

Project No. 18-519-10

December 11, 2019

Lakeview Community Partners Limited 2173 Turnberry Road, Burlington Ontario L7M 4P8

Attention: Mr. Matthew Marsili Email: <u>matthew@argoland.com</u>

RE:

## Geotechnical Suitability of Soil/ground water Proposed Lakeview Development 800 Hydro Road, Mississauga, ON

DS Consultants Ltd. carried out a geotechnical investigation at the subject site in July 2018 (Project No. 18-519-100, report dated December 4, 2019) and drilled forty-five (45) boreholes to depths varying from 1.7 m to 48.3m below the existing grade.

It is understood that there will be a land conveyance to the City, as shown on the attached drawing. Eleven (11) boreholes (BH18-19, BH18-25, and BH18-29 to BH18-37) were drilled within the boundary of the land conveyance. Borehole logs and location plan are attached in Appendix A of this letter.

## 1. Soil Conditions

<u>Topsoil, Pavement Structure & Fill Materials</u>: A surficial topsoil layer, ranging in thickness from 125 to 300mm, was encountered at BH18-33 to BH18-37. Borehole BH18-30 drilled on the paved areas encountered 70mm of asphalt at the surface, overlying granular base/subbase. Fill materials were found in all boreholes, extending to depths varying from 0.4 to 4.2m below the existing grade. Fill material was heterogeneous and consisted of sand & gravel, crusher run limestone, silty sand, sandy silt and clayey silt to silty clay, with inclusions of organics/topsoil, wood, concrete, asphalt and shale fragments.

<u>Clayey Silt to Silty Clay Till</u>: Below the fill materials, clayey silt to silty clay till deposits were encountered in BH18-19, BH18-29, and BH18-34 to BH18-37 (except BH18-35), overlying shale bedrock or silty clay. Clayey silt till was present in a stiff to hard consistency. with measured SPT 'N' values ranging from 8 to over 50 blows per 300mm of spoon penetration. Occasional cobble/boulders and sand seams were encountered within this deposit.

<u>Silty Clay</u>: A silty clay deposit was encountered in BH18-25, BH18-30 and BH18-36, below the fill material, or cohesionless soils or clayey silt till, and overlying shale bedrock. Silty clay was present in a firm to hard, generally hard consistency, with measured SPT 'N' values ranging from 6 to more than 50 blows for 300 mm penetration.

<u>Cohesionless Soils (Sand & Gravel, Sand)</u>: Cohesionless soils consisting of sand and gravel and sand were encountered in boreholes BH18-25 and BH18-32 below the fill material. These cohesionless soils were



water bearing and present in a very loose to very dense state, as indicated by the measured SPT 'N' values of 2 to over 50 blows per 300mm of spoon penetration.

<u>Shale Bedrock:</u> Shale bedrock of Georgian Bay Formation was found at all borehole locations, at depths ranging from 1.5 to 6.3m below the existing grade, corresponding to elevations ranging from 71.2 to 78.2m.

## 2. Groundwater Conditions

Long-term (stabilized) groundwater levels in the monitoring wells were found at depths ranging from 2.0 to 2.3m below the existing grade, corresponding to Elevations 74.9 to 79.3m.

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events and fluctuation in Lake Level.

## 3. Geotechnical Comments on Suitability of Soils/Groundwater

Based on the borehole information, the soil conditions are considered suitable to support the proposed structures on conventional footings founded on native soils and/or engineered fill. Alternative, extended footings or short drilled piers founded on bedrock can be used in the areas with deep fill materials, depending on the finished floor elevations of the proposed structure.

The existing fill materials are generally suitable to be re-used as engineered fill. Some aeration of the wet excavated soils will be required, prior to their use as engineered fill.

Due to the close proximity of lake and presence of granular soils below the water level, dewatering will be required prior to any excavation in cohesionless sandy soils, otherwise it will result in an unstable base and flowing sides.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

Yours very truly,

DS CONSULTANTS LTD.

Balynale

Shabbir Bandukwala, M.Eng., P.Eng.

Attachments:

Borehole Location Plan & Borehole Logs



• All Units In Metric Unless Otherwise Noted and Areas are Approximate.



LAKEVIEW VILLAGE | Mississauga, Ontario







## DS CONSULTANTS LTD.



## LOG OF BOREHOLE BH18-19

PROJECT: Preliminary Geotechnical Investigation- Proposed Development

CLIENT: Lakeview Community Partners Ltd.

PROJECT LOCATION: 800 Hydro Road, Mississauga, ON

DATUM: Geodetic

BOREHOLE LOCATION: See Drawing 1 N 4825287 E 616692

#### DRILLING DATA

Method: Hollow Stem Auger

Diameter: 200 mm Date: Jul/11/2018 REF. NO.: 18-519-10 ENCL NO.: 20

1/2018		
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ONE PENETRATION		NATI

	SOIL PROFILE		s	AMPL	ES	~		DYNAI RESIS	MIC CC TANCE	NE PE PLOT		ATION			_ NATI	JRAL			F	METHA	NE
(m) <u>ELEV</u> DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	ТҮРЕ	"N" BLOWS	GROUND WATEF CONDITIONS	ELEVATION	2 SHEA 0 UN • QU 2	0 4 IR STF NCONF JICK TF 0 4	0 6 RENG <sup>-</sup> INED RIAXIAI 0 6	0 8 TH (kF + - × 0 8	Pa) FIELD V/ & Sensitiv LAB V/	NE ity ANE 00	WAT	TER CC	TURE TENT V DONTEN <sup>-</sup>	LIQUID LIMIT WL I I I I I I I I I I I I I I I I I I	POCKET PEN. (Cu) (kPa)	NATURAL UNIT W (kN/m <sup>3</sup> )	AND GRAIN S DISTRIBU (%)	SIZE TION
- - - - 11 - - - - - - - - - - - - - -	Total Core Recovery = 100% Solid Core Recovery = 40% RQD = 30% Hard Layer (Limestone/Siltstone)= 15% Maximum Thickness of Hard Layer = 125mm(Continued)		5	RC			70														
DS SOIL LOG 18-519-10 800 HYDRO ROAD.GPJ DS.GDT 12/11/19	END OF BOREHOLE: Notes: 1) Monitoring well was installed in the borehole upon completion. 2) Water level in the monitoring well at 4.7m on Sept. 26, 2018.																				

	DS CONSULTANTS LTD. Geotechnical & Environmental & Materials & Hydrogeology				LOG	) of	BOR	ЕНС	LE E	3H18	-25									1 OF 1
PROJ	ECT: Preliminary Geotechnical Investig	ation	- Pro	posed	l Devel	opmen	nt	DRIL	LING	DATA										
CLIEN	T: Lakeview Community Partners Ltd.			•		·		Meth	od: Ho	llow St	em Aı	uger								
PROJ	ECT LOCATION: 800 Hydro Road, Mis	sissa	uga,	ON				Diam	eter: 2	00 mm	ı					RE	EF. NC	D.: 18	8-519	9-10
DATU	M: Geodetic							Date	Jul/1	0/2018						EN	ICL N	0.: 2	3	
BORE	HOLE LOCATION: See Drawing 1 N 4	8251	02 E	6167	59		-	DYNA	MIC CO	ONE PE	NETR	ATION						r –	1	
	SOIL PROFILE	1		Sampl	.ES	Ľ.		RESI	STANC	PLOT	$\geq$			PLASTI		URAL	LIQUID		۲M	METHANE
(m)		LOT			S L	NS	z				8 0 	30 1 	00	W <sub>P</sub>	CON	TENT N	WL	ET PEN (kPa)	(m <sup>3</sup> )	GRAIN SIZE
ELEV DEPTH	DESCRIPTION	TAP	ЯËК		3LOV		ATIC	0 0	NCONF	FINED	+	FIELD V & Sensiti	ANE vity			o		(CU)	(kN	DISTRIBUTION (%)
77.5		STRA	IWN	ТУРЕ	ż	GRO	ELEV	• C	UICK T	RIAXIAI 10 6	- × 0 8	LAB V. 80 1	ANE 00	WA 1	1ER CC 0 2	DNIEN 20 3	I (%) 30		¥	GR SA SI CI
- 0.0	FILL: sand and gravel, cobbles	X	-		-		+	-												
		$\bigotimes$	1	AS				Ē						с						
-		$\bigotimes$					77													
76.7	FILL: 19mm crusher run limestone.	×				₽	w i	[ 76 7 n	 1											Wet spoon
<u>1</u>	grey, wet, loose to compact	$\bigotimes$	2	SS	6		during	drillin	g						0					
		$\mathbb{X}$						Ē												
F		$\bigotimes$					76	-												
-		$\otimes$	3	SS	10			-								0				
-		$\otimes$						F												
75.2	SAND AND GRAVEL : trace silt	$\bigotimes$				-		-												
	grey, wet, very dense	0	4	SS	50/		75	-							0					
-		0			100mn	n		ŀ												
-		0						Ē												
-		0.		00	50/			-												
-		0	5	55	100mn	h	74	<u> </u>							c	>				
73.7	SILTY CLAY, trace to some cond	:0: 						ŀ												
	grey, moist, hard	R	6	SS	30			-							n					
- 73.3 - 73.4	SHALE: Georgian Bay Formation,		Ŭ	00				-												
4.4	END OF BOREHOLE:																			
	Notes: 1) Water level at 0.8m during																			
	drilling.																			
							1													
							1													
							1													
							1													
							1													
							1													
							1													
GROUN						GRAPH	+ 3	× <sup>3</sup> :	Numbe	rs refer	C	<b>8</b> =3%	Strain	at Failu	re					



Measurement  $\stackrel{1st}{\underline{\vee}} \stackrel{2nd}{\underline{\Psi}} \stackrel{3rd}{\underline{\Psi}} \stackrel{4th}{\underline{\Psi}}$ 



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	DS CONSULTANTS LTD. Geotechnical • Environmental • Materials • Hydrogeology				LOG	G OF	BOR	ЕНО	LE E	3H18	-30									1 OF 1
PROJI	ECT: Preliminary Geotechnical Investig	ation	- Pro	posed	l Devel	opmen	t	DRILI	LING [	ATA										
CLIEN	T: Lakeview Community Partners Ltd.							Metho	od: Hol	low St	em Au	lger								
PROJ	ECT LOCATION: 800 Hydro Road, Miss	sissa	uga,	ON				Diam	eter: 2	00 mm	1					RE	F. NC	).: 18	3-519 -	-10
BORE	M: Geodetic HOLE LOCATION: See Drawing 1 N 4	8251	36 F	6169	16			Date:	Jun/2	2018	5					EN	ICL N	J.: 2	0	
DOILE	SOIL PROFILE	0201	5012	SAMPL	.ES			DYNA		NE PE	NETRA	ATION			ΝΑΤΙ					METHANE
(m)		F				TER		2	0 4	0 6	0 8	30 10	00	PLASTI LIMIT	MOIS CON	TURE TENT	LIQUID LIMIT	EN.	NIT WT	AND
ELEV	DESCRIPTION	A PLO	ъ		3 m S	ID W#	NOL	SHEA	R STI	RENG	TH (kF	Pa)		W <sub>P</sub>	\ (	v >	WL	CKET P Su) (kPe	RAL UI (kN/m <sup>3</sup> )	GRAIN SIZE
DEPTH		RAT/	JMBE	ЪЕ		NUOS	EVAT	0 UI • QI	UICK T	INED RIAXIAI	+ L X	& Sensiti LAB V/	ity ANE	WAT	ER CO	ONTEN	T (%)	8 S	NATU	(%)
77.2	-ASPHALTIC CONCRETE: 70mm	ST	ž	È	z	50	ш	2	0 4	0 6	8 0	80 10	00	1	0 2	20 3	0			GR SA SI CL
76.8	GRANULAR BASE: 300mm	$\bigotimes$	1	AS			77	-												
- 0.4	SILTY CLAY: trace sand, shale	Ž						-												
-	hagmono, groy, molot, hara							-												
- I		H	2	SS	21			-						0						
75 7							76	-												
75.7	SHALE: Georgian Bay Formation,		3	SS	50/			-							0					
1.7	END OF BOREHOLE				( Shini															
	Notes: 1) Borehole dry and open upon																			
	completion.																			
		1				L	<b></b>		I			<u> </u>						L		

	DS CONSULTANTS LTD. Geotechnical & Environmental & Materials & Hydrogeology				LOG	6 OF	BORI	EHO	LE E	3H18	-31									1 OF 1
PROJI CLIEN PROJI DATU	ECT: Preliminary Geotechnical Investig T: Lakeview Community Partners Ltd. ECT LOCATION: 800 Hydro Road, Mis M: Geodetic	ation sissa	- Pro uga,	posed ON	l Devel	opmen	t	<b>DRIL</b> Metho Diam Date:	LING E od: Hol eter: 2 Jul/1	<b>DATA</b> Ilow St 00 mm 7/2018	em Au	ıger				RE	EF. NC	0.: 18 0.: 28	3-519 8	-10
BORE	HOLE LOCATION: See Drawing 1 N 4	18252	16 E	61700	08		-				NETRA							1		
(m) <u>ELEV</u> DEPTH	SOIL PROFILE	TRATA PLOT	UMBER	AMPL 3dk	M. BLOWS	ROUND WATER ONDITIONS	LEVATION	SHEA O U O Q	AR STI NCONF			a non 10 10 Pa) FIELD V/ & Sensitiv LAB V/	00 ANE ity ANE			URAL STURE ITENT W O ONTEN		POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	METHANE AND GRAIN SIZE DISTRIBUTION (%)
- 0.0	FILL: silty sand and gravel, grey, moist		1	AS	-		77	-						0						GR SA SI CL
76.5 - 0.8	<b>FILL:</b> silty clay, trace gravel, trace organics, grey, moist to wet, stiff to firm		2	SS	15		76	-							0			-		
- - - - - - -			3	SS	7			-						c	)					
			4	SS	5	· ¥	75 W. L. during	75.0 m drillin	ן ק   						0					
- - - - - 73.5			5	SS	5		74	-							0					
- 3.8 - 73.2	SHALE: Georgian Bay Formation, weathered, grey		6	SS	50/ 125mn			-							ο					
GROUN	END OF BOREHOLE: Notes: 1) Water level at 2.3 m during drilling					GRAPH	+ 3,	× <sup>3</sup> :	Number	s refer	0	8=3%	Strain	at Failu	re					

	Geotechnical  Environmental  Materials  Hydrogeology				LOG	OF	BOR	EHOLE BH18-32 1 OF
PROJ CLIEN PROJ DATU	ECT: Preliminary Geotechnical Investig IT: Lakeview Community Partners Ltd. ECT LOCATION: 800 Hydro Road, Mis M: Geodetic	ation	- Pro uga,	posed ON	Develo	opmer	nt	DRILLING DATA Method: Hollow Stem Auger/Rock Coring Diameter: 200 mm REF. NO.: 18-519-10 Date: Jul/06/2018 ENCL NO.: 29
BORE	HOLE LOCATION: See Drawing 1 N 4	8252	99 E	61709	95			
	SOIL PROFILE		s	AMPL	ES			
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	LYPE	N" <u>BLOWS</u> 0.3 m	GROUND WATER	ELEVATION	20         40         60         80         100         PLASTIC MOISTURE LIMIT         LIMIT         AND           SHEAR STRENGTH (kPa)         wp         w         w_L         yg
- 0.0	FILL: sand and gravel, brown	X	1	AS	-		77	
76.4 0.8	FILL: 19mm crusher run limestone, brick/concrete fragments, grey, wet, compact		2	SS	22		76	
- 1.5 	FILL:sandy silt mixed with gravel, trace clay, grey, wet, very dense		3	AS	50/ 25mm			
74.9	SAND AND GRAVEL: grey, wet, very loose		4	SS	2	¥	7: W. L. Sep 2	74.9 m 3, 2018 C
3 - - - -		0.0	5	SS	2		74 -Bente	July 06, 20
- - - - - -	cobbles below 4 m	.0 .0 .0	6	SS	50/ 50mm		7'	o
- 4.3 - 4.3 	GEORGIAN BAY FORMATION: shale interbedded with limestone/siltstone layers, grey Total Core Recovery = 67% Solid Core Recovery = 33%		RUN 1	RC				July 09, 20
5.0 - - - - - - - - - - - - - - - - - - -	RQD = 33%       //         Hard Layer       //         (Limestone/Siltstone)=15%       //         Maximum Thickness of Hard Layer/       -/         = 140mm       //         Total Core Recovery = 100%       -/         Solid Core Recovery = 84%       RQD = 73%         Hard Layer (Limestone/Siltstone)=       15%		RUN 2	RC			72 7'	
- 6.4	- Maximum Thickness of Hard Layer / ↓ 140mm J Total Core Recovery = 100% Solid Core Recovery = 94% RQD = 94% Hard Layer (Limestone/Siltstone)= less than 10% Maximum Thickness of Hard Layer = 50mm		RUN 3	RC			Filter	Pack
<u>8</u> 69.2 8.0	Total Core Recovery = 100% Solid Core Recovery = 93% RQD = 93% Hard Layer (Limestone/Siltstone)= less than 10% Maximum Thickness of Hard Layer = 50mm		RUN 4	RC			- - 69 - -	
67. <u>8</u> 9.4							- 68 Slotte	Image: Constraint of the second sec
GROUN	Continued Next Page				<u></u> <u>1</u>	GRAPH	$\frac{1}{2} + 3$	X <sup>3</sup> : Numbers refer to Sensitivity O <sup>8=3%</sup> Strain at Failure



# 





## LOG OF BOREHOLE BH18-32

PROJECT: Preliminary Geotechnical Investigation- Proposed Development

CLIENT: Lakeview Community Partners Ltd.

PROJECT LOCATION: 800 Hydro Road, Mississauga, ON

DATUM: Geodetic

BOREHOLE LOCATION: See Drawing 1 N 4825299 E 617095

#### DRILLING DATA

Method: Hollow Stem Auger/Rock Coring

Diameter: 200 mm Date: Jul/06/2018

REF. NO.: 18-519-10 ENCL NO.: 29

	SOIL PROFILE		5	SAMPL	ES	~		DYNA RESIS	MIC CC TANCE	DNE PE E PLOT		TION			_ NAT	JRAL			F	METHA
(m) <u>ELEV</u> DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	ТҮРЕ	"N" BLOWS	GROUND WATEF CONDITIONS	ELEVATION	2 SHEA 0 UI • QI 2	0 4 IR STF NCONF JICK TF 0 4	RENG RENG INED RIAXIAI	TH (kF + L ×	0 10 Pa) FIELD V. & Sensiti LAB V/ 0 10	ANE vity ANE 00	WAT			LIMIT WL WL T (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT M (kN/m <sup>3</sup> )	ANI GRAIN DISTRIBI (%) GR SA
66.3	Total Core Recovery = 100% Solid Core Recovery = 93% RQD = 93% Hard Layer (Limestone/Siltstone)= 15% Maximum Thickness of Hard Layer = 100mm(Continued)		RUN 5	RC			67	-												
10.9	END OF BOREHOLE: Notes: 1) Monitoring well was installed in the borehole upon completion. 2) Water level in the monitoring well at 2.3m on Sept. 26, 2018.																			





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DS SOIL LOG 18-519-10 800 HYDRO ROAD.GPJ DS.GDT 12/11/19

	DS CONSULTANTS LTD. Geotechnical & Environmental & Materials & Hydrogeology				LOG	G OF	BOR	EHO	LE E	3H18	-36									1 OF 1
PROJ	ECT: Preliminary Geotechnical Investig	gation	- Pro	posed	l Devel	lopmen	t	DRIL	LING	DATA										
CLIEN	IT: Lakeview Community Partners Ltd.							Meth	od: Ho	llow St	em Au	uger								
PROJ	ECT LOCATION: 800 Hydro Road, Mis	sissa	iuga,	ON				Diam	eter: 1	50mm	<b>n</b>					R	EF. NC	).: 1	8-519 0	-10
BORE	™: Geodetic HOLE LOCATION: See Drawing 1_N 4	18257	'22 F	61718	37			Date	Jun/2	27/2018	5					Εľ	NCL N	0.: 3	3	
	SOIL PROFILE		5	SAMPL	ES			DYNA RESIS		DNE PE		ATION			ΝΑΤ				_	METHANE
(m)		F				ATER		:	20 4	0 6	0 8	30 10	00	PLASTI LIMIT	C MOIS	TURE	LIQUID LIMIT	a) EN.	NIT W	AND
ELEV	DESCRIPTION	A PLC	Ř		OWS 3 m	ND W/	NOIT	SHE			TH (kl	Pa) FIELD V	ANE	₩ <sub>P</sub>		w 0	WL	CKET   Cu) (kP	KN/m <sup>3</sup>	GRAIN SIZE
DEPTH		IRAT,	JMBE	ΡE			EVA.	• a	UICK T	RIAXIAI	L X	& Sensiti LAB V	vity ANE	WA	TER CO	ONTEN	T (%)	95	NATL	(%)
80.3	TOPSOIL :150 mm	0 	ž	F	Z.	σŏ	Ē		20 4	0 6	3 0	30 10	00	1	0 2	20 :	30			GR SA SI CL
0.2	FILL: clayey silt, trace asphalt/concrete fragments, trace organics, grey to dark grey, moist, compact	×	1	SS	18	-	80	-						•				-		
- - - - - - - 79.9			2	SS	12		79	- - - - -							c	>				
- 1.5 	CLAYEY SILT TILL: sandy, trace gravel, brown, moist, very stiff		3	SS	25										c	>				
78.0	SII TY CI AY:some sand brown		1				78													
-	moist, hard		4	SS	44			-							0	-				0 11 57 32
-								-												
-			<u> </u>					-												
			5	SS	50/ 100mr		77								0					
-								-												
4								-												
							76	-												
- - 75.7								-												
75:5	SHALE: Georgian Bay Formation, weathered, grey		6	SS	50/ <del>75mn</del>			-						0						
4.0	END OF BOREHOLE: Notes:																			
	<ol> <li>Borehole dry and open upon completion.</li> </ol>																			
						<u>GRAPH</u>	+ 3	× <sup>3.</sup>	Numbe	rs refer	C	8=3%	Strain	at Failu	ro					

DS SOIL LOG 18-519-10 800 HYDRO ROAD.GPJ DS.GDT 12/11/19





## LOG OF BOREHOLE BH18-37

PROJECT: Preliminary Geotechnical Investigation- Proposed Development

CLIENT: Lakeview Community Partners Ltd.

PROJECT LOCATION: 800 Hydro Road, Mississauga, ON

DATUM: Geodetic

BOREHOLE LOCATION: See Drawing 1 N 4825714 E 617057 Т 

### DRILLING DATA

Method: Hollow Stem Auger/Rock Coring

Diameter: 150mm Date: Jun/27/2018 REF. NO.: 18-519-10 ENCL NO.: 34

	SOIL PROFILE		S	AMPL	ES	ſſ		DYNA RESIS	MIC CO TANCE	NE PE PLOT		ATION		PI ASTI	C NAT	URAL			Ļ	METHANE
(m) <u>ELEV</u> DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	ТҮРЕ	"N" <u>BLOWS</u>	GROUND WATEI CONDITIONS	ELEVATION	2 SHEA 0 UI • QI 2	0 4 NR STI NCONF JICK TI 0 4	0 6 RENG INED RIAXIAL 0 6	0 8 TH (kF + - × 0 8	Pa) FIELD V. & Sensiti LAB V.	ANE vity ANE 00	UMIT WP WAT		STURE ITENT w o ONTEN 20 3	LIMIT WL T (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT V (kN/m <sup>3</sup> )	AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Total Core Recovery = 100% Solid Core Recovery = 88% RQD = 88% Hard Layer (Limestone/Siltstone)= less than 10% Maximum Thickness of Hard Layer = 100mm(Continued)		RUN 5	RC			71	- - - - -										-		
10.9	END OF BOREHOLE Notes: 1) Monitoring well was installed in the borehole upon completion. 2) Water level in the monitoring well at 2.0m on Sept. 26, 2018.																			