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REPORT ON

HYDROGEOLOGICAL AND TERRAIN STUDY STUDY CHANGE OF USE 3250 OLD GEORGE STREET OSGOODE WARD CITY OF OTTAWA, ONTARIO

Submitted to:

Suzanne Sinclair 3250 Old George Street Ottawa, Ontario K0A 2W0

DATE November 15, 2018

DISTRIBUTION

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(613) 860-0923

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FAX: (613) 258-0475

Kollaard Associates Engineers 210 Prescott Street, Unit 1 P.O. Box 189 Kemptville, Ontario K0G 1J0

November 15, 2018

Suzanne Sinclair 3250 Old George Street Ottawa, Ontario K0A 2W0

RE: HYDROGEOLOGICAL AND TERRAIN STUDY CHANGE OF USE 3250 OLD GEORGE STREET OSGOODE WARD CITY OF OTTAWA, ONTARIO

Kollaard Associates Inc. was retained by Suzanne Sinclair to undertake a hydrogeological and terrain study for a proposed change of use for an existing building located at 3250 Old George Street in the Village of Osgoode, Ontario (Key Plan, Figure 1).

It is understood that the existing building was formerly used as a church (Osgoode Bible Chapel). It is proposed to change the use of the existing building to a residential use and change the zoning from institutional to residential.

The property occupies an area of about 918 square metres (0.23 acres). The proposed use is for a three bedroom single family dwelling. A drilled well was constructed to service the proposed dwelling and to replace a previous sand point well which has been appropriately abandoned. It is understood that a new sewage system is to be constructed to service the dwelling. The attached Proposed Septic Design Plan, prepared by Kollaard Associates Inc., indicates the approximate location of the existing dwelling, existing well and sewage system and the proposed replacement sewage system location.

Kollaard Associates Inc. carried out a six hour pumping test on the existing well at the site and obtained two water samples that were tested for the subdivision list of parameters to confirm that there was sufficient water of acceptable quality to service the residential dwelling. 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.

HYDROGEOLOGICAL STUDY

Background

The *Township of Osgoode Well Construction Requirements,* Trow Associates, 1997, indicates minimum well construction requirements for wells within the Osgoode Ward of the City of Ottawa and is still applicable to date for wells. The requirements indicate that where there is at least 10 feet of overburden, a drilled well shall be cased and grouted using neat cement for at least 20 feet from surface or 5 feet into bedrock, whichever is greater.

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 Champlain sea sediments consisting of nearshore deposits of fine- to medium- grained sand.

Two test pits were put down at the site on June 28, 2018. The approximate locations of the test pits are shown on the attached site plan. The test pits encountered topsoil overlying red brown to grey sand. Water intrusion was observed at between 1.4 to 1.5 metres below existing ground surface. The test pits were terminated within the sand layer at depths of 1.5 to 1.6 metres below existing ground surface. The test pit logs are provided as Table 2.

A well record for the drilled bedrock well that was constructed to service the proposed dwelling at 3250 Old George Road and the Certificate of Well Compliance are provided herein (Attachment A). The well record indicates that the well was drilled in 1988 by Air Rock Drilling Co. Ltd. of Richmond, Ontario. The well was drilled to a depth of about 67 metres into a limestone and sandstone bedrock aquifer. The overburden indicated to consist of about 1.8 metres of silty clay overlying some 11.9 metres of sand and gravel. Bedrock was encountered at a depth of 13.7 metres below existing ground surface. The well was cased and grouted to a depth of 15.2 metres below existing ground surface. The well construction complies with the Township of Osgoode requirements.

Area Well Records

A review of five area well records was carried out. Four of the wells were indicated to be between about 27 to 49 metres in depth, obtaining water from a limestone aquifer. One well is indicated to be drilled to a depth of 61 metres, obtaining water from the limestone and underlying sandstone aquifer. Test pumping rates indicated on the well records were between 8 to 20 igpm (36 to 91 litres/minute) and well production rates were typically 5 to 20 igpm (23 to 91 litres/minute).

Water Quantity

A pumping test was carried out on June 21, 2018, at the recently constructed well on the subject site that will service the proposed dwelling at 3250 Old George Street (TW1).

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 three and 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

.2

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.

Water was pumped from the well for about 360 minutes at a pumping rate of about 33.8 litres per minute. Over the course of the pumping test, the water level in the well dropped some 7.2 metres. At the end of pumping, over 98 percent recovery of the total drawdown in the static water level created during pumping was measured manually after about 20 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 25 m²/day. Based on the recovery data the transmissivity of the aquifer is estimated to be about 18 m²/day.

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 33.8 litres per minute (7.4 lgpm). During the course of the six hour pumping period less than 20 percent of the available drawdown in the test well was utilized.

The expected water demand for the site was calculated using the total expected residential occupancy. It is understood that the proposed dwelling at the site will contain three bedrooms (obtained from Sewage Design information). THE MECP indicates that the number of occupants is the number of bedrooms plus one, in this case four occupants. The peak water demand (obtained from MECP D-5-5) is usually taken as 3.75 litres/person/minute, which is 15 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 well above the minimum test rate for a three bedroom home.

It is considered that sufficient available drawdown exists at the well for sustained pumping at 33.8 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 three and 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, iron and turbidity. Total dissolved solids were elevated after the three hour sample but were within the aesthetic objective of the ODWSOG after six hours.

The water is considered to be hard by water treatment standards. Water with hardness above 80 to 100 milligrams per litre as $CaCO_3$ is often softened for domestic use. The hardness at the well is 289 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 iron level Iron was measured at levels of 0.34 to 0.38 mg/l, compared to the aesthetic objective of 0.3 mg/l. Manganese was present at levels of between 0.02 to 0.03 mg/l in the water samples compared to the aesthetic limit of 0.05 mg/l. Excessive iron and manganese 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. Iron and manganese can be effectively removed using conventional ion exchange water softeners.

The lab based turbidity measurements for the water samples obtained after three and six hours of pumping were 14.9 NTU and 11.0 NTU, respectively. Field turbidity was measured during the pumping test at levels of >5.0 NTU but had decreased to about 3.5 NTU by the end of the pumping test. At the start of the pumping test, the water was observed to be visibly cloudy and it cleared with pumping. The cloudiness is considered to be due to well development as the well was newly constructed at the time of the pumping test. There were no bacteria present in either of the water samples and the field turbidity was below 5 NTU, which is considered acceptable for groundwater at the point of consumption.

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 above noted "predictive assessment" is typically done prior to development of the lot. In this case, there is an existing development at the site (former church) which it is understood was previously serviced by a sewage system.

Based on the information from the test pits and the well record for the site, there is sufficient overburden at the site to provide natural attenuation of the sewage effluent and to support that the site is not hydrogeologically sensitive.

The MECP D-5-4 document allows a monitoring-based assessment where there is existing development nearby. Provided that the existing development has been in place for a sufficient period of time and the proposed sewage system is in a similar hydrogeological environment, the information on existing groundwater quality could be used to demonstrate the combined effect of all available attenuative processes.

The MECP D-5-4 document also states the following.

The Ministry recognises that groundwater, infiltrating precipitation and sewage effluent will not be completely mixed at the property boundary. It is also recognised that processes such as absorption, denitrification, filtration and biodegradation may attenuate contaminants as the effluent passes down through the unsaturated zone and moves into the saturated zone.

The existing lot occupies an area of about 917 square metres (0.23 acres). The existing surrounding residential lots are all of similar size ranging from 917 to 1050 square metres (0.23 acres to 0.26 acres) for adjacent lots. The site had been previously serviced by a sewage system for the former church. While no information regarding the sewage flows generated by the former church could be reviewed, the existing residential development in the area is on lot sizes that are similar to the proposed use of this site.

All of the adjacent properties are serviced with drilled bedrock wells, similar to the subject site. The wells are indicated to be in the front yards for the two adjacent properties and the subject site. The water quality from the water samples obtained from the well had no bacterial issues and the nitrates and nitrites levels were negligible (< 0.10 mg/l N-NO_3). This indicates that there are no significant impacts on the water supply from the existing development in the area. The reasonable use concept considers that nitrates levels of less than 2.5 mg/l are considered to be within an acceptable amount of impact. The proposed use of this site is unlikely to increase nitrate levels in the aquifer significantly, based on the existing background levels of nitrates which are well within the reasonable use limits.

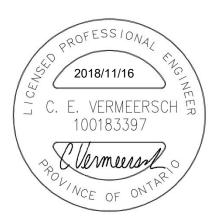
The sewage system that is proposed is in a similar location to the previous leaching bed in the rear yard of the property. Down gradient of the sewage system (to the west) is the Osgoode Link Pathway (a former rail bed). Consequently, there are no down gradient wells within at least 70 metres or more of the proposed sewage system location.

Based on the above noted information, it is considered that there is very little potential for sewage impacts from the change of use of the subject property.

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 Table 2 Figure 1	Summary of Hourly Field Water Quality Test Pit Logs Key Plan
	Figure 2	Sewage Design Plan, prepared by Kollaard Associates Inc.
	Attachment A	TW1-Well Record and Certificate of Well Compliance for Site and Area Well Records
	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	Temp.	pН	Turbidity	Total Dissolved Solids	Conductivity	Free chlorine (ppm)
(min)	(⁰ C)		(NTU)	(ppm)	(µS)	
60	10.8	8.1	-	366	732	-
120	11.0	7.8	-	363	723	-
180	11.0	7.9	>5.0	363	727	0.0
240	11.0	7.9	-	365	727	-
300	11.0	7.9	-	366	733	-
360	11.0	7.8	3.5	368	733	0.0



TABLE II

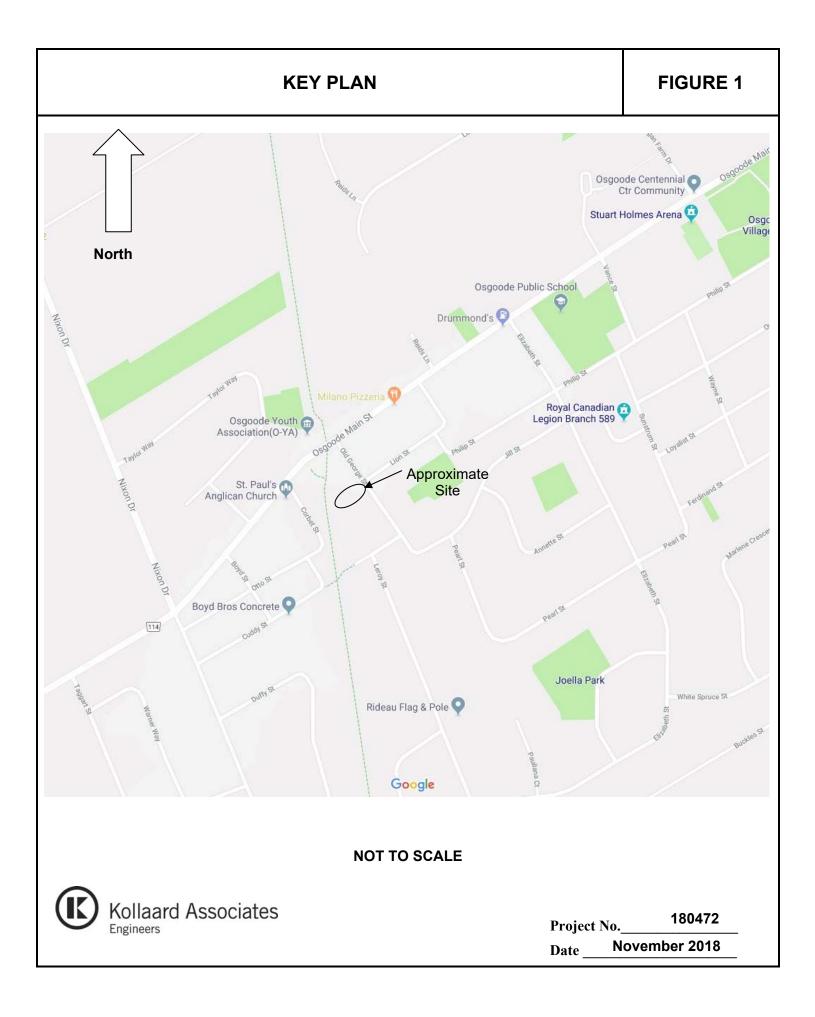
TEST PIT LOGS 3250 OLD GEORGE STREET OSGOODE WARD CITY OF OTTAWA, ONTARIO

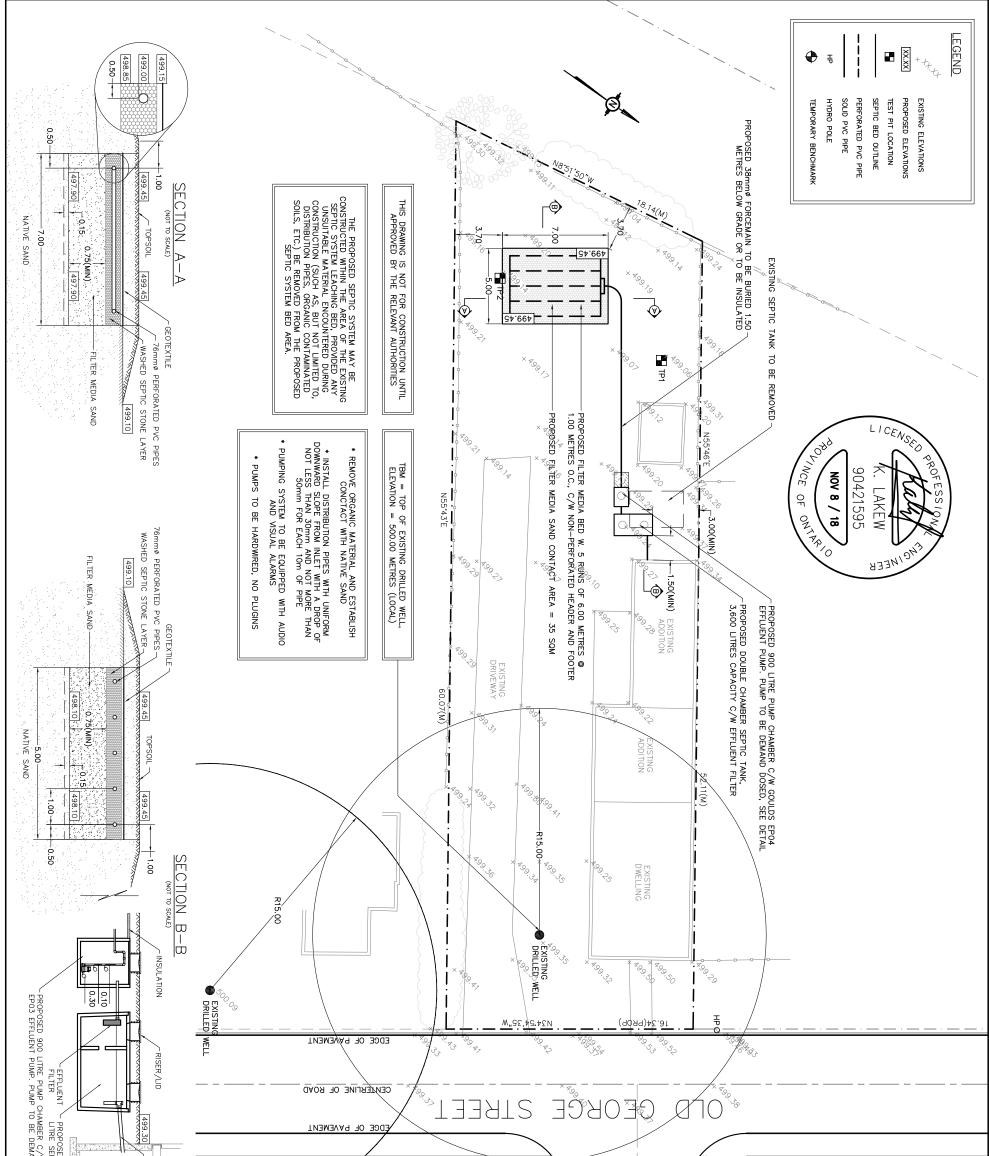
TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP1	0.00 – 0.25	TOPSOIL
	0.25 – 0.70	Red brown fine to medium SAND
	0.70 – 1.40	Yellow brown fine to medium SAND
	1.40 – 1.60	Grey fine to medium SAND
	1.60	End of test pit

Water observed at about 1.5 metres below existing ground surface, June 28, 2018.

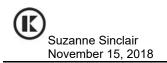
TP2	0.00 - 0.20	TOPSOIL
	0.20 – 1.20	Red brown fine to medium SAND
	1.20 – 1.50	Grey brown fine to medium SAND
	1.50	End of test pit

Water observed at about 1.4 metres below existing ground surface, June 28, 2018.





© COPYRIGHT 2018 KOLLAARD ASSOCIATES INCORPORATED	SEPTIC TANK SEPTIC TANK (/W GOULDS		100mmø ABS PIPE @					
KULLAARU FILE NUMBER: 180		DESIGNED BY: DV	<i>LOCATION:</i> 3250 OLD GE R.PLAN 393 LOT 28, OSGO CITY OF OTT.	<i>project:</i> Proposed septic	<i>client:</i> MS. SUZANNE	Engineers 210 PRESCOTT STREET PO BOX 189 KEMPTVILLE ONTARIO KOG 1J0	REV. NAME DATE	 1. All dimensions and elevations are in acade drawing: not a legal survey, a site plan and is for septic purposes of TBM = Top of existing drilled well, elevation is drawing is not for construction is the served system envelope (leaching equipment other than the material or in elevation rate of any imported surgiment authorities. 6. The sewage system envelope (leaching is and read exposed subgrade. No wee be allowed in elevation rate of any imported sent in the sewage system envelope. 7. Topsoil routing drawing acount the drawing connot be a material or in elevation for any material or material, with gradation conforming to 0. 8. Percolation rate of any imported sent the drawing area and exposed subgrade. No wee be allowed in elevation bed area. 8. Percolation rate of any imported sent the other than the setting and the detection of the level in the setting and the detect of any imported sent the to BC. 9. Stone layer to be washed septic stor material, with gradation conforming to 0. 9. Stone layer to be installed in accepted with 75 to 100 mm permises of the leaching bed area. 9. Stone layer to be installed in acception the addition or to be connect system: Water softener; swimming poor system to be installed in acception or solution or over leaching bed; 13. Septic tank to meet criteria describe the describe the describe the setule of a secoleta in acception of the secoleta in acception of the secoleta in acception of the secoleta is the describe the setule of a structure = 1.5m 17. Minimum clearance from distribution * structure = 5.7m 18. Minimum clearance from distribution * property line = 3.7m 19. Minimum clearance from distribution * property line = 3.7m
ек: 180472	:250	DATE: NOV 8. 2018	LD GEORGE STREET 393, SUBLOT 18 28, CONC. 1, OSGOODE, OTTAWA, ONTARIO	TIC DESIGN PLAN	NE SINCLAIR	d Associates (613) 860–0923 FAX (613) 258–0475 www.kollaard.ca info@kollaard.ca	DESCRIPTION	 180472-1 CONSTRUCTION NOTES: All dimensions and elevations are in metres. Do not scale drawing. This drawing is not a legal survey, a utility plan or a site plan and is for spitch purposes only. This drawing cannot be accepted as acknowledging all of the utilities, and it will be the responsibility of the depart of the construction of the leaching bed area. This drawing is not for the construction for the tacking the #200 (0.080 mm) size. Stone layer to be wished septic stone, free of fine material, with gradation conforming to OBC Table \$27.3.3. Septic tank to meet criteria described in the Septic system backwash; sump pump discharge. All of manges to this design must be verified and approved by Kollaard Associates incorporated. Minimum clearance from distribution piping to: structure = 1.5m conditied well = 15.7m drilled well = 15.7m



ATTACHMENT A

MOE WELL RECORD AND CERTIFICATE OF WELL COMPLIANCE FOR TEST WELL AND MOE AREA WELL RECORDS

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CERTIFICATE OF WELL COMPLIANCE

I, **Ken Desculaters** DO HEREBY CERTIFY that I am licensed to drill wells in the Province of Ontario, and that I have supervised the drilling of a well on the

propertivel JAMIE SINCLAIR locatedat # 3250 Old George Street, Osgonde

Lot/Plan No.) in the City of Ottawa (Geographical Township of Osgoode).

CERTIFY FURTHER that, I am aware of the well drilling requirements, the guidelines, recommendations and regulations of the Ministry of the Environment governing well installations in the Province of Ontario, and the standards specified in any subdivision agreement and hydrogeological report applicable to this site and City Standards.

AND DO HEREBY CERTIFY THAT the said well has been drilled, eased, grouted (cement or bentonite) as applicable and constructed in strict conformity with the standards required.

TH day of JUNE Signed this . Kenny DZ Air Rock Drilling Co.L.

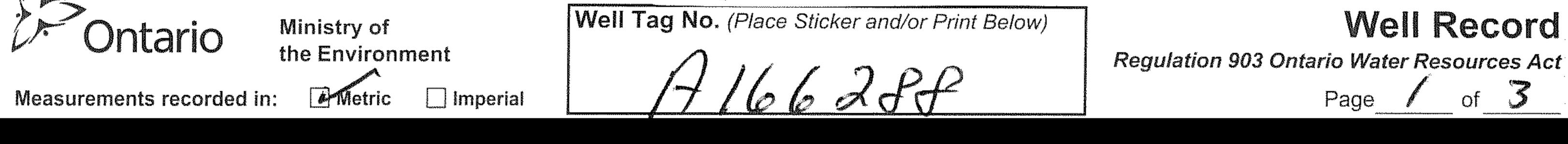
The Engineer on behalf of the landowner set out above Certifies that he/she has inspected the well and it was constructed in accordance with the specifications in O.Reg.903, this report and the Hydrogeological Report with regards to casing length and grouting requirements. Twp. of Osgoode Requirements, 1998

SIGNE JOHA day of moin Engineer

Shaping our future together Ensemble, formons notre avenir Kollaard Associates Engineers P.O. Box 189 210 Prescott Street, Unit 1 Kemptville, Ontario K0G 1J0

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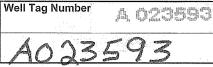


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Depth Set at (<i>n</i> From T	n/ft) Type of Sealant Us (Material and Type)		Volume Placed (m³/ft³)	After test of well yield, water was: Clear and sand free Other, specify	Time Water L (<i>min</i>) (<i>m/f</i>	evel Time	Water Level (<i>m/ft</i>)
U C;	Ve Cement	bend	ILUKS.	If pumping discontinued, give reason:	Static Level S. 3	?9	18.61
!!		·······		Pump intake set at (<i>m/ft</i>)	1 10.2	291	12.55
				$\frac{30.30}{30.30}$	2 11. 2	P 2 1	0.76
Method o	of Construction	Well Use		Pumping rate (I/min / GPM)	3 12,1	2 3	7.64

45:00 Cable Tool Diamond Public 12.7 4 Commercial Not used Duration of pumping Domestic Rotary (Conventional) Municipal Dewatering hrs + OU min Rotary (Reverse) AIK Driving 5 13.2 5 Livestock Test Hole Monitoring Boring Digging Final water level end of pumping (m/ft) Irrigation Cooling & Air Conditioning 14.60 R.61 10 10 Air percussion ___ Industrial] Other, *specify* Other, specify 15 15 Ø. If flowing give rate (I/min / GPM) 15.10 **Construction Record - Casing** Status of Well 8.39 20 20 S 38 Inside Water Supply **Open Hole OR Material** Depth (*m/ft*) Recommended pump depth (m/ft) Wall Diameter (Galvanized, Fibreglass, Thickness Replacement Well R. 39 То 25 From 25 (cm/in) Concrete, Plastic, Steel) (cm/in) Test Hole Recommended pump rate 25.40 Recharge Well 30 F.YP 15.59 R.39 30 (I/min / GPM) **Dewatering Well** 40 40 Observation and/or 6 Well production (I/min / GPM) Monitoring Hole 20:00 15.55 Steel 0.48 0.60 15.15 15.61 R 39 50 50 Alteration Disinfected? (Construction) R39 60 05.61 60 Yes No Abandoned, Insufficient Supply **Construction Record - Screen** Map of Well Location Abandoned, Poor Outside Please provide a map below following instructions on the back. Depth (*m/ft*) Water Quality Material Diameter Slot No. (Plastic, Galvanized, Steel) Abandoned, other, From To (cm/in) specify Other, specify Rue Oxtors x (Water Details **Hole Diameter** Water found at Depth Kind of Water: Fresh Depth (*m/ft*) Untested Diameter From (cm/in) 17.57 (m/ft) Gas Other, specify Selfer То Water found at Depth Kind of Water: Fresh Untested (m/ft) Gas Other, specify Water found at Depth Kind of Water: Fresh Untested Other, specify (*m/ft*) Gas Well Contractor and Well Technician Information Ruc. Pu **Business Name of Well Contractor** Well Contractor's Licence No. u elay+ JAN-WATER-Well- Dulling Iness Address (Street Number/Name) Muniçipality Comments: 163-Route 200 wrs Ow Province Postal Code Business E-mail Address KOM3CO OW Well owner's **Date Package Delivered** Ministry Use Only information Bus.Telephone No. (inc. area code) Name of Well Technician (Last Name, First Name) Audit No.Z 190096 package 140609 6 delivered esnorens Date Work Completed Technician's Licence No. Signature of Technician and/or Contractor Date Submitted Yes 102014 JUL 20140602 6609 8014 No Com © Queen's Printer for Ontario, 2007 0506E (2007/12) Ministry's Copy

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Well Record **Regulation 903 Ontario Water Resources Act**

page ____ of _

Cette formule est disponible en français

Instructions for Completing Form

Or

X

0506E (09/03)

- 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. 0
- 0 Please print clearly in blue or black ink only.

Ministry Use Only

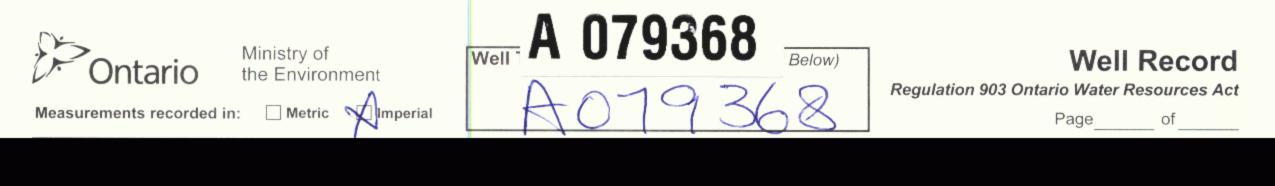
Address of Well Location (County	6	i provinski stali i sta	ownship	GOOD	E Lot	Forz	Concession	1
RR#/Street Number/Name	Adv =1		City/Town/Vi	illage GOODE	Site/Comp	artment/[Block/Tract et	ic.
GPS Reading NAD Zor	e Easting	Northing	Unit Make/M	lodel Mode		differentiate	ed 📉 Aver	raged
8 3 8 3 Log of Overburden and Be		Northing 4998883	1 Mage	llan	Diffe	erentiated,		
General Colour Most common		ther Materials		Genera	I Description		Depth	Metres
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GREY CLA	\checkmark ,			thick	1		5.48	7.31
GREY Clar		NES		Packe			7.31 14.32	14.32
GREY Lim	estone	**	N	VED H	FARD	m ⁺	14:22	24.38
15.54 N	neters of	15.87 cr	n ca	sing				
1 Heav	Y DRIVE S		Iwe	IL Cal	ρ			
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	15.87X Steel Fil	Casing	0	15.08	Pump intake set at - (metres) 2	1 8	183 1	12.97
		Net0*	Corr	12102	(litres/min) 36.40			
Water Record Water found at Metres / Kind of Water	Galvanized				Duration of pumping hrs + min		.57 2	10.92
Fresh X Sulphur	Steel Fil	-			Final water level end	3 9	.80 3	9.82
Gas Salty Minerals	Galvanized				of pumping metres Recommended pump	4 /4	0.18 4	9.24
m Fresh Suiphur	Steel Fil Plastic Co				type. Shallow Deep Recommended pump			San San S
Gas Salty Minerals	Galvanized				depth. 21.35 metres		0.14 5	8.71
m Fresh Sulphur Gas Salty Minerals	Quitaida	Screen		-	Recommended pump rate. (litres/min)	10	1.2.7 10	7.56
Other:	Outside diam Steel Fil				(litres/min) If flowing give rate -		1.58 15 .73 20	7.34
After test of well yield, water was	Galvanized				(litres/min)	25	25 26 30	7.23
Other, specify		No Casing or Sc	reen		ued, give reason.	40	2.06 40	7.16
Chlorinated 💢 Yes 🗌 No	15.55X Open hole		15.08	24.38		50	3 • 3 (2) 50	7.16
Plugging and Se	aling Record 🛛 🕅	5 · · · · · · · · · · · · · · · · · · ·	Abandonment		Location c			
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	al 🗌 Pub		Other	÷				2-00
Stock Commer		used — ling & air conditioning		Audit No.	DA1ED Dat	e Well Co	mpleted	1414 DD
Water Supply	Final Status of Well	nished	doned, (Other)	la la	24159	e Delivere	2005	69
Observation well Abandoned,	insufficient supply	vatering		Was the well ow package delivered	nor o imornadori			MM DD
Test Hole Abandoned, Well Cont	poor quality Rep tractor/Technician Info	a de la presidencia de la compañía d			Ministry Use			
B. Well Contractor E W	ellDRilling	Well Contractor's	Licence No.	Data Source	Cor	ntractor	455	
Business Address (street hame, numb	er, city etc.)	5-1 9-1 -	SED	Date Received		e of Inspe	ction YYYY	MM DD
ame of Well Technician (last name, fi	rstrigeme)	Well Technician's	Licence No.	Remarks	JUL_1_9_2007 Wei	II Record	Number	
	1 - v	Date Submitted						
i Bour IV	loore	ఎంక		And the second s				

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

Image: Second model	🗑 Onta	ario Ministry of the Environment		Th	e Ontario Wate WATER WI	r Resources A ELL RECOR
Contraction Construction Co			11 1	1532730	• _ '_ <u> </u>	
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Barend colour Most common matched Other matched Other matched JBArnn +1/1/ - </td <td>21</td> <td>Ч <u>1</u> м 10 12</td> <td>Northing</td> <td></td> <td></td> <td></td>	21	Ч <u>1</u> м 10 12	Northing			
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33 Image: Anti-ER RECORD 34 Form For						
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Static level Indicate promping Water levels during 1 Pumping 2 Ffecovery 192 192 10 <t< td=""><td>71 1 Pump 2</td><td></td><td>Duration of pumping 15-16 17-18 Mins Hours Mins</td><td></td><td></td><td>m road and lot line.</td></t<>	71 1 Pump 2		Duration of pumping 15-16 17-18 Mins Hours Mins			m road and lot line.
It flowing give rate feet // feet // feet // feet If flowing give rate 38-11 Pump intake set at Water at end of test 10 Recommended pump tog GPM feet Clear Clear GPM Percommended 0-10 GPM Recommended 64-49 95-33 90-50 GPM Anandoned, insufficient supply 90-10 GPM If Materia 90-20 GPM Anandoned, insufficient supply 90-10 Replacement well 90-33 Conservation well 90-20 Anandoned, insufficient supply 90-10 Replacement well 1 Clear * Anandoned, insufficient supply 90-10 Replacement well 75-75 1 Clear * Conting 90-10 Replacement well 75-75 1 Clear (innormodia) 90-10 Not use 90-10 75-75 75-75 1 Clear (innormodia) 90-10 100-10 90-10 90-10 75-75 1 Clear (innormodia) 90-10 10-10 10-10 10-10 10-10		and of pumping Water levels during 1				
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Image: Nalive Decommended Decommended Decommended Durp ratio 9 Shallow 200ep 90 feet 5 gPM 9053 4 Abandoned, insufficient supply 5 Abandoned, insufficient supply 9 Unfinished 1 Water supply 5 Abandoned, loor quality 9 Unfinished 9 Not use 1 Contractor 5 0 Dewatering 9 Not use 10 Other 10 0	If flowing give r	GPM feet	Clear Cloudy	1 1		
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3 Test hole 7 Abandoned (Other) 4 Recharge well 8 Dewatering WATER USE 5556 9 Not use 1 Domestic 6 Commercial 9 Not use 2 Stock 6 Municipal 10 Other 0 3 Irrigation 7 Public supply 0 Other 0 4 Industrial 8 Cooling & air conditioning 9 Driving 0 1 Cable tool 5 Air percussion 9 Driving 0 Digging 3 Rotary (conversional) 5 Air percussion 9 Driving 0 Digging 3 Rotary (conversional) 5 Diamond 10 Digging 0 Diagond 0 240280 Name of Well Contractor Well Contractor's Licence No 14 14 14 4 APR 2 4 2002 Address A Dback A A A A A APR 2 4 2002 Inspector	¹ Water sup ² Observati	5 Abandoned, insufficient sup ion well 6 Abandoned, poor quality		12	す	
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METHOD OF CONSTRUCTION 57 1 Cable tool 2 Rotary (conventional) 3 Rotary (reverse) 4 Driving 10 Digging 11 Other 4 Driving 10 Digging 11 Other 4 Driving 10 Digging 11 Other 4 Driving 10 Digging 11 Other 4 Data 5 Star (air) 5 Star (air)	2 Stock 3 Irrigation	6 🔲 Municipal 7 🗋 Public supply	10 🗌 Other	Ment	4	
1 Cable tool 5 Air percussion 9 Driving 2 Rotary (conventional) 6 Boring 10 Digging 3 Rotary (reverse) 7 Diamond 11 Other 240280 Name of Well Contractor 8 Jetting 9 Diamond 11 Other 240280 Name of Well Contractor 4 14	METHOD OF				١	
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Address & A b at or compared by the source of inspection inspector inspector					- 11-11-1	240280
St Albertone g	Name of Well Contr	^ .		Data 58 Contracto		
		1) July 1 gibts	17 17	Date of inspection		<u>MIN (4 2002</u>
Standarde of Tegrinician/Contractor	Name of Well Tech		Well Technician's Licence No.			
	Signature of Teachni	H me	Submission date	NIST	C	55.E52

Ministry of Environment and Energy		The	Ontario Water Re NATER WELL	sources Act RECORD
Print only in spaces provided. Mark correct box with a checkmark, where applicable.	<u>11</u> 1 2	529556	Municipality Con. 15 10 10 10 10 10 10 10 10 10 10	22 23 24
County or District	Township/Borough/City/Town/Mil	lage	Con block tract survey,	etc. Lot 25-27 28
	Address		Date completed	19-53 17 97
	35/5 Lion Northing	RC Elevation RC	Basin Code ii	day month year
	17 18 24 RBURDEN AND BEDROCK	MATERIALS (see instructi	<u>31</u> O NS)	47
General colour Most common material	Other materials	1	description	Depth - feet From To
Brown Sand		Packer)	0 15
GREY Sand		PackEI	>	15 18
GRET CLAY		Kunny	$(\mathcal{Q}_{X,n})$	18 26 01 59
GREY Clay & Ston	es	HARD	HARD	52 88
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	55' OF 64"	Casing		
	/ HEAVY D	RIVE Shoe		
	I WELL Ca	ρ		
3	Bags of C	ement		
	B.W	<u>.</u>		
31				
32 10 14 15 21 21 41 WATER RECORD 51	CASING & OPEN HOLE REC	CORD Sizes of Sizes of Sizes of Sizes of		31-38 Length 39.40
Water found Kind of water diam at - feet inches	Material thickness From	Jeptn - leet	in	ches teet Depth at top of screen 30
6 13 1 Fresh 3 Sulphur 14 6 14 14 1 Minerals	Steel ¹² i 88 O Galvanized Concrete			41-44 feet
	Open hole Plastic	3 88 61	PLUGGING & SEALIN	
20-23 1 C Fresh 3 C Sulphur 24 2 2 2 2 2 C C C C C C C C C C C C C	Steel ¹⁹ Galvanized Concrete	Depth set at	- feet Material and type (Cel	Abandonment
25-28 ; C Fresh 3 C Sulphur 29 5 C	Open hole Plastic	From 013	10 .	FGROUT
2 Gais 60 2 0	Galvanized Concrete	27-30 18-21	22-25	
Minerals	Open hole Plastic			
Pumping test method 10 Pumping rate 11-14 Du 71 I Pumping at 1 Pumping rate 1 Du	ration of pumping 15-16 Hours		CATION OF WELL	ad and lot line
Static level Water level end of pumping 25 Water levels during 1 KPu		In diagram below snow Indicate north by arrow		ad and lot line.
$40 30^{2.78} 40^{2.78}$	$\begin{array}{c} \text{60 minutes} \\ \text{40} \\ \text{feet} \end{array} \begin{array}{c} \text{60 minutes} \\ \text{40} \\ \text{feet} \end{array}$	mai et	IN Roll	20#114
	ater at end of test 42 Clear & Cloudy	Main St	. 192 OF 0560	ODED
A Recommended pump type	ecommended 46-49			Sopt
50-53	6 GPM			BORDENST
FINAL STATUS OF WELL 54 Water supply 5 Abandoned, insufficient supp			Hess)\$
Observation well Obse		i linit ch	180' 1	Antiact
WATER USE 55-56		S.		Phillip st.
Domestic 5 Commercial 2 Stock 6 Municipal 1 Irritation 7 Public supply	s 🗋 Not used	W N Pumped W With S	WELL FOR	RIES
4 🗌 Industrial 💦 🗋 Cooling & air conditioning		U with 51	hallow w	LJet
METHOD OF CONSTRUCTION 57	9 Driving	pump-	WELL FOR Mallow W water cree S Level 981	28
2 Actary (conventional) 6 Boring 3 Rotary (reverse) 7 Diamond 4 Rotary (air) 8 Jetting	16 Digging	Pumpino	s Level 981	76425
Name of Well Contractor	Well Contractor's Licence No.	Data 58 Contracct	07 59-62 Date rec	
B. MOORE WELL DRILLING	6455		155 AU	
Address Main 37. Box 436 OSGOC Name of Well Technician	Well Technician's Licence No.	5		
Name of Well Technician Bob MOORE Signature of Technician Sontractor	7-0517			
Signature of Technician Sontractor	Submission date day 24 mo 7 yr 97			0506 (07/94) Front Form 9
	-			SSOC (S7/34) FIGHL FOIL 8

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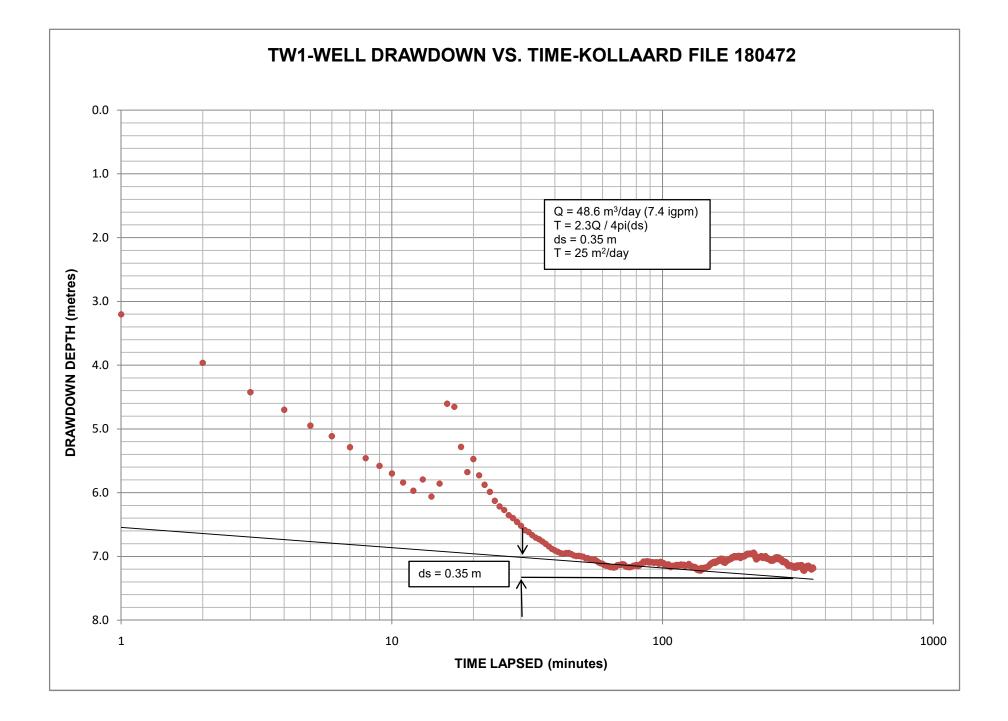


Address of Well Location (Street Number/Name)	CH Township	Lot	Concession
County/District/Municipality	City/Town/Village	JOAL de	Province Postal Code
UTM Coordinates Zone , Easting , Northing	Municipal Plan and Subl	ot Number	Ontario
NAD 8 3 845205 649990	0.3	LAN 393	SIL19
Overburden and Bedrock Materials/Abandonment Seal		e back of this form)	Death (and
General Colour Most Common Material	Other Materials	General Description	n Depth (mft) From Fo
and	0 1 1		0 25
and Gravel	Barlders		25 3512
Grayhinesto	re		3512 185
Grey Sord ST	ne		185 200
Annular Space		Posulte of W	ell Yield Testing
Depth Set at (<i>m/ft</i>) Type of Sealant Used	Volume Placed	After test of well yield, water was:	Draw Down Recovery
From To (Material and Type)		Other specify	TimeWater LevelTimeWater Level(min)(m/ft)(min)(m/ft)
491/2 391/2 Matteret SI	MIY 1.8	If pumping discontinued, give reason:	Static 27'2" 87'9"
3712 O perspites /u	rry 16.8		1871 1641
		Pump, intake set at (m/ft)	2 421711 2 541
		Pumping rate (I/min /GPM)	3/Q'/'' 3////''
Method of Construction Cable Tool Diamond Public	Well Use Commercial Not used		4 214" 4 4 1911
Rotary (Conventional)	Municipal Dewatering	Duration of pumping hrs + min	5 55 9 5 2/1
Rotary (Reverse) Driving Livestock Boring Digging Irrigation	Test Hole Monitoring	Final water level end of pumping (m/ft)	0.07 36
Air percussion		87190	1613 1003
Construction Record - Casing	Status of Well	If flowing give rate (I/min-/ GPM)	15 13' 15 75"
Inside Open Hole OR Material Wall Depth Diameter (Galvanized, Fibreglass, Thickness	m/ft) Water Supply	Recommended pump depth (m/ft)	20765 20
(<i>cm/in</i>) Concrete, Plastic, Steel) (<i>cm/in</i>) From	To Replacement Well	(12HP) (40'	25 3' 25
6" Stel .188" +2'	493 □ Recharge Well	Recommended pump rate (I/min / GPM)	30 9 5 30
6° Openhole 4912	Observation and/or	Well production (I/min GPM)	40 82'3" 40
	Monitoring Hole	Disinfected?	50 57 1 50
	(Construction)	Yes No	60 8719" 60
Construction Record - Screen	Insufficient Supply		/ell Location
Outside Material Diameter (Plastic, Galvanized, Steel) Slot No. From	To Water Quality	Please provide a map below following	
	specify	peando	Main Street
	Other, specify	037000	
Water Details	Hole Diameter		Lionstreet
Water found at Depth Kind of Water: Fresh Untested	Depth (m/ft) Diameter		Lionstreg
Water found at Depth Kind of Water: Fresh Untested	From To (cm/in)		
$53 (m_{TD})$ Gas Other, specify	0 000 6 116	80	
Water found at Depth Kind of Water: Fresh Untested		-	# 3254
Well Contractor and Well Technician	Information		old George
Business Name of Well Contractor	Well Contractor's Licence No.	- (5'	Diffect
Business Address (Street Number/Name)	Municipality	Comments:	1 50
RRdl	IctmonD		
Province Postal Code Business E-mail Addre	ess	Well engeries Data Data Data	
Bus.Telephone No. (inc. area code) Name of Well Technician (La	st Name, First Name)	Well owner's Date Package Delivered information package	Audit No.
6138382170 GRANN	MRYAN	delivered Date Work Completed	54003
Well Technician's Licence No. Signature of Technician and/or Con	tractor Date Submitted	No 2007	JUN 0 3 2009
0506E (12/2007)	Ministry's Copy		© Queen's Printer for Ontario, 20



ATTACHMENT B

PUMPING TEST DATA



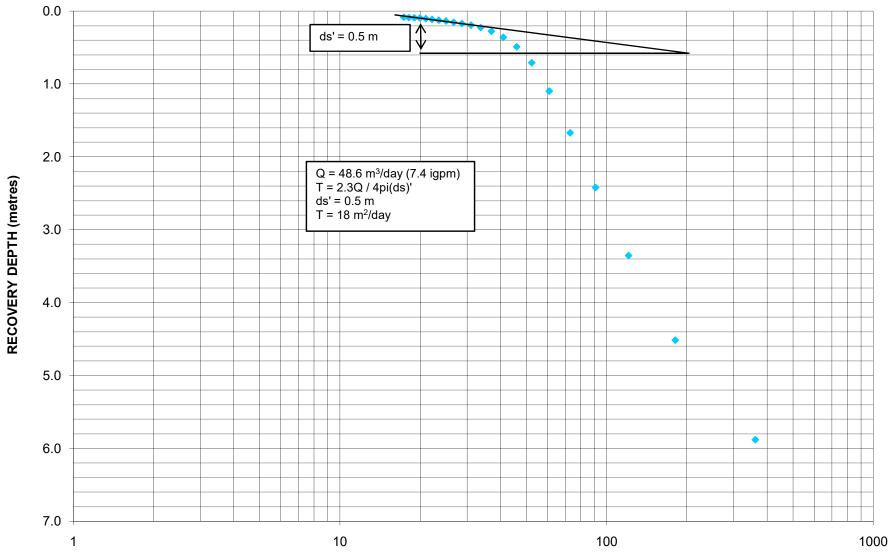
Kollaard File 180472	Pump Rate	33.8	litres/minu
DRAWDOWN DATA	TW-1		

(m) (m) (m) 0 319.38 11.041 -7.27 - 1 280.778 10.533 -10.473 3.20 2 280.324 10.259 -11.233 3.96 3 275.805 10.063 -11.694 4.42 4 273.092 9.965 -12.217 4.95 6 260.033 9.768 -12.849 5.53 7 267.345 9.768 -12.849 5.53 9 264.48 9.768 -12.849 5.53 10 263.02 9.768 -12.849 5.53 11 261.069 9.669 -13.34 5.97 13 260.66 9.669 -13.84 6.66 16 274.039 9.669 -11.84 4.60 17 273.551 9.571 -12.948 5.68 16 274.039 9.671 -13.24 6.60 17 273.53 9.571 -12.943	Time Lapsed	Abs Pres	Temp	Water Level	Drawdown
1 287.778 10.533 -10.733 3.20 2 280.324 10.259 -11.233 3.56 3 275.805 10.063 -11.694 4.42 4 273.092 9.565 -12.177 4.70 5 270.674 9.568 -12.237 4.45 6 269.033 9.768 -12.557 5.29 8 265.658 9.768 -12.809 5.70 11 261.909 9.768 -12.809 5.70 12 260.666 9.669 -13.324 5.67 13 251.743 9.669 -13.324 5.68 15 261.743 9.669 -13.324 5.67 15 261.743 9.671 -12.944 5.68 16 274.059 9.571 -12.977 5.73 19 263.023 9.571 -13.342 5.47 19 263.023 9.571 -13.52 5.23 10 <t< th=""><th>(minutes)</th><th></th><th>(°C)</th><th></th><th>(m)</th></t<>	(minutes)		(°C)		(m)
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77 248.974 9.472 -14.43 7.16 78 249.107 9.472 -14.416 7.15 79 249.107 9.472 -14.414 7.14 80 249.241 9.472 -14.403 7.13 81 249.054 9.472 -14.423 7.15 82 249.134 9.472 -14.423 7.15 82 249.134 9.472 -14.424 7.15 84 249.375 9.472 -14.389 7.12 84 249.455 9.472 -14.381 7.11 85 249.749 9.472 -14.381 7.11 86 249.642 9.472 -14.362 7.09 87 249.776 9.472 -14.362 7.09					
78 249.107 9.472 -14.416 7.15 79 249.134 9.472 -14.414 7.14 80 249.241 9.472 -14.403 7.13 81 249.054 9.472 -14.402 7.15 82 249.134 9.472 -14.412 7.15 82 249.134 9.472 -14.422 7.15 82 249.134 9.472 -14.314 7.14 83 249.375 9.472 -14.389 7.12 84 249.455 9.472 -14.381 7.11 85 249.749 9.472 -14.351 7.08 86 249.642 9.472 -14.362 7.09 87 249.776 9.472 -14.348 7.08					
79 249.134 9.472 -14.414 7.14 80 249.241 9.472 -14.403 7.13 81 249.054 9.472 -14.422 7.15 82 249.134 9.472 -14.424 7.14 83 249.375 9.472 -14.414 7.14 83 249.375 9.472 -14.389 7.12 84 249.455 9.472 -14.381 7.11 85 249.749 9.472 -14.351 7.08 86 249.642 9.472 -14.362 7.09 87 249.776 9.472 -14.362 7.09					
80 249.241 9.472 -14.403 7.13 81 249.054 9.472 -14.422 7.15 82 249.134 9.472 -14.422 7.15 82 249.375 9.472 -14.414 7.14 83 249.375 9.472 -14.389 7.12 84 249.455 9.472 -14.381 7.11 85 249.749 9.472 -14.351 7.08 86 249.642 9.472 -14.362 7.09 87 249.776 9.472 -14.348 7.08					
82 249.134 9.472 -14.414 7.14 83 249.375 9.472 -14.389 7.12 84 249.375 9.472 -14.381 7.11 85 249.749 9.472 -14.381 7.11 85 249.642 9.472 -14.351 7.08 86 249.642 9.472 -14.362 7.09 87 249.776 9.472 -14.348 7.08			9.472		7.13
83 249.375 9.472 -14.389 7.12 84 249.455 9.472 -14.381 7.11 85 249.749 9.472 -14.351 7.08 86 249.642 9.472 -14.362 7.09 87 249.776 9.472 -14.362 7.08					
84 249.455 9.472 -14.381 7.11 85 249.749 9.472 -14.351 7.08 86 249.642 9.472 -14.352 7.09 87 249.776 9.472 -14.348 7.08					
86 249.642 9.472 -14.362 7.09 87 249.776 9.472 -14.348 7.08	84	249.455	9.472	-14.381	7.11
87 249.776 9.472 -14.348 7.08					
00 249.802 9.472 -14.345 7.08	88	249.802	9.472	-14.345	7.08

89	249.615	9.472	-14.364	7.09
90	249.695	9.472	-14.356	7.09
91	249.642	9.472	-14.362	7.09
92	249,642	9.472	-14.362	7.09
93	249.562	9.472	-14.37	7.10
94	249.615	9.472	-14.364	7.09
95	249.642	9.472	-14.362	7.09
96	249.535	9.472	-14.373	7.10
97	249.401	9.472	-14.386	7.12
98	249.695	9.472	-14.356	7.09
99	249.669	9.472	-14.359	7.09
100	249.455	9.472	-14.381	7.11
101	249.508	9.472	-14.375	7.11
102	249.268	9.472	-14.4	7.13
103	249.268	9.472	-14.4	7.13
104	249.107	9.472	-14.416	7.15
105	249.321	9.472	-14.394	7.12
105	249.188	9.472	-14.408	7.12
100	248.894	9.472	-14.438	7.14
107	249.001	9.472	-14.438	
				7.16
109	249.081	9.472	-14.419	7.15
110	249.107	9.472	-14.416	7.15
111	249.054	9.472	-14.422	7.15
112	249.214	9.472	-14.405	7.14
113	249.241	9.472	-14.403	7.13
114	249.081	9.472	-14.419	7.15
115	249.214	9.472	-14.405	7.14
116	249.161	9.472	-14.411	7.14
117	249.295	9.472	-14.397	7.13
118	249.188	9.472	-14.408	7.14
119	249.214	9.472	-14.405	7.14
120	249.268	9.472	-14.4	7.13
121	249.027	9.472	-14.424	7.15
122	249.161	9.472	-14.411	7.14
122	249.188	9.472	-14.408	7.14
123	249.161	9.472	-14.411	7.14
			-14.389	
125	249.375	9.472	-14.389	7.12
126	249.134	9.472		7.14
127	249.134	9.472	-14.414	7.14
128	248.947	9.472	-14.433	7.16
129	248.947	9.472	-14.433	7.16
130	248.894	9.472	-14.438	7.17
131	248.947	9.472	-14.433	7.16
132	248.867	9.472	-14.441	7.17
133	248.813	9.472	-14.446	7.18
134	248.493	9.472	-14.479	7.21
135	248.573	9.472	-14.471	7.20
136	248.413	9.472	-14.487	7.22
137	248.439	9.472	-14.484	7.21
138	248.359	9.472	-14.493	7.22
139	248.76	9.472	-14.452	7.18
140	248.626	9.472	-14.465	7.20
141	248.6	9.472	-14.468	7.20
142	248.707	9.472	-14.457	7.19
143	248.813	9,472	-14.446	7.18
144	248.76	9.472	-14.452	7.18
145	248.84	9.472	-14.443	7.17
146	248.894	9.472	-14.438	7.17
140	248.974	9.472	-14.43	7.16
147	249.054	9.472	-14.422	7.15
148		9.472		
	249.241		-14.403	7.13
150	249.295	9.472	-14.397	7.13
151	249.455	9.472	-14.381	7.11
152	249.455	9.472	-14.381	7.11
153	249.589	9.472	-14.367	7.10
154	249.562	9.472	-14.37	7.10
155	249.722	9.472	-14.354	7.08
156	249.535	9.472	-14.373	7.10
157	249.642	9.472	-14.362	7.09
158	249.642	9.472	-14.362	7.09
159	249.802	9.472	-14.345	7.08
160	249.883	9.472	-14.337	7.07
161	249.963	9.472	-14.329	7.06
162	249.856	9.472	-14.34	7.07
163	249.963	9.472	-14.329	7.06
164	250.203	9.472	-14.305	7.04
165	249.936	9.472	-14.332	7.06
166	250.15	9.472	-14.31	7.04
167	250.177	9.472	-14.307	7.04
168	249.642	9.472	-14.362	7.09
169	249.722	9.472	-14.354	7.08
170	249.562	9.472	-14.37	7.10
170	249.722	9.472	-14.354	7.08
172	249.829	9.472	-14.343	7.07
172	249.856	9.472	-14.343	7.07
173	250.016	9.472	-14.324	7.05
174	249.963	9.472	-14.324	7.05
175	249.963	9.472	-14.329	7.05
176	250.043	9.472	-14.321	7.05
178	250.123	9.472	-14.313	7.04
179	250.203	9.472	-14.305	7.04
180	250.39	9.472	-14.285	7.02
181	250.283 250.497	9.472 9.472	-14.296 -14.275	7.03 7.01
182				
183	250.497	9.472	-14.275	7.01

				-
184	250.578	9.472	-14.266	7.00
185	250.417	9.472	-14.283	7.01
186	250.551	9.472	-14.269	7.00
187	250.578	9.472	-14.266	7.00
188	250.417	9.472	-14.283	7.01
189	250.524	9.472	-14.272	7.00
190	250.324	9.472	-14.277	7.01
190	250.631	9.472	-14.261	6.99
192	250.524	9.472	-14.272	7.00
193	250.578	9.472	-14.266	7.00
194	250.31	9.472	-14.294	7.02
195	250.417	9.472	-14.283	7.01
196	250.444	9.472	-14.28	7.01
197	250.604	9.472	-14.264	6.99
198	250.578	9.472	-14.266	7.00
199	250.551	9.472	-14.269	7.00
200	250.551	9.472	-14.269	7.00
201	250.578	9.472	-14.266	7.00
202	250.684	9.472	-14.255	6.99
203	250.791	9.472	-14.245	6.98
204	250.791	9.472	-14.245	6.98
205	250.925	9.472	-14.231	6.96
206	250.952	9.472	-14.228	6.96
207	250.898	9.472	-14.234	6.96
208	250.898	9.472	-14.234	6.96
200	250.952	9.472	-14.228	6.96
203	250.979	9.472	-14.225	6.96
211	250.925	9.472	-14.231	6.96
212	250.898	9.472	-14.234	6.96
213	250.952	9.472	-14.228	6.96
214	250.979	9.472	-14.225	6.96
215	251.032	9.472	-14.22	6.95
216	250.979	9.472	-14.225	6.96
217	251.139	9.472	-14.209	6.94
218	251.032	9.472	-14.22	6.95
219	250.845	9.472	-14.239	6.97
220	250.417	9.472	-14.283	7.01
221	250.364	9.472	-14.288	7.02
222	250.07	9.472	-14.318	7.05
223	250.337	9.472	-14.291	7.02
224	250.364	9.472	-14.288	7.02
225	250.364	9.472	-14.288	7.02
226	250.337	9.472	-14.291	7.02
227	250.417	9.472	-14.283	7.01
228	250.39	9.472	-14.285	7.02
229	250.444	9.472	-14.28	7.01
230	250.471	9.472	-14.277	7.01
231	250.578	9.472	-14.266	7.00
232	250.578	9.472	-14.266	7.00
232	250.497	9.472	-14.275	7.01
233	250.524	9.472	-14.273	7.00
235	250.324	9.472	-14.294	7.02
235	250.31	9.472	-14.275	7.02
				7.01
237	250.524	9.472	-14.272	
238	250.471	9.472	-14.277	7.01
239	250.524	9.472	-14.272	7.00
240	250.578	9.472	-14.266	7.00
241	250.39	9.472	-14.285	7.02
242	250.23	9.472	-14.302	7.03
243	250.283	9.472	-14.296	7.03
244	250.177	9.472	-14.307	7.04
245	250.257	9.472	-14.299	7.03
246	250.177	9.472	-14.307	7.04
247	250.123	9.472	-14.313	7.04
248	250.07	9.472	-14.318	7.05
249	250.07	9.472	-14.318	7.05
250	249.936	9.472	-14.332	7.06
251	249.963	9.472	-14.329	7.06
252	249.883	9.472	-14.337	7.07
253	250.07	9.472	-14.318	7.05
254	249.936	9.472	-14.332	7.06
255	249.883	9.472	-14.337	7.07
256	250.016	9.472	-14.324	7.05
257	250.016	9.472	-14.324	7.05
258	250.016	9.472	-14.324	7.05
259	250.123	9.472	-14.313	7.04
260	250.257	9.472	-14.299	7.03
261	250.364	9.472	-14.288	7.02
262	250.23	9.472	-14.302	7.03
263	250.39	9.472	-14.285	7.02
264	250.337	9.472	-14.291	7.02
265	250.417	9.472	-14.283	7.01
266	250.39	9.472	-14.285	7.02
267	250.096	9.472	-14.315	7.05
268	250.31	9.472	-14.294	7.02
269	250.364	9.472	-14.288	7.02
270	250.283	9.472	-14.296	7.03
271	250.257	9.472	-14.299	7.03
272	250.096	9.472	-14.315	7.05
273	250.15	9.472	-14.31	7.04
274	250.043	9.472	-14.321	7.05
275	250.07	9.472	-14.318	7.05
276	249.802	9.472	-14.345	7.08
277	249.883	9.472	-14.337	7.07
278	249.669	9.472	-14.359	7.09
	- '			-

279	249.749	9.472	-14.351	7.08
280	249.802	9.472	-14.345	7.08
281	249.749	9.472	-14.351	7.08
282	249.749	9.472	-14.351	7.08
283	249.722	9.472	-14.354	7.08
284	249.615	9.472	-14.364	7.09
285	249.695	9.472	-14.356	7.09
286	249.482	9.472	-14.378	7.11
287	249.482	9.472	-14.378	7.11
288		-		
288	249.508	9.472	-14.375	7.11
289	249.321	9.472	-14.394	7.12
290	249.188	9.472	-14.408	7.14
291	249.134	9.472	-14.414	7.14
292	249.081	9.472	-14.419	7.15
293	249.107	9.472	-14.416	7.15
294	249.081	9.472	-14.419	7.15
295	249.107	9.472	-14.416	7.15
296	249.161	9.472	-14.411	7.14
297	249.188	9.472	-14.408	7.14
298			-14.416	
	249.107	9.472	-	7.15
299	249.027	9.472	-14.424	7.15
300	249.134	9.472	-14.414	7.14
301	248.974	9.472	-14.43	7.16
302	248.92	9.472	-14.435	7.17
303	248.92	9.472	-14.435	7.17
304	248.974	9.472	-14.43	7.16
305	248.84	9.472	-14.443	7.17
306	248.894	9.472	-14.438	7.17
307	248.867	9.472	-14.441	7.17
308	248.787	9.472	-14.449	
				7.18
309	248.894	9.472	-14.438	7.17
310	249.081	9.472	-14.419	7.15
311	248.813	9.472	-14.446	7.18
312	249.027	9.472	-14.424	7.15
313	249.081	9.472	-14.419	7.15
314	248.867	9.472	-14.441	7.17
315	249.161	9.472	-14.411	7.14
316	249.054	9.472	-14.422	7.15
317	249.027	9.472	-14.424	7.15
318	248.947	9.472	-14.433	7.16
319	249.107	9.472	-14.416	7.15
320	249.161	9.472	-14.411	7.14
321	249.161	9.472	-14.411	7.14
322	249.054	9.472	-14.422	7.15
323	248.974	9.472	-14.43	7.16
324	249.161	9.472	-14.411	7.14
			-14.419	7.15
325	249.081	9.472		
326	249.214	9.472	-14.405	7.14
327	249.188	9.472	-14.408	7.14
328	248.947	9.472	-14.433	7.16
329	248.68	9.472	-14.46	7.19
330	248.573	9.472	-14.471	7.20
331	248.413	9.472	-14.487	7.22
332	248.359	9.472	-14.493	7.22
333	248.519	9.472	-14.476	7.21
334	248.359	9.472	-14.493	7.22
335	248.573	9.472	-14.471	7.20
336	248.653	9.472	-14.463	7.19
337	248.68	9.472	-14.46	7.19
338	248.707	9.472	-14.457	7.19
339	248.92	9.472	-14.435	7.17
340	248.947	9.472	-14.433	7.16
341	249.054	9.472	-14.422	7.15
342	249.001	9.472	-14.427	7.16
343	249.001	9.472	-14.427	7.16
344	249.054	9.472	-14.422	7.15
345	248.974	9.472	-14.43	7.16
346	249.107	9.472	-14.416	7.15
347	249.001		-	
		9.472	-14.427	7.16
348	248.867	9.472	-14.441	7.17
349	248.787	9.472	-14.449	7.18
350	248.867	9.472	-14.441	7.17
351	248.707	9.472	-14.457	7.19
352	248.813	9.472	-14.446	7.18
353	248.626	9.472	-14.465	7.20
354				
	248.573	9.472	-14.471	7.20
355	248.519	9.472	-14.476	7.21
356	248.733	9.472	-14.454	7.18
357	248.68	9.472	-14.46	7.19
358	248.76	9.472	-14.452	7.18
359	248.84	9.472	-14.443	7.17
360	248.707	9.472	-14.457	7.19
			-	-

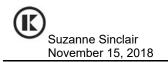


TW1- WELL RECOVERY VS. TIME - KOLLAARD FILE 180472

t/t' (ratio)

Kollaard File 180472 RECOVERY DATA TW-1

ť'	t / t'	Abs Pres	Temp	Water Level	Drawdown	Recovery
		(kPa)	(°C)	(m)	(m)	(%)
1	361.0	261.518	9.472	-13.151	5.88	18%
2	181.0	274.912	9.472	-11.785	4.52	37%
3	121.0	286.287	9.472	-10.625	3.36	53%
4	91.0	295.446	9.472	-9.691	2.42	66%
5	73.0	302.813	9.472	-8.94	1.67	77%
6	61.0	308.437	9.472	-8.366	1.10	85%
7	52.4	312.233	9.472	-7.979	0.71	90%
8	46.0	314.388	9.472	-7.759	0.49	93%
9	41.0	315.654	9.472	-7.63	0.36	95%
10	37.0	316.489	9.472	-7.545	0.28	96%
11	33.7	316.974	9.472	-7.496	0.23	97%
12	31.0	317.298	9.472	-7.463	0.19	97%
13	28.7	317.513	9.472	-7.441	0.17	98%
14	26.7	317.702	9.472	-7.422	0.15	98%
15	25.0	317.863	9.472	-7.405	0.14	98%
16	23.5	317.971	9.472	-7.394	0.12	98%
17	22.2	318.079	9.472	-7.383	0.11	98%
18	21.0	318.187	9.472	-7.372	0.10	99%
19	19.9	318.268	9.472	-7.364	0.09	99%
20	19.0	318.295	9.472	-7.361	0.09	99%
21	18.1	318.322	9.472	-7.358	0.09	99%
22	17.4	318.375	9.472	-7.353	0.08	99%
23	16.7	319.723	9.472	-7.215	-0.05	101%



ATTACHMENT C

WATER QUALITY RESULTS

Certificate of Analysis

Environment Testing

Client: Attention: PO#:	Kollaard Associates Inc. 210 Prescott St., Box 189 Kemptville, ON KOG 1J0 Ms. Colleen Vermeersch 180472		Report Number: Date Submitted: Date Reported: Project: COC #:	1810352 2018-06-21 2018-06-28 180472 197974	
Invoice to:	Kollaard Associates Inc.	Page 1 of 6			

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:

🛟 eurofins

APPROVAL:

Addrine Thomas, Inorganics Supervisor

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Eurofins Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf.

Eurofins(Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water.

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.



Certificate of Analysis

Environment Testing

Client:	Kollaard Associates Inc.
	210 Prescott St., Box 189
	Kemptville, ON
	K0G 1J0
Attention:	Ms. Colleen Vermeersch
PO#:	180472
Invoice to:	Kollaard Associates Inc.

Report Number:	1810352
Date Submitted:	2018-06-21
Date Reported:	2018-06-28
Project:	180472
COC #:	197974

				1		
				Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1367287 Water 2018-06-21 TW1-3hr	1367288 Water 2018-06-21 TW1-6hr
Group	Analyte	MRL	Units	Guideline		
Anions	CI	1	mg/L	AO 250	30	30
	N-NO2	0.10	mg/L	MAC 1.0	<0.10	<0.10
	N-NO3	0.10	mg/L	MAC 10.0	<0.10	<0.10
	SO4	1	mg/L	AO 500	9	9
General Chemistry	Alkalinity as CaCO3	5	mg/L	OG 500	134	135
	Colour	2	TCU	AO 5	3	3
	Conductivity	5	uS/cm		795	711
	F	0.10	mg/L	MAC 1.5	0.19	0.21
	рН	1.00		6.5-8.5	8.09	8.09
	S2-	0.01	mg/L	AO 0.05	0.02	0.01
	TDS (COND - CALC)	1	mg/L	AO 500	517*	462
	Turbidity	0.1	NTU	AO 5.0	14.9*	11.0*
Hardness	Hardness as CaCO3	1	mg/L	OG 100	289*	289*
Indices/Calc	Ion Balance	0.01			2.08	2.04
Metals	Ca	1	mg/L		68	68
	Fe	0.03	mg/L	AO 0.3	0.38*	0.34*
	К	1	mg/L		3	3
	Mg	1	mg/L		29	29
	Mn	0.01	mg/L	AO 0.05	0.03	0.02
	Na	2	mg/L	AO 200	43	41
Subcontract-Inorg	DOC	0.5	mg/L	AO 5	2.9	2.4
	N-NH3	0.01	mg/L		0.19	0.19
	Phenols	0.001	mg/L		<0.001	<0.001
	Tannin & Lignin	0.1	mg/L		0.1	0.2
	Total Kjeldahl Nitrogen	0.1	mg/L		0.3	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.



Client:	Kollaard Associates Inc.
	210 Prescott St., Box 189
	Kemptville, ON
	K0G 1J0
Attention:	Ms. Colleen Vermeersch
PO#:	180472
Invoice to:	Kollaard Associates Inc.

🛟 eurofins

Report Number:	1810352
Date Submitted:	2018-06-21
Date Reported:	2018-06-28
Project:	180472
COC #:	197974

QC Summary

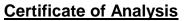
Analyte Blank		QC % Rec	QC Limits
Run No 347938 Analysis/Extraction Date 20 Method M SM3120B-3500C)18-06-22 Ana	llyst SKH	
Calcium	<1 mg/L	96	90-110
Potassium	<1 mg/L	98	87-113
Magnesium	<1 mg/L	94	76-124
Sodium	<2 mg/L	103	82-118
Run No347951Analysis/Extraction Date2018-06-22MethodC SM2130B		l yst YH	
Turbidity	<0.1 NTU	102	73-127
Run No348006Analysis/Extraction Date2018-06-22MethodC SM4500-S2-D		lyst AET	
\$2-	<0.01 mg/L	74	
Run No348031Analysis/Extraction Date2018-06-22MethodEPA 200.8		l iyst SKH	
Iron	<0.03 mg/L	97	91-109
Manganese	<0.01 mg/L	102	92.9-107
Run No 348152 Analysis/Extraction Date 20 Method SM2320,2510,4500H/F	018-06-25 Ana	llyst AET	
Conductivity	<5 uS/cm	101	90-110

Guideline = ODWSOG

* = Guideline Exceedence

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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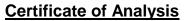
QC Summary

Analyte	Blank	QC % Rec	QC Limits
рН		99	90-110
Run No 348171 Analysis/Extraction Date 20 Method C SM2120C)18-06-26 An a	alyst YH	
Colour	<2 TCU	100	80-120
Run No 348227 Analysis/Extraction Date 20 Method SUBCONTRACT P-INORG)18-06-25 Ana	alyst AET	
DOC	<0.5 mg/L	107	
N-NH3	<0.01 mg/L	96	
Phenols	<0.001 mg/L	92	69-132
Tannin & Lignin	<0.1 mg/L	90	
Total Kjeldahl Nitrogen	<0.1 mg/L	118	81-126
Run No348250Analysis/Extraction Date20MethodSM 4110)18-06-27 An a	alyst H_F	
Chloride	<1 mg/L		90-110
N-NO2	<0.10 mg/L	6	90-110
N-NO3	<0.10 mg/L	7	90-110
SO4	<1 mg/L	5	90-110
Run No 348287 Analysis/Extraction Date 20 Method SM2320,2510,4500H/F)18-06-27 Ana	alyst AET	

Guideline = ODWSOG

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Report Number:	1810352
Date Submitted:	2018-06-21
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Project:	180472
COC #:	197974

QC Summary

Analyte	Blank	QC % Rec	QC Limits	
F	<0.10 mg/L 91		90-110	
Run No348368Analysis/Extraction Date20MethodSM2320,2510,4500H/F)18-06-28 Ana	lyst AET		
Alkalinity (CaCO3) <5 mg/L				
Run No 348400 Analysis/Extraction Date 20 Method C SM2340B)18-06-28 Ana	lyst AET		
Hardness as CaCO3				
Ion Balance				
TDS (COND - CALC)				

Guideline = ODWSOG

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Certificate of Analysis

Environment Testing

Client:	Kollaard Associates Inc.
	210 Prescott St., Box 189
	Kemptville, ON
	K0G 1J0
Attention:	Ms. Colleen Vermeersch
PO#:	180472
Invoice to:	Kollaard Associates Inc.

Report Number:	1810352
Date Submitted:	2018-06-21
Date Reported:	2018-06-28
Project:	180472
COC #:	197974

Sample Comment Summary

 Sample ID: 1367287
 TW1-3hr
 The Ion Balance is outside Eurofins acceptable tolerance levels. All results have been confirmed.

 Sample ID: 1367288
 TW1-6hr
 The Ion Balance is outside Eurofins acceptable tolerance levels. All results have been confirmed.

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.



Certificate of Analysis

Environment Testing

Client: Attention: PO#:	Kollaard Associates Inc. 210 Prescott St., Box 189 Kemptville, ON K0G 1J0 Ms. Colleen Vermeersch 180472		Report Number: Date Submitted: Date Reported: Project: COC #:	1810353 2018-06-21 2018-06-24 180472 197974	
Invoice to:	Kollaard Associates Inc.	Page 1 of 2			

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:

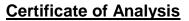
Dragana Dzeletovic, Team Leader

All analysis is completed in Ottawa, Ontario (unless otherwise indicated).

Eurofins Ottawa is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on our CALA scope of accreditation. It can be found at http://www.cala.ca/scopes/2602.pdf.

Eurofins (Ottawa) is certified and accredited for specific parameters by OMAFRA, Ontario Ministry of Agriculture, Food and Rural Affairs (for farm soils). Licensed by Ontario MOE for specific tests in drinking water.

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.



Client:	Kollaard Associates Inc.	Report Number:	1810353	
	210 Prescott St., Box 189	Date Submitted:	2018-06-21	
	Kemptville, ON	Date Reported:	2018-06-24	
	K0G 1J0	Project:	180472	
Attention:	Ms. Colleen Vermeersch	COC #:	197974	
PO#:	180472			
Invoice to:	Kollaard Associates Inc.			
PO#:	K0G 1J0 Ms. Colleen Vermeersch 180472	Project:	180472	

				Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1367289 Water 2018-06-21 TW1-3hr	1367290 Water 2018-06-21 TW1-6hr
Group	Analyte	MRL	Units	Guideline		
Microbiology	Heterotrophic Plate Count	0	ct/1mL		27	40
Others	Escherichia Coli	0	ct/100mL	MAC 0	0	0
	Faecal Coliforms	0	ct/100mL		0	0
	Total Coliforms	0	ct/100mL	MAC 0	0	0

Guideline = ODWSOG

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Results relate only to the parameters tested on the samples submitted. **Analytical Method: AMBCOLM1** additional QA/QC information available on request.