0.30
281	394.85	9.077	-7.707	0.30
282	394.85	9.077	-7.707	0.30
283	394.785	9.077	-7.714	0.30
284	394.818	9.077	-7.711	0.30
285	394.818	9.077	-7.711	0.30
286	394.883	9.077	-7.704	0.29
287	394.85	9.077	-7.707	0.30
288	394.883	9.077	-7.704	0.29
289	394.85	9.077	-7.707	0.30
290	394.915	9.077	-7.701	0.29
291	394.883	9.077	-7.704	0.29
292	394.72	9.077	-7.721	0.31
293	394.818	9.077	-7.711	0.30
294	394.85	9.077	-7.707	0.30
295	394.72	9.077	-7.721	0.31
296	394.558	9.077	-7.737	0.33
297	394.558	9.077	-7.737	0.33
298	394.818	9.077	-7.711	0.30
299	394.818	9.077	-7.711	0.30
300	394.493	9.077	-7.744	0.33
301	394.493	9.077	-7.744	0.33
302	394.655	9.077	-7.727	0.32
303	394.688	9.077	-7.724	0.31
304	394.655	9.077	-7.727	0.32
305	394.525	9.077	-7.74	0.33
306	394.623	9.077	-7.73	0.32
307	394.72	9.077	-7.721	0.31
308	394.85	9.077	-7.707	0.30
309	394.59	9.077	-7.734	0.32
310	394.59	9.077	-7.734	0.32
311	394.655	9.077	-7.727	0.32
312	394.753	9.077	-7.717	0.31
313	394.818	9.077	-7.711	0.30
314	394.883	9.077	-7.704	0.29
315	394.85	9.077	-7.707	0.30
316	394.883	9.077	-7.704	0.29
317	394.915	9.077	-7.701	0.29
318	394.85	9.077	-7.707	0.30
319	394.818	9.077	-7.711	0.30
320	396.378	9.077	-7.551	0.14
321	396.541	9.077	-7.535	0.12
322	396.606	9.077	-7.528	0.12
323	396.476	9.077	-7.541	0.13
324	396.541	9.077	-7.535	0.12
325	396.833	9.077	-7.505	0.09
326	396.638	9.077	-7.525	0.11
327	396.671	9.077	-7.522	0.11
328	396.703	9.077	-7.518	0.11
329	396.573	9.077	-7.532	0.12
330	396.703	9.077	-7.518	0.11
331	396.736	9.077	-7.515	0.10
332	396.736	9.077	-7.515	0.10
333	396.736	9.077	-7.515	0.10
334	396.768	9.077	-7.512	0.10
335	396.671	9.077	-7.522	0.11
336	396.736	9.077	-7.515	0.10
337	396.768	9.077	-7.512	0.10
338	396.768	9.077	-7.512	0.10
339	396.768	9.077	-7.512	0.10
340	396.801	9.077	-7.508	0.10
341	396.606	9.077	-7.528	0.12
342	396.541	9.077	-7.535	0.12
343	396.703	9.077	-7.518	0.11
344	396.606	9.077	-7.528	0.12
345	396.671	9.077	-7.522	0.11
346	396.736	9.077	-7.515	0.10
347	396.736	9.077	-7.515	0.10
348	396.768	9.077	-7.512	0.10
349	396.736	9.077	-7.515	0.10
350	396.768	9.077	-7.512	0.10
351	396.736	9.077	-7.515	0.10
352	396.606	9.077	-7.528	0.12
353	396.541	9.077	-7.535	0.12
354	396.606	9.077	-7.528	0.12
355	396.736	9.077	-7.515	0.10
356	396.768	9.077	-7.512	0.10
357	396.801	9.077	-7.508	0.10
358	396.801	9.077	-7.508	0.10
359	396.833	9.077	-7.505	0.09
360	396.833	9.077	-7.505	0.09

TW1- WELL RECOVERY VS. TIME - KOLLAARD FILE 220996



Kollaard File 220996

RECOVERY DATA TW-1

t'	t / t'	Abs Pres (kPa)	Temp (°C)	Water Level (m)	Drawdown (m)	Recovery (%)
1	361	397.061	9.077	-7.482	0.07	25%
2	181.0	397.158	9.077	-7.472	0.06	35%
3	121.0	397.321	9.077	-7.455	0.04	54%
4	91.0	397.516	9.077	-7.435	0.02	75%
5	73.0	397.516	9.077	-7.435	0.02	75%
6	61.0	397.581	9.077	-7.429	0.02	82%
7	52.4	397.516	9.077	-7.435	0.02	75%
8	46.0	397.646	9.077	-7.422	0.01	89%
9	41.0	397.581	9.077	-7.429	0.02	82%
10	37.0	397.646	9.077	-7.422	0.01	89%
11	33.7	397.581	9.077	-7.429	0.02	82%
12	31.0	397.581	9.077	-7.429	0.02	82%
13	28.7	397.776	9.077	-7.409	0.00	103%

ATTACHMENT C

WATER QUALITY RESULTS

eurofins | Environment Testing

Certificate of Analysis

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

Report Number: 1988079
Date Submitted: 2022-10-14
Date Reported: 2022-10-21
Project: 220996
COC #: 901489

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:

Emma-Dawn Ferguson
2022.10.21 15:58:23
-04'00'

APPROVAL: _____
Emma-Dawn Ferguson, Chemist

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: https://directory.cala.ca/.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is licensed by the Ontario Ministry of the Environment, Conservation, and Parks (MECP) for specific tests in drinking water (license #2318). A copy of the license is available upon request.

Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) is accredited by the Ontario Ministry of Agriculture, Food, and Rural Affairs for specific tests in agricultural soils.

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline values listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official provincial or federal guideline as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

eurofins | Environment Testing

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				Lab I.D.	1656460	1656461
				Sample Matrix	Water	Water
				Sample Type		
				Sampling Date	2022-10-14	2022-10-14
				Sample I.D.	TW1-3 hrs	TW1-6 hrs
Group	**Analyte**	**MRL**	**Units**	**Guideline**		
Nutrients	N-NH3	0.020	mg/L		0.153	0.159
	Total Kjeldahl Nitrogen	0.100	mg/L		0.260	0.508
Subcontract	Tannin & Lignin	0.1	mg/L		1.0	1.0

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

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Report Number: 1988079
Date Submitted: 2022-10-14
Date Reported: 2022-10-21
Project: 220996
COC #: 901489

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 431422 **Analysis/Extraction Date** 2022-10-16 **Analyst** L V **Method** AMBCOLM1			
Escherichia Coli			
Heterotrophic Plate Count			
Total Coliforms			
Run No 431424 **Analysis/Extraction Date** 2022-10-15 **Analyst** CK **Method** C SM2130B			
Turbidity	<0.1 NTU	100	70-130
Run No 431472 **Analysis/Extraction Date** 2022-10-17 **Analyst** SD **Method** EPA 200.8			
Iron	<0.03 mg/L	107	80-120
Manganese	<0.01 mg/L	104	80-120
Run No 431474 **Analysis/Extraction Date** 2022-10-17 **Analyst** ACG **Method** C SM4500-S2-D			
S2-	<0.01 mg/L	101	80-120
Run No 431497 **Analysis/Extraction Date** 2022-10-18 **Analyst** AaN **Method** SM 4110			
N-NO2	<0.10 mg/L	98	90-110
N-NO3	<0.10 mg/L	98	90-110

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Date Reported: 2022-10-21
Project: 220996
COC #: 901489

QC Summary

Analyte	Blank	QC % Rec	QC Limits
SO4	<1 mg/L	95	90-110
Run No 431504 **Analysis/Extraction Date** 2022-10-18 **Analyst** ACG **Method** C SM2120C			
Colour (True)	<2 TCU	100	90-110
Run No 431520 **Analysis/Extraction Date** 2022-10-18 **Analyst** Z S **Method** M SM3120B-3500C			
Calcium	<1 mg/L	104	90-110
Potassium	<1 mg/L	110	87-113
Magnesium	<1 mg/L	102	76-124
Sodium	<1 mg/L	107	82-118
Run No 431556 **Analysis/Extraction Date** 2022-10-19 **Analyst** AaN **Method** SM 4110			
Chloride	<5 mg/L		90-110
Run No 431558 **Analysis/Extraction Date** 2022-10-18 **Analyst** ACG **Method** SM2320,2510,4500H/F			
Alkalinity (CaCO3)	<5 mg/L	98	90-110
Conductivity	<5 uS/cm	100	90-110
F	<0.10 mg/L	104	90-110
pH		99	90-110

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

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QC Summary

Analyte	Blank	QC % Rec	QC Limits
Run No 431595 **Analysis/Extraction Date** 2022-10-19 **Analyst** SKH **Method** EPA 350.1			
N-NH3	<0.020 mg/L	111	80-120
Run No 431627 **Analysis/Extraction Date** 2022-10-18 **Analyst** ACG **Method** C SM5310C			
DOC	<0.5 mg/L	102	84-116
Run No 431628 **Analysis/Extraction Date** 2022-10-19 **Analyst** ML **Method** EPA 351.2			
Total Kjeldahl Nitrogen	<0.100 mg/L	110	70-130
Run No 431652 **Analysis/Extraction Date** 2022-10-20 **Analyst** AET **Method** C SM2340B			
Hardness as CaCO3			
Ion Balance			
TDS (COND - CALC)			
Run No 431683 **Analysis/Extraction Date** 2022-10-19 **Analyst** AET **Method** SUBCONTRACT-A			
Tannin & Lignin	<0.10 mg/L	102	
Run No 431738 **Analysis/Extraction Date** 2022-10-21 **Analyst** IP **Method** SM5530D/EPA420.2			

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

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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#:
Invoice to: Kollaard Associates Inc.

Report Number: 1988079
Date Submitted: 2022-10-14
Date Reported: 2022-10-21
Project: 220996
COC #: 901489

QC Summary

Analyte	Blank	QC % Rec	QC Limits
Phenols	<0.001 mg/L	104	50-120

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

Ryznar Stability Index

RSI = 2(pH_s) - pH

RSI << 6 → the scale tendency increases as the index decreases
RSI >> 7 → the calcium carbonate formation probably does not lead to a protective corrosion inhibitor film
RSI >> 8 → mild steel corrosion becomes an increasing problem

Langelier Saturation Index

LSI = pH - pH_s

If LSI is negative → no potential to scale, the water will dissolve $CaCO_3$
If LSI is positive → scale can form and $CaCO_3$ precipitation may occur
If LSI is close to zero → borderline scale potential, water quality or temperature change or evaporation could change the index

where pH measured from sample
pH_s = pH at saturation in calcite or calcium carbonate

$$pH_s = (9.3 + A + B) - (C + D)$$

$$A = \frac{\log_{10}[TDS] - 1}{10}$$

$$B = -13.12 \times \log_{10}(°C + 273) + 34.55$$

$$C = \log_{10}[Ca^{2+} as CaCO_3] - 0.4$$

$$D = \log_{10}[alkalinity as CaCO_3]$$

	TW1-3hr	TW1-6hr
pH	7.45	7.55
hardness [mg/l as $CaCo_3$]	417	420
Alkalinity [mg/l as $CaCo_3$]	304	307
total dissolved solids [mg/l]	607	610
temperature (°C)	11.3	12.1
→→ RSI	6.81	6.67
→→ LSI	0.32	0.44