

September 20, 2024

File: 61899.04

Cardel Homes
301 Moodie Drive, Suite 100
Ottawa, Ontario
K2H 9C4

Attention: Tyler Ferguson, Land Manager

**Re: Preliminary Geotechnical Considerations
Proposed Park Land, Creekside 2 Development
2780 Eagleson Road
Ottawa, Ontario**

This letter presents preliminary geotechnical considerations relating to the proposed park land within the Creekside 2 Development to be located at 2780 Eagleson Road in Ottawa, Ontario.

The purpose of this letter is to address the City of Ottawa's comments regarding the suitability of the proposed park land for construction of a conventional city park (i.e., soccer/football fields, play structures, etc.) based on the previously completed boreholes at the site. The boreholes were advanced at the site by GEMTEC, during a previous investigation phase, and also by others.

This letter should be read in conjunction with our previous geotechnical and hydrogeological investigation report titled:

- Report titled "Geotechnical and Hydrogeological Investigation, Proposed Residential Development, Creekside 2 – Village of Richmond, 2770 Eagleson Road, Ottawa, Ontario", dated February 1, 2022 (Project No. 61899.04).

PROJECT DESCRIPTION

Plans are being prepared for a residential development identified as Creekside 2 which will be constructed in the Village of Richmond in Ottawa, Ontario. Based on the conceptual plan provided, the development site is irregular in shape with plan dimensions of about 1,200 metres from north to south and ranges from about 750 metres to 1,000 metres from east to west (about 105 hectares). The site is currently agricultural lands. The Creekside residential development is located to the west side of the site (adjacent to Shea Road).

A park is proposed for the central portion of the site with approximate dimensions of about 65 by 125 metres, which is the subject of this letter. No details on the proposed park are available at this time.

SUBSURFACE CONDITIONS

Six boreholes have previously been advanced within the vicinity of the park land by GEMTEC and others. These are identified as 20-06, 20-07A, 20-07B, 20-09, 20-11, 20-12, and 13-1. Borehole 20-07B was advanced, without sampling, adjacent to borehole 20-07A for the installation of a monitoring well (shown as borehole 20-07 on the site plan).

The borehole logs, which provided descriptions of the subsurface conditions encountered in the boreholes, are attached to this letter. The approximate locations of the boreholes are shown on the Site Plan, Figure 1, following the text of this letter. A summary of the subsurface conditions according to these boreholes is provided below:

- A layer of topsoil was encountered at the ground surface at the borehole locations with a thickness ranging from about 50 to 200 millimetres;
- Deposits of silty clay were encountered below the topsoil in all of the boreholes. Where fully penetrated, the silty clay is present to depths of 3.4 to 5.7 metres below ground surface. At one location, borehole 20-06, the underside of the silty clay was not encountered within the upper 6.6 metres of the soil profile.
 - The upper portion of the silty clay, and at some locations the full profile of the silty clay, has been weathered to a grey brown crust. The weathered crust in general has a stiff to very stiff consistency.
 - Where not weathered over the full profile depth, the lower portion of silty clay is grey, with a firm to stiff consistency. The results of Atterberg limit testing indicates that samples of silty clay deposit have a medium plasticity;
- A deposit of very loose clayey silt with some sand and trace gravel was encountered below the silty clay in borehole 20-11. The clayey silt deposit has a thickness of about 1.0 metre and extends to a depth of about 5.5 metres below ground surface;
- Glacial till, consisting of silty sand with trace to some gravel and clay to gravelly silty sand with some clay, was encountered below the silty clay and clayey silt in the boreholes, with the exception of borehole 20-06. The glacial till also contains cobbles and boulders. The glacial till has a loose to compact density, according to the measured SPT N values. The glacial till was not fully penetrated in the boreholes but was proven to depths of up to 8.2 metres below ground surface;
 - A layer of sand with trace to some gravel was encountered below the glacial till in borehole 20-12. This layer is likely also of glacial origin. The sand layer has a compact density according to the measured SPT N values. The sand deposit was not fully penetrated but was proven to a depth of about 6.7 metres below the existing ground surface;

- Auger refusal was encountered in borehole 20-07A at a depth of about 6.5 metres below ground surface within the glacial till. The presence of bedrock at this level was not confirmed. All other boreholes were terminated at the scheduled depths;
- Well screens were installed in the overburden at all the borehole locations and measured on September 30, 2020. The measured water level ranges from about 2.0 to 2.6 metres below the existing ground surface.

GEOTECHNICAL CONSIDERATIONS

The follow sections address the City of Ottawa's concerns on the proposed park land. The geotechnical considerations are preliminary in nature and are subject to confirmation/further assessment once the final design of the park and any structures therein is known.

Suitability of Soil for Construction and Load Bearing

The area is considered suitable for a parkland development, from a geotechnical perspective. It is considered that standard design and construction practices can be used for proposed buildings and play structures within the park land, from a geotechnical point of view.

The topsoil and any fill materials, if encountered, are not considered suitable for the support of any grade sensitive structures or concrete slabs and should be removed from the proposed structure/slab footprints. The underlying native soils are suitable for the support of lightly loaded structures founded on conventional spread footing foundations. Excavations for foundations should be taken through topsoil to expose undisturbed native silty clay. No geotechnical constraints are anticipated in excavating the overburden using conventional hydraulic excavating equipment, noting that boulders should be anticipated in the glacial till deposit if deeper excavations are planned.

Spread footings founded on or within native undisturbed weathered silty clay crust, or on a pad of compacted granular material above native, undisturbed soil should be sized using an allowable bearing pressure of 75 kilopascals. Provided that any loose or disturbed soil is removed from the bearing surfaces, and the grade raise restrictions provided below are adhered to, the settlement of the footings should be less than 25 millimetres.

Site Grade Raise Restriction

The development is underlain by deposits of sensitive silty clay, which has a limited capacity to support loads imposed by grade raise fill material, pavement structures and foundations of any structures.

Based on the results of the subsurface investigation, the maximum thickness of any grade raise filling at the park land should be limited to 2.7 metres above the existing ground surface.

Groundwater Conditions

The groundwater level ranges from about 2.0 to 2.6 metres below the existing ground surface in the area of the proposed park land.

Based on our previous experience, groundwater inflow from the silty clay deposits into the excavations should be relatively small and controlled by pumping from filtered sumps within the excavations. It is not expected that short term pumping during excavation will have any significant effect on nearby structures and services.

The above groundwater control measures are typical of those given for the overall site (i.e., the groundwater conditions are generally considered consistent across the entire site).

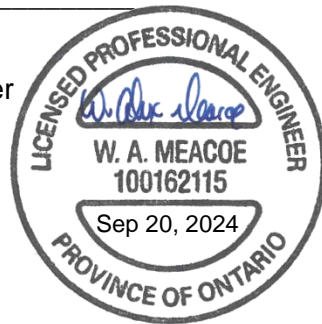
CLOSURE

We trust this letter provides sufficient information for your present purposes. If you have any questions concerning this report, please do not hesitate to contact our office.



Alex Meacoe, P.Eng.
Senior Geotechnical Engineer

WAM/DC



Daire Cummins, M.Sc.

Enclosures

L:\Drawings and Files\Projects\61800\61899.04\04_Deliverables\Park Memo\61899.04_LET_Creekside Park_Rev0_2024-09-20.docx



ATTACHMENTS

Figure 1 – Site Plan
Record of Borehole Logs
Boreholes 20-06, 20-07, 20 09, 20-11, 20-12, and 13-1

N:\PROJECTS\61800\61899.02

RECORD OF BOREHOLE 20-06

CLIENT: Cardel Homes
 PROJECT: Geotechnical & Hydrogeological Investigation
 JOB#: 61899.04
 LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jul 14 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m		WATER CONTENT, % W _p — W — W _L				
0	Power Auger Hollow Stem Auger (260mm OD)	Ground Surface		93.72								MH		
		TOPSOIL		93.52										
		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)		0.20	1	SS	180	14						
1					2	SS	355	5						
2					3	SS	610	5						
3					4	SS	610	5						
4					5	SS	610	5						
4				Stiff, grey SILTY CLAY	89.91	6	SS	610	WH					
5			3.81											
6				7	SS	610	WH							
7		End of borehole	87.17	8	SS	610	WH							
			6.55											
8														
9														
10														
11														
12														

GEO - BOREHOLE LOG 61899.04_BOREHOLE LOGS_R0_2020-07-17.GPJ GEMTEC 2018.GDT 11-30-20

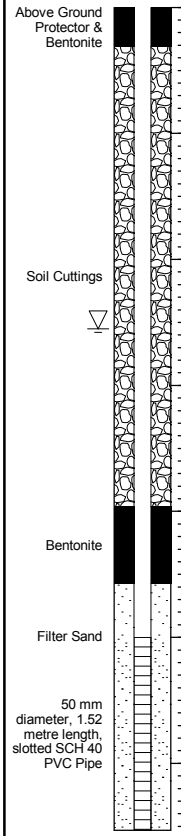
GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
20-09-30	2.0	91.7

RECORD OF BOREHOLE 20-07A

CLIENT: Cardel Homes
 PROJECT: Geotechnical & Hydrogeological Investigation
 JOB#: 61899.04
 LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jul 20 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED		WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m						
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		93.80										
		TOPSOIL		93.65 0.15	1	SS	205	10	●					
1		Stiff to very stiff, grey brown SILTY CLAY, with sand seams (WEATHERED CRUST)			2	SS	405	6	●					
2					3	SS	610	5	●	----- ⊕				
3					4	SS	610	4	●					
4		Very loose to compact, grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		90.45 3.35	5	SS	610	6	●					
5					6	SS	205	9	●					
6					7	SS	205	3	●					
7					8	SS	25	9	●					
8					9	SS	100	26	●					
9				87.27 6.53										
10			Auger refusal End of borehole											
11														
12														



GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
20-09-30	2.6 ▽	91.3

GEO - BOREHOLE LOG 61899.04_BOREHOLE LOGS_R0_2020-07-17.GPJ GEMTEC 2018.GDT 11-30-20



LOGGED: ML
 CHECKED: WAM

RECORD OF BOREHOLE 20-09

CLIENT: Cardel Homes
 PROJECT: Geotechnical & Hydrogeological Investigation
 JOB#: 61899.04
 LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jul 17 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED	WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m						
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		93.81									Above Ground Protector & Bentonite Soil Cuttings Bentonite Filter Sand 50 mm diameter, 1.52 metre length, slotted SCH 40 PVC Pipe	
		TOPSOIL		0.05	1	SS	205	8	●					
1		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)			2	SS	610	9	●	—	○			
2					3	SS	610	7	●					
3					4	SS	535	4	●					
4					5	SS	610	3	●					
4		Stiff, grey SILTY CLAY		89.85 3.96						⊕		+		
5			6	SS	610	1	●							
6								⊕		+				
6	Compact, grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)	88.09 5.72												
7			7	SS	355	15	●							
7	End of borehole	87.10 6.71												
8														
9														
10														
11														
12														

GEO - BOREHOLE LOG 61899.04_BOREHOLE LOGS_R0_2020-07-17.GPJ GEMTEC 2018.GDT 11-30-20

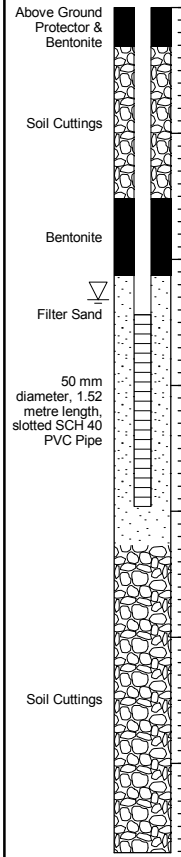
GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
20-09-30	2.2	91.6

RECORD OF BOREHOLE 20-11

CLIENT: Cardel Homes
 PROJECT: Geotechnical & Hydrogeological Investigation
 JOB#: 61899.04
 LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jul 10 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE			SAMPLES				● PENETRATION RESISTANCE (N), BLOWS/0.3m ▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	SHEAR STRENGTH (Cu), kPA + NATURAL ⊕ REMOULDED WATER CONTENT, % W _p — W — W _L	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m				
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		93.77								
		TOPSOIL		93.57								
		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)		0.20	1	SS	125	9	●			
1					2	SS	230	6	●	○		
2					3	SS	610	5	●			
3					4	SS	610	4	●			
4					5	SS	610	3	●			
		Firm, grey SILTY CLAY		90.11								
				3.66	6	SS	610	WH				
5			Very loose to loose grey CLAYEY SILT, some sand, trace gravel		89.30							
			4.47	7	SS	405	4	●	○			
6		Loose to compact, grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		88.28								
			5.49	8	SS	205	23	●				
				9	SS	455	10	●				
7		End of borehole		87.06								
			6.71									
8												
9												
10												
11												
12												



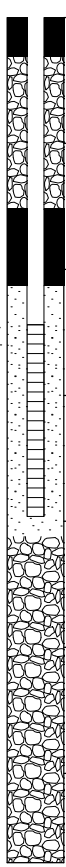
GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
20-09-30	2.3	91.5

GEO - BOREHOLE LOG 61899.04_BOREHOLE LOGS_R0_2020-07-17.GPJ GEMTEC 2018.GDT 11-30-20

RECORD OF BOREHOLE 20-12

CLIENT: Cardel Homes
 PROJECT: Geotechnical & Hydrogeological Investigation
 JOB#: 61899.04
 LOCATION: See Site Plan, Figure 1

SHEET: 1 OF 1
 DATUM: CGVD28
 BORING DATE: Jul 17 2020

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES				PENETRATION RESISTANCE (N), BLOWS/0.3m		SHEAR STRENGTH (Cu), kPA		ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	RECOVERY, mm	BLOWS/0.3m	▲ DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	● PENETRATION RESISTANCE (N), BLOWS/0.3m	+ NATURAL ⊕ REMOULDED		
0	Power Auger Hollow Stem Auger (210mm OD)	Ground Surface		93.94									 <p>Above Ground Protector & Bentonite</p> <p>Soil Cuttings</p> <p>Bentonite</p> <p>Filter Sand</p> <p>50 mm diameter, 1.52 metre length, slotted SCH 40 PVC Pipe</p> <p>Soil Cuttings</p>
		TOPSOIL		0.10	1	SS	100	12	●				
1		Stiff to very stiff, grey brown SILTY CLAY (WEATHERED CRUST)			2	SS	355	9	●				
2					3	SS	610	5	●	—	○		
3					4	SS	610	4	●				
4					5	SS	610	4	●				
4		Very loose to loose, grey SILTY SAND, some gravel, with cobbles and boulders (GLACIAL TILL)		90.49 3.45	6	SS	255	4	●				
5					7	SS	255	5	●				
6				88.61 5.33	8	SS	355	28	●				
6	Compact, grey SAND, some gravel			9	SS	455	24	●					
7	End of borehole		87.23 6.71										
8													
9													
10													
11													
12													

GEO - BOREHOLE LOG 61899.04_BOREHOLE LOGS_R0_2020-07-17.GPJ GEMTEC 2018.GDT 11-30-20

GROUNDWATER OBSERVATIONS		
DATE	DEPTH (m)	ELEV (m)
20-09-30	2.6	91.3

PROJECT: Geotechnical Investigation - 5831/5873 Perth St. & 2770 Eagleson Rd. **DRILLING DATA**
 CLIENT: Cardel Homes Method: Hollow Stem Augers
 PROJECT LOCATION: 5831/ 5873 Perth St. and 2770 Eagleson Rd., Ottawa Diameter: 203mm REF. NO.: 1776-710
 DATUM: Geodetic Date: Aug/02/2013 ENCL NO.:
 BH LOCATION: See Borehole Location Plan N 5006187 E 435121

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE			"N" BLOWS 0.3 m	SHEAR STRENGTH (kPa)						
93.7	Topsoil													
90.0	Silty Clay brown, moist, stiff, (weathered crust)		1	SS	7									
0.2			2	SS	4									
			3	SS	6									
			4	SS	5									
90.7	Silty Clay grey, moist, firm to stiff		5	SS	3									
3.1				VANE										
				VANE										
88.8	Silty Clay mixed with silty sand and some gravel		6A	SS	1									
4.9			6B	SS	1									
88.5	Gravelly Silty Sand grey, wet, compact (Till)													
5.3			7	SS	9									29 39 (32)
85.5	END OF BOREHOLE		8	SS	6									
8.2	Notes: 1) Upon completion, standing water in borehole at 4.2 m depth													

SPL SOIL LOG-OTTAWA 1776-710.GPJ SPL.GDT 23/1/14

GROUNDWATER ELEVATIONS

Shallow/ Single Installation ▽ ▽ Deep/Dual Installation ▽ ▽

GRAPH NOTES

+ 3, × 3: Numbers refer to Sensitivity ○ ε=3% Strain at Failure