

Boswick, Robert (SD)

From: Oswald Wohlgemut <owohlgemut@jrcc.ca>
Sent: November-13-17 1:24 PM
To: Boswick, Robert (SD)
Cc: McInnis, Anthony (IMR); 'Jeff Dyck'
Subject: Wabowden Permeability Test Results
Attachments: HC-TH01 S01 @ 1 1m-1# 2) - BW signed.pdf; HC-TH01 S02 @ 2 6m-3# 3) - BW signed.pdf; Stantec Permeability Results.pdf

Hi Rob,

We have attached results of the permeability testing conducted at the Wabowden Lagoon in August and in October. Please review. We will be completing the Record Drawings for the Lagoon Expansion shortly and will send you a copy.

Regards,

Oswald Wohlgemut, M.Sc.
Environmental Scientist

J.R. Cousin Consultants Ltd.
Phone: (204) 489-0474
Fax: (204) 489-0487
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ASTM D5084 - HYDRAULIC CONDUCTIVITY REPORT



TO: Oswald Wohlgemut, M.Sc
 JR Cousin Consultants Ltd
 91 Scurfield Boulevard
 Winnipeg, MB R3Y 1G4

PROJECT NO: WX11334 - 3000
CLIENT: JR Cousin Consultants Ltd
DATE SUBMITTED: 13-Sep-17

PROJECT: Soil Analysis for Wabowden Lagoon

TEST HOLE: TH01
SAMPLE NO.: S02
SAMPLE DEPTH: 2.6m-3.0m

PERMEANT: De-Aired Tap Water
HYDRAULIC GRADIENT: 29.36

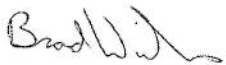
CONSTANT HEAD METHOD (K = cQL/thA)

	Sample Height, L (cm)	Sample Dia. (cm)	Water Content (%)	Dry Density (kg/m ³)	Degree of Saturation (%)	Cell Pressure (kPa)	Back Pressure (kPa)	Differential Pressure, h (kPa)
Initial	7.18	7.19	20.3%	1650	83.6%	241.4	196.5	20.7
Final	7.23	7.23	30.3%	1501	100.3%			

Date & Time		Time, t (seconds)	Flow (Q)		Temp. Corr, c	Hyd. Cond. Corrected, K (cm/s)
Start	End		Influent (ml)	Effluent (ml)		
9/19/17 8:16 AM	9/20/17 8:10 AM	86040	0.65	0.60	1.238	7.55E-09
9/20/17 8:10 AM	9/21/17 8:05 AM	86100	0.70	0.60	0.980	6.21E-09
9/21/17 8:05 AM	9/22/17 8:14 AM	86940	0.65	0.60	0.980	5.92E-09
9/22/17 8:14 AM	9/25/17 7:59 AM	258300	1.75	1.70	0.980	5.50E-09
9/25/17 7:59 AM	9/26/17 8:20 AM	87660	0.60	0.55	0.980	5.40E-09

Average Temperature
Corrected Value (cm/s): 5.75E-09

Amec Foster Wheeler Environment & Infrastructure

Per: 
 Brad Wiebe, M.Sc., P.Eng.
 Senior Associate Geotechnical Engineer

*Reporting of these results constitutes a testing service only.
 Engineering interpretation or evaluation of the test results is provided only on written request.*

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 JR Cousin Consultants Ltd
 91 Scurfield Boulevard
 Winnipeg, MB R3Y 1G4

PROJECT NO: WX11334 - 3000
 CLIENT: JR Cousin Consultants Ltd
 DATE SUBMITTED: 13-Sep-17

PROJECT: Soil Analysis for Wabowden Lagoon

TEST HOLE: TH01
 SAMPLE NO.: S01
 SAMPLE DEPTH: 1.1m-1.5m

PERMEANT: De-Aired Tap Water
 HYDRAULIC GRADIENT: 28.98

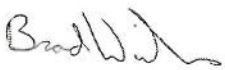
CONSTANT HEAD METHOD ($K = cQL/thA$)

	Sample Height, L (cm)	Sample Dia. (cm)	Water Content (%)	Dry Density (kg/m ³)	Degree of Saturation (%)	Cell Pressure (kPa)	Back Pressure (kPa)	Differential Pressure, h (kPa)
Initial	7.28	7.17	26.6%	1582	98.9%	241.4	196.5	20.7
Final	7.34	7.26	30.2%	1503	100.3%			

Date & Time		Time, t (seconds)	Flow (Q)		Temp. Corr, c	Hyd. Cond. Corrected, K (cm/s)
Start	End		Influent (ml)	Effluent (ml)		
9/19/17 8:18 AM	9/20/17 8:11 AM	85980	1.05	1.10	1.238	1.32E-08
9/20/17 8:11 AM	9/21/17 8:06 AM	86100	1.10	1.10	0.980	1.07E-08
9/21/17 8:06 AM	9/22/17 8:13 AM	86820	1.10	1.00	0.980	1.01E-08
9/22/17 8:13 AM	9/25/17 7:57 AM	258240	2.90	2.90	0.980	9.41E-09
9/25/17 7:57 AM	9/26/17 8:18 AM	87660	1.05	1.00	0.980	9.80E-09

Average Temperature
 Corrected Value (cm/s): 1.00E-08

Amec Foster Wheeler Environment & Infrastructure

Per: 
 Brad Wiebe, M.Sc., P.Eng.
 Senior Associate Geotechnical Engineer

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Stantec Consulting Ltd.
199 Henlow Bay, Winnipeg MB R3Y 1G4

November 10, 2017
File: 123313464

Attention: Mr. Oswald Wohlgemut
JR Cousin Consultants Ltd.
91A Scurfield Blvd.
Souris, Manitoba R3Y 1G4

Good day Oswald,

Reference: Wabowden Lagoon

On October 27, 2017, a total of two (2) soil samples were submitted to our laboratory for analysis. The following test was conducted on select soil samples:

- Hydraulic Conductivity (ASTM D5084)

We appreciate the opportunity to assist you in this project. Please call if you have any questions regarding this report.

Regards,

STANTEC CONSULTING LTD.

Kevin Hiraoka, C.Tech.
Senior Materials Technician
Lab Supervisor, Materials Testing Services
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kevin.hiraoka@stantec.com

Jason Thompson, C.E.T.
Senior Associate – Team Lead
Manager, Materials Testing Services
Phone: (204) 928-4004
jason.thompson@stantec.com

Attachments: 2 x Hydraulic Conductivity Reports



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 199 Henlow Bay
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**HYDRAULIC CONDUCTIVITY
 ASTM D5084**

JR Cousin Consultants Ltd.
 91A Scurfield Blvd.
 Winnipeg, MB
 R3Y 1G4

PROJECT: Wabowden Lagoon

REPORT NO.: 1

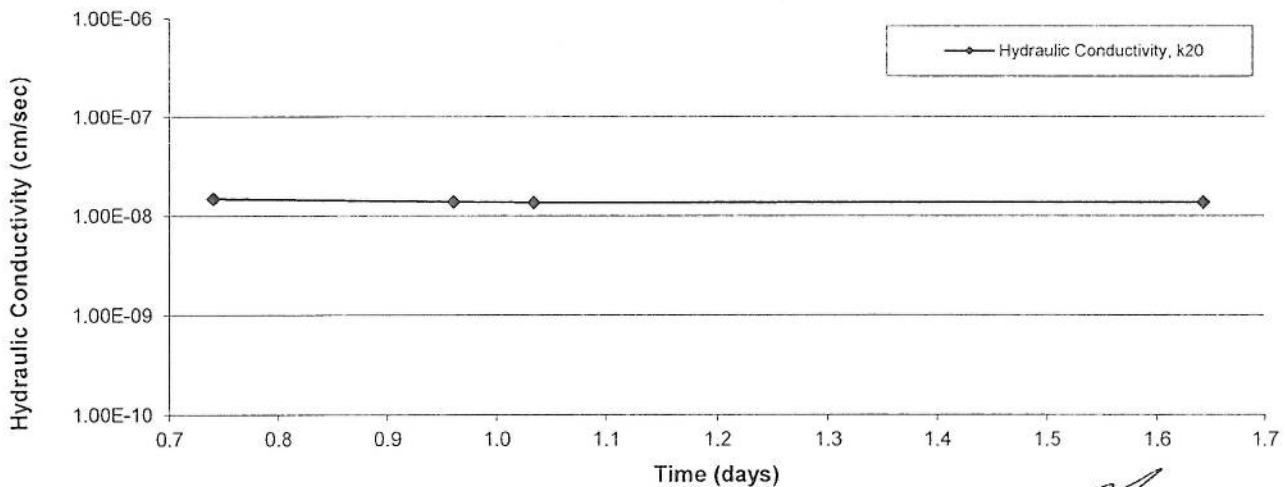
Attention: Oswald Wohlgemut

PROJECT NO.: 123313464

SAMPLE FIELD I.D.: TH18, 2.1 m - 2.7 m
SOIL DESCRIPTION: Clay, brown, firm, moist, high plasticity, trace silt

DATE TESTED: November 1 to November 9, 2017
CONFINING PRESSURE (kPa): 137.9
EFFECTIVE SATURATION STRESS (kPa): 34.5
ASSUMED SPECIFIC GRAVITY: 2.71
HYDRAULIC GRADIENT: 19.1
TYPE OF PERMEANT LIQUID: De-aired Water
HYDRAULIC CONDUCTIVITY, "k" (cm/s): 1.4E-08
HYDRAULIC CONDUCTIVITY, "k₂₀" (cm/s): 1.4E-08

	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm ³)	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)
Initial Reading	77.7	72.1	617.8	1.507	29.1	43.8	98.8
Final Reading	77.7	72.1	620.5	1.497	30.7	45.9	102.5



REPORT DATE: November 10, 2017

REVIEWED BY:  Jason Thompson, C.E.T.

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**HYDRAULIC CONDUCTIVITY
 ASTM D5084**

JR Cousin Consultants Ltd.
 91A Scurfield Blvd.
 Winnipeg, MB
 R3Y 1G4

PROJECT: Wabowden Lagoon

REPORT NO.: 2

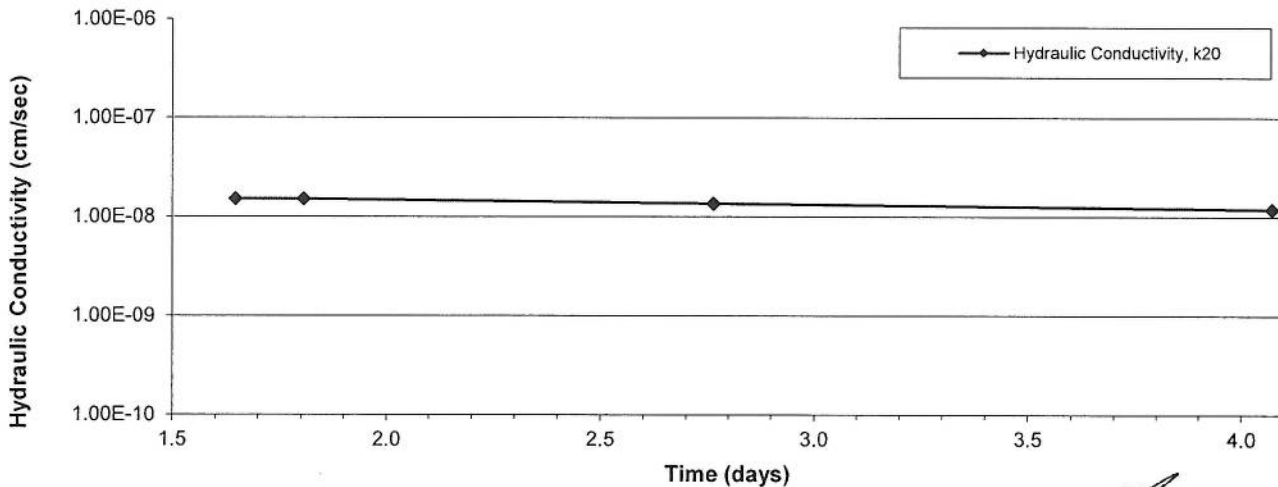
Attention: Oswald Wohlgemut

PROJECT NO.: 123313464

SAMPLE FIELD I.D.: TH23, 1.2 m - 1.8 m
SOIL DESCRIPTION: Clay, brown, firm, moist, high plasticity, trace silt

DATE TESTED: November 1 to November 7, 2017
 CONFINING PRESSURE (kPa): 137.9
 EFFECTIVE SATURATION STRESS (kPa): 34.5
 ASSUMED SPECIFIC GRAVITY: 2.71
 HYDRAULIC GRADIENT: 19.1
 TYPE OF PERMEANT LIQUID: De-aired Water
 HYDRAULIC CONDUCTIVITY, "k" (cm/s): 1.4E-08
 HYDRAULIC CONDUCTIVITY, "k₂₀" (cm/s): 1.4E-08

	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm ³)	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)
Initial Reading	77.7	72.4	630.2	1.513	30.1	45.6	103.1
Final Reading	77.9	72.4	633.0	1.528	29.1	44.5	102.0



REPORT DATE: November 10, 2017

REVIEWED BY:  Jason Thompson, C.E.T.

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