Hydrogeological and Nitrate Loading Assessment Graham Property (corner of Highway 9 and Mount Pleasant Road) Caledon, Ontario

Prepared For:

Rob Russell Planning Consultants Inc.

Project #: 18-577-30 **Date:** Janyary 17, 2020



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18-577-30

January 17, 2020

Rob Russell, MCIP, RPP Rob Russell Planning Consultants Inc. 32 Albert Street Georgetown, ON, L7G 2B3

Via email: russell@russellplanning.com

RE: Hydrogeological and Nitrate Loading Assessment- Graham Property (Corner of Highway 9 and Mount Pleasant Road)

1.0 INTRODUCTION

DS Consultants Ltd. (DS) was retained by Rob Russell Planning Consultants Inc. to carry out a hydrogeological assessment and nitrate loading assessment to address the Town's Peer Reviewer (Golder) with regards to the comments received in a letter dated February 14, 2018 with respect to the City of Caledon's Official Plan (OP) and in support of design and approvals for the future development at the southeast corner of Highway nine (9) and Mount Pleasant Road in Palgrave, Ontario (Site). The Site will be developed as a residential subdivision that has an approximate area of 30,174 m²(30.174 ha) and is proposed to consist of twenty-two (22) estate-style lots. **Figure 1** shows the site location.

1.1 Previous and Current Investigations

Fifteen (15) boreholes were advanced across the subject site during the previous geotechnical investigation by Shaheen & Peaker Consulting Engineers (S&P) in May 2007. No monitoring wells were installed during the geotechnical investigation. Five (5) monitoring wells were installed across the subject site as part of a hydrogeological investigation by V.A. Wood in July 2016. All wells were screened in a shallow unsaturated silt to sand unit and found dry during subsequent groundwater monitoring events that were carried out at the site.

In June 2018, three (3) additional boreholes were drilled by DS as part of this hydrogeological assessment to specifically address the peer review comments made by Golder on behalf of the Town of Caledon. These boreholes were converted into monitoring wells to identify the primary aquifer at the site and to enable groundwater monitoring and groundwater quality sampling to assess nitrate loading as a result of the proposed private individual septic system for the development. The borehole/monitoring wells locations are shown on **Figure 3** and the borehole logs are presented in **Appendix A**. All monitoring wells screened in the saturated sandy silt/silty sand unit extending to depths between 21 to 28 meters below the existing ground surface (mbgs). The well screen detail was based on the first saturated soil samples noted during drilling and in line with groundwater elevations noted in the MECP water well records of the area.

Three (3) groundwater monitoring rounds were obtained for nitrate (NO_3^-) and nitrite (NO_2^-) on the site from wells (MW 1, MW 2 and MW 3) on July 9, July 26, and September 26, 2018. Two (2) additional groundwater samples for the noted parameters above were obtained from off-site residential wells on

July 26, 2018. Analytical results were compared against the Ontario Drinking Water Standard (ODWS) of 10 mg/L to assess the background groundwater quality on and off the Site.

1.2 Purpose

The purpose of this investigation was to, estimate nitrate loading, investigate potential impacts as it relates to the future residential development at the Site, propose mitigation measures and address the Town's Peer Review (Golder) with regards to the comments received on February 14, 2018,

1.3 Scope of Work

The scope of work for this investigation included:

- (i) Site visits;
- (ii) Collecting and interpreting available reports and data including the previously conducted hydrogeological assessments and geotechnical, hydrogeological and environmental studies completed at the Site;
- (iii) Drill three (3) monitoring wells strategically positioned across the site;
- (iv) Develop, purge and monitor groundwater levels to assess existing groundwater elevations and the predicted groundwater flow direction at the site;
- (v) In-situ hydraulic conductivity testing of existing monitoring wells;
- (vi) Groundwater quality monitoring;
- (vii) Door to door well survey;
- (viii) Estimation of nitrate loading extending to the property boundary and off-site/down gradient nitrate impact assessment and mitigation measures;
- (ix) Propose monitoring and contingency plan;
- (x) Data analyses and report preparation.

2.0 PHYSICAL SETTING

Available topographic maps, environmental, geotechnical and hydrogeological reports were used to develop an understanding of the physical setting of the study area. Additionally, borehole logs from this investigation conducted by DS at the Site and the Ministry of the Environment Conservation and Parks Water Wells Records (MECP WWRs) were used to interpret the geological and hydrogeological conditions at the Site.

The study area is characterized by hummocky topography. Based on available topography mapping, the topography at the site is undulating with the ground surface elevations varying from 295-311 metres above sea level (masl), sloping towards the west to about 287 masl and sloping towards the east to about 306 masl towards from the high ridge (about 311 masl). The subject Site is entirely located within the Nottawasaga River Watershed (Beeton Creek Sub watershed). There are no water bodies located at the Site. Water supply in the study area primarily depends on groundwater sources (municipal water supply wells or domestic water wells), protected under the Source Water Protection Plan. A small portion at northeast side of the Site falls within the 25 year Well Head Protection Area (WHPA) in the Town of

Caledon and is mapped under Palgrave municipal well 3, WHPA-D (25-year travel time). The Site is within agricultural land and is surrounded by an existing subdivision located to the west, an under-construction subdivision to the south, and rural homes and agricultural land to the north of the Site. The study area is not serviced by municipal sewages. Septic systems are presumed to be used at all residential dwellings.

2.1 Geology

2.1.1 Quaternary Geology

The study area is within the Kame Moraine physiographic region of Southern Ontario (Chapman and Putnam, 1984) and characterised by Bevelled till Plains physiographic landform. The study area generally consists of glaciofluvial deposits of sand and glacial till deposits. The surficial geology map is shown in **Figure 2**.

2.1.2 Bedrock Geology

Based on the review of local boreholes and well record information, the depth to bedrock in the study area is estimated to be approximately at 55 mbgs. Available published mapping indicates that the bedrock consists of shale with seams of limestone. Surficial deposits consist mostly of sand with seams of silt and clay (MNDM Map 2544 Bedrock Geology of Ontario).

2.1.3 Site Geology

Subsurface soils were interpreted from the boreholes drilled at the site as part of previous and current investigations. The locations of the BHs/MWs are shown in **Figure 3** and detailed subsurface conditions are presented on the borehole logs in **Appendix A**. The subsurface conditions in the boreholes are summarized in the following paragraphs.

Topsoil and clayey silt to silty clay (Possible fill/ disturbed native):

All boreholes encountered about 150 mm of topsoil consisting of silt, clay with traces of sand, gravel and grassroots. Cohesive fine-textured fill consisting of clayey silt to silty clay with traces of sand and gravel extending to depths 0.15 m to 1.2 m were found beneath the topsoil.

Silty Sand to Sandy Silt:

Below the topsoil, native Silty Sand to Sandy Silt layers were encountered in all the borehole ranging to depths from 2.4-6.1 mbgs to termination depths (22-28 mbgs).

Bedrock:

Bedrock was not encountered during the drilling at the site or at the termination depth in any borehole.

3.0 HYDROGEOLOGY

The hydrogeology at the Site was evaluated using the on-site monitoring wells, local domestic wells and existing hydrogeological reports for the area.

3.1 Local Groundwater Use

As part of the hydrogeological study, DS completed a search of the Ministry of the Environment Conservation and Parks (MECP) Water Well Record (WWR) database. Based on the MECP water well records search, there are 29 water wells records within 500 meters of the Site. A water well record summary is provided in **Appendix B**. All water well usage is noted as a domestic water wells or unknown. **Figure 1** shows the MECP water well record locations. The study area is not serviced with municipal water.

To verify the results of the MECP WWR search, a door to door well survey was completed in July 2018. Door to door surveys are voluntary and rely of well owner's consent to provide any relevant information. Completed surveys are provided in **Appendix B.** A total of 18 properties were visited during the door-to-door survey, resulting in two (2) properties (17381 Mount Pleasant Road and 10305 Hwy 9, Caledon) providing permission to collect groundwater samples. On July 20, 2018, two (2) water samples were collected from these wells and analyzed for nitrate and nitrite.

3.2 Groundwater Conditions and Flow Direction

Groundwater levels were measured on several occasions in all available monitoring wells by DS hydrogeologists. Groundwater levels are presented in **Table 1**. Groundwater levels at the Site range from 19 to 25 mbgs. Based on groundwater levels recorded, DS identified the primary aquifer at an approximate elevation of 281 masl. The MECP WWRs indicate the wells are screened within the sand/sand & gravel aquifer. Based on monitored groundwater levels and the local topography, the local groundwater flow direction within the site is inferred to be north-northeast. The estimated groundwater flow direction is presented on **Figure 4**.

Well ID	Ground Elevation (Approx. masl)	Well Depth (mbgs)	Screened Interval (mbgs)	Date of Measurement	Depth to Water (mbgs)	Groundwater Elevation (masl)
MW18-1	305.7	27.3	25.9-27.3	June 22, 2018	24.3	281.4
				July 9, 2018	24.3	281.4
				July 26, 2018	24.3	281.4
				September 27, 2018	24.2	281.5
MW18-2	297.5	22.2	20.7-22.2	June 22, 2018	18.9	278.6
				July 9, 2018	18.8	278.7
				July 26, 2018	18.8	278.7
				September 27, 2018	18.8	278.7
MW18-3	297.7	21.2	19.7-21.2	June 22, 2018	18.2	279.5
				July 9, 2018	18.1	279.6
				July 26, 2018	18.1	279.6
				September 27, 2018	18.2	279.5
Domestic well(on-site)	304.5	N/A	N/A	June 22, 2018	23.20	281.3

Table 1: Groundwater Levels in Monitoring Wells

3.3 Hydraulic Conductivity

Single Well Response Tests (SWRT) were conducted using the rising head test method by a DS hydrogeologist in all wells on July 9, 2018 to estimate hydraulic conductivity (k) for the representative geological units in which the wells were screened. Hydraulic conductivity (k) values were calculated using the Bouwer & Rice method. **Table 2** presents a summary of the hydraulic conductivity (k) values for the representative geological units. The value of calculated hydraulic conductivity (k) varies 6.8×10^{-5} m/s for silty sand layer to 6.8×10^{-7} m/s for sandy silt deposits. The hydraulic conductivity analyses are provided in **Appendix C.**

Well ID	Screened Lithology	Well Depth (mbgs)	K (m/s)	Geomean K (m/s)
BH/MW 18-1	Silty Sand to Sandy Silt	28.3	6.8 x 10 ⁻⁷	1.24 x 10 ⁻⁷
BH/MW 18-2	Silty Sand	23	4.2 x 10 ⁻⁵	
BH/MW 18-3	Silty Sand	21	6.8 x 10 ⁻⁵	

Table 2: Summary of Hydraulic Conductivity (k) Test Results

3.4 Background Groundwater Quality- Nitrate Concentrations

Three (3) groundwater monitoring rounds were completed from onsite wells (MW 18-1, MW 18-22 and MW 18-3) on July 9, July 26, and September 27, 2018. Additionally, two (2) groundwater samples were collected from domestic wells off-site on July 26, 2018. Samples were submitted under chain of custody to a CALA accredited laboratory (ALS Laboratories). The analytical results were compared to the Ontario Drinking Water Standards (ODWS). The reported analytical results indicated that the nitrate concentrations were exceeded the ODWS from the on-site wells but met the ODWS at the two (2) off-site wells. **Table 3** presents a summary of nitrate concentrations from the three (3) sampling events from the on-site wells (BH/MW18-1 to BH/MW18-3). The certificates of analysis are provided in **Appendix D**.

Parameter	Unit	ODWS	BH/ MW 18-1	BH/ MW 18-2	BH/ MW 18-3	Off Site Well (Upgradient) 17381 Mount Pleasant Rd.	Off Site Well (Downgradient) 10305 Hwy 9
				Ju	ly 9, 201	8	
Nitrate (NO ₃ ⁻)	mg/L	10	12.2	15.9	9.1	-	-
	·	·	·	Juh	y 26, 20	18	
Nitrate (NO ₃ ⁻)	mg/L	10	12.3	12.5	12.0	< 0.02	4.60
	·	-	·	Septer	nber 27,	2018	
Nitrate (NO ₃ -)	mg/L	10	10.1	14.5	8.4	-	-
Average	mg/L	10	11.5	14.3	9.8	< 0.02	4.60

Table 3: Nitrate Concentrations in Groundwater

4.0 NITRATE IMPACT ASSESSMENT

It is our understanding that the proposed subdivision will utilize private on-site sewage treatment and disposal facilities for each of the proposed 22 lots. As a result, a groundwater impact assessment must be completed to assess the ability of the lands to treat sewage effluent to meet acceptable limits. A guide for assessing whether on-site sewage systems are appropriate for new developments is provided in the MECP guideline "D-5-4 Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment". The guideline provides an evaluation process including lot size, system isolation and contaminant attenuation considerations. Developments consisting of lots which average less than 1 hectare in size generally require a groundwater impact assessment when proposing private on-site sewage treatment. At the site, the size of proposed lots ranges from 0.54 to 1.18 ha with an average size of 0.77 ha. Based on the D-5-4 guideline, it can not be assumed that attenuative processes within the lots will be sufficient to reduce the nitrate-nitrogen to an acceptable concentration in groundwater below adjacent properties.

Based on the analytical results presented in **Table 3**, background nitrate concentrations ranging from 8.4 to 15.9 mg/L (11.9 mg/L average) were reported for onsite wells MW18-1 through MW18-3 in July and September monitoring periods. In late July, the analytical results for the upgradient domestic well was reported below the detection limit at 0.02 mg/L nitrate, while results for the downgradient domestic well was reported at 4.6 mg/L nitrate. The data suggests elevated nitrate levels on site are likely the result of current farming practices and the application of nitrates in the form of fertilizers to enhance crop growth. Section 5.1 of the D-5-4 guideline recognizes the impact agricultural practices can have on nitrate-nitrogen concentrations in groundwater. The guideline suggests that if it can be demonstrated that existing levels of nitrates are the result of historical agricultural practices on the site (farming, feedlot, etc.), nitrate levels will decline following the change in land use. For this site, the change from agricultural to residential land use is expected to decrease on-site nitrate-nitrogen loading to groundwater.

Additional sampling of the upgradient nitrate-nitrogen concentrations in groundwater is recommended to provide seasonal comparisons and to further validate that the on-site nitrate-nitrogen concentrations in groundwater are the result of historical agricultural practices.

4.1 Nitrate Loading- On and Off-Site Impacts

The potential impacts of constructing a twenty-two (22) lot subdivision in the 301,740 m² (30.174 ha) site were assessed using the methodology presented in **Appendix E.** An increase in the downgradient nitrate concentration as a result of development is estimated to be approximately 4.87 mg/L. Though the onsite nitrate concentration is higher, this is expected to be the result of current agricultural practices at the site. Considering the change in land use and the future discontinued application of fertilizers, the background nitrate concentration is expected to be more representative of up-gradient nitrate concentrations (< 0.02 mg/L). Using this up-gradient concentrations as background nitrate concentrations at the site, inclusive nitrate concentrations at the site and property boundary would be

4.89 mg/L, which meets the Ontario Drinking Water Standard (ODWS) of 10 mg/L for nitrate. The calculated nitrate loading assumes that the recharged water will contribute directly to the sand aquifer and that there will be no dilution or attenuation between septic system and aquifer.

5.0 MITIGATION AND MONITORING PLAN

Even though downgradient wells are not expected to be affected by the proposed development and considering higher background nitrate concentration at the Site, a tertiary aeration treatment system is recommended to minimize nitrate loading at the Site and to reduce or limit the offsite nitrate concentrations in the future. Assuming a 50% reduction of nitrate loading with a tertiary treatment and taking into account the background concentrations the resulting nitrate concentration is 2.44 mg/L.

A post-development groundwater sampling program should be implemented at registered wells to confirm any adverse effects on water quality due to any increase in nitrate concentrations. The program will include nitrate monitoring on a quarterly basis for the duration of one (1) year after the installation of the tertiary treatment system or will continue as per Town of Caledon requirement.

6.0 CONTINGENCY PLAN

In the event that any homeowners within the 500 m zone of the development site file a complaint about their well water quantity or quality, the owner of the site will provide a potable source of water. Additionally, the owner will immediately investigate the complaint. As part of the investigation, samples will be collected from the affected wells and analyzed for nitrate and nitrite. If the investigation determines that water quality has been negatively impacted as a direct result of the development at the Site, remedial action will be taken immediately. If possible, water will be treated directly at the well. Alternatively, a local company will be retained to provide a temporary potable water supply (i.e. cistern). This service shall be maintained until quality in the affected well is restored, or it is determined a long-term solution is required. If an affected well is determined to have been permanently degraded, deepening the existing well, drilling a new well, or connection to municipal supply (if available) will be considered.

We trust that this report satisfies your needs. Should you have any questions or need more information, please do not hesitate to contact our office.

DS Consultants Ltd.

Prepared By:

A-Palel

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Reviewed By:

mh. 10000

Martin Gedeon, M.Sc., P.Geo. Senior Hydrogeologist

7.0 **REFERENCES**

Chapman, L.J., and D.F. Putnam; The Physiography of Southern Ontario, Third Edition, Ontario Geological Survey Special Volume 2; 1984, & 2007.

Freeze, R.A. and J.A. Cherry. "Groundwater". Prentice-Hall, Inc. Englewood Cliffs, NJ. 1979.

Guideline-D-5-4 Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment, the MECP, Ontario.

Hydrogeological Investigation, Proposed Residential Development, Highway 9/Mount Pleasant Road, Palgrave, Ontario by V.A Wood Associated Limited, July 2016.

Ontario Regulation 153/04 made under the Environmental Protection Act, July 1, 2011.

Summary of Comments- Town of Caledon, 23 APR 2018: Proposed Draft Plan of Subdivision and Zoning By-law Amendment-2nd Submission Graham (1685078 Ontario Inc.).

Town of Caledon Official Plan, April 2018

TOWN OF CALEDON PLANNING RECEIVED

May 04, 2020

FIGURES



TOWN OF CALEDON PLANNING RECI<mark>E</mark>IVED







Appendix A: Borehole Logs

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PROJECT: Geotechnical Investigation - Proposed Subdivision

CLIENT: Rob Russell Planning Consultants Inc

PROJECT LOCATION: Hwy 9 and Mount Pleasant Road, Palgrave, ON

DATUM: Geodetic

TOWN OF CALEDON PLANNING RECEIVER

May 04, 2

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 200 mm Date: Jun-13-2018

BOREHOLE LOCATION: See Drawing 1

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		L: Geotechnical Investigation - Prop	osed	Subo	division	ו				DRIL	LING		m Ai	laor							
		ECT LOCATION: Hww 9 and Mount Pla			nd Dal	aravo				Diam	otor: 2	00 mm	in Au	igei			DI		. 10	577	20
	DATU	IM: Geodetic	asan		iu, r ai	giave	, ON			Date:	Jun-	13-2018					FN			5-577	-30
	BORE	HOLE LOCATION: See Drawing 1								Duto.	ourr	10 2010							0 4		
		SOIL PROFILE		5	SAMPL	.ES				DYNA			ETRA	FION		NAT					
	(77)		L				ЩЩ			2	20 4	40 60	8	0 100	PLASTIC LIMIT	C MOIS	URAL STURE TENT	LIQUID LIMIT	ż,	IIT WT	AND
	(m) ELEV		PLO'			SN E	WA.	ONS	NO	SHE/	AR ST	RENGT	TH (kF	Pa)	W _P	\	N 0	WL	KET P (KPa	tAL UN	GRAIN SIZE
	DEPTH	DESCRIPTION	ATA	ABEF	ш	BLC 0.3	INN	ITION	VATI			FINED RIAXIAI	+	FIELD VANE & Sensitivity	WAT	FER CC		T (%)	00 00	ATUR (F	(%)
	296.3		STF	NUN	ΤYF	z.	GR(0 S	ELE	2	20 4	40 60) 8	0 100	1	0 2	20 3	30		-	GR SA SI CL
	0.0	: Augered straight down to 6.1 m without spoon sampling. Spoon		1	SS			1.	296	-											
		Sampling started at 6.1 m		2	SS		1.	1		-											
				2	99		11			-											
	2				33				294	-											
				4	SS					-											
				5	SS		1.			-											
	4						11	1		-											
							-		292	-											
				6	SS		1.	1.		-											
	£90.2						•			-											
	6.1	SILTY SAND: trace gravel, brown,		7	SS	26			290	-											
		moist								-											
								1		-											
	8								288	-											
										-											
				8	SS	45				-											
	<u>10</u>						1.		200	-											
			間				1		280	-											
			間							-											
N	12		間					1.		-											
-12-1			間	9	SS	56	1.		284	-											
т 18			臣							Ē											
S.GD	14							1		F											
ŭ	14		臣					1.	282												
N.GF							•	•		-											
, Е				10	SS	45				-											
GRA	<u>16</u>								200	-											
PAL							1	1	200	-											
OAD,							1			-											
NT R	<u>18</u>		臣																		
ASA	277.5	saturated below 18.3 m		11	SS	37	1.		W. L.	278.1 278.1	m 8										
T PLE	18.8									<u>F</u>											
NUNO	20									-											
Ŭ Q							E		276	-											
0 AN				1			Ē			È											
ЖН		END OF BOREHOLE						-													
-30-1		1)Monitoring well installed upon		1																	
8-577		completion of borenole		1																	
100				1																	
ЛГ ГО				1																	
s so				1																	
			1	-		I	-			L	I			I I			1	1		-	

 $\begin{array}{c} \underline{\text{GROUNDWATER ELEVATIONS}} \\ \text{Measurement} \quad \stackrel{1\text{st}}{\underline{\nabla}} \quad \stackrel{2\text{nd}}{\underline{\Psi}} \quad \stackrel{3\text{rd}}{\underline{\Psi}} \quad \stackrel{4\text{th}}{\underline{\Psi}} \end{array}$

Appendix B: MECP Water Well Record & Door to Door Well Survey

Table: MECP Water Wells Records

TOWN OF CALEDON PLANNING RECEIVED May 04, 2020

Project: 18-577-30

Hydrogeological Investigation - Graham Property

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FOF
CALEDON TOWN (ALBION	17 594160 4870134 W	1957/10 3414	4	FR 0172	92/170/2/2:0	DO	0172 4	4900492 ()	MSND CLAY 0056 MSND 0092 F
CALEDON TOWN (ALBION	17 594130 4870134 W	1957/10 3414	4	FR 0092	92/170/2/2:0	DO	0172 4	4900493 ()	MSND 0092 FSND 0176
CALEDON TOWN (ALBION	17 594964 4870323 W	1970/10 4610	5	FR 0075	69/85/4/8:0	DO	0090 4	4903561 ()	BRWN LOAM MSND 0001 BRW SILT 0094 BLUE FSND SILT 0096
			-					0	BRWN LOAM 0002 BRWN MSN
CALEDON TOWN (ALBION CON 08 027	17 595014 4870293 W	1970/10 4610	5					4903562 () A	MSND SILT 0154
CALEDON TOWN (ALBION CON 08 027	17 594564 4869598 W	1971/04 5206	5	FR 0094	14/16/8/6:0	DO		4903674 ()	BRWN SAND 0069 GREY SAND (
CALEDON TOWN (ALBION CON 08 027	17 594590 4869523 W	1971/12 1315	65	FR 0190	70/150/5/5:0	DO	0185 5	4903748 ()	OBDN 0018 FSND QSND 0180 C
CALEDON TOWN (ALBION CON 08 028	17 595226 4870398 W	1975/06 3108	7	UK 0087	63/82/10/2:0	DO	0094 3	4904757 ()	BRWN CLAY SAND 0029 BRWN BRWN MSND FSND 0097
CALEDON TOWN (ALBION CON 09 027	17 594419 4869303 W	1975/09 5459			75/141/12/3:0	DO	0131 6	4904792 ()	BRWN SAND 0008 BRWN CLAY 0120 BLUE FSND 0130 BLUE SA
	17 505114 4970472 W	1079/05 4779	7		62/17/2:0	20	0107.2	4005486 ()	BRWN SAND CLAY BLDR 0063 B
CALEDON TOWN (ALBION CON 09 027	17 595114 4870473 W	1978/05 4778	/	FR 0095	63////3:0	DO	01073	4905486 ()	BRWN GRVL CLAY 0022 BRWN
CALEDON TOWN (ALBION CON 09 027	17 594464 4869848 W	1979/05 5459	6	FR 0114	75/108/10/:	DO	0111 3	4905502 ()	0100 BRWN FSND 0114
	17 504564 4860822 W	1070/05 5450	6	ED	75/150/7/		015/ 2	4905502 ()	BRWN GRVL 0003 BRWN SAND
	17 JJ4304 4803825 W	1979705 5455	0		/3/130///.		0154 5	4909903 ()	
CALEDON TOWN (ALBION CON 09 027	17 594548 4869646 W	1985/03 3108	5	UK 0170	67/110/12/1:30	DO	0175 6	4906250 ()	PRDR 0099 BRWN SAND 0168 E
									BRWN CLAY SAND 0005 BRWN 0105 BLUE SILT CLAY 0155 BLUI
CALEDON TOWN (ALBION CON 09 027	17 594752 4869702 W	1989/06 4778	6	FR 0177	77/110/12/3:0	DO	0183 4	4907238 (55236)	0187
	17 504590 4960694 W	1090/06 4779	c		88/120/12/20	20	0195 4	4007241 (55227)	BRWN SAND GRVL 0012 BRWN
CALEDON TOWN (ALBION CON 09 027	17 594580 4809084 W	1989/00 4778	0	FK 0104	88/120/12/3.0	bo	0185 4	4907241 (55257)	BRWN CLAY SAND 0005 BRWN
CALEDON TOWN (ALBION CON 09 027	17 594720 4869719 W	1989/06 4778	6	FR 0170	78/115/10/3:0	DO	0173 4	4907242 (55235)	0118 BLUE SILT 0142 BLUE FSN
								4909007 (241987)	
CALEDON TOWN (ALBION CON 09 028	17 595188 4869949 L	2002/05 4645				DO		A	
	17 E02690 4970196 W	1067/05 2414	G		08/106/5/2:0	DO	0202.2	E704020 ()	LOAM 0002 CLAY MSND 0020 B
CALEDON TOWN (ALBION CON 09 028	17 593080 4870180 W	1967/05 3414	0	FR 0205	98/100/5/3:0	DO	0202 3	5704039 ()	BRWN MSND CLAY 0200 GRET C
CALEDON TOWN (ALBION CON 09 028	17 595106 4870587 W	1956/04 3414	5					5704042 () A	MSND 0235 GRVL 0248 CLAY BI
	17 595246 4870596 W	1956/05 3414	4	FR 0086	49/72/6/6:0	00		5704043 ()	
	17 555240 4870550 W	1550705 5414	4	110000	+3/72/0/0.0			5704045 ()	
	17 E0EDAG 4070E0C M		4		69/99/10/4-0	DO	0105 4	E704044 ()	
CALEDON TOWN (ALBION CON TO 027	1/ 393240 48/0596 W	1957/07 3414	4	ΓΚ Ουσδ	00/00/10/4:0		0105 4	5704044 ()	אסטט מאנט אוניאן אונען איזעט אוניאן (אוניאן אוניאן אונען אוניאן אונען אונען אונען אונען אונען אונען אונען אונע אונען איז אונען
TECUMSETH TOWNSHIP CON 01 001	17 595166 4870632 W	1966/01 3414	5	FR 0075	38/44/10/2:0	DO	0071 4	5704049 ()	PRDG 0040 FSND 0070 BRWN C
	17 502954 4970172 \\/	1070/04 2414	6		05/07/7/2:0	DO	0122.2	5707104 ()	BRWN MSND 0020 BRWN CLAY
	1/ 333034 40/U1/3 W	1970/04 3414	U	1 / 0125	53/51/1/2:0	00	0122.2	5707104 ()	0123

RMATION

SND 0176

N MSND CLAY SILT 0075 BRWN MSND

ID SILT 0035 BRWN CLAY 0100 BLUE

0170 MSND 0181

SND 0190 SAND 0057 BRWN CLAY SAND 0086

0061 BRWN FSND 0114 BLUE SAND ND 0141

BRWN SAND CLAY 0095 BRWN FSND

SAND CLAY SOFT 0092 BRWN CLAY

CLAY SOFT 0021 BRWN SAND CLAY JE FSND 0157

BLUE SAND 0182 SAND GRVL 0090 BRWN SAND SILT E SILT SAND CLAY 0177 BRWN MSND

SAND CLAY 0035 BRWN SAND SILT E FSND SILT CLAY 0184 FSND CLN 0189 SAND GRVL 0090 BRWN SAND SILT D SILT 0170 FSND CLN 0177

BRWN MSND 0118 GREY SILT 0193 SND 0205 0078 MSND 0117 HPAN 0184 GREY LDR 0285

0109

CSND 0075

0046 MSND 0100 FSND 0120 MSND

TECUMSETH TOWNSHIP CON 01 003	17 595244 4870658 W	1973/04 3414	6	FR 0095	60/75/5/2:0	DO	0092 4	5709748 ()	LOAM 0001 BRWN SAND 0070 B
									BLCK LOAM 0003 BRWN CLAY S
TECUMSETH TOWNSHIP CON 01 003	17 594106 4870271 W	1973/07 3108	7		87/135/6/3:0	DO	0145 3	5710113 ()	0067 BRWN CLAY SAND 0142 BR
TECUMSETH TOWNSHIP CON 01 003	17 594944 4870501 W	1988/05 5206	6	FR 0072	72/95/6/4:0	DO	0107 3	5725126 (26322)	BRWN SAND 0034 GREY SAND 0
								7160611 (Z42886)
TECUMSETH TOWNSHIP CON 01 003	17 594925 4870561 W	2010/06 6915	2.46		161/184/3/1:0	DO	0361 30	A038480	BRWN SAND SILT 0390
								(Z150111)	
TECUMSETH TOWNSHIP CON 01 003	17 594758 4870410 W	6915	6.25		70/83/15/1:		0120 5	A130465	BRWN SAND CLAY 0126
								7214466	
TECUMSETH TOWNSHIP CON 01 003	17 594766 4870418 W	6915				NU		(Z150125) A	
								7258770	
								(Z225818)	BRWN CLAY SILT HARD 0006 BR
TECUMSETH TOWNSHIP CON 01 004	17 593715 4869855 W	2016/01 5459	6	UT 0216	114/118/12/1:	DO	0210 6	A032778	FSND MSND LOOS 0216

BRWN MSND 0095 SAND 0034 BRWN CLAY SAND GRVL SRWN MSND 0148

0110

RWN FSND SILT PCKD 0200 BRWN

Project : 18-577-30 Water Well Survey Results- Graham Proprerty

Address	MECP ID	Comment
Mt. Pleasant Road:		
17390	496250	No Answer
17374	490364	Has Well, busy at the moment/day (Left Phone #, Call to return at another time to take sample)
17366	4903748	On Municipal (Says he was the only one to get hooked up to Municipal Water)
17345	4907238	No Answer
17381	4907242	Survey Completed, Water Level and Sample taken
17385	4907241	Not home owner, gave email to send survey too + arrange for sampling another time
17409	4905503	No Answer
17419	7104867	No Answer
Hwy. 9:		
10261	4903562	No Answer
10305	4903561	Survey Completed, Sample Taken, Unable to access well for water level
8726	5704049	No Answer
8738	5704042	No Answer
8770	4905486	Gate closed
8750	5725126	No Answer
8800	7214465	No Answer, contact Larry Hall: 905-951-1462
8870	5710113	Gate closed
8964	5707104	Not home owner, gave email to send survey too + arrange for sampling another time
8986	5704039	No Answer

DS Consultants Ltd.

WATER WELL SURVEY LOCATION: 17381 MH. Measurt OWNER: Brad Hayhar	DATE: July 26/18 PROJECT #: 18-577-30
TELEPHONE #: $(247) - 32 - 2343$ WELL INFORMATION	WELL #: PUMP INFORMATION
Drilled Dug or bored Combination Date Completed Unknown Depth $\sim 190'/60$ M Casing Diameter Seal Aquifer: Overburden Bedrock Static Level: Original Present Has well ever been dry? No Owner when well drilled Slu = 0.39 M $UL = 22.98$ mb for	Make Age HP Type: Jet Submersible Shallow well Deep Well Other Depth to intake Centre of pump mbgs Pump capacity Condition: good fair poor
pHTemp:Conductivity Chlorideron HardnessAlkalinity Bacterial Clear: YesNoSand-free: YesNo Sulfurous: YesNoOdour: YesNo Any water treatment: Yes	WATER CONSUMPTION Domestic: # of persons Livestock: (specify) Other uses: Watering Pool Estimated daily requirement:



Is Well Water Supplemented? Yes__ No____

Accessible for Water Levels? Yes___No Permission to obtain water levels and samples? Yes _____ No _____

The Above information is correct to the best of my knowledge. Signed (

Date: July, 26/18

(Owner/tenant)

-- 4 TALE

TOWN OF CALEDON PLANNING RECEIVED May 04, 2020	05
UCATION: 16305 Huy. 9 OWNER: Pargan Singh TELEPHONE #: 416 435.5662 WELL INFORMATION * coulditrace	DATE: <u>July 26/18</u> PROJECT #: <u>18-577-70</u> WELL #: % Sealed PUMP INFORMATION
Drilled Dug or bored Combination Date Completed? Depth <u>~000</u> Casing Diameter? Seal Aquifer: Overburden Bedrock Static Level: Original Present Has well ever been dry? Owner when well drilled? O WATER QUALITY (if previously tested)	Make Age HP Type: Jet Submersible Shallow well Deep Well Other Depth to intake Centre of pump mbgs Pump capacity Condition: goodfair poor WATER CONSUMPTION
pH Temp: Conductivity Chloride Iron Hardness Alkalinity Bacterial Clear: Yes No Sand-free: Yes No Sulfurous: Yes No Odour: Yes No Any water treatment: Yes	Domestic: # of persons Livestock: (specify) Other uses: Estimated daily requirement:
SKETCH (Location - use back if necessary)	ANNUAL SAMPLING PROGRAM Is Well Water Supplemented? Yes No Accessible for Water Levels? Yes No Permission to obtain water levels and samples? Yes No

The Above information is correct to the best of my knowledge.

Signed (Owner/tenant)

Date: July. 26/18

TOWN OF CALEDON PLANNING RECEIVED	DS
WATER WELL SURVEY	* busy at the moment/day, call to return another time for sample
LOCATION: 17374 Mt. PleaSant	DATE: July 26/18
OWNER: Patrick Cleary	PROJECT #: 18-577-30
TELEPHONE #: (905) - 880 - 4599	WELL #:
WELL INFORMATION	PUMP INFORMATION
Drilled Dug or bored Combination	Make Age HP
Date Completed Depth ~ 60.9 m	Type: Jet Submersible
Casing Diameter Seal	Shallow well Deep Well Other
Aquifer: OverburdenBedrock	Depth to intake
Static Level: Original Present	Centre of pump mbgs
Has well ever been dry?O	Pump capacity
Owner when well drilled	Condition: good fair poor
Static $WL = - 21.3 m$ WATER QUALITY (if previously tested)	WATER CONSUMPTION
pH Temp: Conductivity	Domestic: # of persons
Chloride Iron	Livestock: (specify)
Hardness Alkalinity	Other uses:
Bacterial	Estimated daily requirement:
Clear: Yes No Sand-free: Yes No	
Sulfurous: Yes No Odour: Yes No	
Any water treatment:	
SKETCH (Location – use back if necessary)	ANNUAL SAMPLING PROGRAM
	Is Well Water Supplemented? Yes No
	Accessible for Water Levels? Yes No Permission to obtain water levels and samples? Yes No
OWNERS ACKNOWLEDGEMENT:	
The Above information is correct to the best of my kno	wledge.
Signed	Date:
(Owner/tenant)	

LOCATION: 8964 Him 9	sarry The ZC/18
OWNER: Stephenic	$\underline{\qquad} DATE: \underline{\qquad} DATE$
TELEPHONE #:	WFIL #
Email: 51 barrett 95 cgmail, co WELL INFORMATION	PUMP INFORMATION
Drilled Dug or bored Combination	Make Age HP
Date Completed Depth	Type: Jet Submersible
Casing Diameter Seal	Shallow well Deep Well Other
Aquifer: OverburdenBedrock	Depth to intake
Static Level: Original Present	Centre of pump mbgs
Has well ever been dry?	Pump capacity
Owner when well drilled	Condition: good fair poor
WATER QUALITY (if previously tested)	WATER CONSUMPTION
pH Temp: Conductivity	Domestic: # of persons
Chloride Iron	Livestock: (specify)
Hardness Alkalinity	Other uses:
Bacterial	Estimated daily requirement:
Clear: Yes No Sand-free: Yes No	
Sulfurous: Yes No Odour: Yes No Any water treatment:	
SKETCH (Location – use back if necessary)	ANNUAL SAMPLING PROGRAM
	Is Well Water Supplemented? Yes No
	Accessible for Water Levels? Yes No Permission to obtain water levels and samples? Yes No
OWNERS ACKNOWLEDGEMENT:	
The Above information is correct to the best of my kn	owledge
	in menger

LOCATION: 17385 Mt. Pleasant	DATE: JULY, 26/18
OWNER:	PROJECT #: 18-577-30
TELEPHONE #:	WELL #:
WELL INFORMATION	PUMP INFORMATION
Drilled Dug or bored Combination	Make Age HP
Date Completed Depth	Type: Jet Submersible
Casing Diameter Seal	Shallow well Deep Well Other
Aquifer: Overburden Bedrock	Depth to intake
Static Level: Original Present	Centre of pump mbgs
Has well ever been dry?	Pump capacity
Owner when well drilled	Condition: good fair poor
WATER QUALITY (if previously tested)	WATER CONSUMPTION
pH Temp: Conductivity	Domestic: # of persons
Chloride Iron	Livestock: (specify)
Hardness Alkalinity	Other uses:
Bacterial	Estimated daily requirement:
Clear: Yes No Sand-free: Yes No	
Sulfurous: Yes No Odour: Yes No	
Any water treatment:	
SKETCH (Location – use back if necessary)	ANNUAL SAMPLING PROGRAM
	Is Well Water Supplemented? Yes No
	Accessible for Water Levels? Yes No
	Permission to obtain water levels and
	samples? Yes No
WINERS ACKNOWLEDGEMENT:	
he Above information is correct to the best of my kn	owledge.
gned	Date:

Appendix C: Hydraulic Conductivity Analysis

					Slug T	est Ana	lysis Rej	port			
ns					Project:	Hydrog	eological	Investigatior	ı		
					Number: 18-577-30						
					Client:	Rob Ru	issell Plar	ining Consul	Itants Inc.		
Location: Caled	on, ON		Slug Test:	MW18-1			Test	Well: MW18	8-1		
Test Conducted	Fest Conducted by: SE						Test	Date: 2018-	-07-09		
Analysis Perform	ned by: SE		MW18-1				Anal	ysis Date: 2	018-07-18		
Aquifer Thickne	ss: 2.95 m										
0	300	600	900	Ti 1200	me [s] 15	00	1800	2100	2400	2700	
10.00											
1.00											
0.10											
0.01											
0.01 • M	W18-1										
• •	VV10-1										
Calculation using I	Bouwer & Ri		al								
Observation well		Hydraulic Con	ductivity								
MW18-1		6.75 × 10									



				Slug Te	st Analys	sis Repor	t			
ne				Project:	Hydrogeo	logical Inve	estigation			
				Number: 18-577-30						
				Client:	Rob Russ	ell Plannin	a Consulta	nts Inc.		
Location: Caledon, ON	Location: Caledon, ON Slug Test: MW18-3						ell: MW18-	3		
Test Conducted by: SE			Test Da	te: 2018-07	7-09					
Analysis Performed by:	SE	MW18-3				Analysis	s Date: 201	8-07-18		
Aquifer Thickness: 2.97	7 m									
0 2	4 48	72	Ti 96	me [s] 120	144	168	192	216	240	
10.000										
1.000										
0.100										
0.010										
0.001										
• MW18-	-3									
Calculation using Bouwer	& Rice									
Observation Well	Hydraulic Condu	ıctivity								
	[m/s]									
MW18-3	6.83 × 10 ⁻⁵									

TOWN OF CALEDON PLANNING RECEIVED May 04, 2020

> Appendix D: Groundwater Quality Certificate of Analysis



DS Consultants (Vaughan) ATTN: Scott Watson 6221 Highway 7 Unit 16 Vauqhan ON L4H 0K8 Date Received:09-JUL-18Report Date:13-JUL-18 11:19 (MT)Version:FINAL

Client Phone: 647-237-5110

Certificate of Analysis

Lab Work Order #:L2125942Project P.O. #:NOT SUBMITTEDJob Reference:18-577-30C of C Numbers:17-615312Legal Site Desc:17-615312

Amanda Fasebas

Amanda Fazekas Account Manager

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ADDRESS: 5730 Coopers Avenue, Unit #26 , Mississauga, ON L4Z 2E9 Canada | Phone: +1 905 507 6910 | Fax: +1 905 507 6927 ALS CANADA LTD Part of the ALS Group An ALS Limited Company

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L2125942 CONTD.... PAGE 2 of 3 Version: FINAL

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2125942-1 MW18-1 Sampled By: CLIENT on 09-JUL-18 @ 08:00							
Anions and Nutrients							
Nitrate and Nitrite as N	10.0		0.022	ma/l		12 11 19	
Nitrate (an N)	12.2		0.022	mg/L		12-JUL-10	D 44 02607
	12.2		0.020	mg/∟		11-JUL-10	R4123007
	<0.010		0.010	mg/L		TI-JUL-18	R4123607
L2125942-2MW18-2Sampled By:CLIENT on 09-JUL-18 @ 08:00Matrix:WATER							
Anions and Nutrients							
Nitrate and Nitrite as N	15.9		0.022	mg/L		12-JUL-18	
Nitrate (as N)	15.9		0.020	mg/L		11-JUL-18	R4123607
Nitrite (as N)	<0.010		0.010	mg/L		11-JUL-18	R4123607
L2125942-3 MW18-3 Sampled By: CLIENT on 09-JUL-18 @ 08:00 Matrix: WATER							
Anions and Nutrients							
Nitrate and Nitrite as N	9.09		0.022	mg/L		12-JUL-18	
Nitrate (as N)	9.09		0.020	mg/L		11-JUL-18	R4123607
Nitrite (as N)	<0.010		0.010	mg/L		11-JUL-18	R4123607
l							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.



Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description		Parameter	Qualifier	Applies to Sample Number(s)	
Matrix Spike		Nitrate (as N)	MS-B	L2125942-1, -2, -3	
Sample Param	eter Qualifier key	listed:			
Qualifier	Description				
MS-B	Matrix Spike recover	ry could not be accurately calculated	due to high analyte	background in sample.	
Test Method R	eferences:				
ALS Test Code	Matrix	Test Description	Method Reference	ence**	
ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B		
NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (m	od)	
Inorganic anior	ns are analyzed by lon	Chromatography with conductivity a	and/or UV detection.		
NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (m	od)	
Inorganic anior	ns are analyzed by lon	Chromatography with conductivity a	and/or UV detection.		
** ALS tost mothe	da may incorporato m	adifications from appointed reference	mothode to improve	anorformance	

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

17-615312

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

				-		-			
			Workorder:	L2125942		Report Date:	13-JUL-18		Page 1 of 2
Client: DS Consult 6221 Highw Vaughan C		Consultants (Vaughan) Highway 7 Unit 16 Jhan ON L4H 0K8							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT		Water							
Batch	R4123607								
WG2819395-	14 DUP		WG2819395-1	3					
Nitrite (as N)	14 001		< 0.010	<0.010	RPD-NA	mg/L	N/A	25	11-JUL-18
WG2819395- Nitrite (as N)	12 LCS			102.1		%		70-130	11-JUL-18
WG2819395- Nitrite (as N)	11 MB			<0.010		mg/L		0.01	11-JUL-18
WG2819395- Nitrite (as N)	15 MS		WG2819395-1	3 99.5		%		70-130	11-JUL-18
NO3-IC-WT		Water							
Batch	R4123607								
WG2819395-	14 DUP		WG2819395-1	3					
Nitrate (as N)		8.16	8.15		mg/L	0.2	25	11-JUL-18
WG2819395- Nitrate (as N	12 LCS)			101.7		%		70-130	11-JUL-18
WG2819395- Nitrate (as N	11 MB)			<0.020		mg/L		0.02	11-JUL-18
WG2819395- Nitrate (as N	15 MS)		WG2819395-1	3 N/A	MS-B	%		-	11-JUL-18

TOWN OF CALEDON PLANNING RECEIVED

Quality Control Report Workorder: L2125942

Report Date: 13-JUL-18

May 04, 2020 Client: DS Consultants (Vaughan) 6221 Highway 7 Unit 16 Vaughan ON L4H 0K8

Contact: Scott Watson

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

TOWN OF CALEDON Are samples for h TOWN OF CALEDON Are samples for h Are samples for h A	Drinking Are samples taker							ALS Sample # (lab use only)	ALS Lab Wor	LSD:	PO / AFE:	Job #:	ALS Account # /	4 49 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Contact:	Comosny		Postal Code:	City/Province:	Street:		Phone:	Company: Contact:	Report To	(ALS)	1 1	
S [g Water (DW) Samples' (client use) s n from a Regulated DW System?				MW18-3	NW18-2	MW18-1	Sample Identification and/ (This description will appea	k Order # (lab use only): 1,21259			18-577-30	Quote #:	Project Information					Vaysha / ON	Ghal Huy 7, Unit 1	Company address below will appear on the final report	1910-212-0291	UJ Consultants ate	Contact and company name below will appear on the	Enuironmental www.alsolobal.com		
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DS Consultants (Vaughan) ATTN: Pradeep Patel 6221 Highway 7 Unit 16 Vauqhan ON L4H 0K8 Date Received: 26-JUL-18 Report Date: 03-AUG-18 14:17 (MT) Version: FINAL

Client Phone: 647-237-5110

Certificate of Analysis

Lab Work Order #:L2136473Project P.O. #:NOT SUBMITTEDJob Reference:18-577-30C of C Numbers:17-615381Legal Site Desc:17-615381

Amanda Fasebas

Amanda Fazekas Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 5730 Coopers Avenue, Unit #26 , Mississauga, ON L4Z 2E9 Canada | Phone: +1 905 507 6910 | Fax: +1 905 507 6927 ALS CANADA LTD Part of the ALS Group An ALS Limited Company

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ANALYTICAL REPORT

L2136473 CONT'D.... Job Reference: 18-577-30 PAGE 2 of 4 03-AUG-18 14:17 (MT)

Summary of Guideline Exceedances

Guideline						
ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
Ontario Dri	nking Water Regulation (ODWQS) JAN.1,2018 - Schedule 1	(Microbiological) and 2 (Chemical) Sta	andards (JAN,2018)		
L2136473-1	MW18-1	Anions and Nutrients	Nitrate and Nitrite as N	12.3	10.0	mg/L
			Nitrate (as N)	12.3	10	mg/L
L2136473-2	MW18-2	Anions and Nutrients	Nitrate and Nitrite as N	12.5	10.0	mg/L
			Nitrate (as N)	12.5	10	mg/L
L2136473-3	MW18-3	Anions and Nutrients	Nitrate and Nitrite as N	12	10.0	mg/L
			Nitrate (as N)	12.0	10	mg/L
Ontonio Dal	nking Water Degulation //		M. A south attained the south south of the line of	_		

Ontario Drinking Water Regulation (ODWQS) JAN.1,2018 - Ontario DW Aesthetic and Operational Guidelines

(No parameter exceedances)



ANALYTICAL REPORT

L2136473 CONT'D Job Reference: 18-577-30 PAGE 3 of 4 03-AUG-18 14:17 (MT)

Anions and Nutrients - WATER

		Sample Sam	Lab ID e Date iple ID	L2136473-1 26-JUL-18 MW18-1	L2136473-2 26-JUL-18 MW18-2	L2136473-3 26-JUL-18 MW18-3	L2136473-4 26-JUL-18 17381	L2136473-5 26-JUL-18 10305
Analyte	Unit	Guide #1	Limits #2					
Nitrate and Nitrite as N	mg/L	10.0	-	12.3	12.5	12	<0.022	4.64
Nitrate (as N)	mg/L	10	-	12.3	12.5	12.0	<0.020	4.64
Nitrite (as N)	mg/L	1	-	<0.010	<0.010	<0.010	<0.010	<0.010

Guide Limit #1: Schedule 1 (Microbiological) and 2 (Chemical) Standards (JAN,2018)

Guide Limit #2: Ontario DW Aesthetic and Operational Guidelines

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made. Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

May 04, 2020

Reference Information

Methods Listed (if applicable)

hethous Listeu (II applicable).									
ALS Test Code	Matrix	Test Description	Method Reference**						
ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B						
NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)						
Inorganic anions are analy	Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.								
NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)									
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.									
**ALS test methods may incorp	oorate modifica	tions from specified reference methods t	to improve performance.						
Chain of Custody Numbers:									
17-615381									
The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:									
Laboratory Definition Code	Laboratory Definition Code Laboratory Location								
WT	WT ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA								

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

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Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.



Quality Control Report

			Workorder:	L2136473	F	Report Date:	03-AUG-18		Page 1 of 2
Client:	DS Consu 6221 High Vaughan	ultants (Vaughan) hway 7 Unit 16 ON L4H 0K8							
Contact:	Pradeep	Patel							
Test		Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT		Water							
Batch F	R4157969								
WG2839808-9 Nitrite (as N)	DUP		WG2839808-8 <0.010	<0.010	RPD-NA	mg/L	N/A	25	02-AUG-18
WG2839808-7 Nitrite (as N)	LCS			102.8		%		70-130	02-AUG-18
WG2839808-6 Nitrite (as N)	6 MB			<0.010		mg/L		0.01	02-AUG-18
WG2839808-1 Nitrite (as N)	0 MS		WG2839808-8	94.7		%		70-130	02-AUG-18
NO3-IC-WT		Water							
Batch F	R4157969								
WG2839808-9 Nitrate (as N)	DUP		WG2839808-8 12.9	12.0		mg/L	7.4	25	02-AUG-18
WG2839808-7 Nitrate (as N)	LCS			102.7		%		70-130	02-AUG-18
WG2839808-6 Nitrate (as N)	6 MB			<0.020		mg/L		0.02	02-AUG-18
WG2839808-1 Nitrate (as N)	0 MS		WG2839808-8	N/A	MS-B	%		-	02-AUG-18

TOWN OF CALEDON PLANNING RECEIVED

Quality Control Report

Workorder: L2136473

Report Date: 03-AUG-18

May 04, 2020 Client: DS Consultants (Vaughan) 6221 Highway 7 Unit 16 Vaughan ON L4H 0K8

Pradeep Patel

Contact:

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

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Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

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Are samples take	n from a Regulated DW System?				lce Pack	େ 🔲 🗔 ପ	ibes 🗹	Gustody	seal intac	t Yes			No		
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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION Failure to complete all portions of this form may delay analysis. Picase fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy. 1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

TOWN OF CALEDON PLANNING RECEIVED May 04, 2020	rofins Environment Testing	Certificate of Analysis		
Client: Attentio PO#:	DS Consultants Limited 6221 Highway 7 Vaughn, Ontario L4H 0K8 Dn: Mr. Pradeep Patel		Report Number: Date Submitted: Date Reported: Project: COC #:	1817591 2018-09-27 2018-10-04 18-577-30 198743
Invoice	to: DS Consultants Limited	Page 1 of 3		

Dear Pradeep Patel:

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:

Addrine Thomas 2018.10.04 12:23:27 -04'00'

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.

PLANNING RECEIVED CUROFINS May 04, 2020

TOWN OF CALEDON

Certificate of Analysis

Environment Testing

Client:	DS Consultants Limited
	6221 Highway 7
	Vaughn, Ontario
	L4H 0K8
Attention:	Mr. Pradeep Patel
PO#:	
Invoice to:	DS Consultants Limited

Report Number:	1817591
Date Submitted:	2018-09-27
Date Reported:	2018-10-04
Project:	18-577-30
COC #:	198743

				Lab I.D. Sample Matrix Sample Type Sampling Date Sample I.D.	1390097 GW 2018-09-26 MW 18-1	1390098 GW 2018-09-26 MW 18-2	1390099 GW 2018-09-26 MW 18-3
Group	Analyte	MRL	Units	Guideline			
Anions	N-NO2	0.10	mg/L	MAC 1.0	<0.10	<0.10	<0.10
	N-NO3	0.10	mg/L	MAC 10.0	10.1*	14.5*	8.40
General Chemistry	рН	1.00		6.5-8.5	7.94	7.97	7.94
Nutrients	N-NH3 (unionized)	0.02	mg/L		< 0.02	< 0.02	<0.02
	N-NH4	0.02	mg/L		< 0.02	<0.02	0.03
Subcontract-Inorg	N-NH3	0.02	mg/L		<0.02	<0.02	0.03

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.

146 Colonnade Rd. Unit 8, Ottawa, ON K2E 7Y1

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range



Certificate of Analysis

Environment Testing

Client:	DS Consultants Limited
	6221 Highway 7
	Vaughn, Ontario
	L4H 0K8
Attention: PO#:	Mr. Pradeep Patel
Invoice to:	DS Consultants Limited

Report Number:	1817591
Date Submitted:	2018-09-27
Date Reported:	2018-10-04
Project:	18-577-30
COC #:	198743

QC Summary

Analyte	Blank	QC % Rec	QC Limits	
Run No 353715 Analysis/Extraction Date 2018-10-01 Analyst Z S Method C SM4500-NO3-F Analysis/Extraction Date 2018-10-01 Analyst Z S				
N-NO2	<0.10 mg/L	100	80-120	
N-NO3	<0.10 mg/L	90	80-120	
Run No 353762 Analysis/Extraction Date 20 Method SM2320,2510,4500H/F	118-09-28 Ana	ilyst AET		
рН		99	90-110	
Run No 353911 Analysis/Extraction Date 20 Method POINTECLAIRE	18-10-01 Ana	ilyst AET		
N-NH3	<0.02 mg/L	98		
Run No 353960 Analysis/Extraction Date 20 Method C SM4500-NH3D C	18-10-04 Ana	llyst AET		
N-NH3 (unionized)				
Run No 353962 Analysis/Extraction Date 20 Method C SM4500-NH3D	18-10-04 Ana	llyst AET		
N-NH4				

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



TOWN OF CALEDON PLANNING RECEIVED

May 04, 2020

IID and

CHAIN OF CUSTODY

146 Colonnade Rd., Unit 8, Ottawa, ON K2E 7Y1 Ph: (613) 727-5692 Fax: (613) 727-5222
 608 Norris Court, Kingston, ON K7P 2R9 Ph: (613) 634-9307 Fax: (613) 634-9308
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2395 Speakman Drive, Mississauga, ON, L5K 1B3 Phone: (905) 822-4111 Fax: (905) 823-1446

LABORATORY USE ONLY Report #: 1817591

198743

Clicity De	Criteria Required*:	
Client: US Consultants	BODWSOC	Additional Email/Fax:
Contact: prodeen Pritel	PWOO	city: 1. Email: doubter constant is
Address: 6221 Highway 7 init 14	Opt Reg 558	2. Email:
Vaughein, ON		3. Email:
Email: Ordeep. ruleieds Phone: (42-32-34)		Fax:
Project: Consultanis: (4	Samary Sewer, City:	Report Format:
Invoice Information*:	Storm Sewer, City:	PDF & Excel D Other Specify
Invoice to the same as above? (Yes) / No. or:	Cont. Reg 153/04	Turnaround Time (ruch owner)
Client:	lable #, Coarse/Fine, Surface/Su	ubsurface 5 Business Days (Standard)
Contact:	Type: Com-Ind / Res-Park / Agri / GW	N / Other 3 Business Days (Bush)
Address:	The sample results from this submission	
	will form part of a formal Record of Site	2 Dusiness Days (Rush)
Email:	Condition (RSC) under O.Reg. 153/04	L*
Purchase Order #	YES / NO	Other (specifiy date):
Pulchase Order #:	Is this a drinking water sample? VEC /	Notes:
	If yes, complete the drinking water	
* Indicates a required field	water L	
Ploase note that i		
Samples should be be	around time delays	Parameters
Camples should be kept cool (4-10°C) from sampling time	through drop-off at the laboratory	
	Somela	
Sample ID* Date/Time Sampled*	Sample Sample	
MW18-1 Second 2	Matrix # Bottles Location	
Jep 26, 2013	SW 2 Caledon	X X Uniy
MWIO-L		137009
MW18-3		129.99
		X X 200
		51007
Samples Relinquished By: Date/Time: US	Samples Received Pre	
Nor singlande 3ep 27, 2013	Steres 11. 4-10-	Date/Time: 1:00 Temperature: Condition
Samples Relinquished By: Date/Time:	STOUCH WINTIN	09/27/18 m 11/00
5	bamples Received By:	Date/Time:
		Page #
	AFSTDCOC 2	

Appendix E: Nitrate Loading Assessment

Nitrate Loading Assessment

Detail	Without	With
	Treatment	Tertiary Treatment
Subdivision Area (A)	30.174 ha	30.174
Proposed number of lots (P)	22	22
Number of bedrooms	4/lot	4/lot
Sewage volume per bedroom	250 L/day	250 L/day
Sewage nitrate concentration (C)	40 mg/L	20 mg/L
Sewage loading (SL)	1000L/day/lot	1000L/day/lot
Nitrate loading (N)	40 gm/day/lot	20 gm/day/lot
Impervious Surface Area (S)	0.1263	0.1263
Infiltration (I)	0.25 m/year	0.25 m/year
Average On-site Background Nitrate	11.9	-
Concentration (B)-max.		
Off-site Background Nitrate Concentration (B)-	<0.2 - 4.64 mg/L	-
max.		
Ontario Drinking Water Standard (O)	10 mg/L	-

On-site Nitrate Calculations- Without Treatment

Property Recharge (R) R=A*(1-S) * I = 31* 10,000 m²*(1-0.1263) * 0.25m/year = 180.55 m³/day Nitrate Loading (L) L=N*P = 40 gm/day *22 mg/day = 880 gm/day Resulting Downgradient Nitrate Concentration (RNC) RNC=L/H = (840 gm/day)/ (191 m³/day) = 4.87 mg/L

On-site Nitrate Calculations- With Treatment

Property Recharge (R) R=A*(1-S) * I = 31* 10,000 m²*(1-0.1) * 0.25 m/year = 180.55 m³/day Nitrate Loading (L) L=N*P = 20 gm/day *22 mg/day = 440 gm/day Resulting Downgradient Nitrate Concentration (RNC) RNC=L/H = (420 gm/day)/ (191m³/day) = 2.44 mg/L