

October 15, 2019

NRCB
#303, 4920 51 Street
Red Deer, Alberta
T4N 6K8
Attn: Jeff Froese

**Re: Application RA19016 – Geotechnical Information
Kramer Dairy Ltd.
SE-02-043-25 W4M
Ponoka County, Alberta**

Dear Jeff,

In response to the letter dated September 5, 2019, requesting additional information please find the following. Envirowest Engineering completed an on-site assessment September 26, 2019. The letter requested the following:

1. *I need to know the depth of the EMS.*
2. *I need one borehole advanced or drilled on the downgradient side (with respect to expected direction of shallow groundwater flow) of the EMS.*
 - a. *The borehole should be advanced to at least the top of bedrock and/or past the determined depth of the EMS,*
 - b. *The borehole should be properly logged, including determination of the depth to the water table, and*
 - c. *The borehole should be completed as a groundwater monitoring well.*

Three boreholes were advanced on the suspected down and cross gradient sides of the earthen manure storage (EMS) lagoon. Three boreholes were advanced to accurately triangulate site stratigraphy and depth to groundwater. All three boreholes were completed as monitoring wells to accurately determine groundwater flow direction. The borehole logs documenting lithology and depth to groundwater are attached. Elevation was measured from an on-site benchmark to determine relative depth to groundwater on October 9, 2019. Elevation and depth to groundwater is tabulated in the following table.

Monitoring Well	Ground Elevation (meters)	Stick-up (meters)	Depth to Groundwater (meters)
MW-01	0.12	0.7	Dry
MW-02 (Benchmark)	0	0.7	Dry
MW-03	0.33	0.7	3.26

Groundwater monitoring wells were completed to 5.0 meters below ground surface with a 3.0 meter screen (2.0 to 5.0 meters). Groundwater flow direction is to the north – northeast.

Through assessment of the lagoon wall slope, lithology and landowner reports it is predicted that the lagoon is approximately 3.75 to 4.5 meters below the northeast grade. The exact depth of the lagoon could not be determined through the soil assessment. Bedrock was encountered in borehole 19BH01 at 11.25 meters below ground surface.

Envirowest Engineering is pleased to submit the report on the Site and Soil Assessment to Reinder Kramer of Kramer Dairy Ltd.. The information and conclusions contained in this report are for their sole use and such parties as may be normally involved in the approval process for such a facility. No other party is to rely upon the information contained within the report without the express written authorization of Envirowest Engineering.

We trust that this report meets your present needs. Please feel free to contact the undersigned with any questions or should you require additional information.

If you have any questions, please contact the undersigned.

Respectfully submitted,

Emily J. Low, P.Eng.
Envirowest Engineering

Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice No. P14810



Professional Environmental Engineering Services

Title:
Borehole Locations
Site and Soil Assessment
SE¼-Sec. 02-Twp. 043-Rge. 25-W4M
Ponoka County, Alberta

Image Source:

Project No:	1909-42939
Scale:	1:1000
Date Drawn:	October 15, 2019
Prepared By:	E.Low, P.Eng.

2206165 Alberta Ltd. o/a Envirowest Engineering
Association of Professional Engineers and Geoscientists of Alberta
Permit to Practice No. P14810

Stamp:

Not Required

Figure:

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LOG OF BORING 19BH01

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Site and Soil Assessment
SE¼-Sec. 02-Twp.043-Rge. 25-W4M
Ponoka County, Alberta

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : September 26, 2019
Logged By: : Emily Low P.Eng.

Kramer Dairy Ltd.
Project Number: 1909-42939

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well: MW01 Elev.:	Water Level
0.0				Top Soil, sandy, damp, black		
0.3						
0.5						
0.8				SAND, some clay, brown black, damp to dry, fill		
1.0						
1.3				SANDY CLAY, light brown, damp, stiff		
1.5						
1.8				mottled, very stiff		
2.0						
2.3						
2.5						
2.8				silt inclusions		
3.0						
3.3				greenish brown, damp, loose		
3.5						
3.8						
4.0						
4.3						
4.5						
4.8				SAND, damp, light brown to reddish brown, loose		
5.0						
5.3						
5.5						
5.8						
6.0						
6.3						
6.5						
6.8						
7.0						
7.3						
7.5						
7.8						
8.0						
8.3						
8.5						
8.8						
9.0						
9.3						
9.5						
9.8						
10.0						
10.3						
10.5						
10.8						
11.0						
11.3						
11.5				Weathered Sandstone		
11.8						
12.0						

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LOG OF BORING 19BH02

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Site and Soil Assessment
SE¼-Sec. 02-Twp.043-Rge. 25-W4M
Ponoka County, Alberta

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : September 26, 2019
Logged By: : Emily Low P.Eng.

Kramer Dairy Ltd.
Project Number: 1909-42939

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well: MW02 Elev.:	Water Level
0.0				Top Soil, sandy, damp, black		
0.3						
0.5				SAND, some clay, brown black, damp to dry, fill	Bentonite	
0.8					Solid	
1.0						
1.3						
1.5						
1.8						
2.0				SANDY CLAY, light brown, mottled, damp		
2.3						
2.5						
2.8						
3.0						
3.3					Sand	
3.5					Screen	
3.8						
4.0						
4.3						
4.5				SAND, damp, light brown to reddish brown, loose		
4.8						
5.0						
5.3					Bentonite	
5.5						
5.8						
6.0						



LOG OF BORING 19BH03

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Site and Soil Assessment
SE¼-Sec. 02-Twp.043-Rge. 25-W4M
Ponoka County, Alberta

Driller: : Evergreen Drilling
Drilling Method: : Truck Mounted Auger
Drill Date : September 26, 2019
Logged By: : Emily Low P.Eng.

Kramer Dairy Ltd.
Project Number: 1909-42939

Depth in Meters	Gastech Reading (ppm)	VOC Reading	GRAPHIC	DESCRIPTION	Well: MW02 Elev.:	Water Level
0.0				Topsoil, black brown, damp, loose		
0.3						
0.5						
0.8						
1.0						
1.3				GRAVEL and SANDS, Poorly Graded		
1.5				SANDY CLAY, light brown, mottled, very stiff		
1.8						
2.0						
2.3						
2.5				silt inclusions		
2.8						
3.0						
3.3						
3.5						
3.8						
4.0						
4.3						
4.5						
4.8						
5.0						
5.3						
5.5						
5.8						
6.0						

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