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August 15, 2016

File No. 1000-027-02

Mr. Brad Boyd
Quantum Murray
201 Portage Avenue - 18th Floor
Winnipeg MB
R3B 3K6

RE Dauphin River First Nation Wastewater Lagoon Construction – Lab Testing Update for Shelby Tube Samples

TREK Geotechnical Inc. (TREK) was retained by Quanrum Murray LP (QM) to provide testing services on an as requested basis at the above project. This report provides a summary of the hydraulic conductivity test results completed to date.

On July 5, 2016 QM delivered Shelby tube samples to Trek for testing. The Shelby tubes were identified as ST1 to ST10. Representatives from Manitoba Conservation, QM, J.R. Cousin Consultants Ltd. met at Trek's laboratory to observe the extrusion of Shelby tube samples. Manitoba Conservation selected which samples were to be extracted from the Shelby tubes as well as selected four samples to be tested for Hydraulic conductivity. Three tests have been completed to date (ST4, ST6, ST7) while testing of ST9 is in progress. A summary of results from the completed tests is provided below, and the completed reports are attached.

ST4 - 4.67×10^{-11} m/s (4.67×10^{-9} cm/s)

ST6 - 1.09×10^{-10} m/s (1.09×10^{-8} cm/s)

ST7 - 7.47×10^{-11} m/s (7.47×10^{-9} cm/s)

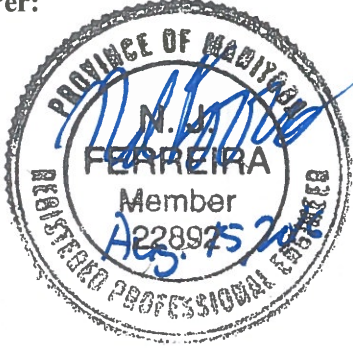
A final testing report will be issued once all testing has been completed. The test results presented are representative of the soil samples provided. The testing services undertaken by TREK constitutes testing services only and engineering evaluation or interpretation has not been undertaken, but is available upon request.



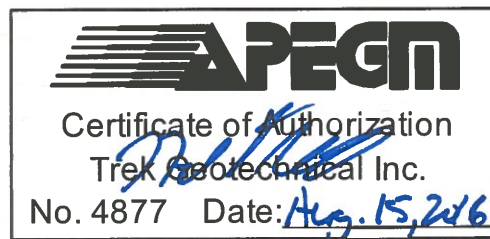
If you have any questions or require any additional information, please contact the undersigned.

TREK Geotechnical

Per:



Nelson Ferreira, M.Sc., P.Eng.
Geotechnical Engineer





Project No. 1000-027-02
Client Quantum Murray
Project Dauphin River First Nation
 Wastewater Lagoon Construction

Test Hole ST4
Trek Sample #
Depth (m) 1.54 - 2.16
Sample Date July 04, 2016
Test Date July 07, 2016 to Aug 02, 2016
Technician Paul Bevel

Specimen Details

Visual Classification Clay, silty, brown, firm, high plasticity

Comments The specific gravity of the soil was assumed to be 2.75.

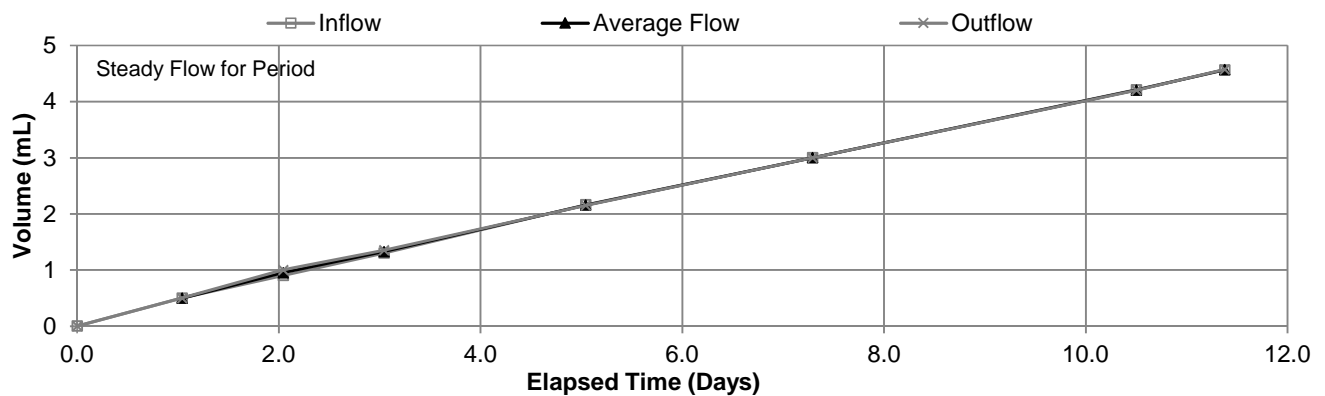
Atterberg Limits

Liquid Limit Not Requested
Plastic Limit Not Requested
Plasticity Index Not Requested

Test Details

Permeant Distilled, de-aired water
Method Constant Head
Cell Pressure 172.4 kPa
Influent Pressure 128.2 kPa
Effluent Pressure 110.3 kPa
Gradient 22.48

Permeation Graph



Steady Flow Permeation Data

Time Increment (Days)	Elapsed Time (Days)	Flow (Q)		Inflow / Outflow Ratio	Average Flow (mL)	Temperature Correction	Corrected Hydraulic Conductivity, k_{20} (m/s)
		Influent (mL)	Effluent (mL)				
2.00	5.04	0.86	0.80	1.08	0.83	0.95	4.91E-11
2.25	7.29	0.84	0.85	0.99	0.85	0.95	4.44E-11
3.21	10.50	1.21	1.20	1.01	1.21	0.94	4.39E-11
0.88	11.38	0.35	0.37	0.95	0.36	0.96	4.93E-11

Average Temperature Corrected Hydraulic Conductivity, k_{20} (m/s) **4.67E-11 (4.67x10⁻⁹ cm/s)**

Consolidation Data

	Average Height (m)	Average Diameter (m)	Moisture Content (%)	Dry Density (kN/m ³)	Degree of Saturation (%)	Cell Pressure	Back Pressure
Initial	0.0808	0.0727	30.2	14.5	97.2	172.4	110.3
Final	0.0813	0.0727	31.9	14.5	101.5	172.4	110.3



Project No.	1000-027-02	Test Hole	ST6
Client	Quantum Murray	Trek Sample #	
Project	Dauphin River First Nation Wastewater Lagoon Construction	Depth (m)	0.62 - 1.23
		Sample Date	July 04, 2016
		Test Date	July 12, 2016 to Aug 04, 2016
		Technician	Paul Bevel

Specimen Details

Visual Classification Clay, silty, brown and grey, trace oxidation, firm, high plasticity

Comments The specific gravity of the soil was assumed to be 2.75.

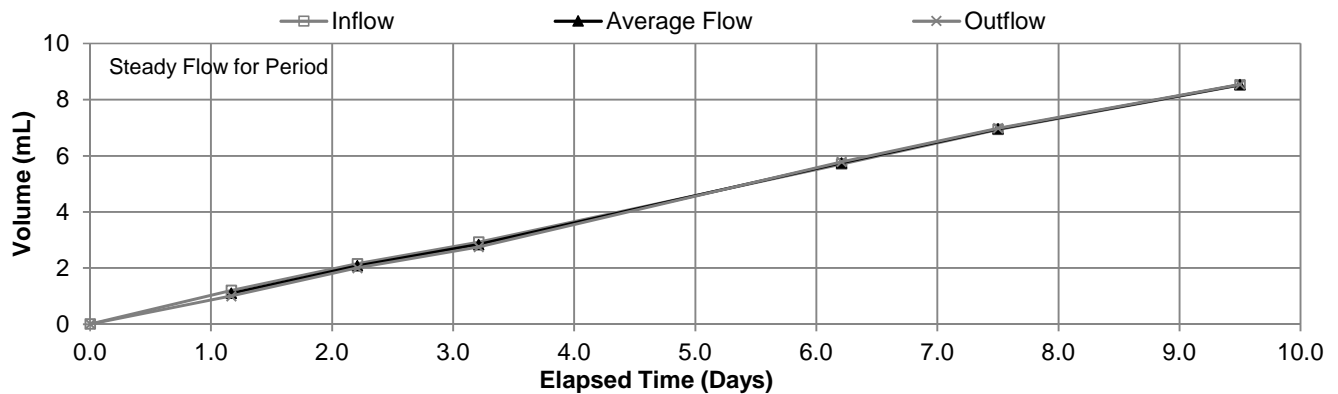
Atterberg Limits

Liquid Limit Not Requested
Plastic Limit Not Requested
Plasticity Index Not Requested

Test Details

Permeant Distilled, de-aired water
Method Constant Head
Cell Pressure 151.7 kPa
Influent Pressure 124.1 kPa
Effluent Pressure 110.3 kPa
Gradient 21.05

Permeation Graph



Steady Flow Permeation Data

Time Increment (Days)	Elapsed Time (Days)	Flow (Q)		Inflow / Outflow Ratio	Average Flow (mL)	Temperature Correction	Corrected Hydraulic Conductivity, k_{20} (m/s)
		Influent (mL)	Effluent (mL)				
1.00	3.21	0.77	0.75	1.03	0.76	0.96	9.71E-11
3.00	6.21	2.78	3.03	0.92	2.91	0.95	1.22E-10
1.29	7.50	1.23	1.20	1.03	1.22	0.95	1.19E-10
2.00	9.50	1.59	1.56	1.02	1.58	0.95	9.94E-11

Average Temperature Corrected Hydraulic Conductivity, k_{20} (m/s) **1.09E-10 (1.09x10⁻⁸ cm/s)**

Consolidation Data

	Average Height (m)	Average Diameter (m)	Moisture Content (%)	Dry Density (kN/m ³)	Degree of Saturation (%)	Cell Pressure	Back Pressure
Initial	0.0841	0.0727	32.1	14.3	99.7	151.7	110.3
Final	0.0835	0.0727	32.2	14.4	101.8	151.7	110.3

Project No. 1000-027-02
Client Quantum Murray
Project Dauphin River First Nation
 Wastewater Lagoon Construction

Test Hole ST7
Trek Sample #
Depth (m) 1.54-2.16
Sample Date July 04, 2016
Test Date July 05, 2016 to July 22, 2016
Technician Paul Bevel

Specimen Details

Visual Classification Clay, silty, mottled brown and grey, firm, high plasticity
Comments The specific gravity of the soil was assumed to be 2.75.

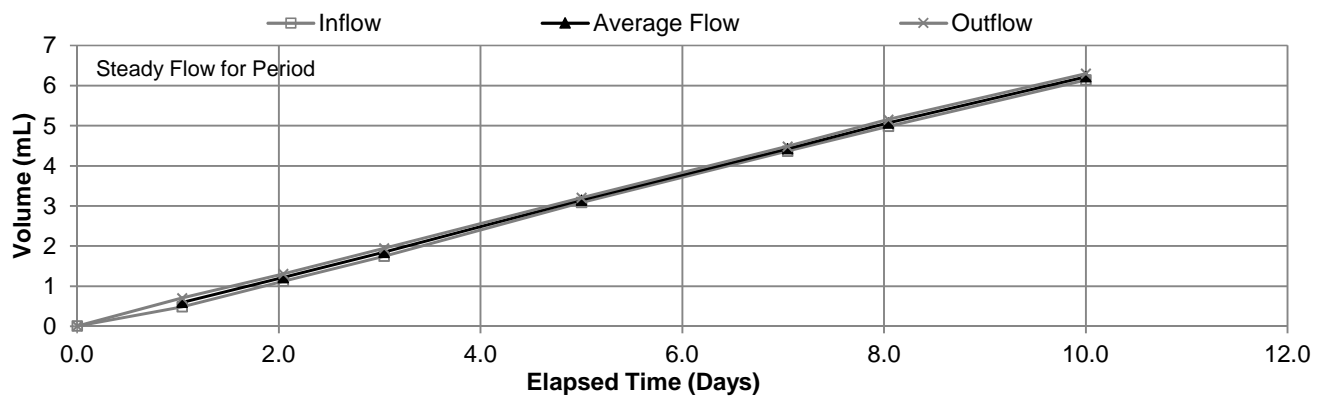
Atterberg Limits

Liquid Limit Not Requested
Plastic Limit Not Requested
Plasticity Index Not Requested

Test Details

Permeant Distilled, de-aired water
Method Constant Head
Cell Pressure 199.9 kPa
Influent Pressure 179.3 kPa
Effluent Pressure 160.6 kPa
Gradient 22.45

Permeation Graph



Steady Flow Permeation Data

Time Increment (Days)	Elapsed Time (Days)	Flow (Q)		Inflow / Outflow Ratio	Average Flow (mL)	Temperature Correction	Corrected Hydraulic Conductivity, k_{20} (m/s)
		Influent (mL)	Effluent (mL)				
1.96	5.00	1.34	1.26	1.06	1.30	0.95	7.86E-11
2.04	7.04	1.28	1.28	1.00	1.28	0.95	7.42E-11
1.00	8.04	0.62	0.67	0.93	0.65	0.94	7.55E-11
1.96	10.00	1.16	1.15	1.01	1.16	0.96	7.07E-11

Average Temperature Corrected Hydraulic Conductivity, k_{20} (m/s) **7.47E-11 (7.47x10⁻⁹ cm/s)**

Consolidation Data

	Average Height (m)	Average Diameter (m)	Moisture Content (%)	Dry Density (kN/m ³)	Degree of Saturation (%)	Cell Pressure	Back Pressure
Initial	0.0783	0.0726	31.1	14.3	96.4	199.9	160.6
Final	0.0783	0.0727	33.2	14.2	101.3	199.9	160.6