

#### PRELIMINARY GEOTECHNICAL REPORT PROPOSED CAMPGROUND EXPANSIONS & UPGRADES 1898 WHISTLE BARE ROAD TOWNSHIP OF NORTH DUMFRIES, ONTARIO

Submitted to:

Whistle Bare Campground 1898 Whistle Bare Road Cambridge, Ontario N1R 5S3

Attention:

Mr. Peter Bingeman



519-742-8979

November 27, 2019 File No.: G19847

Whistle Bare Campground 1898 Whistle Bare Road Cambridge, Ontario N1R 5S3

Attention: Mr. Peter Bingeman

#### Re: PRELIMINARY GEOTECHNICAL REPORT **PROPOSED CAMPGROUND EXPANSIONS & UPGRADES 1898 WHISTLE BARE ROAD** TOWNSHIP OF NORTH DUMFRIES, ONTARIO

We take pleasure in enclosing one (1) copy of our Geotechnical Report conducted for the abovedescribed project and we will be glad to discuss any questions arising from this work.

We thank you for giving us this opportunity to be of service to you.

Yours truly, CHUNG & VANDER DOELEN ENGINEERING LTD.

Robert Vander Doelen, P. Eng. Senior Engineer

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#### 1.0 INTRODUCTION

CHUNG & VANDER DOELEN ENGINEERING LTD. (CVD) has been retained by Whistle Bare Campground to prepare a preliminary geotechnical report for the expansions and upgrades proposed for the existing Whistle Bare Campgrounds located at 1898 Whistle Bare Road in the Township of North Dumfries.

The existing campground is located in the north half of the 38.6 hectare site and is comprised of eighty (80) seasonal trailer sites, a public washroom building, a recreational pavilion, and a picnic pavilion. The site is serviced with various wastewater treatment systems and a private well. A gravel surfaced roadway network meanders through the campground.

It is proposed to reconfigure the eighty (80) seasonal trailer sites, expand the campground to accommodate a total of 400± sites (including several cabin and overnight sites), and construct two (2) recreation halls and pool areas. New water distribution and communal wastewater collection and treatment systems are proposed for the campground expansion. Expansion of the roadway network and parking areas are also proposed.

The purpose of this preliminary report is to evaluate the subsurface conditions findings generated by others and provide general geotechnical recommendations for the design and construction of private/communal site servicing, roadways and building structures. Estimates of hydraulic conductivity and infiltration rates of the insitu inorganic native soil deposits will be provided.

#### 2.0 FIELD WORK AND LABORATORY TESTING

Subsurface borehole and test pit investigations were conducted by LVM in 2012 and 2013 and by FlowSpec Engineering (FSE) in 2017. The findings of these four (4) investigations will be used for the purposes of this preliminary report. The borehole and test pit logs sheets are presented in Appendix "B". The locations of the boreholes and test pits are shown on Drawing No. 1, Testhole Location Plan.

Boreholes were drilled and sampled to depths between 3.81 and 13.72 m below existing grade and test pits were excavated and sampled to depths between 1.3 and 2.2 m below existing grade.

50 mm diameter monitoring wells were installed at all fifteen (15) borehole locations. Groundwater levels for 2019 were measured by FSE on May 17 and August 21, 2019.

Moisture content analysis was performed on the samples retrieved during the LVM borehole investigation. Twelve (12) grain size distribution analyses were conducted during the various investigations.

Whistle Bare Campground Proposed Campground Expansions & Upgrades 1898 Whistle Bare Road, Township of North Dumfries

#### 3.0 SUBSURFACE CONDITION

The subsurface conditions encountered at the boreholes and test pits are detailed on the Borehole and Test Pit Log Sheets enclosed in Appendix "B". The following notes are intended to amplify and comment on the subsurface data obtained.

The stratigraphic boundaries shown on the borehole logs are inferred from non-continuous sampling conducted during advancement of the borehole drilling procedures and, therefore, represent transitions between soil types rather than exact planes of geologic change. The subsurface conditions will vary between and beyond the borehole locations.

#### 3.1 Fill

Fill soil consisting of topsoil, silt, sandy silt, silty sand, sand, and/or sand and gravel was encountered at LVM Boreholes 1 to 4 and 6, FSE Boreholes 1 to 3, and LVM Test Pit 1. The fill extended to depths between 0.1 and 1.8 m below existing grade. Based on the low Standard Penetration Test (SPT) values obtained at the various boreholes, the fill exists in a very loose to loose compactness condition. The fill is reported to be in a generally moist condition.

#### 3.2 Organic Deposits

The fill at LVM Boreholes 1, 3, 4 and 6 and FSE Boreholes 1 to 3 were underlain by peat and marl deposits which extended to depths between 1.8 and at least 4.6 m below existing grade. Based on the low SPT values obtained at the various boreholes, the peat and marl exist in a very loose to loose compactness condition. These organic soils are reported to be in a generally wet to saturated condition.

The fill at LVM Test Pit 1 and the ground surface at LVM Boreholes 5, 7 and 8, LVM Test Pits 2 to 11, and FSE Test Pits 1 to 7 were underlain by topsoil (0.1 to 0.5 m thick) which extended to depths between 0.1 and 0.8 m below existing grade.

#### 3.3 Silt to Sand and Silt

The peat or topsoil at LVM Borehole 8, LVM Test Pits 1 to 10, and FSE Test Pits 1 to 3 and 5 to 7, and the ground surface at FS Borehole 6 were underlain by brown deposits varying in composition from silt (with trace to some sand) to sand and silt which extended to depths between 0.35 and 6.1 m below existing grade. Layers of silt till were sporadically encountered at LVM Borehole 8 and the borehole were was terminated within the sit till at a depth of 5.79 m below existing grade.



Based on the SPT values obtained at LVM Borehole 8 and FSE Boreholes 3 and 6, the silt to sand and silt generally exists in a very loose to compact compactness condition. These soils are reported to be in a moist to saturated condition.

#### 3.4 Granular Deposits

The above described layers/deposits were underlain by fine to coarse granular deposits varying in composition between fine sand with trace to some silt to sand and gravel. Thirty two (32) of thirty three (33) testholes were terminated within the granular deposits at depths between 1.3 and 13.72 m below existing grade.

Based on the Standard Penetration Test (SPT) values obtained at the various boreholes, the sand deposits displayed a variable very loose to compact compactness condition, however, the SPT values may be affected by hydrostatic pressures when testing was conducted below the groundwater table. The sand and gravel deposits displayed a compact to very dense compactness condition. The granular deposits are reported to be in a variable damp to saturated condition.

Twelve (12) grain size distribution analyses were conducted on representative samples of the sand and sand and gravel deposits retrieved from the various test pits and the results are enclosed in Appendix "C".

#### 3.5 Groundwater Condition

50 mm diameter monitoring wells were installed at LVM Boreholes 1 to 8 and FS Boreholes 1 to 7 to enable measurement of groundwater levels over the long term. The following table provides the water levels measured on May 17 and August 21, 2019 by FSE.

Borehole	Ground Surface	Water D	epth (m)	Water Elev	vation (m)
Location	Elevation (m)	May 17, 2019	Aug 21, 2019	May 17, 2019	Aug 21, 2019
LVM BH 1	300.48		1.75		298.73
LVM BH 2	301.19		2.46		298.73
LVM BH 3	299.68	0.96	1.18	298.72	298.50
LVM BH 4	298.95	0.39	0.78	298.56	298.17
LVM BH 5	298.98		1.36		297.62
LVM BH 6	208.48		1.02		297.46



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Borehole	Ground Surface	Water D	epth (m)	Water Elev	vation (m)
Location	Elevation (m)	May 17, 2019	Aug 21, 2019	May 17, 2019	Aug 21, 2019
LVM BH 7	297.96		1.89		296.07
LVM BH 8	301.24		3.18		298.06
FSE BH 1	299.76	0.78	1.02	298.98	298.74
FSE BH 2	299.98	0.89	1.11	299.09	298.87
FSE BH 3	301.21	1.49	1.82	299.72	299.39
FSE BH 4	310.53	9.67	10.22	300.86	300.31
FSE BH 5	311.07	9.40	9.80	301.67	301.27
FSE BH 6	304.58	4.51	5.08	300.07	299.50
FSE BH 7	312.12	10.56	10.88	301.56	301.24

Initial groundwater levels measured at the eight (8) LVM boreholes in April of 2012 were generally very similar to the levels measured in August of 2019.

It is noted that the groundwater table will fluctuate in response to major weather events. Seasonal fluctuations of the groundwater table will occur as illustrated in the table above.

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#### 4.0 DISCUSSION AND RECOMMENDATIONS

It is proposed to reconfigure the eighty (80) seasonal trailer sites, expand the campground to accommodate a total of 400± sites (including several cabin and overnight sites), and construct two (2) recreation halls and pool areas. New water distribution and communal wastewater collection and treatment systems are proposed for the campground expansion. Expansion of the roadway network and parking areas are also proposed.

Groundwater levels in the north lower area of the site are very shallow, lying generally between 0.4± m and 2.5± m below existing grade. "French Drain" systems may be feasible and could be considered to control groundwater levels, thus creating less impact to future construction works and costs in this area of the site.

#### 4.1 Underground Site Servicing

Underground servicing will include new water distribution and communal wastewater collection and treatment systems are proposed for the campground re-configuration and expansion. Cognizant of the shallow groundwater conditions and the permeable/transmissive qualities of the inorganic granular deposits underlying the surficial organic soils in the north portion of the site, it is recommended that future servicing (including sewage pumping stations) be kept as shallow as possible to prevent/minimize extensive dewatering requirements and prevent uplift forces being applied to the installed infrastructure.

#### 4.1.1 Excavation Conditions

Trenching can be carried out using conventional open cut procedures, however, the use of trench box is recommended for excavations in the low-lying north portion of the site. The excavations will generally intersect very loose to loose fill, organic soil and various underlying very loose to compact inorganic soil deposits in the lower north portion of the site and competent compact to very dense granular soils in the higher south portion of the site.

The inorganic soil deposits underlying the organic soils will generally provide suitable subgrade support to sewer and watermain serving. All organic soils encountered at the pipe and structure invert level should be sub-excavated and replaced with non-shrinkable fill to within 0.15 m of the pipe or structure invert level.

The soils encountered in the low-lying north portion of the site are generally considered to be Type 4 Soils in accordance with the latest Occupational Health and Safety Act and trenches should be cut to 3H to 1V throughout. The side slopes should be suitably protected from erosion processes. Where seepage zones are intersected, side slopes may require to be flattened and the groundwater controlled by suitable means. Excavations can also be supported using suitable trench box support systems.



The soils encountered in the higher south portion of the site are generally considered to be Type 3 Soils in accordance with the latest Occupational Health and Safety Act and trenches should be cut to 1H to 1V throughout. The side slopes should be suitably protected from erosion processes. Where seepage zones are intersected, side slopes are to be flattened locally and the groundwater controlled by suitable means. Excavations can also be supported using suitable trench box support systems.

#### 4.1.2 Pipe Bedding

As noted in Section 4.2.1, any organic or unsuitable soils exposed at the pipe and structure invert level should be sub-excavated and replaced with non-shrinkable fill to within 0.15 m of the pipe or structure invert level.

The bedding requirements for the services should be in accordance with Ontario Provincial Standard Drawings OPSD - 802 for flexible and rigid pipes. The bedding shall be a Class "B" and consist of at least 150 mm thick Granular "A" or High Performance Bedding (HPB) compacted to at least 95% SPMDD. Granular "A" or HPB should be used to backfill around the pipe to at least 150 mm above the top of the pipe.

Particular attention should be given to ensure material placed beneath the haunches of the pipe is adequately compacted. Recycled asphalt will not be allowed to be used in bedding material.

#### 4.1.3 Trench Backfill

Excavated inorganic materials are considered suitable for reuse as trench backfill. If necessary, potential mixing of drier and wetter excavated soils in proper ratios can be done to produce a suitable mixture near the materials optimum moisture content in order to achieve the required compaction specification. HPB is recommended to be used as trench backfill to at least the surface of the groundwater table where encountered (primarily the low-lying north portion of the site). Any shortfall of backfill material can be made with inorganic granular soil excavated elsewhere on the site.

The backfill should be placed in thin layers, 300 mm thick or less dependant on the demonstrated success of compaction based on in-situ density test results. Other types of materials such as organic soils, overly wet soils, boulders and frozen materials (if work is carried out in the winter months) should not be used for backfilling. All backfill should be compacted to at least 95% SPMDD.

Backfilling operations should follow closely after excavation so that only a minimal length of trench slope is exposed at any one time so as to minimize potential problems. This will potentially minimize over-wetting of the backfill material. Particular attention should be given to make sure frozen material is not used as backfill should construction extend into the winter season.



Frequent inspection by experienced geotechnical personnel should be carried out to examine and approve backfill material, to carefully inspect placement, and to verify that the specified degree of compaction has been obtained by in situ density testing.

#### 4.1.4 Groundwater Control

The groundwater table will be encountered during the installation of site servicing and construction works. It should be noted that the groundwater table can be expected to fluctuate seasonally and with major weather events.

## CVD recommends that test pits be dug during the tendering stage of the project, so that the potential contractors can examine the groundwater and soil conditions and arrive at suitable methods of excavation, groundwater control and backfilling based on their experience and plant.

Where the exposed base subgrade and sidewall soils of the excavation are comprised of saturated granular deposits, it is recommended that groundwater be lowered and controlled to at least 0.6 m below the base of excavations to create and maintain a stable subgrade condition to facilitate construction activities and backfilling operations, and to ensure cut slope stability.

In general, groundwater is expected to be controllable by pumping from several filtered sump pits (possibly together with intercept ditching) if the water table at the time of construction is located within 0.5 m above the required excavation level. If the water table at the time of construction is located higher than 0.5 m above the required excavation level, it is expected that pre-lowering of the groundwater table will be required prior to excavation. This may require the use of a vacuum well point(s) dewatering system.

Pumping over 50,000 Litres/day is considered to be a "water taking" by the Ministry of Environment, Conservation and Parks (MECP) and is subject to the ministry's "Permit To Take Water (PTTW)" requirements. In March 2016, the Ministry provided an exemption from the permitting requirements for "construction-only" water takings that do not exceed 400,000 Litres/day. For these modest "construction-only" water takings, the water taking must still be "registered" on the MECP "Environmental Activity and Sector Registry (EASR)", but nevertheless a quicker and less formal process is now available to allow pumping to proceed.

In addition, the ministry has clarified that surface water from rainfall is not included in the water quantity and there is no time limitation for these regulated water takings, although a qualified person (QP) must still evaluate the water taking for all the same environmental impact issues and then indicate this through the online registration procedure. For all other water takings and construction water takings exceeding 400,000 Litres/day, a PTTW is still required along with a 90-day review process.



#### 4.2 Pavement Design and Construction

The earth subgrade soil beneath pavement areas is expected to vary substantially over the site. It is recommended that granular-surfaced pavements be utilized in areas underlain by organic peat and/or marl deposits due to their likely need for annual routine maintenance and their extensive removal costs otherwise (protracted settlement of this organic soils is anticipated).

The following asphalt-surfaced pavement structure is recommended in areas where inorganic silt to sand and silt soil exists beneath future asphalt pavement and groundwater lies at least 0.5 m below the pavement structure profile.

Component	Light Duty Pavement (mm)	Heavy Duty Pavement (mm)
HL3 Asphaltic Concrete HL8 Asphaltic Concrete	40 40	40 50
Granular "A" Base	150	150
Granular "B" Sub-base	300	400

The pavement design considers that road construction will be carried out during the drier time of the year and that the subgrade is stable, not heaving under construction equipment traffic. If the subgrade is wet or unstable, additional granular sub-base may be required.

Reduction of the Granular "B" sub-base thickness has potential to occur if free-draining granular deposits are exposed at the earth subgrade level. Further evaluation would be required at the time of construction.

Preparation of the earth subgrade for asphalt-surfaced pavement will involve removal of surficial topsoil and thorough recompaction of the exposed inorganic subgrade. Any unstable/soft areas encountered or exposed during the preparation process should be excavated to the level of competent soil. The required grades can then be achieved by placing approved on-site inorganic soil or imported soils (within 3% below the optimum moisture content) in maximum 200 to 300 mm thick lifts which should be compacted to at least 95% SPMDD.

The base and sub-base materials should be produced in accordance with the current OPSS specifications, and placed and uniformly compacted to at least 100% SPMDD. The asphaltic concrete should be placed and compacted in accordance with OPSS Form 310 and to a minimum of 92% of the Marshall Density (MRD). Frequent in situ density testing by this office should be carried out to verify that the specified degree of compaction is being achieved and maintained.



It should be noted that even well compacted trench backfill could settle for a period of time after construction. In this regard, the surface course of the asphaltic concrete should be placed at least one (1) year after trench backfill is completed so as to allow any minor settlements to occur within the trench backfill. The incomplete pavement structure may not be capable of supporting construction traffic. Consequently, minor repairs of the sub-base, base and asphaltic concrete may be required prior to paving with the base course and/or the surface course asphaltic concrete.

Longitudinal sub-drains with positive drainage outlets are recommended to be installed at the subgrade level along the edges of the roadway construction to enhance the performance of the pavement if non free-draining soil conditions exist at the earth subgrade level. Systematic drainage of the granular base materials will promote the longevity of the pavement structure.

#### 4.3 Foundations

Conventional shallow footing foundations are expected to be feasible to support building structures located in areas without substantial organic soils. Use of helical piles or other alternative deep foundation support technologies could be utilized in areas underlain by substantial organic soils and/or very loose to loose native inorganic deposits.

Additional geotechnical investigation for future building structures is advised at the design stage.

#### 4.4 Hydraulic Conductivity and Infiltration Rates

Grain size distribution analyses were conducted on samples of the various native inorganic deposits. The results are graphically presented in Appendix "C".

Based on our past experience and the results of grain size analyses, the coefficient of permeability and infiltration rate of the encountered inorganic native soil deposits are estimated and provided in the following table:

MATERIAL	PERMEABILITY (K) (cm/sec)	INFILTRATION RATE (mm/hr)
Sand and Silt	1 X 10 <sup>-5</sup> to 1 X 10 <sup>-4</sup>	10 to 30
Silt	5 X 10 <sup>-6</sup>	5
Fine to Medium Sand, trace silt	1 X 10 <sup>-3</sup> to 1 X 10 <sup>-2</sup>	75 to 150
Sand and Gravel, trace silt	1 X 10 <sup>-2</sup> to 1 X 10 <sup>-1</sup>	150 to 600

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#### 5.0 CLOSURE

The Limitations of Report, as quoted in Appendix "A", is an integral part of this report.

We trust that the information presented in this report is complete within our terms of reference. If there are any further questions concerning this report, please do not hesitate to contact our office.

Yours truly, CHUNG & VANDER DOELEN ENGINEERING LTD.

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Robert Vander Doelen, P. Eng. Senior Engineer

Eric Y. Chung, M. Eng., P. Eng. Principal Engineer



### **APPENDIX "A"**

### **LIMITATIONS OF REPORT**



### **APPENDIX "A"**

#### LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the testhole locations. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Soils Engineer be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the testholes.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of testholes and their respective depths may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusion as to how the subsurface conditions may affect their work.

The benchmark and elevations mentioned in this report were obtained strictly for use in the geotechnical design of the project and by this office only, and should not be used by any other parties for any other purposes.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. CHUNG & VANDER DOELEN ENGINEERING LIMITED accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

This report does not reflect the environmental issues or concerns unless otherwise stated in the report.

### **APPENDIX "B"**

## LVM and FlowSpec Borehole and Test Pit Log Sheets



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	-	FILL: dark brown sandy silt (topsoil), moist SAND AND GRAVEL: compact brown sand and gravel, trace silt, damp		0.00 \ <u>301.11</u> 0.08				-															protective cover and concrete	
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								_														<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<	50 mm pipe 1.52 m slotted screen	
	-			295.40	SS-6	6-9 10	19												•				Talive Cave	
	6- - - - - - - - - - - - - - - - - - -	Borehole terminated at 5.79 m		5.79																				
	Revi	ewed by: D.Morlock	L	]	I	Dra	afted I	by:	S	.м	ete	er			1	1	1						Sheet: 1 of 1	
	Note	es: Top of pipe elevation = 301.92 m																						

X:\Style\_LVM\_Ontario\LogBorehole\_Log\_LVM\_Ontario\_NEW.sty- Printed : 2012-10-03 09h

							Grou	Ind	l Ele	eva	ation	:	299.	68 n	1		Bor	ehol	e Nu	mb	er:	BI	H-3-12
11-04 11h	L																Job	N°:				P-0000145-0-	00-400
: 2013-1		•															Drill	Date	•			2012	2-04-24
Printed	Proj	ect: Sage Campground - Se	wag	e Syst	tems	Assess	ment										Fiel	d Tec	h:			R.M	cMillan
tario.sty-	Loc	ation: 1912 Whistle Bare Road	i, To	ownsh	ip of	North D	oumfrie	es,	On	tar	io						Drill	Meth	od:			Hollow Stem	Auger
1_LVM_Ont		SOIL PROFILE			SAN				Dynar ×	mic (	Cone ×	s	ihear Si	trength	(PP) kl	Pa	⊢–– wp						
hole_Loc				Ê	Jumbe	50 mm	lue	, ,	20 40	06	0 80	_	50 1	100 1	50 200		Water	Content %)					
rio\LogBore	epth (m)	Description	ymbol	levation epth (m)	ype and I	Blows" /1	PT 'N' Va		Std Pe	eneti	ration	s	ihear Si	Initial Remol trength	d (FV) kl	Pa				Gro	ound S	dwater Observation Standpipe Details	ns and
M_Ontai	٥	Ground Elevation	Ś	ш <u></u> 299.68 0.00	F.	F	s		20 40	0 6	0 80	4	50 1	100 1	50 200		10	20 30					
V:\Style_LV		\ dark brown sandy silt, moist / loose brown fine to coarse sand, some silt, damp		299.60 /	r															m 2012-04-27 m 2012-04-27	m 2012-04-27	protective cover and concrete	
	1-				SS-1	4-6 3	9	•									$\square$			el. 298.49 el 298.49	. 298.43	hentonite seal	
		<b>PEAT:</b> very soft black amorphous peat, WTPL		298.46																¥	ē	Contonito Soai	
	2-	<i>MARL:</i> very soft grey marl, shells, WTPL		<b>297.85</b> 1.83	SS-2	0-0 1-2	1															19 mm pipe	
	-	SAND:		<b>297.39</b> 2.29																		0.15 m slotted filter	
	-	very loose to loose brown fine to coarse sand, saturated		6 6 6 6 7	SS-3	3-3 3	6	+															
40.0	3-	some silty sand layers		296.63 3.05				┢		_												bentonite seal	
al Scale = 1 :	-				SS-4	2-1 1	2																
Vertic	-	compact		3.66																~			
	-4 -			- - - -	SS-5	4-6 8	14													{ < < < < < <		sand pack	
	-																			~~~~~		50 mm pipe	00
	5-																		_			1.02 m slotted scre	
	-	Borehole terminated at 5.33 m		<b>294.35</b> 5.33	SS-6												•					0.15 m slotted filter	
	-																						
	6-							╞		_		+											
	-																						
	-																						
_	-																						
3.02.201	Rev	iewed by: D.Morlock		•		Dra	afted b	by:	<b>S</b> .	Me	teer											Sheet: 1	of 1
Ge-72 R.1 1£	Note	es: Top of pipe elevation = 300.54 m (	(50 n	nm), 300	0.56 n	n (19 mm i	upper),	300	0.52	<i>m</i> (	′19 m	m lo	wer)										
EQ-09-																							

							Grou	Ind	l Ele	eva	ation	1:	298	8.95	т		в	ore	ho	le	Num	nber:	BH-4-12	2
460 EO	L																Jo	b N	l°:			<b>P-0000</b>	145-0-00-400	0
012-10-																	D	rill I	Dat	e:			2012-04-24	4
inted : 2	Proj	ject: Sage Campground - Se	wag	e Syst	tems	Assessn	nent										Fi	eld	Те	ch:			R.McMillar	n
sty-Pri	Loc	ation: 1912 Whistle Bare Boar	ιτο	wnshi	in of	North Du	mfri	20	On	tar	in						D	rill <b>I</b>	Met	ho	d:	Hollow	Stem Auge	er
NEW		SOIL PROFILE	, 10		SAN	MPLE		, 	011	(u)		1												
Log_LVM_Ontaric	u)			(m) (r	d Number	/150 mm	Value		Dynai < 20 4(	nic ( ) 6	Cone ×	4	Shear S	Streng 100 Initia	th (PP) 150 2	) kPa	⊢ WP Wa	ter Co (%)		/L 1t		Groundwater Obse	ervations and	
gBorehole	Jepth (r	Description	Symbol	Elevatio Depth (r	lype an	Blows	SPT 'N'	•	Std Pe	eneti	ration		Shear	Rem Streng	old th (FV	) kPa						Standpipe I	Details	
ntario\Lo	_	Ground Elevation <i>FILL:</i>	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	298.95 0.00		-		ļ	20 40	) 6	0 80	4	50	100	150 2	200	10	20	30	)		protective cover		
X:\Style_LVM_O	- - -	brown silt, some sand, moist																			Ţ	and concrete		
	- 1- -	<b>PEAT:</b> very soft black amorphous peat, WTPL		298.04 0.91	SS-1	/WH													•		m 2012-04-27			
	-		에 <u>제</u> 도 제도 제도	297.43																	98.34	bentonite seal		
		<i>MARL:</i> very soft light beige marl, saturated	(ද (ද (ද (ද 4) (ද (ද (ද (	1.52	SS-2	/WH	_														el.			
	-				SS-3	/WH	_																	
	3						_														< < <			
al Scale = 1 : 40.0	-			295.37	SS-4	/WH															~~~~~~	sand pack 50 mm pipe 1.52 m slotted scree	an	
Vertic	4-	SAND: loose brown fine to coarse sand, trace silt, saturated		3.58	SS-5	1-5 5	10	-										Ŧ						
	-																					native cave		
	5			293.92	SS-6	3-3 3	6	ł										•						
	- - - - - - - - - - - -	Borenole terminated at 5.03 m		5.03																				
	- - - - -																							
02.2011	Rev	iewed by: <i>D.Morlock</i>	L	<u> </u>	I	Drat	fted I	by:	S.	Me	teer							Τ	T			Sheet:	1 of 1	
EQ-09-Ge-72 R.1 18.	Note	es: Top of pipe elevation = 299.70 m																						

							Grou	Ind	l Ele	eva	tion	:	298.	98 m	1	в	oreh	nole	Num	nber:	3H-5-12
460 EC																J	ob Nʻ	•		P-0000145-	0-00-400
012-10-(																D	rill D	ate:		20	12-04-24
nted : 2	Proj	ect: Sage Campground - Se	wag	e Syst	tems	Assessi	ment									Fi	eld 1	Fech:		R.I	McMillan
/.sty-Pr	Loc	ation: 1912 Whistle Bare Road	d. To	wnsh	ip of	North D	umfrie	es.	On	tar	io					D	rill M	etho	d:	Hollow Ste	m Auger
io_NEM		SOIL PROFILE	.,		SAM	PLE															
ole_Log_LVM_Ontar	(m)	Description		ion (m) (m)	nd Number	s" /150 mm	l' Value		Dynai < 20 4	mic ( 0 6(	Cone ×	s A	hear St 50 1	rength 00 15 Junitial Remole	(PP) kPa	₩P ₩P	iter Con (%)	→  WL		Groundwater Observat	ions and
gBoreh	Depth		Symbo	Elevati Depth	Type a	"Blows	N' TAS	•	Std Pe	enetr	ation	s	hear St	rength	(FV) kPa					Standpipe Detail	S
ntario\Lo	_	Ground Elevation		298.98 0.00		•		ļ	20 4	0 60	0 80		50 1	00 15	0 200	10	20	30		protective cover	
X:\Style_LVM_O	- - - -	dark brown sandy silt,moist / SAND: compact brown fine to coarse sand, trace silt and fine gravel, damp		0.08															2012-04-27	and concrete	
	- 1- -	saturated		<b>297.76</b>	SS-1	3-6 7	13									(			Cel. 297.64 m	bentonite seal	
	-				SS-2	5-7 8	15	-											Ŧ		
	2-							H					-								
	-	loose		296.69 2.29			_														
	-				SS-3	2-2 4	6										Ì			native cave	
al Scale = 1 : 40.0	3-				SS-4	2-4 6	10										•			50 mm pipe 1.52 m slotted screen	
Vertica	- - 4-	Borehole terminated at 3.81 m		295.17 3.81	-																
	-																				
	5-										_										
	-																				
	6-																				
	-																				
_	-							L													
.02.201	Rev	iewed by: <i>D.Morlock</i>	1	1	1	Dra	afted b	by:	<b>S</b> .	Ме	teer			1	1		1	1	1	Sheet: 1	of 1
-09-Ge-72 R.1 18	Note	es: Top of pipe elevation = 299.71 m																			
ß																					

							Grou	inc	i El	eva	atior	<b>1</b> :	298.	.48 n	n	E	Bor	ehc	le	Num	nber:	BH-6-12
460 EO																J	lob	N°:			P-0000	145-0-00-400
012-10-																[	Drill	Dat	e:			2012-04-24
inted : 2	Proj	ect: Sage Campground - Se	wag	e Syst	ems	Assess	ment									F	Field	d Te	ch:			R.McMillan
V.sty- Pı	Loca	ation: 1912 Whistle Bare Road	i, To	wnsh	ip of	North D	umfrie	es,	, Or	ntar	rio					[	Drill	Me	tho	d:	Hollow	Stem Auger
io_NEV		SOIL PROFILE			SAM	PLE		Γ				Т										
.ogBorehole_Log_LVM_Ontai	Depth (m)	Description	Symbol	Elevation (m) Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value	, 	Dyna 20 4 Std F	amic 10 6 L	Cone ×	< ,	Shear S	trength 100 1 Initial Remol trength	a (PP) kPa 50 200 Id a (FV) kPa		P Vater ( (?	V Conte %)	VL nt	ſ	Groundwater Obse Standpipe I	ervations and Details
Ontario\L		Ground Elevation FILL: brown conductive come group		<b>298.48</b> 0.00				-		+0 0				·····			1	20 3			protective cover	
X:\Style_LVM_C		brown sandy silt, some gravel, moist <b>PEAT:</b> soft black amorphous peat		<u>297.57</u> 0.91	SS-1	1-1 1	2	-												) m 2012-04-27 <u></u> ₩	and concrete	
	-		NK 71%	296.58	SS-2	/WH														297.50		
	2-	<i>MARL:</i> very soft grey marl, WTPL	214 214 214 214 214 214 214 214 214 214	1.91				H				╁		-						- <del>-</del> -		
	-	SAND:	<u>N#</u> 114	<b>296.19</b> 2.29																2		
0		loose grey fine to coarse sand, trace silt and fine gravel, saturated			SS-3	3-2 9	11														sand pack 50 mm pipe	
cal Scale = 1 : 40.	-				SS-4	1-4 4	8	┥												222223	1.52 m slotted scree native cave	n
Verti	-	Borehole terminated at 3.81 m		<b>294.67</b> 3.81	AS-5													•				
2011		Borenole terminated at 3.81 m		3.01																	Shaati	1 of 1
18.02.2(	Revi	iewed by: <i>D.Morlock</i>				Dra	afted I	by:	: <i>S</i>	.Me	eteel	r									Sheet:	1 of 1
EQ-09-Ge-72 R.1	Note	es: 1 op of pipe elevation = 299.16 m																				

							Grou	nd	Ele	eva	atio	n:	297	.96 n	n		Во	rehole	e Nun	nber: BH-7-12
03 09h	L																Job	oN°:		P-0000145-0-00-400
2012-10-																	Dri	I Date:		2012-04-25
inted : 2	Proj	ject: Sage Campground - Se	wag	e Sysi	tems	Assess	ment										Fie	ld Tecł	n:	R.McMillan
V.sty- PI	Loc	ation: 1912 Whistle Bare Road	d, To	wnsh	ip of	North D	umfrie	es,	On	tar	rio						Dri	I Meth	od:	Hollow Stem Auger
'io_NEV		SOIL PROFILE		•	SAN	MPLE		Γ												
Borehole_Log_L VM_Ontai	epth (m)	Description	ymbol	levation (m) epth (m)	ype and Number	31ows" /150 mm	PT 'N' Value		Dynar <204 June Std Pe	mic 0 6	Cone		Shear S	100 1 Initial Remo Strengtl	h (PP) k 50 20 11 Id h (FV) k	(Pa <b>4</b> 0 (Pa	 WP Wate	WL r Content (%)		Groundwater Observations and Standpipe Details
ario\Log	Ő	Ground Elevation	is N	297.96	f		S		20 4	06	0 80		50	100 1	50 20	<b>.</b>	10	20 30		
/M_Onta	-	dark brown silt, moist	~~~~	297.65															2-04-2	protective cover and concrete
X:\Style_LV		SAND: compact brown silty fine to medium sand, moist		0.30															296.85 m 2012	
	1- -	saturated		0.91	SS-1	6-8 10	18											•	e	bentonite seal
					SS-2	6-8 8	16													
	2-																			
	-	compact brown fine to coarse		<b>295.37</b> 2.59	SS-3	4-7 11	18	•											<u> &lt;&lt;&lt;&lt;</u>	-
	-	sand, trace silt and fine gravel, saturated						1												sand pack
Scale = 1 : 40.0	3-				SS-4	4-8 8	16										•		~~~~~~~	50 mm pipe 1.52 m slotted screen
Vertical \$	-			294.15															~~~~	
	4-	Borehole terminated at 3.81 m		3.81				$\mid$				_							_	
	-																			
	5-																		_	
	-																			
	-																			
	6-																			
	-																			
	-																			
2.2011	Rev	iewed by: <i>D.Morlock</i>				Dra	afted k	by:	<b>S</b> .	Me	etee	r								Sheet: 1 of 1
3.1 18.0	Note	es: Top of pipe elevation = 298.73 m																		
EQ-09-Ge-72 F																				

d : 2012-10-03 09h							Grou	Ind	Elev	atio	n:	301.24 m	Bo Jol Dri	rehole o N°: Il Date:	Number:	BH-8-12 P-0000145-0-00-400 2012-04-25
sty- Printe	Proj	ect: Sage Campground - Se	ewag	e Syst	tems	Assess	ment		0				Fie	la lecn	:	R.MCMIIIan
_NEW.s	LOC	SOIL PROFILE	a, 10	ownsn	IP OT		umfri	es,	Onta	rio			Dri			nonow Stern Auger
\LogBorehole_Log_LVM_Ontario	Depth (m)	Description	Symbol	중 Elevation (m) 2 Depth (m)	Type and Number	"Blows" /150 mm	SPT 'N' Value		Dynamic 20 40 11 Std Pene 20 40	c Cone		Shear Strength (PP) kPa 50 100 150 200 Initial Remold Shear Strength (FV) kPa 50 100 150 200	WP Wate	WL r Content (%) 20 30	Groundy S	vater Observations and tandpipe Details
X:\Style_LVM_Ontaric	- - - - - - - - - - - - - - - - - - -	TOPSOIL: dark brown silt, moist SILT: loose brown silt, some sand, trace clay, roots, moist stiff brown silt, some clay, DTPL		0.00 301.04 0.20 300.63 0.61	SS-1	3-4 5	9	-								protective cover and concrete bentonite seal
	2-	compact brown silt, trace fine sand, moist		29 <u>9</u> .72 1.52	SS-2	4-6 6	12							•	27 27 2 27	sand pack 19 mm pipe 0.04 m eletted filter
0	3	SILT TILL: loose brown silt, some sand, trace clay and gravel, moist	· · · · · · · · · · · · ·	298.95 2.29 298.19	SS-3	5-4 4	8								el. 298.10 m 2012-04	0.91 m slotted litter 2012-04-27 upper standpipe dry bentonite seal
Vertical Scale = 1 : 40.	- - - - - - -	SILT: compact brown silt, saturated, dilatant SILT / SAND:		3.05 297.43 3.81	SS-4	5-6 6	12									
	4 - - - -	loose to compact brown silt / fine sand, saturated, dilatant			SS-5	3-4 4	8							•	~~~~~~	50 mm pipe 1.52 m slotted screen sand nack
	5			295.75	SS-6	5-7 10	17							+	*****	сына разл
	- - - - - - - - - - - - - - - - - - -	SILT TILL: dense brown silt, some sand, moist Borehole terminated at 5.79 m		5.49 295.45 5.79	SS-7	9-18 16	34		•						<u></u>	
2011	-	iowed by D Merleck						E			-				-	Shaatu 1 of 1
EQ-09-Ge-72 R.1 18.02.	Note	ежец ыу. <i>D.INOTIOCK</i> es: MOE Well Tag No. A115242 Top of pipe elevation = 302.14 m	(19 n	nm uppe	er), 30	Dra 2.06 m (50	) mm lo	owe	<b>з.</b> М	<i>ee</i> e	'					

# Flowspec

#### Project: Whistle Bare Campground Location: 1912 Whistle Bare Road, Township of North Dumfries

#### Borehole Number: 1

Project No.: 00009-2 Ground Surface Elevation: 299.76 m Top-of-Pipe Elevation: 300.52 m Date: October 2, 2017

Depth (m):	Elevation (m):	SOIL STRATIGRAPHY:	Spoon Spoon (Type and No.): M	Blow Count :: (150 mm):	SPT "N" Value:	GROU AND I WELL	JNDWATER MEASUREMENT DETAILS OF MONITORING . INSTALLATION:
0	299.76	Ground Surface Elevation:					steel box
		<u>TOPSOIL</u> : Dark brown silty sand, moist	_				
1 —	299.46	<u>SILTY SAND</u> : Brown silty sand, some gravel, moist				Ţ	groundwater elev. = 298.98 m May 17, 2019
2 —	298.24	mixed peatmoss, moist	SS-1	1 1	n/a		bentonite
			SS-2	1	n/a	**	
3 —	297.47	<u>MARL</u> : Loose, white marl, saturated	SS-3	1	n/a		
4 —			SS-4	1	n/a		filter sand 1.52 m slotted screen
	295.19	Monitoring well terminated at 4.57 m	SS-5	1	n/a		native cave
5 —						-	
6 —							
7 —							
•							
0 —							
9 —							
-							
10							
 11							
-							
12—							
13—							
14—							
Note	es:		1				
						Fiel Dra Rev	d Technician: DFIII fted by: DFIII ⁄iewed by: DM

# Flow Spec

Project: Whistle Bare Campground

Location: 1912 Whistle Bare Road, Township of North Dumfries

#### Borehole Number: 2

Project No.: 00009-2 Ground Surface Elevation: 299.98 m Top-of-Pipe Elevation: 300.77 m Date: October 2, 2017

Depth (m):	Elevation (m):	SOIL STRATIGRAPHY:	Spoon	Blow Count :: (150 mm):	SPT "N" Value:	GROU AND WELL	JNDWATER MEASUREMENT DETAILS OF MONITORING LINSTALLATION:
0	299.98	Ground Surface Elevation:					steel box
_		<u>TOPSOIL</u> : Dark brown silty sand, moist					
_	299.68	<u>SILTY SAND AND GRAVEL</u> : Loose, brown silty sand and gravel, very moist					
1 —			SS-1	4-4	6	Ŧ	groundwater elev. = 299.09 m
-	298.76	mixed peatmoss, moist		Z-1			May 17, 2019
2			SS-2	1	n/a		bentonite
2				4.4			
_	297.69	<u>SAND:</u> Loose, fine to medium sand, trace silt, saturated; occasional seams	SS-3	4-4 5-4	9		
3 —	206.02	raddich brown trace to come ailt	00.4	2-2	•	<u> </u>	
-	290.93		55-4	4-6	Ø	ö	
4 —						öe 🕅	filter sand
-							1.52 m slotted screen
	295.41	Monitoring well terminated at 4.57 m	SS-5	3-6	13	<u> </u>	
5 —				7-8			
-							
6 —							
7							
ʻ _							
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8 —							
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10							
10							
11							
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12—							
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13—							
-							
14—							
_							
Note	es:					Fiel	d Technician: DFIII
						Dra Re\	fted by: DFIII <i>r</i> iewed by: DM

# Flow Spec

Project: Whistle Bare Campground

Location: 1912 Whistle Bare Road, Township of North Dumfries

#### Borehole Number: 3

Project No.: 00009-2 Ground Surface Elevation: 301.21 m Top-of-Pipe Elevation: 301.97 m Date: October 2, 2017

Jepth (m):	Elevation (m):	SOIL STRATIGRAPHY:	Spoon Type and No.): UN	3low Count	SPT "N" Value:	GRC ANE WEL	DUNDWATER MEASUREMENT D DETAILS OF MONITORING LL INSTALLATION:
0	301.21	Ground Surface Elevation:		<u> </u>	•,		steel box
_		<u>TOPSOIL</u> : Dark brown silty sand, moist				╵	
- - 1 —	300.91	<u>SAND AND GRAVEL</u> : Loose, brown sand and gravel, some silt, very moist to wet	SS-1	4-4	6		
	299.99	wet; seams of silt, some sand and clay, saturated	SS-2	2-1 1	n/a	Ţ	groundwater elev. = 299.72 m May 17, 2019
2 —	299.38	mixed peatmoss, saturated	SS-3	1	n/a		bentonite
3							X
4 —							
5 —	296.49	SANDY SILT: Loose, brown sandy silt, trace clay and gravel, saturated	SS-4	1-1 2-3	3		filter sand
6 —							1.52 m slotted screen
_	295.11	SAND AND GRAVEL: Loose, brown sand and gravel, trace silt, saturated	SS-5	2-2 3-4	5		
/		Monitoring well terminated at 6.1 m					
8 —							
9 —							
 10							
11							
12 							
13—							
  14							
Note	es:		ı				
						⊦⊪ Dr R€	eid Technician: DFIII rafted by: DFIII eviewed by: DM

# Flowspec

Project: Whistle Bare Campground

Location: 1912 Whistle Bare Road, Township of North Dumfries

#### Borehole Number: 4

Project No.: 00009-2 Ground Surface Elevation: 310.53 m Top-of-Pipe Elevation: 311.60 m Date: October 4, 2017

SAMPLE: GROUNDWATER MEASUREMENT SOIL STRATIGRAPHY: Spoon (Type and No.): AND DETAILS OF MONITORING "N" Value: :( E) WELL INSTALLATION: Blow Count (150 mm): Depth (m): Elevation SPT -310.53 steel box 0 Ground Surface Elevation: 1 309.77 SAND: Compact, brown medium to coarse sand, some gravel, trace silt, moist 8-8 SS-1 17 9-12 2 3 12-11 307.48 seams of fine to medium sand, moist SS-2 18 7-8 4 18-26 305.96 SAND AND GRAVEL: Compact, brown medium to coarse sand and gravel, SS-3 53 bentonite 5 27-13 trace silt, moist 6 13-15 SS-4 36 21-18 303.98 very moist 7 23-35 SS-5 56 8 21-24 9 SS-6 16-50 50 150 mm 301.39 frequent cobbles groundwater elev. = 300.66 m Ŧ 10 May 17, 2019 13-15 299.86 rusty brown to brown, saturated SS-7 36 11 21-18 filter sand 12 6-8 21 SS-8 13-13 1.52 m slotted screen 13 10-11 296.81 grey SS-9 24 14 13-21 Monitoring well terminated at 13.72 m Notes: Field Technician: DFIII Drafted by: DFIII Reviewed by: DM

# Flow Spec

Project: Whistle Bare Campground

Location: 1912 Whistle Bare Road, Township of North Dumfries

#### Borehole Number: 5

Project No.: 00009-2 Ground Surface Elevation: 311.07 m Top-of-Pipe Elevation: 311.95 m Date: October 3, 2017

:(u	:(m) ւ	SOIL STRATIGRAPHY:	SAMP	LE:	Value:	GRO ANI WE	OUNDWATER MEASUREMENT D DETAILS OF MONITORING LL INSTALLATION:
Depth (n	Elevation		Spoon (Type ar	Blow Co (150 mm	"N" TAS		
0	311.07	Ground Surface Elevation:					steel box
1		SAND AND GRAVEL: Compact, light brown medium to coarse sand and	SS-1	9-9 16-28	25		
				10 12			
4	308.02	seams of brown fine to medium sand, moist	SS-2	13-15	26		
5 —			SS-3	22-32 22-21	54		bentonite
6 — 	304.97	frequent cobbles, moist to very moist	SS-4	9-11 10-10	21		
8 —	303.45	very moist	SS-5	9-12 6-8	18		
9	301.93	occasional cobbles	SS-6	20-26 27-50	53	Ţ	groundwater elev. = 301.67 m May 17, 2019
11	300.40	grey, saturated	SS-7	25-27 30-16	57		
12							filter sand
13—							1.52 m slotted screen
14— — —	297.35	Monitoring well terminated at 13.72 m					
Note	es:					Fi Dr Re	eld Technician: DFIII rafted by: DFIII eviewed by: DM

# Flow Spec

Project: Whistle Bare Campground

Location: 1912 Whistle Bare Road, Township of North Dumfries

#### Borehole Number: 6

Project No.: 00009-2 Ground Surface Elevation: 304.58 Top-of-Pipe Elevation: 305.54 Date: October 4, 2017

Depth (m):	Elevation (m):	SOIL STRATIGRAPHY:	Spoon (Type and No.):	Blow Count :: (150 mm):	SPT "N" Value:	GR( ANI WE	OUNDWATER MEASUREMENT D DETAILS OF MONITORING LL INSTALLATION:
0	304.58	Ground Surface Elevation:					steel box
0 1	302.60 301.53 300.01	SILT AND SAND: Loose, brown silt and sand, moist         SAND: Loose, light brown sand, trace silt, moist         SAND AND GRAVEL: Compact, brown sand and gravel, trace to some silt, frequent cobbles, moist         very moist	SS-1 SS-2 SS-3	4-2 2-4 12-16 12-19 12-10 13-18	4 28 23	· · · · · · · · · · · · · · · · · · ·	bentonite groundwater elev. = 300.07 m May 17, 2019
6 7 8 9	298.48 295.44	<u>SILTY SAND</u> : Compact, brown silty fine sand, trace clay, saturated some silt Monitoring well terminated at 9.14 m	SS-4 SS-5 SS-6	14-21 20-33 16-11 23-36 6-11 20-23	41 34 31		filter sand 1.52 m slotted screen
Not	es:					Fi Dr Re	eld Technician: DFIII rafted by: DFIII eviewed by: DM

# Flowspec

#### Project: Whistle Bare Campground Location: 1912 Whistle Bare Road, Township of North Dumfries

#### Borehole Number: 7

Project No.: 00009-2 Ground Surface Elevation: 312.12 Top-of-Pipe Elevation: 313.10 Date: October 4, 2017

	:(u	SOIL STRATIGRAPHY:	SAMPI	LE:	lue:	GR( AN[	OUNDWATER MEASUREMENT D DETAILS OF MONITORING
Jepth (m):	Elevation (r		Spoon (Type and 1	3low Count (150 mm):	SPT "N" Va	VV L.	LL INGTALLATION.
0	312.12	Ground Surface Elevation:		<u> </u>	•-	1	steel box
- - 1							
2 —		<u>SAND AND GRAVEL</u> : Compact, brown medium to coarse sand and gravel, trace silt, frequent cobbles, moist	SS-1	7-16 14-14	30		bentonite
3			SS-2	13-22	39		
4 —				17-20			
5 —			SS-3	10-16 17-16	33		
6 —	306.02	brown to light brown	SS-4	14-25 22-23	47		
7							
8 — 			SS-5	26-39 32-21	71		
9 —	302.98	grey, very moist	SS-6	22-25 50	<u>50</u> 150 mm		
10				0.0		Ŧ	groundwater elev. = 301.56 m
11	300.99	saturated	SS-7	8-9	17		
12			SS-8	10-15 15-18	30		filter sand
13—							1.52 m slotted screen
14— — —	298.40	Monitoring well terminated at 13.72 m					
Note	es:						
						Fi Dr Re	eld Technician: DFIII rafted by: DFIII eviewed by: DM
							<b>,</b>



#### Test Pit Number: 1-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

	SOIL PROFILE			SAMPLE					
Depth (m)	Description	Symbol	Elevation (m)	Number	WP WL Water Content (%)	Groundwater Observations and Measurements (m)			
0.00	Ground Elevation FILL: dark brown silt (topsoil), moist; rootlets rusty brown sandy silt, moist TOPSOIL: layer of brown silt, moist; roots SILT/SAND: light brown silt, trace to some sand, moist		0.00						
-	<b>SAND:</b> grey sand, trace to some silt, wet to saturated		- - -1.50 - -			Upon completion of excapyation, test pit			
2.00	Test pit terminated at 1.9 m.		-2.00 - - - -2.50	-		Upon completion of excacvation, test pit sidewalls stable. Free groundwater seepage encountered at 1.8 m.			
Re Fie No	eviewed by: VM eld Tech: BS otes:					Drafted by: BS Sheet: 1 of 1			



#### Test Pit Number: 2-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

	SOIL PROFILE			SAMPLE	
Depth (m)	Description	Symbol	Elevation (m)	Number	WP WL Water Content (%) Groundwater Observations and Measurements (m)
0.00	Ground Elevation		0.00		
0.00	<b>TOPSOIL:</b> dark brown silt, moist; rootlets		-		
-	SILT/SAND: rusty brown silt and sand, moist; rootlets		-0.50 -	1	
- - 1.00-			- - -1.00		
-	SAND: brown sand, trace silt and fine gravel, wet saturated	+		1	
-	Test pit terminated at 1.6 m.		-1.50-		Upon completion of excacvation, test pit
-			-		sidewalis caving.
-			-		Free groundwater seepage encountered at 1.3 m.
2.00-			-2.00-		
-			-		
_			_		
_			-		
-			-		
-			-2.50-		
Re	eviewed by: VM				Drafted by: BS
Fie	eld Tech: BS				Sheet: 1 of 1
No	otes:				



#### Test Pit Number: 3-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

	SOIL PROFILE			SAMPLE		
Depth (m)	Description	Symbol	Elevation (m)	Number	WP Water Content (%)	Groundwater Observations and Measurements (m)
0.00-	Ground Elevation		0.00			
- 0.00	<b>TOPSOIL:</b> dark brown silt, damp to moist		-			
-	<b>SILT:</b> rusty brown silt, some sand, moist; rootlets		-0.50			
-	SAND: brown sand, trace to some silt, damp		-			
- 1.00-			-1.00-			
-						
-	trace silt, very moist		-1.50	1		
2.00-	saturated		-2.00-			
_			-			
-	Test pit terminated at 2.2 m.		-			Upon completion of excacvation, test pit sidewalls stable.
-			-2.50-			Free groundwater seepage encountered at 1.8 m.
Re	eviewed by: VM	-		· · · · ·		Drafted by: BS
Fie	eld Tech: BS					Sheet: 1 of 1
No	otes:					



#### Test Pit Number: 4-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

	SOIL PROFILE			SAMPLE	
Depth (m)	Description	Symbol	Elevation (m)	Number	WP WL Water Content (%) Groundwater Observations and Measurements (m)
0.00	Ground Elevation		0.00		
-	TOPSOIL: dark brown silt, some gravel, damp		-		
-	SILT/SAND: brown to light brown sand and silt, moist		- -0.50 - -		
- 1.00 — -	SAND: brown sand, some gravel, trace silt, very moist		- - -1.00 -	1	
	saturated Test pit terminated at 1.4 m.		- - -1.50 - -		Upon completion of excacvation, test pit sidewalls caving. Free groundwater seepage encountered at 1.2 m.
2.00-			-2.00 — - - - -2.50 —		
Re Fie No	eviewed by: VM eld Tech: BS otes:	· I			Drafted by: BS Sheet: 1 of 1



#### Test Pit Number: 5-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

	SOIL PROFILE			SAMPLE	
Depth (m)	Description	Symbol	Elevation (m)	Number	WP WL Water Content (%) Groundwater Observations and Measurements (m)
0.00-	Ground Elevation		0.00		
-	<b>TOPSOIL:</b> dark brown silt, moist; rootlets		-		
-	<b>SILT/SAND:</b> rusty brown silt and sand, moist		-0.50 —		
-	SAND: brown sand, trace silt, very moist		-		
1.00	saturated		-1.00 <i>—</i> -	1	
-	Test pit terminated at 1.4 m.		- -1.50 — -		Upon completion of excacvation, test pit sidewalls caving. Free groundwater seepage encountered at 0.9 m.
- 2.00 — - -			- -2.00 — -		
-	wiewed by VA		- -2.50		
Ke Fie No	eviewea by: vm eld Tech: BS otes:				Sheet: 1 of 1



#### Test Pit Number: 6-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

SOIL PROFILE					
Depth (m)	Description	Symbol	Elevation (m)	Number	WP WL Water Content (%) 10 20 30 WL Groundwater Observations and Measurements (m)
0.00	Ground Elevation TOPSOIL: dark brown silt, moist; rootlets SILT/SAND: rusty brown silt and sand, moist; rootlets		0.00		
	SAND: brown sand, trace silt, moist saturated Test pit terminated at 1.5 m.		-1.00- - - - - -1.50-	· · ·	Upon completion of excacvation, test pit sidewalls caving.
2.00 - - - - - - - - - - - - - - - - -	eviewed by: VM		- -2.00- - - - - -2.50-		Free groundwater seepage encountered at 1.2 m.
Fie	eld Tech: BS otes:				Sheet: 1 of 1



#### Test Pit Number: 7-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

SOIL PROFILE				SAMPLE		
Depth (m)	Description	Symbol	Elevation (m)	Number	WP WL Water Content (%) Groundwater Observations and Measurements (m) 10 20 30	
0.00	Ground Elevation <b>TOPSOIL:</b> dark brown silt, moist; roots		0.00			
-	SILT/SAND: rusty brown silt and sand, moist SAND: brown sand, trace silt, very moist		-0.50 — _ _			
- 1.00 - -	saturated Test pit terminated at 1.3 m.		- -1.00 - -		Upon completion of excacvation, test pit sidewalls caving.	
-			-1.50 —  		Free groundwater seepage encountered at 1.0 m.	
- 2.00			-2.00 - - -			
Re Fie No	eviewed by: VM eld Tech: BS otes:		-2.50-		Drafted by: BS Sheet: 1 of 1	



#### Test Pit Number: 8-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

SOIL PROFILE								
Depth (m)	Description	Symbol	Elevation (m)	Number	WP Water C	20 3	WL )	Groundwater Observations and Measurements (m)
0.00	Ground Elevation		0.00					
0.00	<b>TOPSOIL:</b> dark brown silt, moist; rootlets		-					
-	<b>SILT/SAND:</b> rusty brown silt and sand, moist		- -0.50 - - -					
- 1.00 — - -			- -1.00 - -					
-	<b>SAND:</b> brown sand, trace silt and gravel, moist		- -1.50 - -					
_	Test pit terminated at 1.8 m.		-					Upon completion of excacvation, test pit sidewalls stable.
2.00-			-2.00 — - - -					Minor groundwater seepage encountered at 1.7 m.
_			-2.50-					
Re Fie No	eviewed by: VM eld Tech: BS otes:							Drafted by: BS Sheet: 1 of 1



#### Test Pit Number: 9-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

SOIL PROFILE						
Depth (m)	Description	Symbol	Elevation (m)	Number	WP WL Water Content (%) 10 20 30	Groundwater Observations and Measurements (m)
0.00-	Ground Elevation		0.00			
0.00-	<b>TOPSOIL:</b> dark brown silt, moist; rootlets		-			
-	SILT/SAND: rusty brown silt and sand, moist		-			
-	brown		-0.50 — - -			
1.00-			-1.00-			
-	SAND AND GRAVEL: brown coarse sand and gravel, trace silt, damp		-	1		
-			-1.50-			
2 00 -			-			
2.00 -	Test pit terminated at 2.0 m.		-2.00 -			sidewalls stable.
-			-		No g	roundwater seepage encountered.
			-2.50-			
Reviewed by: VM					 Dr	afted by: BS
Fie	eld Tech: BS				Sh	eet: 1 of 1
N	otes:				•	



#### Test Pit Number: 10-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

SOIL PROFILE				SAMPLE			I	
Depth (m)	Description	Symbol	Elevation (m)	Number	WP Water	20	WL <b>t (%)</b> 30	Groundwater Observations and Measurements (m)
0.00	Ground Elevation		0.00					
0.00	TOPSOIL: dark brown sandy silt, damp to moist		-					
-	<b>SILT/SAND:</b> rusty brown sand, some silt damp		-0.50 — - - -					
1.00-			-1.00-					
-	<b>SAND:</b> light brown sand, some gravel, trace silt, damp		-	1				
-			-1.50					
2.00-	Test pit terminated at 2.0 m.		-2.00 <i>—</i>					Upon completion of excacvation, test pit sidewalls stable.
-			-					No groundwater seepage encountered.
-			-					
-			-					
_			-2.50-					
Re Fie No	eviewed by: VM eld Tech: BS otes:							Drafted by: BS Sheet: 1 of 1



#### Test Pit Number: 11-13

Ground Elevation: n/a

#### Project: Sage Campground - Sewage System Assessment Location: 1912 Whistle Bare Road, Township of North Dumfries, ON

Job No.: P-0000145-400

SOIL PROFILE			SAMPLE			
Depth (m)	Description	Symbol	Elevation (m)	Number	WP WL Gro Water Content (%) 10 20 30	oundwater Observations and Measurements (m)
0.00	Ground Elevation		0.00			
- 0.00	<b>TOPSOIL:</b> dark brown silt, moist; rootlets		-			
-			- -0.50—			
_	SAND AND GRAVEL: brown coarse sand and gravel, trace silt, damp		-	1		
1.00			-1.00 - -			
-	Test pit terminated at 1.8 m.		-1.50 — - -		Upon co	ompletion of excacvation, test pit
-			-			
2.00-			-2.00-		No grou	undwater seepage encountered.
-			-			
-			-2.50-			
Re	eviewed by: VM				Draf	ted by: BS
Fie	eld Tech: BS				Shee	et: 1 of 1
No	otes:					

Date of Excavation:	July 26, 2017
Machine:	Mini-Excavator
Surface Elevation:	
Field Technician:	DM

Depth (m)	Elevation (m)	Soil Description	Sample No.	Sample Depth (m)
0.00		TOPSOIL: Dark brown sandy silt, some gravel, moist		
0.20		<u>SANDY SILT</u> : Rusty brown sandy silt, some gravel, moist		
0.40		<u><i>GRAVELLY SAND</i></u> : Loose, brown, gravelly fine to coarse sand, trace silt, damp		
0.80		<u>SAND</u> : Compact, brown fine sand, trace silt, damp	1	1.0 - 1.2

Comments:

- test pit terminated at 1.9 m
- no groundwater seepage observed
- dry caving observed at 1.7 m

#### Test Pit 2

Date of Excavation:	July 26, 2017
Machine:	Mini-Excavator
Surface Elevation:	
Field Technician:	DM

Depth (m)	Elevation (m)	Soil Description	Sample No.	Sample Depth (m)
0.00		<u>TOPSOIL</u> : Dark brown silt, moist		
0.25		<i>SILT</i> : Firm, rusty brown silt, some clay and sand, trace gravel, moist		
0.80		<u>SILTY SAND</u> : Brown silty sand, moist		
0.95		<u>SAND AND GRAVEL</u> : Loose, brown medium sand and gravel, trace silt, damp		
1.30		<u>SAND</u> : Compact, brown fine to medium sand, trace silt, damp	1	1.6 – 1.8

- test pit terminated at 2.1 m
- no groundwater seepage observed
- test pit sidewalls stable at completion of excavation



Date of Excavation:	July 26, 2017
Machine:	Mini-Excavator
Surface Elevation:	
Field Technician:	DM

Depth (m)	Elevation (m)	Soil Description	Sample No.	Sample Depth (m)
0.00		<u>TOPSOIL</u> : Dark brown sandy silt, moist		
0.30		SANDY SILT: Rusty brown sandy silt, trace gravel, damp to moist		
0.50		<u>SILTY SAND AND GRAVEL</u> : Loose, brown, silty sand and gravel, damp		
0.90		<u>SAND AND GRAVEL</u> : Loose, brown fine to medium sand and gravel, trace silt, frequent cobbles and boulders, damp	1	1.2 – 1.4
1.40		<u>SAND</u> : Loose, brown medium sand, trace silt, damp		

Comments:

- test pit terminated at 2.0 m
- no groundwater seepage observed
- dry caving observed at 1.4 m

#### **Test Pit 4**

Date of Excavation:July 26, 2017Machine:Mini-ExcavatorSurface Elevation:--Field Technician:DM

Depth (m)	Elevation (m)	Soil Description	Sample No.	Sample Depth (m)
0.00		TOPSOIL: Dark brown sandy silt, damp		
0.20		<u>SAND</u> : Compact, brown medium sand, some gravel, trace silt, damp		
1.10		medium to coarse sand	1	1.2 – 1.4
1.80		fine sand		

- test pit terminated at 2.0 m
- no groundwater seepage observed
- test pit sidewalls stable at completion of excavation



Date of Excavation:	July 26, 2017
Machine:	Mini-Excavator
Surface Elevation:	
Field Technician:	DM

Depth (m)	Elevation (m)	Soil Description	Sample No.	Sample Depth (m)
0.00		TOPSOIL: Dark brown sandy silt, moist		
0.20		<u>SANDY SILT</u> : Rusty brown sandy silt, moist		
0.35		SILTY SAND AND GRAVEL: Brown silty sand and gravel, moist		
0.60		<u>SAND AND GRAVEL</u> : Loose, brown medium to coarse sand and gravel, trace silt, damp		

Comments:

- test pit terminated at 1.7 m
- no groundwater seepage observed
- test pit sidewalls stable at completion of excavation

#### Test Pit 6

Date of Excavation:July 26, 2017Machine:Mini-ExcavatorSurface Elevation:--Field Technician:DM

Depth (m)	Elevation (m)	Soil Description	Sample No.	Sample Depth (m)
0.00		TOPSOIL: Dark brown sandy silt, moist		
0.20		<u>SANDY SILT</u> : Rusty brown sandy silt, moist		
0.35		SILTY SAND AND GRAVEL: Brown silty sand and gravel, moist		
0.65		<u>SAND AND GRAVEL</u> : Loose, brown medium to coarse sand and gravel, trace silt, damp; veins of medium to coarse sand, damp		

- test pit terminated at 1.8 m
- no groundwater seepage observed
- dry caving observed at 0.8 m





Date of Excavation:	July 26, 2017
Machine:	Mini-Excavator
Surface Elevation:	
Field Technician:	DM

Depth (m)	Elevation (m)	Soil Description	Sample No.	Sample Depth (m)
0.00		<u>TOPSOIL</u> : Dark brown sandy silt, moist		
0.25		<u>SANDY SILT</u> : Rusty brown sandy silt, moist		
0.45		SILTY SAND AND GRAVEL: Brown silty sand and gravel, moist		
0.80		<u>SAND AND GRAVEL</u> : Loose, brown medium sand and gravel, damp		
1.40		<u>SAND</u> : Compact, brown fine sand, trace silt, damp		

- test pit terminated at 2.0 m
- no groundwater seepage observed
- dry caving observed at 1.1 m



### **APPENDIX "C"**

## LVM and Stantec Grain Size Distribution Charts











## **TESTHOLE LOCATION PLAN**





