Appendix B. LSMEOC Reach 1 and 3 Soil Logs

APPENDIX D

KGS GROUP BOREHOLE LOGS

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L1

CLIENT

PROJECT

SITE

LOCATION Drill hole on drill PAD 1

DRILLING METHOD

JOB NO.
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **7/21/2011**
UTM (m) N **554,688**
E **5,741,845**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	0			**PEAT** - Organics						
	2			**CLAYEY SILT TILL** - Light grey, moist to wet, soft, some sand, some gravel.		S1				
	3			**SILT TILL** - Light brown/tan, low plasticity, limestone, some sand, trace gravel, generally sub-angular, some cohesion.		S2				
	5	5								
	10	10		- Drilled through boulder at 2.74 m.						
	15	15								
	20	20		**END OF HOLE 6.10 m**						

Note:
1. Auger refusal at 2.74 m. Switched to Air Hammer.
2. No refusal.

SAMPLE TYPE Auger Grab

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\LAKE ST MARTIN3.GPJ

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L1

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
			3. In bedrock. 4. Water at 0.30 m below surface.		20 40 60	20 40 60 80

SAMPLE TYPE Auger Grab

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

KGS GROUP

SUMMARY LOG

HOLE NO. **BH-L2**

CLIENT

PROJECT

SITE

LOCATION 35m North of creek, Drill hole on PAD 5

DRILLING METHOD

JOB NO.
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **7/21/2011**
UTM (m) N **562,070**
E **5,745,441**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	0–3			**PEAT** - Organics		S1		20 40 60	20 40 60 80	20 40 60 80
	3–4			**SILTY CLAY** - Black/grey to grey/brown, moist, soft to firm, low plasticity, some sand, trace fine gravel.						
	4–5			**SILT TILL** - Light brown/ tan, damp to moist, firm, with sand fine grain to coarse grain, trace to some gravel, some clay, limestone angular to sub-angular, low plasticity.		S2				
	5–7	5				S3				
	7–10			- Grey/ tan, moist to wet, firm, low plasticity, with sand fine grain to coarse grain, some gravel, some clay, limestone angular to sub-angular below 2.74 m.		S4				
	10–15	10								
	15–17	15				S5				
	17–20									
	20–22	20				S6				
	22–30			**SILTY SAND** - Limestone and granite.		S7				
	25	25								
	30	30								
	32			**END OF HOLE 9.75 m**						
	35	35								

Notes:
1. Auger refusal at 6.71 m. Switched to Air Hammer with water injection.
2. In till.

SAMPLE TYPE Auger Grab

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L2

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
	36 37 38 39 40 (40) 41 42 43 44 45 (45) 46 47 48 49 50 (50) 51 52 53 54 55 (55) 56 57 58 59 60 (60) 61 62 63 64 65 (65) 66 67 68 69 70 (70) 71 72 73 74 75 (75) 76		3. Water at 0.30 m below surface.		20 40 60	20 40 60 80

SAMPLE TYPE Auger Grab

CONTRACTOR	INSPECTOR	APPROVED	DATE
			7/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\LAKE ST MARTIN3.GPJ

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L3

CLIENT

PROJECT

SITE

LOCATION Drill hole on PAD 4

DRILLING METHOD

JOB NO.
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **7/22/2011**
UTM (m) N **556,496**
E **5,744,880**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	1		**PEAT** - Organics		20 40 60	20 40 60 80
	2		- Sand gravel seam at 0.61 m.			
	3		**CLAY** - Black/ drak grey, moist to wet, soft to firm, with sand			
	4		- Gravel and cobbles at 0.91 m.			
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23		**SILTY CLAY TILL** - Light brown, moist, firm to stiff, intermediate to high plasticity, some sand, fine to coarse grained gravel, trace travel, boulder (approx. 0.15 to 0.20 m in diameter).			
	24					
	25		**TILL** - Dense, mix of granite chips with clay peices, sand included.			
	26					
	27					
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					
	41					
	42		**END OF HOLE 9.75 m**			
	43					
	44					
	45					
	46					

Notes:
1. In till.
2. Water at 6.40 m below surface.

SAMPLE TYPE

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L3A

CLIENT
PROJECT
SITE
LOCATION Drill hole on PAD 4
DRILLING METHOD

JOB NO.
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **7/22/2011**
UTM (m) N
E

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
	1			**PEAT** - Organics - Sand gravel seam at 0.61 m.		20 40 60	20 40 60 80
	2			**CLAY** - Black/ drak grey, moist to wet, with organics, some sand, some limestone gravel.			
	3			SILTY CLAY **- Brown, moist, soft, high plasticity, some sand, trace gravel.**			
	4						
	5	5		**SILTY CLAY TILL** - Light brown/ tan, wet, soft, low plasticity, some sand, trace to some gravel.			
	6						
	7			**AUGER REFUSAL AT 1.98 m.** Notes: 1. In till. 2. Water at 6.40 m below surface.			

SAMPLE TYPE

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L4

CLIENT

PROJECT

SITE

LOCATION Drill hole on PAD 3A

DRILLING METHOD

JOB NO.
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **7/23/2011**
UTM (m) N
E

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
	0		**PEAT** - Organics		20 40 60	20 40 60 80
	3		**SILTY CLAY** - Black/ dark grey, wet, medium to high plasticity, soft, some sand, fine gain to coarse gain, trace fine gravel.			
	4		**SILTY CLAY** - Light grey, wet, soft, low plasticity, some to with sand, trace gravel, subangular. - S2 at 0.91 - 1.37 m.			
	5 (5)		**SILTY CLAY TILL** - Light brown/ tan, moist, firm to stiff. - S3 at 1.37 m.			
	10 (10)					
	15 (15)					
	20 (20)					
	25 (25)					
	30 (30)					
	32		**END OF HOLE 9.75 m**			
	35 (35)		Notes: 1. Air Hammer with water injection. 2. In till.			

SAMPLE TYPE

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L4

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
			3. Water at 0.30 m below surface.		20 40 60	20 40 60 80

SAMPLE TYPE

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L4A

CLIENT

PROJECT

SITE

LOCATION Drill hole on PAD 3A

DRILLING METHOD

JOB NO.
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **7/23/2011**
UTM (m) N
E

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	1			**PEAT** - Organics					
	2								
				SILTY CLAY - Black/ dark grey, wet, medium to high plasticity, soft, some sand, fine gain to coarse gain, trace fine gravel.					
	3			**SILTY CLAY** - Light grey, wet, soft, low plasticity, some to with sand, trace gravel, subangular.					
	4								
				SILTY CLAY TILL - Light brown/ tan, moist, firm to stiff.					
	5	5							
	6								
	7								
				END OF HOLE 2.29 m					
	8			Notes: 1. Air Hammer with water injection. 2. In till.					

SAMPLE TYPE

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L4A

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
			3. Water at 0.30 m below surface.		20 40 60	20 40 60 80

9
10 — 10
11
12
13
14
15 — 15
16
17
18

SAMPLE TYPE

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\LAKE ST MARTIN3.GPJ

KGS GROUP

SUMMARY LOG

HOLE NO.
BH-L5

CLIENT

PROJECT

SITE

LOCATION Drill hole on PAD 3A

DRILLING METHOD

JOB NO.
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **7/24/2011**
UTM (m) N **553,446**
E **5,741,002**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	1			**PEAT** - Organics					
	2								
	3			**BOULDERS** - Cobbles, mix limestone and granite					
	4			**TILL** - Silty clay till/ clayey silt till, grey, wet, soft, medium plasticity, some to with sand, trace gravel.					
	5	5							
	6								
	7								
	8								
	9								
	10	10							
	11								
	12								
	13								
	14								
	15	15							
	16								
	17								
	18								
	19								
	20	20							
	21								
	22								
	23								
	24								
	25	25							
	26								
	27								
	28								
	29								
	30	30		**END OF HOLE 9.75 m**					
	31								
	32								
	33								

Notes:
1. In till.
2. Water at 0.30 m below surface.

SAMPLE TYPE

CONTRACTOR | INSPECTOR | APPROVED | DATE 7/28/11

APPENDIX E

TESTPITTING AND TILL SAMPLING PROGRAM ALONG BUFFALO CREEK - INTERNAL MEMO

KGS GROUP CONSULTING ENGINEERS

MEMORANDUM

TO: **Colin Siepman**

FROM: **John Burns**

cc: **Tony Ng, Brian Bodnaruk, Bert Smith**

DATE: **October 7, 2011**

PROJECT NO: **11-0300-18**

RE: **Testpitting and Till Sampling Program along Buffalo Creek, Lake St. Martin Outlet Sediment Erosion Monitoring**

1.0 INTRODUCTION

As part of the Sediment Erosion Monitoring Program for the Lake St Martin Flood Relief project, KGS Group completed 15 testpits and collected till samples along Buffalo Creek between station 13+500 and 27+500 m (Figure 1). All field work was completed between September 21, 2011 and September 26, 2011. The field work required helicopter support for site access each day. Five additional helipads (#15 to #19) were cut immediately prior to the start of the testpitting program.

The purpose of the testpitting program was to document the soil characteristics in the till embankments along Buffalo Creek as part of the Sediment Erosion Monitoring program. The testpit program involved the excavation of approximately 1.0 m^3 of soil, then separating the coarse fraction (>50 mm ø) from the fine soil fraction. The coarse fraction is the material that is expected to remain in place to armour the new flood relief channel. The fine material is expected to erode away by stream flow. A soil sample of the fine grained material (smaller than 50 mm ø) from each testpit was collected for grain size analysis.

In addition to the testpit/till sampling program, a vegetation survey was completed during the same time frame and a detailed cross section survey is currently being completed. The results of the vegetation survey and detailed cross section survey will be presented as stand alone reports.

2.0 WORK PROGRAM

The testpitting program included the following components:

- Cutting of 5 additional helipads
- Excavation of 1.0 m^3 testpits at 1 km spacings between Helipad #5 and the Dauphin River
- Separating the fine soil fraction from coarse soil fraction and calculating the volume of coarse material by water displacement method

- Collecting a representative sample of the fine soil fraction (smaller than 50 mm ø) for laboratory grain size analysis.
- Photographing the testpit, recording the GPS coordinate of the testpit, and backfilling the testpit.

3.0 METHODOLOGY

A crew of four was mobilized to the closest helipad to the work area each day. Field equipment included 20 L pails with graduation marks, a 2 L measuring cup with graduations, digging tools, tarps, and a screen with a 50 mm mesh.

The crew took turns digging and placed excavated soils adjacent to the testpit. Depending on the soil texture, the coarse gravel, cobbles, and boulders were either separated by hand or by using the screen (50 mm mesh) as excavation continued. In general, two people sorted the soils as the other two dug the testpit.

Digging ceased when approximately 1 m^3 of soil had been excavated. The testpit walls were squared-up and the testpit was measured so the in-situ volume could be calculated.

The coarse fragments were brushed clean, and then placed into a 20 L pail. The 20 L pail was then filled to either the 10 L mark or 20 L mark with water using the graduated 2 L measuring cup. The water displaced by the coarse fragments was then recorded and the percent (by volume) of coarse fragments was calculated for the testpit.

A representative sample of the fine fraction from the testpit was then collected. The field crew collected this sample from a portion of the testpit wall that looked most representative of the entire testpit. It was decided (in the field) not to collect the sample from the stockpile of excavated soil, because any changes in the soil texture with depth could skew the sampling results – if the soils near the base of the testpit were coarser grained or finer grained than the upper soils, these soils would end up on the top of the soil pile, and potentially skew the sampling results.

After a 5 kg soil sample was collected from the testpit wall (with fragments larger than 50 mm ø removed) the sample was labelled with the testpit name and depth-interval (i.e. TP7, 0.25-0.40 m). After the first 5 testpits were completed, it was decided to use a hand auger to probe deeper from the base of the testpit. This enabled the field crew to determine if there were any significant changes in the soil characteristics below the testpits. The testpit stratigraphy and the stratigraphic information gathered with the hand auger testhole were recorded on field logs. The data on the field logs also includes the GPS coordinate of the testpit, the volume of material larger than 50 mm ø, the dimensions of the testpit, and the percent by volume of coarser material (Appendix A).

Prior to backfilling the testpits, the coarse fragments and the excavation were photographed. The photographs of each testpit are attached to the field logs in Appendix A.

4.0 LABORATORY ANALYTICAL RESULTS

One soil sample from each of the 15 testpits was submitted to the MIT Materials Engineering Branch Central Laboratory for grain size analyses. The laboratory analytical report is included as Appendix B.

All soil samples except the sample from testpit TP5 contained a large proportion of fine material (clay and silt). The clay and silt contents ranged from a high of 98% at TP14 to 45% at TP13.

Excluding TP5, the average clay and silt content was 70.4%. The sand size fraction (0.075 mm to 4.75 mm) ranged from a high of 46% at TP8 down to 2% at TP14 (average=24%). The fine to medium grained gravel fraction (4.75 mm to 50 mm) ranged from a high of 22% at TP3 to 0% at TP10, TP11, TP12, TP14 and TP15 (average=6%).

The soils at testpit TP5 are discussed separately because of the vast difference in the soil texture at this location. At TP5, the silt and clay content was 5%, the sand size fraction was 40% and the fine to medium gravel fraction was 55%.

5.0 PERCENT BY VOLUME LARGER THAN 50 MM Ø

Testpit TP5 contained 11.3% (by volume) material larger than 50 mm in size. This location was anomalous compared to the remaining 14 testpit locations, and is not factored into the following discussion.

The remaining 14 testpits contained between 0% material larger than 50 mm (TP8, TP10, TP12 and TP13) and 3.2% material larger than 50 mm (TP2). Testpit 14 contained a very small amount of coarse material (less than 0.1%). Twelve (12) of the fourteen (14) testpits contained 1% or less coarse material. Excluding TP5, only TP2 and TP4 contained more than 1% coarse material.

6.0 CONCLUSIONS

The soils along Buffalo Creek can be classified as a silty clay till. The silt and clay content combined average approximately 70%. The sand size fraction averages approximately 24%, and the fine to medium gravel content is approximately 6%.

Factoring out the results from TP5, the percent by volume of material exceeding 50 mm in size is approximately 0.65%. With the results from TP5 factored in, the percent by volume of material exceeding 50 mm in size is 1.37%.

If you have any questions regarding the three work programs described above, contact Colin Siepman or John Burns.

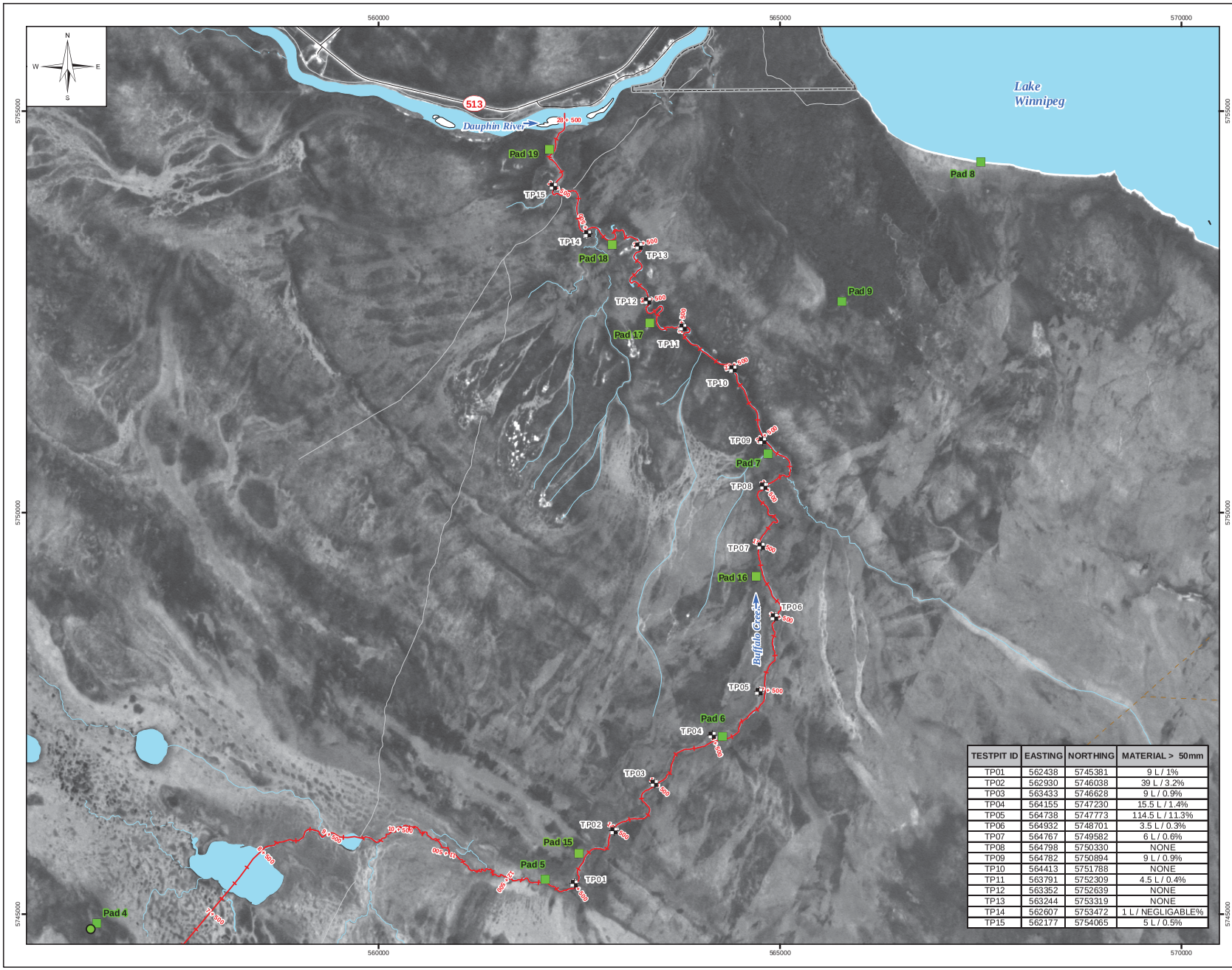
Prepared By:

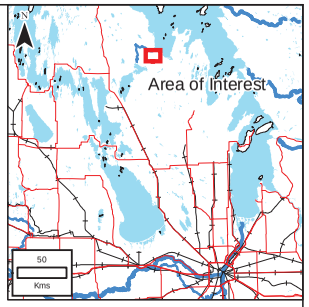
John Burns

John Burns, P.Geo.
Senior Environmental Geologist

JB/sl
Attachment

FIGURE





LEGEND:

- Testpit
- Helicopter Landing Pad
- Lake St. Martin Channel Option L
- Road Paved 2 or more lanes
- Paved Street or Road
- Gravel Road
- Unclassified Road
- Accessway or Backlane
- Trail
- Railway
- Ditch
- River/Stream, Indefinite
- River/Stream
- Dugout; Pond;
- Lake
- Aboriginal Lands

TESTPIT ID	EASTING	NORTHING	MATERIAL > 50mm
TP01	562438	5745381	9 L / 1%
TP02	562930	5746038	39 L / 3.2%
TP03	563433	5746628	9 L / 0.9%
TP04	564155	5747230	15.5 L / 1.4%
TP05	564738	5747773	114.5 L / 11.3%
TP06	564932	5748701	3.5 L / 0.3%
TP07	564767	5749582	6 L / 0.6%
TP08	564798	5750330	NONE
TP09	564782	5750894	9 L / 0.9%
TP10	564413	5751788	NONE
TP11	563791	5752309	4.5 L / 0.4%
TP12	563352	5752639	NONE
TP13	563244	5753319	NONE
TP14	562607	5753472	1 L / NEGLIGABLE%
TP15	562177	5754065	5 L / 0.5%

0.5 0 0.5 1 1.5

Kilometres

SCALE: 1:45,000 METRIC 11"x17"

All units are metric and in metres unless otherwise specified.
Transverse Mercator Projection, NAD 1983, Zone 14
Elevations are in metres above sea level (MSL)

NO.	YY/MM/DD	DESCRIPTION	BY
0	11/10/06	ISSUED FOR INFORMATION	JB

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

AECOM

Manitoba INFRASTRUCTURE AND TRANSPORTATION

LAKE MANITOBA AND LAKE ST. MARTIN EMERGENCY CHANNELS

TESTPIT LOCATIONS FOR SEDIMENT EROSION PROGRAM

OCTOBER 2011 | FIGURE 01 | REV. 0

FileName: P:\Projects\2011\11-0300-18\Dwg\GIS\MXD\REVO\SEDIMENT_EROSION\11-0300-18-F01-REVO.mxd
11"x17" PLOT SCALE 1:1

APPENDIX A

TESTPIT LOGS

Photo 1 – Helipad 5 area, Inundated

Photo 2 – Helipad 5 area, Inundated

Photo 3 – Helipad 5 area

KGS GROUP

SUMMARY LOG

HOLE NO. **TP01**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 13+500
DRILLING METHOD Shovel

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/21/2011**
UTM (m) N **5,745,381**
E **562,438**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
			ORGANICS - Black, moist, soft, non to low plastic, with rootlets.		20 40 60	20 40 60 80
			SILTY CLAY (CH) - Grey, moist, soft, high plasticity, some fine to medium grained sand, some gravel, trace cobbles (up to 125 mm x 125 mm x 200 mm), occasional silt seams up to 25 mm thick.	S1		
			END OF TESTPIT AT 0.49 m.			
			Notes: 1.) Recovered 9 L of material larger than 50 mm Ø (1% by volume).			
	1					
	5					
	2					
	3					

SAMPLE TYPE ⊠ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Completed Testpit

Photo 2 – Coarse material >50 mm ø from testpit

Photo 3 – Material passing 50 mm ø screen

Photo 4 – Backfilled testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP02**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 14+500
DRILLING METHOD Shovel

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/22/2011**
UTM (m) N **5,746,038**
E **562,930**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.			20 40 60	20 40 60 80
			SILTY CLAY (CH) - Dark grey, moist, soft to firm, high plasticity, some gravel, trace sand.				
			SANDY CLAY (CI) - Light grey, moist to wet, soft, low to intermediate plasticity, some fine grained gravel, trace to some medium to coarse grained grael, trace cobbles (subrounded to subangular and up to 225 mm Ø), increasing silt content and decreasing plasticity with depth.	S1			
			END OF TESTPIT AT 0.7 m.				
	1 (5)		Notes: 1.) Recovered 39 L of material larger than 50 mm Ø (3.2% by volume). 2.) Water infiltration at base of testpit. 3.) GPS point didn't save, coordinates scaled off from drawing.				
	2						
	3						

SAMPLE TYPE ▨ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Side view of testpit

Photo 2 – End view of testpit

Photo 3 – Gravel <50 mm ø from testpit

Photo 4 – Fine material from testpit

Photo 5 – Coarse material >50 mm ø from testpit

Photo 6 – Backfilling testpit

Photo 7 – View of work area

Photo 8 – Testpit backfilled

KGS GROUP

SUMMARY LOG

HOLE NO. **TP03**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 15+500
DRILLING METHOD Shovel

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/22/2011**
UTM (m) N **5,746,628**
E **563,433**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0		**CLAYEY SILT (CL-ML)** - Brown, dry, firm to stiff, friable, low plasticity, some fine to coarse grained sand, trace subangular gravel (mostly 20 mm to 40 mm Ø).			20 40 60	20 40 60 80
			- Some tan, dry, hard silt pockets (up to 75 mm Ø) below 0.3 m.	S1			
			END OF TESTPIT AT 0.6 m.				
	1		Notes: 1.) Recovered 9 L of material larger than 50 mm Ø (0.9% by volume). 2.) Water infiltration at base of testpit.				
	5						
	2						
	3						

SAMPLE TYPE ⊠ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Creek embankment/work area

Photo 2 – Coarse material >50 mm ø

Photo 3 – View of testpit

Photo 4 – Surficial boulder near testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP04**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 16+500
DRILLING METHOD Shovel

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/22/2011**
UTM (m) N **5,747,230**
E **564,155**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.			20 40 60	20 40 60 80
			SILT WITH GRAVEL (GP) - Brown, damp, firm to stiff, medium grained subrounded to rounded gravel (up to 50 mm Ø), trace coarse grained gravel, trace cobbles.				
			- 50 mm thick sand seam at 0.25 m, medium to coarse grained sand, trace fine grained gravel.	S1			
			SAND AND CLAY (CL) - Grey/Brown, damp, stiff/dense, low plasticity, some medium grained gravel (up to 50 mm Ø), trace coarse grained gravel, trace cobbles, trace boulders (up to 250 mm Ø).				
			SILTY CLAY (CI) - Grey, moist, firm, intermediate plasticity, some silt pockets (up to 20 mm Ø), trace cobbles.				
			END OF TESTPIT AT 0.75 m.				
	1		Notes: 1.) Recovered 15.5 L of material larger than 50 mm Ø (1.4% by volume).				
	5						
	2						
	3						

SAMPLE TYPE ⊠ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

Photo 1 – Side view of testpit

Photo 2 – End view of testpit

Photo 3 – Coarse material >50 mm ø from testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP05**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 17+500
DRILLING METHOD Shovel

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/23/2011**
UTM (m) N **5,747,773**
E **564,738**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.		20 40 60	20 40 60 80
			GRAVELLY SAND (SW) - Brown, damp, dense, well graded, trace subangular to subrounded cobbles.	S1		
			END OF TESTPIT AT 0.85 m.			
	1		Notes: 1.) Recovered 114.5 L of material larger than 50 mm Ø (11.3% by volume).			
	5					
	2					
	3					

SAMPLE TYPE ⊠ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

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Photo 1 – View of testpit

Photo 2 – Sidewall of testpit

Photo 3 – Screening testpit material

Photo 4 – Coarse material >50 mm ø from testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP06**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 18+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/23/2011**
UTM (m) N **5,748,701**
E **564,932**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.		20 40 60	20 40 60 80
			SILTY CLAY (CH) - Grey, dry to damp, stiff to very stiff, friable (high plasticity when wetted), occasional silt pockets (up to 50 mm thick), trace silt seams.	S1		
			- Switched to hand auger at 0.85 m.			
	1					
	5					
			AUGER REFUSAL ON SUSPECTED COBBLE/BOULDER AT 1.68 m.			
			Notes: 1.) Recovered 3.5 L of material larger than 50 mm Ø (0.3% by volume). 2.) Found a 600 mm by 450 mm Ø boulder first encountered at 0.15 m depth, moved testpit beside boulder.			
	2					
	3					

SAMPLE TYPE ⊠ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – End view of testpit

Photo 2 – Rock in testpit wall

Photo 3 – Recording GPS coordinate of testpit

Photo 4 – Coarse material >50 mm ø from testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP07**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION East Bank Sta. 19+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/23/2011**
UTM (m) N **5,749,582**
E **564,767**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
				ORGANICS - Black, moist, soft, non to low plastic, with rootlets.			20 40 60	20 40 60 80
				SILTY CLAY (CI) - Brown, dry, stiff to very stiff, friable (low to intermediate plasticity when wetted), some medium grained sand, trace gravel, trace cobbles (up to 150 mm Ø), some silt seams (up to 25 mm thick), roots to 0.3 m.	S1			
	1			- Switched to hand auger below 0.9 m.				
		5		**SANDY SILT (ML)** - Tan, moist, soft, non-plastic, some medium to coarse grained sand.	S2			
				SAND (SW) - Brown, moist, compact, well graded medium to coarse grained sand.	S3			
	2			**END OF HOLE AT 1.97 m.**				
	3			Notes: 1.) Recovered 6 L of material larger than 50 mm Ø (0.6% by volume). 2.) Water entering hole from sand at end of drilling.				

SAMPLE TYPE ▨ Shovel ▨ Auger Grab

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Side wall of testpit

Photo 2 – End wall of testpit

Photo 3 – Base of testpit showing auger hole

Photo 4 – Coarse material >50 mm ø from testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP08**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 20+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/24/2011**
UTM (m) N **5,750,330**
E **564,798**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	0			**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.				20 40 60	20 40 60 80	20 40 60 80
				SANDY CLAY (CL) - Grey/Black, dry, firm, low plsticity, some silt, trace gravel (up to 25 mm Ø), some roots.						
				SILTY CLAY (CH) - Grey, dry to damp, stiff, friable (high plasticity when wet), trace gravel (up to 40 mm Ø), trace sand, some silt pockets (up to 25 mm Ø).						
						S1				
				- Switched to hand auger at 0.7 m.						
	1									
		5								
				END OF HOLE AT 1.65 m.						
	2			Notes: 1.) No material larger than 50 mm Ø was encountered. 2.) Water entering hole at 1.36 m, rising to base of testpit at end of digging.						
	3									

SAMPLE TYPE ⊠ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Side wall of testpit

Photo 2 – End wall of testpit

Photo 3 – Base of testpit

Photo 4 – Fine material excavated from testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP09**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 21+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/24/2011**
UTM (m) N **5,750,894**
E **564,782**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.		20 40 60	20 40 60 80
			SANDY CLAY (CL) - Grey/Black, dry, firm, low plsticity, some silt, trace gravel (up to 25 mm Ø), some roots.			
			SILTY CLAY (CH) - Grey, dry to damp, stiff, friable (high plasticity when wet), trace boulders (up to 280 mm Ø), trace cobbles, trace gravel (up to 40 mm Ø), trace sand, some silt pockets (up to 25 mm Ø).	S1		
	1		- Switched to hand auger below 0.85 m.			
	5					
			END OF HOLE AT 1.8 m.			
	2		Notes: 1.) Recovered 9 L of material larger than 50 mm Ø (0.9% by volume).			
	3					

SAMPLE TYPE ⊠ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Base of testpit

Photo 2 – Coarse material >50 mm ø from testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP10**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 22+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/24/2011**
UTM (m) N **5,751,788**
E **564,413**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.				
			SILTY CLAY (CH) - Grey, damp to moist, stiff, friable (high plasticity when wet), trace fine grained sand, some silt pockets (up to 25 mm Ø).	S1			
			SILT (ML) - Grey, moist, soft, low plasticity, with clay, trace fine grained sand.				
			- Switched to hand auger below 0.8 m.				
	1						
			GRAVELLY SILT (ML) - Tan, wet, soft, non plastic, fine grained gravel, some sand, some clay.	S2			
			AUGER REFUSAL ON SUSPECTED COBBLE AT 1.26 m.				
	5		Notes: 1.) No material larger than 50 mm Ø was encountered. 2.) Water entering hole at 1.26 m, rising to base of testpit at end of digging.				
	2						
	3						

SAMPLE TYPE ▨ Shovel ▨ Auger Grab

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Base and side wall of testpit

Photo 2 – End wall of testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP11**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 23+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/25/2011**
UTM (m) N **5,752,309**
E **563,791**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.		20 40 60	20 40 60 80
			SILTY CLAY (CH) - Grey, damp to moist, stiff, friable (high plasticity when wet), trace cobbles.	S1		
			- Switched to hang auger at 0.7 m.			
	1					
	5					
			END OF HOLE AT 1.62 m.			
			Notes: 1.) Recovered 4.5 L of material larger than 50 mm Ø (0.4% by volume).			
	2					
	3					

SAMPLE TYPE ▨ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Base and side wall of testpit

Photo 2 – End wall of testpit

Photo 3 – View of testpit

Photo 4 – Coarse material >50 mm ø from testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP12**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 24+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/25/2011**
UTM (m) N **5,752,639**
E **563,352**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.		20 40 60	20 40 60 80
			SILTY CLAY (CH) - Grey, damp to moist, stiff, friable (high plasticity when wet).			
			- Light grey, moist below 0.4 m.	S1		
			- Switched to hang auger at 0.7 m.			
	1		**GRAVELLY SAND (SW)** - Grey, wet, compact, well graded, fine grained gravel, some silt.			
			AUGER REFUSAL ON SUSPECTED COBBLE AT 1.2 m.			
	5		Notes: 1.) No material larger than 50 mm Ø was encountered. 2.) Water entering hole at 1.05 m, rising to 0.75 m at end of digging.			
	2					
	3					

SAMPLE TYPE ▨ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Side wall of testpit

Photo 2 – End wall of testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP13**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 25+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/25/2011**
UTM (m) N **5,753,319**
E **563,244**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80) / PL MC LL % (20 40 60 80)
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.			
			SILTY CLAY (CH) - Grey, damp to moist, stiff, friable (high plasticity when wet), trace cobbles.			
			- Moist to wet, decreased plasticity, increased silt content, some sand and gravel below (up to 25 mm Ø) below 0.45 m.	S1		
	1		- Switched to hang auger at 0.7 m.			
			AUGER REFUSAL IN DENSE SANDY CLAY AT 1.37 m.			
	5		Notes: 1.) No material larger than 25 mm Ø was encountered. 2.) Water entering testhole from 1.3 m, rising to base of testpit at end of digging.			
	2					
	3					

SAMPLE TYPE ⊠ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – End wall of testpit

Photo 2 – Close up of fine textured soils in testpit

Photo 3 – General view of testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP14**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 26+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/25/2011**
UTM (m) N **5,753,472**
E **562,607**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.			20 40 60	20 40 60 80
			SILTY CLAY (CH) - Brown/Grey, damp, stiff to very stiff, high plasticity, trace sand, trace subangular gravel (up to 50 mm Ø), occasional silt seams (up to 25 mm thick), trace rootlets.	S1			
			- Switched to hang auger at 0.83 m.				
	1						
	5						
			END OF HOLE AT 1.85 m.				
	2		Notes: 1.) Recovered less than 1 L of material larger than 50 mm Ø (negligable amount by volume).				
	3						

SAMPLE TYPE ▨ Shovel

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – End wall of testpit

Photo 2 – Side wall of testpit

Photo 3 – Auger cuttings from below

Photo 4 – Auger hole at base of testpit

KGS GROUP

SUMMARY LOG

HOLE NO. **TP15**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT Buffalo Creek Sediment Survey
SITE Buffalo Creek
LOCATION West Bank Sta. 27+500
DRILLING METHOD Shovel and Hand Auger

JOB NO. **11-0300-18**
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **9/26/2011**
UTM (m) N **5,754,065**
E **562,177**

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %
	0		**ORGANICS** - Black, moist, soft, non to low plastic, with rootlets.	
			SILTY CLAY (CH) - Grey, moist, firm, high plasticity, trace sand, trace gravel (majority less than 50 mm Ø), trace cobbles (up to 75 mm x 75 mm x 100 mm in size)	S1
	1		- Switched to hang auger at 0.75 m, increased medium to coarse grained gravel (up to 50 mm Ø) below.	
	5		**GRAVELLY SILT (ML)** - Brown, wet, soft, non plastic, fine grained gravel, some sand, some clay.	S2
			END OF HOLE AT 1.66 m.	
	2		Notes: 1.) Recovered 5 L of material larger than 50 mm Ø (0.5% by volume). 2.) Water entering hole at 1.8 m, rising to 0.9 m at end of digging.	
	3			

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE Shovel Auger Grab

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	C. ROBAK	DRAFT	9/28/11

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEO\LOGS\CMR\BUFFALO CREEK SEDIMENT SURVEY.GPJ

Photo 1 – Side wall of testpit

Photo 2 – End wall of testpit

Photo 3 – Coarse material >50 mm ø from testpit

Photo 4 – Fine textured soil from testpit and auger cuttings

APPENDIX B

LABORATORY ANALYTICAL RESULTS
GRAIN SIZE ANALYSES

Manitoba Infrastructure and Transportation
MATERIALS ENGINEERING BRANCH - CENTRAL LAB
GEOTECHNICAL SOIL PROPERTY SUMMARY SHEET

Client:	Water Control and Structures	Site/File No. :	Date Requisitioned Sep 28, 2011
Project:	Buffalo Creek Sediment Survey - LSM	Internal Order No. :	Date Reported: Oct 3, 2011
Location:	Buffalo Creek Station 13+500 to 27+500	Sampled By: KGS Group	Report To: Alena James
Municipality:		Date Sampled:	Page: 1 of 1

Lab No.	SAMPLE DATA					Unified Classification	Moisture Content %	ATTERBERG LIMITS			GRAIN SIZE					Organic Content %	STRENGTH						
	Test Hole No.	Sample No.	Station	Centerline	Depth(m)			Liquid Limit %	Plastic Limit %	Plasticity Index %	Gravel % (pass 75mm)	Sand % (pass 4.75mm)	Silt % (pass 0.075mm)	Clay % (pass 0.005 mm)	Silt/Clay % (pass 0.075 mm)		SPT (N)	Field PP (kpa)	Unconfined qu (kpa)	Direct Shear Performed	Bulk Density (kg/cu.m.)		
WGT110568		TP1			0.45-0.60						6	18	16	60	76								
WGT110569		TP2			0.45-0.60						15	30	36	19	55								
WGT110570		TP3			0.45-0.60						22	19	29	30	59								
WGT110571		TP4			0.30-0.60						6	44	20	30	50								
WGT110572		TP5			0.45-0.60						55	40	3	2									
WGT110573		TP6			0.45-0.60						6	7	17	70	87								
WGT110574		TP7			0.25-0.40						9	16	16	59	75								
WGT110575		TP8			0.45-0.60						1	46	23	30	53								
WGT110576		TP9			0.45-0.60						6	6	12	76	88								
WGT110577		TP10			0.30-0.60							31	28	41	69								
WGT110578		TP11			0.45-0.60							32	26	42	68								
WGT110579		TP12			0.45-0.60							22	24	54	78								
WGT110580		TP13			0.45-0.60						13	42	20	25	45								
WGT110581		TP14			0.30-0.45							2	8	90	98								
WGT110582		TP15			0.30-0.45							15	19	66	85								
															986 ÷ 111 = 70.4%								

WGT-201 2011-10-03 DATASOILPROP

KGS GROUP

SUMMARY LOG

REFERENCE NO. 061

HOLE NO. TP21

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Top of Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,343
E 570,280

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	1	5		**SAND** - Tan colored, wet, coarse grained.		S1		20 40 60	20 40 60 80	20 40 60 80
	2			- Sand Mixed with peat like material black to brown in color, small rocks below 1.52 m.						
	3	10		**PEAT** - Brown to black, roots and small rocks, some wood chips.						
	4			**SILTY CLAY** - Grey to blue, damp to moist, firm, high plasticity.		S4				
		15		**END OF HOLE AT 3.96 m.**						
	5									
	6	20								
	7									
		25								
	8									
	9	30								

SAMPLE TYPE ⊠ Grab from Bucket

CONTRACTOR	INSPECTOR	APPROVED	DATE
Arnason Construction Ltd.	J. ARROWSMTIH/C. ROBAK	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 062

HOLE NO. TP22

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Outlet
LOCATION Shoreline
DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,354
E 570,285

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		**SAND** - Medium to coarse grained
	0.5	2		**PEAT** - Brown to black
	1	5		**SILTY CLAY** - Grey to blue, damp to moist, firm, high plasticity.
	2.74	10		**END OF HOLE AT 2.74 m.**

SAMPLE TYPE | NUMBER | RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 063

HOLE NO. TP23

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Outlet
LOCATION Shoreline
DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,392
E 570,187

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		**SAND** - Brown, medium to coarse grained
	1	5		**SILTY CLAY** - Grey, firm, high plasticity.
	2			- Grey to brown, damp to moist, stiff below 1.52 m.
	3	10		
	3.66			**END OF HOLE AT 3.66 m.**
	4	15		
	5			
	6	20		
	7	25		
	8			
	9	30		

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 064

HOLE NO. TP24

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Top of Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,382
E 570,182

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	1	5		**SAND** - Tan, medium to coarse grained		S1			
	2			**PEAT** - Red to brown					
				SILTY CLAY - Grey to blue, damp to moist, firm, high plasticity.					
	3	10		**END OF HOLE AT 3.05 m.**					
	4	15							
	5								
	6	20							
	7	25							
	8								
	9	30							

SAMPLE TYPE ⊠ Grab from Bucket

CONTRACTOR	INSPECTOR	APPROVED	DATE
Arnason Construction Ltd.	J. ARROWSMTIH/C. ROBAK	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 066

HOLE NO. TP25

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Outlet
LOCATION Shoreline
DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,495
E 570,145

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0	0		GRASS WITH ROCKS AND COARSE GRAINED SAND				20 40 60	20 40 60 80
				PEAT - Brown to black.					
				SILTY CLAY - Grey to brown, damp to moist, high plasticity.					
	1	5							
	2								
	3	10							
				CLAY TILL - Tan, with coarse grained gravel.					
				END OF HOLE AT 3.66 m.					
	4	15							
	5								
	6	20							
	7	25							
	8								
	9	30							

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

KGS GROUP

SUMMARY LOG

REFERENCE NO. 067

HOLE NO. TP26

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Outlet
LOCATION Top of Beach Head
DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,472
E 570,128

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		**SAND** - Brown, medium to coarse grained
	1	5		- Oxidized (orange) sand layer between 0.61 and 0.63 m.
	1	5		- Orange below 1.56 m.
	2	10		**SILTY CLAY** - Grey to blue, firm, high plasticity.
	3	10		**END OF HOLE AT 3.35 m.**
	4	15		
	5	20		
	6	20		
	7	25		
	8	25		
	9	30		

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
Arnason Construction Ltd.	J. ARROWSMTIH/C. ROBAK	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 068

HOLE NO. TP27

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Outlet
LOCATION Shoreline
DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,562
E 570,066

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	1	5		**SILTY CLAY** - Grey to blue, firm, high plasticity, some silt pockets.					
	2								
	3	10		**END OF HOLE AT 3.20 m.**					
	4	15							
	5								
	6	20							
	7	25							
	8								
	9	30							

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 069

HOLE NO. TP28

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Outlet
LOCATION Top of Beach Head
DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,524
E 570,052

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		**SAND** - Brown, damp, medium to coarse grained
	1	5		**PEAT** - Brown to black, roots.
	2	10		**SILTY CLAY** - Grey to blue, damp to moist, firm, high plasticity, some silt pockets.
	3			**END OF HOLE AT 3.35 m.**
	4	15		
	5			
	6	20		
	7	25		
	8			
	9	30		

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 070

HOLE NO. TP29

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Top of Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,596
E 569,922

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		
	1	5		**SAND** - Brown, damp, medium to coarse grained
	1.5			**PEAT** - Black, moist, some fine to medium grained sand.
	2			**SILTY CLAY** - Grey to blue, wet, firm, high plasticity.
	3	10		
	3.35			**END OF HOLE AT 3.35 m.**
	4	15		
	5			
	6	20		
	7	25		
	8			
	9	30		

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
Arnason Construction Ltd.	J. ARROWSMTIH/C. ROBAK	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 071

HOLE NO. TP30

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Behind Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,591
E 569,906

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		**PEAT** - Brown, wet, trace fine grained sand, roots.
	1	5		**SILTY CLAY** - Tan, moist, firm, high plasticity.
	3	10		**END OF HOLE AT 3.05 m.**
	4	15		
	5			
	6	20		
	7	25		
	8			
	9	30		

SAMPLE TYPE
NUMBER
RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
Arnason Construction Ltd.	J. ARROWSMTIH/C. ROBAK	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 073

HOLE NO. TP31

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Behind Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,331
E 570,277

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0	0		**PEAT** - Brown, wet, trace fine grained sand, roots.				20 40 60	20 40 60 80
	1	5		**SILTY CLAY** - Grey to blue, damp, firm, high plasticity.					
				END OF HOLE AT 1.52 m.					
	2								
	3	10							
	4								
		15							
	5								
	6	20							
	7								
		25							
	8								
	9	30							

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
Arnason Construction Ltd.	J. ARROWSMTIH/C. ROBAK	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 074

HOLE NO. TP32

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Behind Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,371
E 570,176

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0	0		**PEAT** - Brown, wet, roots.					
	1								
		5		**SILTY CLAY** - Grey to blue, wet, firm, high plasticity.					
	2								
				END OF HOLE AT 2.44 m.					
	3	10							
	4								
		15							
	5								
	6	20							
	7								
		25							
	8								
	9	30							

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 075

HOLE NO. TP33

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Outlet
LOCATION Behind Beach Head
DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,461
E 570,115

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0	0		**PEAT** - Brown					
	1	5		**SILTY CLAY** - Grey to blue, wet, firm, high plasticity.					
	2			**END OF HOLE AT 2.44 m.**					
	3	10							
	4	15							
	5								
	6	20							
	7	25							
	8								
	9	30							

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 076

HOLE NO. TP34

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Outlet
LOCATION Shoreline
DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,199
E 570,726

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		**SAND** - Brown, damp, medium to coarse grained
	0	0		**PEAT** - Brown to black, wet, some roots.
	1	5		
	2			
	3	10		**END OF HOLE AT 3.05 m.**
	4	15		
	5			
	6	20		
	7	25		
	8			
	9	30		

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 077

HOLE NO. TP35

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Behind Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,184
E 570,735

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	1	5		**PEAT** - Black, saturated, some roots.		S1				
	2			**SILTY CLAY** - Grey to blue, wet, firm, high plasticity. - Hit water. Filled test pit hole at 2.44 m.						
	3	10		**END OF HOLE AT 3.05 m.**						
	4	15								
	5									
	6	20								
	7	25								
	8									
	9	30								

SAMPLE TYPE ⊠ Grab from Bucket

CONTRACTOR	INSPECTOR	APPROVED	DATE
Arnason Construction Ltd.	J. ARROWSMTIH/C. ROBAK	DRAFT	10/16/12

KGS GROUP

SUMMARY LOG

REFERENCE NO. 078

HOLE NO. TP36

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Behind Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,192
E 570,734

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		**SAND** - Brown, medium to coarse grained
	1	5		**PEAT** - Brown to black, damp, some roots.
	2			
	3	10		
	4			**SILTY CLAY** - Grey to brown, wet, firm, high plasticity.
		15		**END OF HOLE AT 3.66 m.**
	5			
	6	20		
	7			
		25		
	8			
	9	30		

SAMPLE TYPE | NUMBER | RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 079

HOLE NO. TP37

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Behind Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,155
E 570,919

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		**SAND** - Medium to coarse grained
	1	5		**PEAT** - Brown to black, damp, some roots.
	3	10		**SILTY CLAY** - Grey to blue, dampt, firm, high plasticity.
	4	15		**END OF HOLE AT 3.96 m.**
	5	20		
	6	25		
	7	30		
	8			
	9			

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 080

HOLE NO. TP38

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Behind Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,142
E 570,914

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	1	5		**PEAT** - Black, saturated, roots, and wood pieces.				20 40 60	20 40 60 80	20 40 60 80
	2									
	3	10		**SILTY CLAY** - Grey to blue, wet, firm, high plasticity.						
	4	15		**END OF HOLE AT 3.66 m.**						
	5									
	6	20								
	7	25								
	8									
	9	30								

SAMPLE TYPE

CONTRACTOR Arnason Construction Ltd.
INSPECTOR J. ARROWSMTIH/C. ROBAK
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 081

HOLE NO. TP39

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE Reach 3 Outlet

LOCATION Top of Beach Head

DRILLING METHOD Test Pit - John Deere Excavator (300 Series)

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/24/2011
UTM (m) N 5,753,170
E 570,917

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0	0		**SAND** - Damp, medium to coarse grained
	1	5		**PEAT** - Brown to black, some roots, and wood pieces.
	2			
	3	10		**SILTY CLAY** - Grey to blue, firm, high plasticity.
				END OF HOLE AT 3.05 m.
	4	15		
	5			
	6	20		
	7	25		
	8			
	9	30		

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
Arnason Construction Ltd.	J. ARROWSMTIH/C. ROBAK	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. **TH-1**

HOLE NO. **TH-35**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Alignment 3D/3E
DRILLING METHOD 76 mm ø Air Hammer

JOB NO. **11-0300-18**
GROUND ELEV. **232.50 m (+/-)**
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **11/30/2011**
UTM (m) N **5,749,652**
E **566,191**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
232	0	0		**PEAT**
231.0	1	5		**SILTY CLAY** - Light grey
230.1	2			**SILTY CLAY TILL**
230				- Larger stones (cobbles) in clay/silt matrix at 2.44 m.
229	3	10		
228	4	15		
227	5			
226.1	6	20		- 30.5 cm ø limestone boulder at 6.10 m.
226				**SILT TILL** - Granite and limestone boulders in silty till (Approx. 60% limestone, 40% granite)
225	7	25		
224	8			
223	9	30		

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR **Maple Leaf Enterprises**
INSPECTOR **D. BARCHYN**
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. **TH-1**

HOLE NO. **TH-35**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
222		35						20 40 60	20 40 60 80
	11								
221.2				**END OF HOLE AT 11.28 m.**					
221				Notes: 1. Did not encounter bedrock at end of test drilling. 2. Test hole dry at end of drilling.					
	12	40							
220									
	13								
219		45							
	14								
218									
	15	50							
217									
	16								
216		55							
	17								
215									
	18	60							
214									
	19								
213		65							
	20								
212									
	21	70							
211									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
Maple Leaf Enterprises	D. BARCHYN	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. **TH-2**

HOLE NO. **TH-36**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Alignment 3E
DRILLING METHOD 76 mm ø Air Hammer

JOB NO. **11-0300-18**
GROUND ELEV. **234.10 m (+/-)**
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **12/1/2011**
UTM (m) N **5,748,762**
E **566,320**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
234				**PEAT**
233	1			
232.6		5		**SILTY CLAY** - Light grey
232	2			
231	3	10		
230.6				**SILTY CLAY TILL** - 1.07 m ø limestone boulder at 3.51 m.
230	4			
229.5		15		**SILT TILL** - Light brown, dense, with boulders, possibly weathered bedrock.
229	5			
228.6				**LIMESTONE BEDROCK**
228	6	20		
227	7			
		25		
226	8			
225.6				**END OF HOLE AT 8.53 m.**
225	9	30		Note: 1. Artesian flow conditions present at end of hole, approximately 0.3 m above grade.

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR **Maple Leaf Enterprises**
INSPECTOR **D. BARCHYN**
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. **TH-3**

HOLE NO. **TH-37**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Alignment 3E
DRILLING METHOD 76 mm ø Air Hammer

JOB NO. **11-0300-18**
GROUND ELEV. **235.70 m (+/-)**
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **12/4/2011**
UTM (m) N **5,747,449**
E **566,072**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
235				**PEAT**
234.5	1			
		5		**SILTY CLAY TILL** - Dark grey, with trace coarse grained sand/gravel.
234	2			
233				- 30.5 cm ø limestone boulder at 2.74 m.
232.7	3	10		**SILT TILL** - Light brown, granite, limestone, cobbles in silty matrix.
232	4			
		15		
231	5			
230				
	6	20		
229				
	7			
		25		
228	8			
227.5				**END OF HOLE AT 8.23 m.**
227				Notes: 1. Did not encounter bedrock at end of test drilling. 2. Test hole dry at end of drilling.
	9	30		
226				

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR **Maple Leaf Enterprises**
INSPECTOR **D. BARCHYN**
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. **TH-4**

HOLE NO. **TH-38**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Alignment 3D/3E
DRILLING METHOD 76 mm ø Air Hammer

JOB NO. **11-0300-18**
GROUND ELEV. **232.80 m (+/-)**
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **12/6/2011**
UTM (m) N **5,749,380**
E **566,313**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
232				
231.9	0			**PEAT**
	1	5		**SILTY CLAY TILL** - Dark grey, trace coarse grained sand/gravel.
231	2			- Increased boulders (150 to 250 mm ø) below 1.8 m.
230	3	10		
229.4				**SILT TILL** - Light brown, granite and limestone cobbles in silty matrix.
229	4			
		15		
228	5			
227.3				**GRAVEL**
227	6	20		
226.4				**END OF HOLE ON SUSPECTED BEDROCK AT 6.40 m.**
226	7			Note: 1. Artesian flow conditions persent at end of hole, approximately 0.3 m below grade.
		25		
225	8			
224	9	30		
223				

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR **Maple Leaf Enterprises**
INSPECTOR **D. BARCHYN**
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. **TH-5**

HOLE NO. **TH-39**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Alignment 3E
DRILLING METHOD 76 mm ø Air Hammer

JOB NO. **11-0300-18**
GROUND ELEV. **233.60 m (+/-)**
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **12/7/2011**
UTM (m) N **5,748,949**
E **566,321**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
233				**PEAT**
232.7	1	5		**SILTY SAND** - Trace gravel, trace cobbles.
232	2			
231.0				**SILT TILL** - Light brown, dense, with coarse grained gravel.
231	3	10		
230	4			- 25 to 50 mm ø stones in silty till at 4.27 m.
229		15		
228.9	5			**LIMESTONE BEDROCK**
228	6	20		
227	7			
226		25		
225.7	8			**END OF HOLE AT 7.92 m.**
225				Note: 1. Artesian flow conditions persent at end of drilling, approximately 1.1 m above grade.
224	9	30		

SAMPLE TYPE NUMBER RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
Maple Leaf Enterprises	D. BARCHYN	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. **TH-6**

HOLE NO. **TH-40**

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Alignment 3E
DRILLING METHOD 76 mm ø Air Hammer

JOB NO. **11-0300-18**
GROUND ELEV. **236.00 m (+/-)**
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED **12/8/2011**
UTM (m) N **5,747,460**
E **565,186**

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
235.1				**PEAT**			
235	1			**SILT TILL** - Dense, with limestone cobbles (75 mm ø down)			
		5					
				- Increasingly loose silt till with sand, limestone cobbles (19 to 25 mm ø) below 1.68 m.			
234	2						
233	3	10					
232	4						
		15					
231	5						
230	6	20					
229	7						
228.8				**GRAVEL**			
		25					
228.1				**END OF HOLE AT 7.92 m.**			
228	8						
				Note: 1. Artesian flow conditions encountered at end of drilling, approximately at grade.			
227	9	30					

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
Maple Leaf Enterprises	D. BARCHYN	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\HAND AUGER_TP_CORING.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 001

HOLE NO. PP381

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE North Dike Investigation (Reach 3)

LOCATION North of Alignment 3C

DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 233.78 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,261
E 566,432

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
233	1			PEAT				20 40 60	20 40 60 80
232.6				REFUSAL ON HARD BOTTOM AT 1.22 m.					
232	2	5							
231	3	10							
230	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 002

HOLE NO. PP382

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 236.83 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,323
E 566,338

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
236				**PEAT**
235.8	1			**CLAY-LIKE MATERIAL** - Firm to hard
235.3		5		**REFUSAL ON CLAY-LIKE BOTTOM AT 1.52 m.**
235	2			
234	3	10		
233	4			

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 003

HOLE NO. PP383

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 235.92 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,383
E 566,261

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
235.0	0			PEAT
235	1			CLAY-LIKE MATERIAL - Firm.
234.4		5		REFUSAL ON CLAY-LIKE BOTTOM AT 1.52 m.
234	2			
233	3	10		
232	4			

SAMPLE TYPE | NUMBER | RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR KGS Group
INSPECTOR J. ARROWSMITH/S. BEAUDRY
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 004

HOLE NO. PP384

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 235.31 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,440
E 566,177

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
235				PEAT
234.4	1			CLAY-LIKE MATERIAL - Firm.
234				
233.8		5		REFUSAL ON CLAY-LIKE BOTTOM AT 1.52 m.
233	2			
	3	10		
232				
	4			

SAMPLE TYPE | NUMBER | RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 005

HOLE NO. PP385

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 229.51 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,474
E 566,131

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
229				PEAT
228.6	1			CLAY-LIKE MATERIAL - Firm to stiff.
228.3				REFUSAL ON CLAY-LIKE AT 1.22 m.
228		5		
227	2			
	3	10		
226	4			

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 006

HOLE NO. PP386

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 230.73 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,497
E 566,043

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
230				PEAT
229.8	1			SILTY CLAY TILL - Firm
229.2		5		REFUSAL ON SILTY CLAY TILL AT 1.52 m.
229	2			
228	3	10		
227	4			

SAMPLE TYPE | NUMBER | RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR KGS Group
INSPECTOR J. ARROWSMITH/S. BEAUDRY
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 007

HOLE NO. PP387

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 231.95 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,566
E 565,977

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
231	1			PEAT				20 40 60	20 40 60 80
230.7				REFUSAL ON HARD BOTTOM AT 1.22 m.					
		5							
230	2								
229	3	10							
228	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 008

HOLE NO. PP388

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 229.82 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,598
E 565,863

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
229	1			PEAT				20 40 60	20 40 60 80
228.3		5		REFUSAL ON CLAY-LIKE BOTTOM AT 1.52 m.					
228	2								
227	3	10							
226	4								

SAMPLE TYPE

CONTRACTOR KGS Group
INSPECTOR J. ARROWSMITH/S. BEAUDRY
APPROVED DRAFT
DATE 10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 009

HOLE NO. PP389

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE North Dike Investigation (Reach 3)

LOCATION North of Alignment 3C

DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 233.78 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,686
E 565,753

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
233				**PEAT**
	1			
232.6				**GRANULAR CRUST** - Firm to stiff.
232.3		5		**REFUSAL ON GRANULAR CRUST AT 1.52 m.**
232				
	2			
231				
	3	10		
230				
	4			

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 010

HOLE NO. PP390

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 231.34 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,787
E 565,687

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
231				PEAT
230.3	1			GRANULAR CRUST
230				
229.8		5		REFUSAL ON FIRM TO STIFF CLAY AT 1.52 m.
229	2			
228	3	10		
	4			

SAMPLE TYPE | NUMBER | RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 011

HOLE NO. PP391

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 233.17 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,750,916
E 565,692

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
233	0			PEAT
	1			
232				
231.6		5		GRANULAR CRUST
231.3				REFUSAL ON STIFF CLAY AT 1.83 m.
	2			
231				
	3	10		
230				
	4			

SAMPLE TYPE / NUMBER / RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 012

HOLE NO. PP392

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 230.73 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,751,053
E 565,591

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
230	0			PEAT				20 40 60	20 40 60 80
	1								
		5							
229.1				REFUSAL ON HARD BOTTOM AT 1.68 m.					
229									
	2								
228									
	3	10							
227									
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 013

HOLE NO. PP393

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE North Dike Investigation (Reach 3)

LOCATION North of Alignment 3C

DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 231.65 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,751,219
E 565,273

ELEVATION (m) | DEPTH (m) (ft) | GRAPHICS | DESCRIPTION AND CLASSIFICATION | SAMPLE TYPE | NUMBER | RECOVERY % | SPT (N) blows/0.15 m ▲ | DYNAMIC CONE (N) blows/ft △ | Cu POCKET PEN (kPa) ★ | Cu TORVANE (kPa) ◆ | PL MC LL %

231
230.3
230
229
228

1
2
3
4
5
10

PEAT

REFUSAL ON HARD BOTTOM AT 1.37 m.

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 014

HOLE NO. PP394

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 226.16 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,751,287
E 565,232

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
226				PEAT				20 40 60	20 40 60 80
	1								
225									
224.8				REFUSAL ON HARD BOTTOM AT 1.37 m.					
		5							
	2								
224									
	3								
		10							
223									
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 015

HOLE NO. PP395

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE North Dike Investigation (Reach 3)

LOCATION North of Alignment 3C

DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 230.73 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,751,401
E 565,130

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
230	0			PEAT				20 40 60	20 40 60 80
	1								
229.5				REFUSAL ON HARD BOTTOM AT 1.22 m.					
		5							
229									
	2								
228									
	3	10							
227									
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 016

HOLE NO. PP396

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 221.28 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,751,493
E 565,100

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
221				**PEAT**
	1			
220.1				**CLAY** - Firm.
220				
219.8		5		**REFUSAL ON CLAY AT 1.52 m.**
	2			
219				
	3	10		
218				
	4			

SAMPLE TYPE
NUMBER
RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 017

HOLE NO. PP397

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE North Dike Investigation (Reach 3)
LOCATION North of Alignment 3C
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 227.69 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,751,567
E 565,033

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
227	0			PEAT
226.5	1			CLAY - Firm.
226.0		5		REFUSAL AT 1.68 m.
225	2			
224	3	10		
	4			

SAMPLE TYPE
NUMBER
RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 018

HOLE NO. PP398

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION

PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION

SITE North Dike Investigation (Reach 3)

LOCATION North of Alignment 3C

DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV. 226.77 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/22/2011
UTM (m) N 5,751,659
E 564,968

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
226	0			PEAT				20 40 60	20 40 60 80
	1								
225.6				REFUSAL ON HARD BOTTOM AT 1.22 m.					
		5							
225	2								
224									
	3	10							
223									
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J. ARROWSMITH/S. BEAUDRY	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 021

HOLE NO. PP399

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,213
E 570,448

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80)	PL MC LL % (20 40 60 80)
	0			PEAT						
	1			CLAYEY SILT						
		5		REFUSAL ON CLAYEY SILT AT 1.52 m.						
	2									
	3	10								
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 022

HOLE NO. PP400

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,244
E 570,416

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0			PEAT				20 40 60	20 40 60 80
	1			CLAYEY SILT					
		5		REFUSAL ON CLAYEY SILT AT 1.52 m.					
	2								
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 023

HOLE NO. PP401

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,258
E 570,382

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80)	PL MC LL % (20 40 60 80)
	0			PEAT						
	1			SILTY CLAY						
				REFUSAL ON FIRM SILTY CLAY AT 1.37 m.						
		5								
	2									
		10								
	3									
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 024

HOLE NO. PP402

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,264
E 570,332

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0			PEAT				20 40 60	20 40 60 80
	1								
		5		CLAYEY SILT					
				REFUSAL ON FIRM CLAYEY SILT AT 1.52 m.					
	2								
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 026

HOLE NO. PP403

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,151
E 570,420

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	0			PEAT				20 40 60	20 40 60 80	20 40 60 80
	1			CLAYEY SILT						
				REFUSAL ON HARD CLAYEY SILT AT 1.22 m.						
		5								
	2									
		10								
	3									
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 027

HOLE NO. PP404

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,114
E 570,499

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0	0		PEAT				20 40 60	20 40 60 80
	1								
		5		SILTY CLAY					
				REFUSAL ON HIGH PLASTICITY SILTY CLAY AT 1.68 m.					
	2								
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 030

HOLE NO. PP405

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,056
E 570,585

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80)	PL MC LL % (20 40 60 80)
	1	5		PEAT						
	2			END OF HOLE AT 1.83 m.						
	3	10		Note: 1. Probe used was 1.83 m long.						
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 032

HOLE NO. PP406

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,012
E 570,661

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0			PEAT				20 40 60	20 40 60 80
	1								
		5							
	2			END OF HOLE AT 1.83 m.					
				Note: 1. Probe used was 1.83 m long.					
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 034

HOLE NO. PP407

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,201
E 570,331

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION
	0			PEAT
	1			
		5		CLAY
				REFUSAL ON STIFF CLAY AT 1.52 m.
	2			
	3	10		
	4			

SAMPLE TYPE | NUMBER | RECOVERY %

SPT (N) blows/0.15 m ▲
DYNAMIC CONE (N) blows/ft △
20 40 60

Cu POCKET PEN (kPa) ★
Cu TORVANE (kPa) ◆
20 40 60 80
PL MC LL
%
20 40 60 80

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 036

HOLE NO. PP408

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,263
E 570,227

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
				PEAT		20 40 60	20 40 60 80
	1			SILTY CLAY			
				REFUSAL ON SILTY CLAY AT 1.22 m.			
		5					
	2						
		10					
	3						
	4						

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 039

HOLE NO. PP409

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,308
E 570,175

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80)	PL MC LL % (20 40 60 80)
				PEAT						
	1			SILTY CLAY - Stiff.						
				REFUSAL ON SILTY CLAY AT 1.37 m.						
		5								
	2									
		10								
	3									
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 041

HOLE NO. PP411

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,317
E 570,304

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80)	PL MC LL % (20 40 60 80)
	0			PEAT						
	1									
		5								
				REFUSAL ON HARD BOTTOM AT 1.68 m.						
	2									
	3									
		10								
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 043

HOLE NO. PP412

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,278
E 570,390

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0			PEAT				20 40 60	20 40 60 80
	1			REFUSAL ON SAND MATERIAL AT 0.91 m.					
		5							
	2								
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 044

HOLE NO. PP413

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,278
E 570,390

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE / NUMBER / RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0			PEAT		20 40 60	20 40 60 80
	1						
		5		SANDY MATERIAL			
				REFUSAL ON HARD SANDY MATERIAL AT 1.68 m.			
	2						
	3	10					
	4						

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 046

HOLE NO. PP414

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,267
E 570,462

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	0			PEAT				20 40 60	20 40 60 80	20 40 60 80
	1									
		5								
				END OF HOLE AT 1.83 m.						
	2			Note: 1. Probe used was 1.83 m long.						
	3	10								
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 047

HOLE NO. PP415

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,229
E 570,564

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0			PEAT				20 40 60	20 40 60 80
	1								
		5							
	2			END OF HOLE AT 1.83 m.					
				Note: 1. Probe used was 1.83 m long.					
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 048

HOLE NO. PP416

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,232
E 570,565

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80)	PL MC LL % (20 40 60 80)
	1	5		PEAT						
				REFUSAL ON SANDY MATERIAL AT 1.52 m.						
	2									
	3	10								
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 049

HOLE NO. PP417

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,206
E 570,681

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80)	PL MC LL % (20 40 60 80)
	1	5		PEAT						
				REFUSAL ON SANDY MATERIAL AT 1.52 m.						
	2									
	3	10								
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 050

HOLE NO. PP418

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,200
E 570,677

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	0			PEAT				20 40 60	20 40 60 80	20 40 60 80
	1									
		5								
				END OF HOLE AT 1.83 m.						
	2			Note: 1. Probe used was 1.83 m long.						
	3	10								
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 053

HOLE NO. PP420

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,165
E 570,769

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0			PEAT				20 40 60	20 40 60 80
	1								
		5							
				END OF HOLE AT 1.83 m.					
	2			Note: 1. Probe used was 1.83 m long.					
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 054

HOLE NO. PP421

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,116
E 570,749

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0	0		PEAT				20 40 60	20 40 60 80
	1								
		5							
				END OF HOLE AT 1.83 m.					
	2			Note: 1. Probe used was 1.83 m long.					
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 055

HOLE NO. PP422

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,095
E 570,849

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆	PL MC LL %
	0			PEAT				20 40 60	20 40 60 80	20 40 60 80
	1									
		5								
				END OF HOLE AT 1.83 m.						
	2			Note: 1. Probe used was 1.83 m long.						
	3	10								
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 056

HOLE NO. PP423

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,154
E 570,867

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0			PEAT				20 40 60	20 40 60 80
	1								
		5							
				REFUSAL ON HARD BOTTOM AT 1.83 m.					
	2								
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 057

HOLE NO. PP424

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,148
E 570,967

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80)	PL MC LL % (20 40 60 80)
	1	5		PEAT						
				REFUSAL ON HARD BOTTOM AT 1.83 m.						
	2									
	3	10								
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 058

HOLE NO. PP425

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,102
E 570,960

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL %
	0			PEAT				20 40 60	20 40 60 80
	1								
		5							
				END OF HOLE AT 1.83 m.					
	2			Note: 1. Probe used was 1.83 m long.					
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 059

HOLE NO. PP426

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,081
E 571,061

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △ (20 40 60)	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ (20 40 60 80)	PL MC LL % (20 40 60 80)
	1	5		PEAT						
				REFUSAL ON SUSPECTED SANDY MATERIAL AT1.83 m.						
	2									
	3	10								
	4									

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

KGS GROUP

SUMMARY LOG

REFERENCE NO. 060

HOLE NO. PP427

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT LAKE ST. MARTIN EMERGENCY CHANNEL EXTENSION
SITE Reach 3 Alignment
LOCATION Shoreline Outlet
DRILLING METHOD Peat Probe

JOB NO. 11-0300-18
GROUND ELEV.
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 11/23/2011
UTM (m) N 5,753,127
E 571,059

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ / DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ / Cu TORVANE (kPa) ◆ / PL MC LL / %
	0	0		PEAT				20 40 60	20 40 60 80
	1								
		5							
				REFUSAL ON HARD BOTTOM AT 1.83 m.					
	2								
	3	10							
	4								

SAMPLE TYPE

CONTRACTOR	INSPECTOR	APPROVED	DATE
KGS Group	J.ARROWSMITH	DRAFT	10/16/12

GEOTECHNICAL-SOIL LOG P:\PROJECTS\2011\11-0300-18\DESIGN\GEOLOGS\#REACH 3\PEAT PROBE.GPJ

APPENDIX D-04

LABORATORY TEST RESULTS

Manitoba Infrastructure and Transportation
MATERIALS ENGINEERING BRANCH - CENTRAL LAB
GEOTECHNICAL SOIL PROPERTY SUMMARY SHEET

Client:	Water Control and Structures	Site/File No. :	2011-11G	Date Requisitioned	Nov 17, 2011
Project:	Lake St. Martin Channel	Internal Order No. :	710012360	Date Reported:	Nov 21, 2011
Location:	Reach 3	Sampled By:	KGS Group	Report To:	Alena James/Tony NG (KGS Group)
Municipality:		Date Sampled:	Nov 7, 2011	Page:	1 of 1

	SAMPLE DATA							ATTERBERG LIMITS			GRAIN SIZE						STRENGTH								
Lab No.	Test Hole No.	Sample No.	Station	Centerline	Depth(m)	Unified Classification	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Gravel % (pass 75mm)	Sand % (pass 4.75mm)	Silt % (pass 0.075mm)	Clay % (pass 0.005 mm)	Silt/Clay % (pass 0.075 mm)	Organic Content %	SPT (N)	Field PP (kpa)	Unconfined qu (kpa)	Direct Shear Performed	Bulk Density (kg/cu.m.)	Reactive with HCl *		Visual Classification
WGT110740		TP01			1.83	CL-ML	14	17	13	4	8	31	39	22										
WGT110741		TP03			1.37	ML	14	17	14	3	14	29	38	19										
WGT110742		TP07			2.44	CL-ML	13	20	14	6	5	16	47	32										
WGT110743		TP10			2.84	CL-ML	12	20	14	6	14	21	37	28										
WGT110744		TP11			2.59	ML	9	16	13	3	17	35	29	19										
WGT110745		TP11A			1.83	CI	38	49	24	25	2	8	16	74										
WGT110746		TP12			3.25	CI	16	31	16	15	16	21	24	39										
WGT110747		TP13			3.33	CI	33	42	21	21	12	20	19	49										
WGT110748		TP15			2.44-2.74	CI	27	48	21	27	8	9	22	61										
WGT110749		TP16			1.22	CI	36	49	24	26	7	9	13	71										
WGT110750		TP20			3.20	CL-ML	14	19	13	6	6	41	26	27										
WGT110751		TP19			1.30	GP-GC	13				49	45			6									

* 1 - Non effervescent 2 - Very slightly effervescent 3 - Slightly effervescent 4 - Strongly effervescent 5 - Violently effervescent

Manitoba Infrastructure and Transportation
MATERIALS ENGINEERING BRANCH - CENTRAL LAB
GEOTECHNICAL SOIL PROPERTY SUMMARY SHEET

Client:	Water Control and Structures	Site/File No. :	2011-11G	Date Requisitioned	Jan 26, 2012
Project:	Lake St. Martin Channel	Internal Order No. :	710012360	Date Reported:	Jan 30, 2012
Location:	Reach 3 - Vicinity of Proposed Shoreline Outlet Areas	Sampled By:	KGS Group	Report To:	Alena James/Tony Ng (KGS Group)
Municipality:		Date Sampled:	Jan 24, 2012	Page:	1 of 1

	SAMPLE DATA							ATTERBERG LIMITS			GRAIN SIZE						STRENGTH							
Lab No.	Test Hole No.	Sample No.	Station	Centerline	Depth(m)	Unified Classification	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Gravel % (pass 75mm)	Sand % (pass 4.75mm)	Silt % (pass 0.075mm)	Clay % (pass 0.005 mm)	Silt/Clay % (pass 0.075 mm)	Organic Content %	SPT (N)	Field PP (kpa)	Unconfined qu (kpa)	Direct Shear Performed	Bulk Density (kg/cu.m.)	Reactive with HCl *		Visual Classification
WGT110919	TP01	TP12-02			3	ML	9	17	14	3	28	29	27	16										
WGT110920	TP01	TP12-03			2.1	CL	12	22	14	8	11	18	35	36										
WGT110921	TP01	TP12-06			3.5	GP	8	16	13	3	69	7	16	8										

* 1 - Non effervescent 2 - Very slightly effervescent 3 - Slightly effervescent 4 - Strongly effervescent 5 - Violently effervescent

MANITOBA INFRASTRUCTURE and TRANSPORTATION

MATERIALS ENGINEERING BRANCH

CENTRAL LAB

PARTICLE SIZE ANALYSIS of SOILS A.S.T.M. D-422

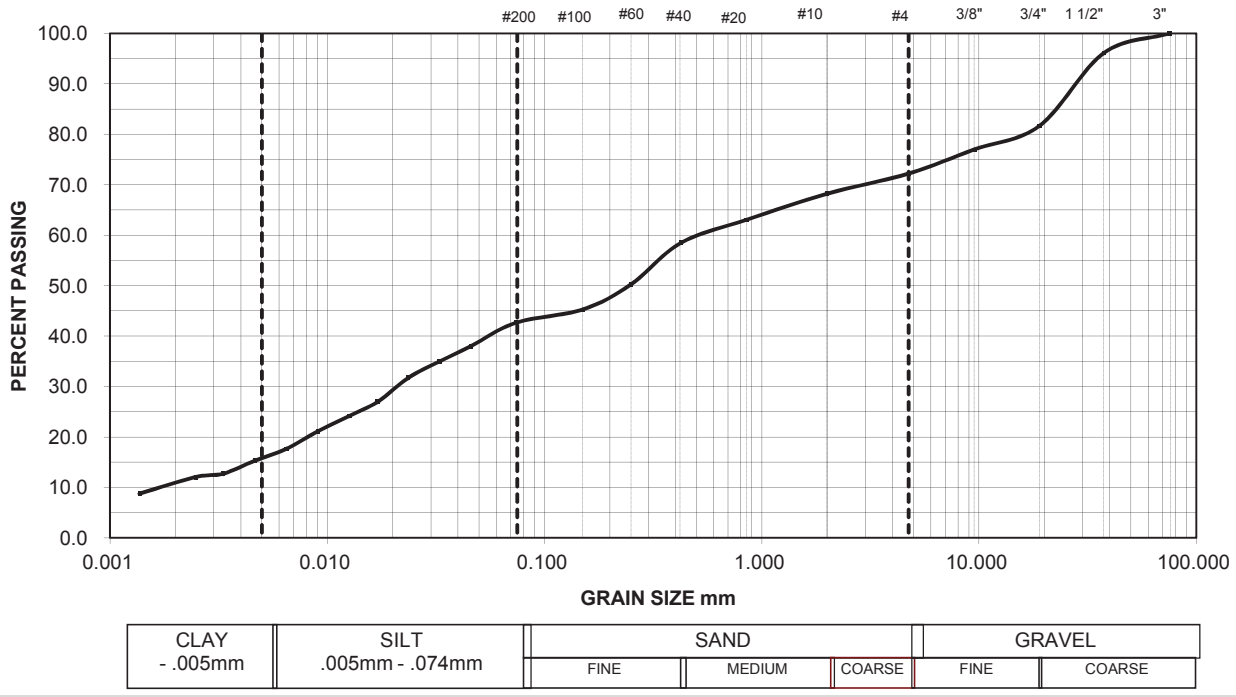
PROJECT: Lake St. Martin Channel — **TESTED BY:** J.H.,P.M.
LOCATION: Reach 3 - Vicinity of Proposed Shoreline Outlet Areas — **CHECKED:** G.J.

LAB.NO. WGT110919 FIELD NO. TP12-02 HOLE NO. TP01 DEPTH (m) 3

SIEVE ANALYSIS			HYDROMETER ANALYSIS				
SIEVE U.S. STANDARD	DIAMETER (mm)	% PASSING	TIME MINUTES	HYDROMETER READING R_O	HYDROMETER READING R_C	DIAMETER (mm)	% PASSING
3.00 in	75.00	100.0	1	20.7	17.6	0.0457	38.0
1.50 in	37.50	96.1	2	19.3	16.2	0.0328	35.0
0.75 in	19.00	81.7	4	17.8	14.7	0.0236	31.7
0.375 in	9.50	77.0	8	15.6	12.5	0.0171	27.0
NO.4	4.75	72.2	15	14.3	11.2	0.0126	24.2
10	2.00	68.2	30	12.9	9.8	0.0090	21.1
20	850um	63.1	60	11.3	8.2	0.0065	17.7
40	425um	58.5	120	10.2	7.1	0.0046	15.3
60	250um	50.3	240	9.0	5.9	0.0033	12.7
100	150um	45.3	432	8.7	5.6	0.0025	12.1
200	75um	42.7	1455	7.0	4.1	0.0014	8.8

% GRAVEL	% SAND	% SILT	% CLAY
28	29	27	16

PARTICLE SIZE ANALYSIS OF SOIL A.S.T.M. D-422



MANITOBA INFRASTRUCTURE and TRANSPORTATION

MATERIALS ENGINEERING BRANCH

CENTRAL LABORATORY

PARTICLE SIZE ANALYSIS of SOILS A.S.T.M. D-422

PROJECT: Lake St. Martin Channel
LOCATION: Reach 3 - Vicinity of Proposed Shoreline Outlet Areas

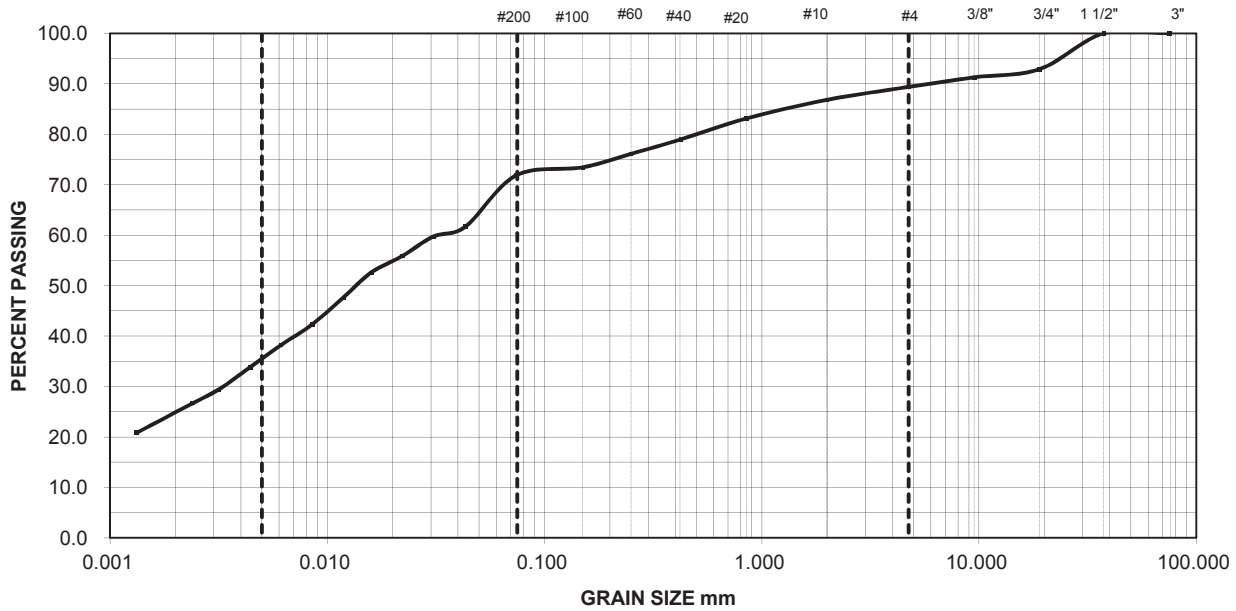
TESTED BY: J.H.,P.M.
CHECKED: G.J.

LAB.NO. WGT110920 FIELD NO. TP12-03 HOLE NO. TP01 DEPTH (m) 2.1

SIEVE ANALYSIS			HYDROMETER ANALYSIS				
SIEVE U.S. STANDARD	DIAMETER (mm)	% PASSING	TIME MINUTES	HYDROMETER READING R_O	HYDROMETER READING R_C	DIAMETER (mm)	% PASSING
3.00 in	75.00	100.0	1	25.5	22.4	0.0432	61.7
1.50 in	37.50	100.0	2	24.8	21.7	0.0308	59.8
0.75 in	19.00	92.9	4	23.4	20.3	0.0222	55.9
0.375 in	9.50	91.3	8	22.2	19.1	0.0159	52.6
NO.4	4.75	89.4	15	20.4	17.3	0.0119	47.6
10	2.00	86.8	30	18.5	15.4	0.0086	42.4
20	850um	83.1	60	17.0	13.9	0.0061	38.3
40	425um	79.0	120	15.4	12.3	0.0044	33.8
60	250um	76.1	240	13.8	10.7	0.0032	29.4
100	150um	73.4	428	12.8	9.7	0.0024	26.7
200	75um	71.8	1451	10.5	7.6	0.0013	20.8

% GRAVEL	% SAND	% SILT	% CLAY
11	18	35	36

PARTICLE SIZE ANALYSIS OF SOIL A.S.T.M. D-422



CLAY	SILT	SAND			GRAVEL	
- .005mm	.005mm - .074mm	FINE	MEDIUM	COARSE	FINE	COARSE

MANITOBA INFRASTRUCTURE and TRANSPORTATION

MATERIALS ENGINEERING BRANCH

CENTRAL LABORATORY

PARTICLE SIZE ANALYSIS of SOILS A.S.T.M. D-422

PROJECT: Lake St. Martin Channel
LOCATION: Reach 3 - Vicinity of Proposed Shoreline Outlet Areas

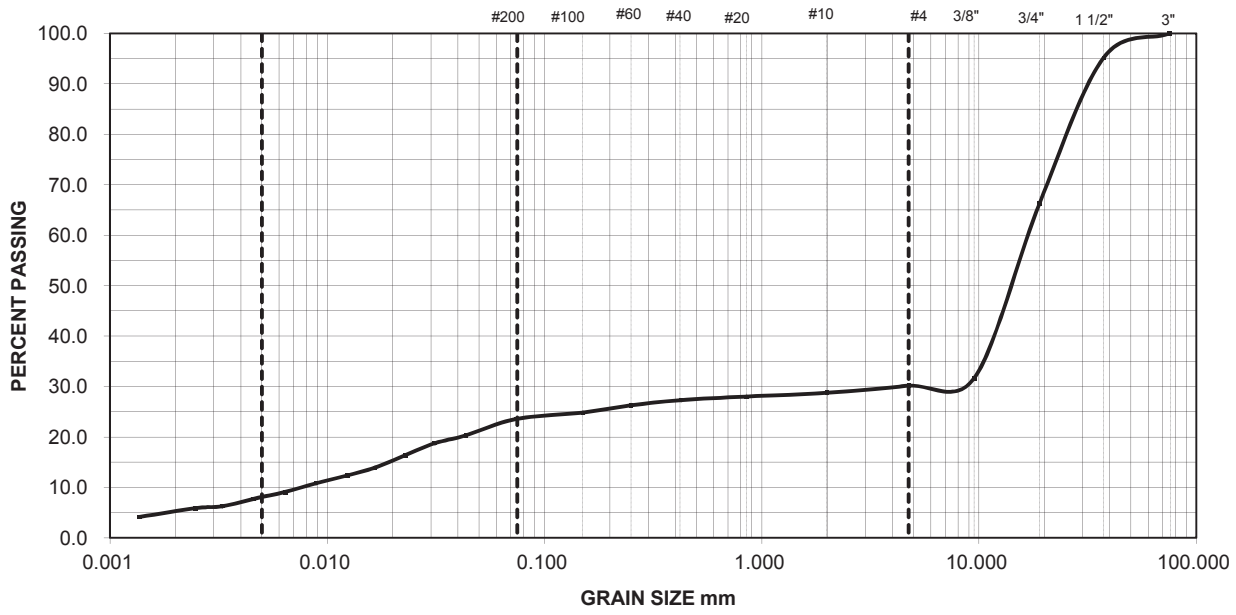
TESTED BY: J.H.,P.M.
CHECKED: G.J.

LAB.NO. WGT110921 FIELD NO. TP12-06 HOLE NO. TP01 DEPTH (m) 3.5

SIEVE ANALYSIS			HYDROMETER ANALYSIS				
SIEVE U.S. STANDARD	DIAMETER (mm)	% PASSING	TIME MINUTES	HYDROMETER READING R_O	HYDROMETER READING R_C	DIAMETER (mm)	% PASSING
3.00 in	75.00	100.0	1	25.4	22.3	0.0433	20.3
1.50 in	37.50	95.2	2	23.7	20.6	0.0313	18.8
0.75 in	19.00	66.3	4	21.1	18.0	0.0228	16.4
0.375 in	9.50	31.7	8	18.4	15.3	0.0166	13.9
NO.4	4.75	30.2	15	16.7	13.6	0.0123	12.4
10	2.00	28.8	30	15.0	11.9	0.0089	10.8
20	850um	28.0	60	13.1	10.0	0.0064	9.1
40	425um	27.3	120	11.6	8.5	0.0046	7.7
60	250um	26.3	240	10.0	6.9	0.0033	6.3
100	150um	24.8	424	9.6	6.5	0.0025	5.9
200	75um	23.6	1447	7.5	4.6	0.0014	4.2

% GRAVEL	% SAND	% SILT	% CLAY
69	7	16	8

PARTICLE SIZE ANALYSIS OF SOIL A.S.T.M. D-422



CLAY	SILT	SAND			GRAVEL	
- .005mm	.005mm - .074mm	FINE	MEDIUM	COARSE	FINE	COARSE

MANITOBA INFRASTRUCTURE AND TRANSPORTATION
MATERIALS ENGINEERING BRANCH
WINNIPEG CENTRAL LAB
1. Aggregate (wpg)

Manitoba

Client:	Water Control and Structures	Contract No. :		Product:	Limestone Rock
Project:	Lake St. Martin Channel - Reach 3	Internal Order No. :	710012360	Product Sequence:	1
From:	Downstream from Sta 21+00	Work Order No. :		Pit Location:	n/a
To:		Contractor:	Hugh Munro Construction	Report To:	Alena James, Tony Ng (KGS Group)

Lab Number	Field Sample Number	Date Sampled	Sampled By	Date Testing Completed	4" 100mm % pass	3" 75mm % pass	2" 50mm % pass	1 1/2" 37.5mm % pass	1" 25mm % pass	3/4" 19mm % pass	5/8" 16mm % pass	1/2" 12.5mm % pass	3/8" 9.5mm % pass	No. 4 4.75mm % pass	No. 10 2mm % pass	No. 20 850um % pass	No. 40 425um % pass	No. 80 180um % pass	No. 200 75um % pass	Crush		S.G.	Absorption (%)	Agg Density kg/m3	Soundness Ave. Loss %	L.A. % Loss
WAG111066	RS1	1/25/2012	KGS	2/14/2012																		2.551	3.36			56.4
WAG111067	RS2	1/25/2012	KGS	2/14/2012																		2.594	2.96		43.0	
WAG111068	RS3	1/25/2012	KGS	2/14/2012																		2.559	3.17		46.1	
Specifications																										
Average																						2.568258	3.162232			56.38

Remarks: