

December 13, 2017

F:\100\118 Pipestone\118.09 Reston Lagoon Upgrade and Pipestone Forcemain\01 Correspondence\Lagoon\174 Oct - Dec\Ltr - Reston Lagoon Cell 4.doc

Ms. Tracey Braun Environmental Approvals Branch Manitoba Sustainable Development Box 80, 160-123 Main Street Winnipeg, Manitoba R3C 1A5 Via e-mail

P-118.09

Dear Ms. Braun,

## RE: RM of Pipestone – Reston Lagoon Upgrade and Expansion – Approval Request to Utilize Cell 4

By way of this letter the RM of Pipestone is requesting to utilize the bottom 0.75 m of Cell 4 of the Reston lagoon over the winter of 2017/2018.

Hydraulic conductivity testing of Cell 4 was completed on October 13, 2017. The following is a summary of the Shelby tube samples tested from the Cell:

ST6 (6' – 8' from TH4 located on the south top of dike) –  $5.2 \times 10^{-8}$  cm/s

ST8 (1' – 3' from TH8 located in the middle of the cell floor) – 3.3 x  $10^{-8}$  cm/s

ST1 (3' – 5' from TH1 in the NW corner of the north dike) –  $5.6 \times 10^{-6}$  cm/s

ST4 (1' – 3' from TH2 in the middle of the north dike) – 7.7. x  $10^{-8}$  cm/s

ST5 (5' – 7' from TH2 in the middle of the north dike) – sample was not cohesive enough to be tested and was deemed a failed test.

The east, west and south dikes of Cell 4 as well as the cell floor of Cell 4 was deemed accepted by Asit Dey of Manitoba Sustainable Development. A section of the north cut-off wall of Cell 4 (ST1 from TH1 and ST5 from TH2) was noted to be a concern. Following the initial testing on October 13, 2017, two areas of the north dike around TH1 and TH2 were excavated and replaced with suitable clay from the borrow area and re-tested on November 10, 2017. The following additional Shelby tube samples were tested:

ST1  $(4' - 6' \text{ from TH1 located in the NW corner of Cell 4}) - 1.1 \times 10^{-7} \text{ cm/s}$ 

ST3 (1' - 3') from TH4 located in the middle of the north dike) - sample was not cohesive enough to be tested and was deemed a failed test.

Once the results of the Shelby tubes were obtained the weather conditions were such that an additional repair could not be completed. In the spring of 2018, the north dike of Cell 4 will have to be excavated and replaced with high plastic clay from a borrow area approximately 1.5 m below the top of dike in the northwest corner and 0.9 m below the top of dike in the middle of the north dike. All Shelby tube samples from the test hole auguring and from the Shelby tube samples extruded but not tested indicate the clay liner up to 1.0 m above the cell floor meet or exceed the licence requirements. Also the north dike cut-off wall was constructed 3 m thick further protecting the environment from potential impacts related to potential soils slightly below the hydraulic conductivity requirements.

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The RM of Pipestone is requesting permission to send wastewater from the Community of Pipestone to the Reston lagoon over the winter and spring of 2017/2018 and repair the top portion of the Cell 4 north dike in the spring of 2018 and re-test. The Community of Pipestone is currently sending wastewater to the Pipestone lagoon which has known leakage concerns and sending effluent to the Reston lagoon would be a better solution for Environmental risk mitigation. By placing Cell 4 into partial operation the RM would begin proper decommissioning procedures for the Pipestone lagoon.

An assessment of the Reston lagoon levels was completed by JRCC personnel on November 16, 2017. The primary cell had a water level of 0.18 m and existing Storage Cell 2 had a water level of 0.79 m. Cell 4 was empty. The storage capacity of the lagoon as of November 16, 2017 is therefore: Expanded primary cell  $(0.18 \text{ m to } 1.5 \text{ m}) - 34,950 \text{ m}^3$ Existing storage cell 2  $(0.79 \text{ m to } 1.5 \text{ m}) - 12,500 \text{ m}^3$ Hydraulic capacity of new cell 4  $(0 \text{ m to } 1.5 \text{ m}) - 27,600 \text{ m}^3$ Total hydraulic capacity of all 3 cells  $- 75,050 \text{ m}^3$ 

The expected hydraulic loadings from November 16 to June 15 from Reston and Pipestone based on the 2018 projected loadings from the EAP document are as follows: Reston – 50,050 m<sup>3</sup> Pipestone – 10,005 m<sup>3</sup> Total – 60,055 m<sup>3</sup>

From the calculations the RM of Pipestone will require 100% of the capacity of the expanded primary cell and Storage Cell 2 plus 42% of Cell 4 (0 to 0.7m) to have sufficient capacity until the discharge date next spring (without using any freeboard).

Therefore it is requested that the bottom 0.75 m of the Cell 4 capacity (to provide 50 mm of safety factor) be placed into operation. This will provided 0.3 m of freeboard to the area of concern  $(1.1 \times 10^{-7} \text{ cm/s})$  in the NW corner of Cell 4 (1.5 m below the top of dike) and 0.85 m to the area of concern in the middle of the north top of dike of Cell 4 (0.9 m below the top of dike).

Please review this letter and provide approval to utilize the bottom 0.75 m of Cell 4 over this winter/spring. If you have any questions or require any additional information, please contact me.

Sincerely, JR Cousin Consultants Ltd.

M'Cane

Brett McCormac, P.Eng. Environmental Engineer

enc Hydraulic Conductivity Results cc Michelle Halls, CAO, RM of Pipestone – via email Dee Genaille, MWSB – via email Asit Dey, Manitoba Sustainable Development – via email



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HYDRAULIC CONDUCTIVITY ASTM D5084

A.D. Hanslip 739 Lockpo Lockport, N	o Excavo ort Road 1B	ating & Demo	olition Ltd.		PROJECT:	Reston Lagoon		
R1A 3J2						REPORT NO.:	1	
Attention:		Allan Hansli	o			PROJECT NO.:	123313178	
SAMPLE FIELD	<b>D I.D.:</b> PTION:	<b>ST-6 @ 6'-8' (t</b> Clay till, brow	<b>op)</b> m, stiff, moist,	medium plast	icity, some silt			
DATE TESTED: CONFINING EFFECTIVE SA ASSUMED SPE HYDRAULIC C TYPE OF PERA HYDRAULIC C HYDRAULIC C	PRESSURI ITURATIO ECIFIC G GRADIEN MEANT LI CONDUC	E (kPa): N STRESS (kPa) RAVITY: T: QUID: CTIVITY, "k" (cm <b>TIVITY, "k<sub>20</sub>" (c</b>	: /s): m/s):	October 18 137.9 34.5 2.71 19.0 De-aired We 6.0E-08 <b>5.2E-08</b>	to October ater	21, 2017		
		Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (a/cm <sup>3</sup> )	Water Content by Mass (%)	Water Content by	Saturation (%)
							V00111e (76)	V V II
Initial Rea	ading	78.7	73.0	690.6	1.803	16.4	29.6	88.4
Initial Rea Final Rea	ading Iding	78.7 78.0	73.0 72.7	690.6 700.0	1.803 1.860	16.4 16.4	29.6 30.5	88.4 97.3
Initial Rec           Final Rec           1.00E-05           1.00E-05           1.00E-05           1.00E-05           1.00E-07           1.00E-07	2ding ading	78.7	73.0	690.6	1.803	16.4 16.4 □ 16.4	29.6 30.5	88.4 97.3
Initial Rec           Final Rec           1.00E-05           1.00E-05           1.00E-05           1.00E-07           1.00E-08           1.00E-08	ading ading	78.7	73.0 72.7	690.6	1.803	16.4 16.4 □ 16.4	29.6 30.5	88.4 97.3
Initial Rec           Final Rec           1.00E-05           1.00E-05           1.00E-06           1.00E-07           1.00E-07           1.00E-08           1.00E-08           1.00E-08           1.00E-08           1.00E-08           1.00E-08           1.00E-08           1.00E-08           1.00E-08	2ding 1ding 5 6 7 8 9 0.1	78.7 78.0	73.0 72.7	690.6 700.0 0.5	1.803 1.860 0.7 ne (days)	16.4 16.4 □ − Hyc	Iraulic Conductivity, k20	88.4 97.3

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.



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**HYDRAULIC CONDUCTIVITY ASTM D5084** 

A.D 739	). Hanslip Excave 2 Lockport Road	ating & Dem	olition Ltd.		PROJECT:	Reston Lagoor	1	
R14	A 3 12					REPORT NO.:	2	
i(i)	( UJL						-	
Att	ention:	Allan Hansli	р			PROJECT NO.:	123313178	
SAA	APLE FIELD I.D.:	ST-8 @ 1'-3' (†	op)					
SOI	L DESCRIPTION:	Clay till, brow	vn, stiff, moist,	medium plast	icity, some silt			
DAT	TE TESTED:			October 18	to October:	21, 2017		
со	NFINING PRESSURE	E (kPa):		137.9				
EFFE	ECTIVE SATURATIO	N STRESS (kPa)	:	34.5				
ASS	UMED SPECIFIC G	RAVITY:		2.71				
HYE	DRAULIC GRADIEN	Т:		19.1				
TYPI	E OF PERMEANT LIC	QUID:		De-aired W	ater			
HYC	DRAULIC CONDUC	TIVITY, "k" (cm	/s):	3.8E-08				
HYC	DRAULIC CONDUC	τίν(îΥ, "k <sub>20</sub> " (c	m/s):	3.3E-08				
		Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm³)	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)
	Initial Reading	Height (mm) 78.5	Diameter (mm) 72.3	Wet Mass (g) 687.4	Dry Density (g/cm³) 1.826	Water Content by Mass (%) 16.7	Water Content by Volume (%) 30.5	Saturation (%) 93.6
	Initial Reading Final Reading	Height (mm) 78.5 77.8	Diameter (mm) 72.3 72.4	Wet Mass         (g)           687.4         688.9	Dry Density (g/cm <sup>3</sup> ) 1.826 1.837	Water Content by Mass (%)           16.7           17.1	Water Content by Volume (%) 30.5 31.4	<b>Saturation</b> (%) 93.6 97.6
raulic Conductivity (crn/sec)	Initial Reading         Final Reading         1.00E-05         1.00E-06         1.00E-07         1.00E-08         1.00E-09	Height (mm) 78.5 77.8	Diameter (mm) 72.3 72.4	Wet Mass         (g)           687.4         688.9	Dry Density (g/cm³) 1.826 1.837	Water Content by Mass (%) 16.7 17.1	Water Content by Volume (%) 30.5 31.4	Saturation (%) 93.6 97.6

REVIEWED BY: Jason Thompson, C.E.T. REPORT DATE: October 23, 2017

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Time (days)

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A.[ 739	D. Hanslip Excave 9 Lockport Road akport, MB	ating & Demo	olition Ltd.		PROJECT:	: Reston Lagoon		
R1/	A 3J2					REPORT NO .:	6	
Att	ention:	Allan Hanslip	0			PROJECT NO.:	123313178	
sai Soi	MPLE FIELD I.D.: L DESCRIPTION:	<b>\$T-4, 1'-3', TH</b> Sandy silt till, I	<b>2</b> brown, stiff, m	noist, medium (	plasticity, som	e clay, trace grav	vel	
DA CO EFF ASS HYI TYP HYI HYI	TE TESTED: DNFINING PRESSURE ECTIVE SATURATION SUMED SPECIFIC G DRAULIC GRADIEN E OF PERMEANT LIC DRAULIC CONDUC DRAULIC CONDUC	E (kPa): N STRESS (kPa): RAVITY: T: QUID: TIVITY, "k" (cm, <b>TIVITY, "k<sub>20</sub>" (c</b>	: /s): <b>m/s):</b>	October 24 137.9 34.5 2.71 19.6 De-aired We 8.2E-08 <b>7.7E-08</b>	to October ater	28, 2017		
		Helght (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm <sup>3</sup> )	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)
	Initial Reading	73.7	71.9	628.8	1.899	10.6	20.1	67.2
	Final Reading	75.7	71.5	662.8	1.890	15.4	29.1	96.3
Conductivity (cm/sec)	1.00E-05 1.00E-06 1.00E-07 1.00E-08					Hyc	iraulic Conductivity, k20	
ydraulic	1.00E-09							
Ĩ	1.00E-10 ↓ 0.2	0.4		0.6	0.8	1.0	1.2	

Reparting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.



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A.D. Hanslip Excav 739 Lockport Road	ating & Demo	olition Ltd.		PROJECT:	Reston Lagoon			
R1A 3J2					REPORT NO .:	5		
Attention:	Allan Hansli	o			PROJECT NO.:	123313178		
SAMPLE FIELD I.D.: SOIL DESCRIPTION:	<b>ST-1, 3'-5', TH</b> Sandy silt till, I	) brown, moist,	medium plast	icity, some clo	ay, trace gravel			
DATE TESTED:October 24 to October 27, 2017CONFINING PRESSURE (kPa):137.9EFFECTIVE SATURATION STRESS (kPa):34.5ASSUMED SPECIFIC GRAVITY:2.65HYDRAULIC GRADIENT:10.0TYPE OF PERMEANT LIQUID:De-aired WaterHYDRAULIC CONDUCTIVITY, "k" (cm/s):5.9E-06HYDRAULIC CONDUCTIVITY, "kao" (cm/s):5.6E-06								
	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm <sup>3</sup> )	Water Content by Mass (%)	Water Content by Volume (%)	Saturation (%)	
Initial Reading	78.8	70.5	616.4	1.827	9.8	17.9	57.5	
Final Reading	78.1	70.6	647.3	1.812	16.9	30.5	96.5	
1.00E-03 1.00E-04					Hyc	iraulic Conductivity, k20		
1.00E-05								
1.00E-06								
00 1.00E-07								
້ອີ ສີ 1.00E-08 0.0			Tin	ne (days)		Maria	0.1	

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A.  73 Lo	D. Hanslip Excave 9 Lockport Road ckport, MB	ating & Demo	olition Ltd.		PROJECT:	Reston Lagoon		
<b>R</b> 1	A 3J2					REPORT NO.:	7	
At	tention:	Allan Hanslij	0			PROJECT NO.:	123313178	
SAMPLE FIELD I.D.: ST1 @ 4'-6' SOIL DESCRIPTION: Clay, brown, moist, stiff (c				umbly), mediu	ım plasticity, t	race to some silt, t	trace coarse sand	d to fine
DA	TE TESTED:	0		November	15 to Novem	ber 18, 2017		
CC	ONFINING PRESSURE	E (kPa):		137.9				
EFF	ECTIVE SATURATIO	N STRESS (kPa)	:	34.5				
AS	SUMED SPECIFIC G	RAVITY:		2.71				
HY	DRAULIC GRADIEN	T:		19.4				
TYF	PE OF PERMEANT LIC		4.1.	De-airea we	ater			
HY	DRAULIC CONDUC	IIVIIY, "K" (CM)	/s): 	1.1E-07				
HT	DRAULIC CONDUC	11V111, K <sub>20</sub> (C	m/sj:	1.16-07				
		Height	Diameter	Wet Mass	Dry Density	Water Content by	Water Content by	Saturation
		(mm)	(mm)	(g)	(g/cm <sup>3</sup> )	Mass (%)	Volume (%)	(%)
	Initial Reading	77.8	70.5	608.5	1.741	15.0	26.2	73.1
	Final Reading	76.5	69.9	631.3	1.801	19.5	35.1	104.6
ulic Conductivity (cm/sec)	1.00E-05 1.00E-06 1.00E-07 1.00E-07 1.00E-08					Hyd	Iraulic Conductivity, k20	
Hydra	1.00E-10 0.0 REPORT DATE:	0.2 November 18	3, 2017	0.4 Tin	0.6 ne (days)	0.8 REVIEWED BY:	1.0	C.E.T.

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