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			1	B	OR	EHC)LI	E ENGINEERING LOG		I	BOREHOLE NO : BH-SKM-23		
CLIEN.	T : TMR							POSITION : E: 10481, N: 152837 (56 South Eas	st Tra	nsit H	orizontal Datum) PAGE: 1 OF 6		
PROJECT : GUSBUS						SURFACE ELEVATION: 33.9 (AHD)				[DATE DRILLED: 28/8/12 to 29/8/12		
JOB NO : QB10312.540								DIP / AZIMUTH : 90°		LOGGED BY: NC			
LOCAT	ION : A	-	nt to Gate	eway N	1wy (1	Northbou	und)	CONTRACTOR : Geodrill MATERIAL		(CHECKED BY : DWL		
PROGRE	SS Z	_					z	IVIATEIXIAE		>-			
<u>ი</u> ი	WATER SS DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE	CONSISTENCY	STRUCTURE & Other Observations		
A A			0,1	- 33.9-	0.0 			FILL (SANDY CLAY) (CL): Brown mottled orange and red, low plasticity, fine to medium grained sand , trace fine sized, sub-rounded gravel.			0.00: - 2.60m FILL 2.60-4.20m ALLUVIUM		
				33.4-	- - 0.5		CL			S	4.20-7.00m RESIDUAL 7.00-TD		
					_		CL	(CL): With pale grey, fine grained sand.	М		XW ROCK		
			1.00m SPT 3, 4, 4 N=8	32.9-	—1.0 -			(CL): Trace medium sized, sub-angular gravel, trace red ironstained sandstone gravel.	-	S to F			
AS ———AS			1.45m	32.4-	- - 1.5		CL						
					_ - -		ML	FILL (SANDY SILT) (ML): Grey brown, medium plasticity, fine to coarse grained, sub-angular, sand.					
				31.9-	- 2.0 -		MI	(ML): Grey, with fine to medium sized, sub-rounded gravel.	М	F			
- CASING			2.50m SPT 6, 14, 30/130mm	31.4-	- - 2.5			2.60m					
			2.93m		- - -		SM	SILTY SAND (SM): Black, fine grained sand, trace rootlets. SAND (SP): Pale grey, fine to medium grained sand, with silt.	M	D			
				30.9-	-3.0 - - -		SP				2.95: - 4.00m No returns, 100% water loss		
— WB				30.4-	3.5 - -				М	D			
			4.00m SPT 6, 8, 10 N=18	29.9-	- 4.0 -	777	sw	(SW): Fine to coarse, with fine sized, sub-rounded gravel, trace silt, trace organics (rootlets). SILTY SAND (SM): Pale grey to white, fine grained					
			4.45m	29.4-	- 4.5 -		SM	sand, high plasticity silt.	М	MD			
		DRILLI	NG	28.9-	- - - 5.0			SAMPLES & FIELD TESTS DENS	SITY (9	SPT N-	value) CONSISTENCY (Su) {N-value}		
DRILLING HAND Auger Park AS Auger Screw HQ HQ Coring AD/T Auger Drill TC-bit NQ NQ Coring AD/V Auger Drill V-bit PQ PQ Coring WB Washbore NMLC NMLC Coring DRILLING PENETRATION VE Very Easy F Firm VH Very Hard E Easy H Hard GROUNDWATER SYMBOLS W = Water level (static)						ES En EW En HP Han HV Han (P: Pea N SPT HW SP	v Soil of Water of Pender Van Kours Frank Van Kours Frank Van Kours Frank Van Kours Van Van Kours Van	Sample SPT Standard Penetration Test VL Very	Loose e um De se Dense	0 4 nse 10 30	-4 VS Very Soft < 12 kPa {0-2} -10 S Soft 12 - 25 {2-4}		
Z			(during dril	ling)						lo: O'	 B10312.540 BH-SKM-23 Page 1 OF		

	S	出		1	В	OR	EHC	DL	E ENGINEERING LOG		I	BOREHOLE NO : BH-SKM-23	
CLIE	ENT	: TMR							POSITION : E: 10481, N: 152837 (56 South	h East Trai	nsit H	orizontal Datum) PAGE: 2 OF 6	
_		CT : GL					SURFACE ELEVATION : 33.9 (AHD)				DATE DRILLED: 28/8/12 to 29/8/12		
_	JOB NO: QB10312.540 LOCATION: Adjacent to Gateway Mwy (I							ınd)	DIP / AZIMUTH : 90° CONTRACTOR : Geodrill			LOGGED BY: NC CHECKED BY: DWL	
LOC	·/-\	ON . A		LING	eway i	nvy (i	OTTIBO	uriu)	MATER	RIAL		ONE ONE DIT : DWE	
BRILLING & SCASING	_		GROUND WATER LEVELS	SAMPLES & FIELD TESTS	(m) 28.9-	0.0 0.0 0.0	GRAPHIC	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteri Secondary and Minor Components	MOIST	CONSISTENCY	STRUCTURE & Other Observations	
				5.50m SPT	28.4-	- - -		SM	SILTY SAND (SM): Pale grey to white, fine graind sand, high plasticity silt. (continued)	med M	MD	- -	
			<u> </u>	6, 7, 12 N=19	27.9-	- - - - - -6.0		-	5.80m SANDY SILT (ML): Pale grey, low plasticity, fine grained sand, with fine to medium sized, sub-angular, quartz gravel.			- - - - -	
CASING ———					27.4-	- - - -6.5 -		ML		М	VSt	- -	
				7.00m SPT 6, 8, 14 N=22	26.9-	7.0			7.00m SILTSTONE: Orange and dark red, extremely		VSt	7.00: [Properties of Clayey SILT, medium plasticity]	
				N=22		_			weathered, extremely low strength. 7.20m Colour change to pale grey.			7.20: [Properties of Clayey SILT, low plasticity]	
				7.45m	26.4-	- -7.5 - -				М	н	- - - -	
	-				25.9-	- 8.0 -			8.20m			-	
19/12/2012 07:28				8.50m SPT 10, 15, 19 N=34	- 25.4-	- - - - 8.5 -			CLAYSTONE: Grey and orange brown, extremely weathered, extremely low strength, with some da red iron staining and cementation.			8.20: [Properties of CLAY, high plasticity] Sample - 8.50m to 8.95m Atterberg Limits: LL = 50.2%; PL = 19.6%; PI = 30.6%; LS = 14.6%; MC = 21.0%	
18.6PJ BH_SKM_23.6DW				8.95m	24.9-	- - - 9.0 - -				М	VSt	- -	
LB LOG BOREHOLE GUSBIO					24.4-	- - - - - -						-	
AD/\ WB	Au T Au V Au Very Easy	and Auger Screauger Screauger Drill uger Drill (ashbore DRILLIN or Easy / GROUI	w TC-bi V-bit G PEN F I H I NDWA	RR Ro HQ Ho t NQ No PQ PO NMLC N IETRATIO Firm V Hard TER SYME	N H Verg BOLS	ng } } Pring	D Dis ES En EW En HP Har HV Har (P: Pea N SPT HW SP	v Soil v Wat nd Pen nd Van k Su l blows T pen	etrometer Sehear D Undisturbed Tube Sample W Water Sample L MD D VD VD	DENSITY (\$ Very Loose Loose Dense Dense Very Dense Compact	0 4 nse 10 30	-4 VS Very Soft < 12 kPa {0-2} -10 S Soft 12 - 25 {2-4}	

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N: N:	t to Gateway Mwy	GRAPHIC LOG CLASSIFICATION SYMBOL	POSITION : E: 10481, N: 152837 (56 South East T SURFACE ELEVATION : 33.9 (AHD) DIP / AZIMUTH : 90° CONTRACTOR : Geodrill MATERIAL MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components CLAYSTONE: Grey and orange brown, with fine grained sand, extremely weathered, extremely low strength, without dark red staining.		orizontal Datum) PAGE: 3 OF 6 DATE DRILLED: 28/8/12 to 29/8/12 LOGGED BY: NC CHECKED BY: DWL STRUCTURE & Other Observations 10.00: [Properties of CLAY, high plasticity]
JOB NO : QB10312.54 LOCATION : Adjacent DRILLI PROGRESS OBJUTINO DRILLING DRIFTING DRILLING DRIFTING	t to Gateway Mwy ING State	GRAPHIC LOG CLASSIFICATION SYMBOL	SURFACE ELEVATION : 33.9 (AHD) DIP / AZIMUTH : 90° CONTRACTOR : Geodrill MATERIAL MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components CLAYSTONE: Grey and orange brown, with fine grained sand, extremely weathered, extremely low	ر ر ر	DATE DRILLED: 28/8/12 to 29/8/12 LOGGED BY: NC CHECKED BY: DWL STRUCTURE & Other Observations
DRILLING PRICTING PRI	t to Gateway Mwy LING SISS (III) (III)	GRAPHIC LOG CLASSIFICATION SYMBOL	CONTRACTOR : Geodrill MATERIAL MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components CLAYSTONE: Grey and orange brown, with fine grained sand, extremely weathered, extremely low	\frac{1}{5}	STRUCTURE & Other Observations
DRILLING ACASING ACASING ACASING ACASING BENETRATION BENETRATION GROUND WATER CROUND WATER THE VEELS TO STORY THE VEELS TO STORY TO S	S1 (E) H L DE	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components CLAYSTONE: Grey and orange brown, with fine grained sand, extremely weathered, extremely low	70	STRUCTURE & Other Observations
BUILLING A CASING A CASING B C	S1 (E) (E) W H Le S (S (MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components CLAYSTONE: Grey and orange brown, with fine grained sand, extremely weathered, extremely low	CONDITION	& Other Observations
SI SI SI SI SI SI SI SI	SPT 9, 14, 22 N=36 10.45m 23.4 10.45m 23.4 10.45m		CLAYSTONE: Grey and orange brown, with fine grained sand, extremely weathered, extremely low	CONDITION	& Other Observations
N: N:	10.45m 23.4—10	.5	grained sand, extremely weathered, extremely low		10.00: [Properties of CLAY, nigh plasticity]
	23.4—10	5			
	22.9 11		N	w VSt	-
	-	.0			-
19 30 HI	11.50m SPT 19, 30/130mm HB N=R	.5	SANDSTONE: Pale grey, fine grained sand in clay matrix, extremely weathered, extremely low strength, with orange staining.		11.50: [Properties of Clayey SAND]
	21.9 12	.0		D	-
- WB	21.412				-
Si 22 30 HI 13	13.00m SPT 22, 30/110mm HB N=R 13.26m	.0 13.	Pink red, fine to medium grained.	м	-
	20.4-13				-
	19.9 - 14			VD	-
14 Si 32 Si	14.50m 19.4 14.50m 19.4 14.72m 19.4 14.72m		Pink and grey, with red iron staining.		_
DDILLING	18.9—15	.0	AMPLES & FIELD TESTS DENSITY	/ (ODT ::	CONDICTENOV (C.) (AL. L.)
	RR Rock Rolling HQ HQ Coring NQ NQ Coring	D Disturbed Si ES Env Soil Sai EW Env Water S HP Hand Penetri HV Hand Vane S (P: Peak Su R: F	ample SPT Standard Penetration Test mple U Undisturbed Tube Sample Sample W Water Sample MD Medium D Dense	4 - Dense 10	-4 VS Very Soft < 12 kPa {0-2} -10 S Soft 12 - 25 {2-4}

SKM	BOREH	OLE ENGINEERING LOG	BOREHOLE NO : BH-SKM-23
CLIENT : TMR		POSITION : E: 10481, N: 152837 (56 South East	Transit Horizontal Datum) PAGE: 4 OF 6
PROJECT : GUSBUS		SURFACE ELEVATION : 33.9 (AHD)	DATE DRILLED: 28/8/12 to 29/8/12
JOB NO : QB10312.540		DIP / AZIMUTH : 90°	LOGGED BY: NC
LOCATION : Adjacent to Gate DRILLING	way Mwy (Northb	oound) CONTRACTOR : Geodrill MATERIAL	CHECKED BY: DWL
	e		6
BELLING A CASING WATER WATER BRILLING PENETRATION GROUND WATER LEVELS SAMPLES & FIELD TESTS	6.81 RL (m) 6.91 DEPTH (m) 7. GRAPHIC		STRUCTURE STRUCTURE STRUCTURE Other Observations 15.00: [Properties of Clayey SAND]
		SANDSTONE: Pink and grey, fine to medium grained sand, with red iron staining.	15.00. [Properties of Clayey SAND]
	18.4—15.5		
	-		
16.00m SPT	17.9 16.0	Yellow grey, predominantly fine to medium grained	
23, 30/130mm HB N=R 16.28m	-	sand, some coarse sub-angular sand, with orange staining.	
	17.4—16.5		
	-		
	16.9 - 17.0		M VD
	-		
17.50m SPT 20,	16.4 17.5	17.50m 17.50m 17.50m 17.50m 17.50m 17.50m 17.50m 17.50m 17.50m	
20, 30/100mm HB N=R 17.75m	- ::::	Grey, fine to coarse grained, poorly cemented clay	
	- ::::	matrix, stained pink.	
	15.9 18.0		
	- ::::		
	15.4 18.5		
	- ::::		
19.00m	14.9—19.0	19.00m	
SPT 6, 10, 16 N=26	19.0	CLAYSTONE: Green-grey, highly weathered, medium strength, with brown staining.	19.00: [Properties of CLAY]
19.45m	14.4—19.5		M VSt
	13.9 20.0		
AS Auger Screw HQ HQ - AD/T Auger Drill TC-bit NQ NQ - AD/V Auger Drill V-bit PQ PQ	ck Rolling D C 2 Coring ES E 2 Coring EW E	Disturbed Sample SPT Standard Penetration Test U Undisturbed Tube Sample L Loose MD Medium Hand Penetrometer MOISTURE CONDITION SPT Standard Penetration Test VL Very Location	4 - 10 S Soft 12 - 25 {2-4} m Dense 10 - 30 F Firm 25 - 50 {4-8} 30 - 50 St Stiff 50 - 100 {8-15}
DRILLING PENETRATION VE Very Easy F Firm VH E Easy H Hard GROUNDWATER SYMB = Water level (static)	N HV H H Very Hard (P: Pe N SF OLS HW S	land Penetrometer MOISTURE CONDITION and Vane Shear D = Dry M = Moist W = Wet Volume 2 CO Compared SPT penetration by hammer weight SPT penetration by rod weight	Dense 50 - 100 VSt Very Stiff 100 - 200 {15-30}
= Water level (during dril	ling)		File: QB10312.540 BH-SKM-23 Page 4 OF

S	K	V	ВС	REHOL	E ENGINEERING LO	G	I	BOREHOLE NO : BH-SKM-23
CLIENT :	TMR				POSITION : E: 10481, N: 152837 (56	orizontal Datum) PAGE: 5 OF 6		
PROJEC	T : GUSB	US			SURFACE ELEVATION: 33.9 (AHD)	DATE DRILLED: 28/8/12 to 29/8/12		
JOB NO	: QB1031	2.540			DIP/AZIMUTH: 90°		l	LOGGED BY: NC
LOCATIO			way M	wy (Northbound	CONTRACTOR : Geodrill	TEDIAL	(CHECKED BY: DWL
PROGRESS		ILLING		z		ATERIAL	Τ.	T
& CASING WATER	DRILLING PENETRATION GROUND WATER	SAMPLES & FIELD TESTS	(E) - 13.9	GRAPHIC LOG CLASSIFICATION		TSIOM	CONSISTENCY	STRUCTURE & Other Observations
					CLAYSTONE: Green-grey, highly weathere medium strength, with brown staining. (con	ed, tinued)		-
		20.50m SPT 9, 15, 30/90mm HB N=R	13.4	-20.5		М	VSt	- - -
		20.89m	12.9	-21.0	20.80m SANDSTONE: Grey, fine to medium graine extremely weathered, extremely low streng		VD	20.80: [Properties of SAND]
			-		21.30m CLAYSTONE: Blue grey, highly weathered strength, trace red iron staining.	l, medium		21.30: [Properties of CLAY]
			12.4	-21.5				- - -
		22.00m SPT 10, 19, 24 N=43	11.9	-22.0				
- WB		22.45m	11.4	-22.5				- - -
			10.9	-23.0		М	н	- - - -
		23.50m SPT 12, 18, 25 N=43	10.4	-23.5	23.50m			- - -
		23.95m	9.9	-24.0				- - -
			9.4	-24.5				- -
		25.00-			05.00m			- - -
AS Aug AD/T Au AD/V Aug WB Wa	nd Auger ger Screw iger Drill TC- ger Drill V-bi shbore	HQ HC bit NQ NC t PQ PC NMLC NI ENETRATION		ES Env So EW Env Wa	ter Sample W Water Sample netrometer	DENSITY VL Very Loos L Loose MD Medium D D Dense VD Very Dens CO Compact	e 0 4 ense 10 30 se 50	-4 VS Very Soft < 12 kPa {0-2} -10 S Soft 12 - 25 {2-4}
▼ ∑	= Water lev	'ATER SYMB el (static) el (during dril		HW SPT pe RW SPT pe	netration by hammer weight netration by rod weight	F	ile: Ol	B10312.540 BH-SKM-23 Page 5 OF 6

BOREHOLE ENGINEERING LOG BOREHOLE NO: BH-SKM-23 POSITION: E: 10481, N: 152837 (56 South East Transit Horizontal Datum) PAGE: 6 OF 6 CLIENT: TMR PROJECT: GUSBUS DATE DRILLED: 28/8/12 to 29/8/12 SURFACE ELEVATION: 33.9 (AHD) JOB NO: QB10312.540 DIP / AZIMUTH : 90° LOGGED BY: NC CONTRACTOR: Geodrill CHECKED BY: DWL LOCATION: Adjacent to Gateway Mwy (Northbound) DRILLING MATERIAL GROUND WATER LEVELS LES & TESTS CLASSIFICATIO CONSISTENCY Ξ MATERIAL DESCRIPTION MOISTURE Ξ DRILLING PENETRAT STRUCTURE DRILLING & CASING DEPTH GRAPHIC Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components & Other Observations 귒 SAMPLI FIELD T 90 8.9 25.00: [Properties of CLAY] CLAYSTONE: Grey, with prominent dark red iron SPT 9, 19, 23 N=42 staining throughout 25.45m -25.5 8.4 26.00n -26.0 With some white bands. -26.5 M Н Colour change to blue grey and pink. 6, 13, 18 N=31 26.95m 6.9 -27.0 -27.5 With some sand. 28.00m SPT 29, 30/90mm N=R 5.9 -28.0 SANDSTONE: Pale grey, fine to medium grained with some coarse grained, extremely weathered, low 28.00: [Properties of SAND, with clay] strength, with orange staining. 28.24m GUSBUS.GPJ BH_SKM_23.GDW 19/12/2012 07:28 5.4--28.5VD 4.9--29.0 4.4--29.5 BOREHOLE 23, 30/110mm HB N=R 29.76m 29.76: BH Terminated Piezometer installed to 19.00m CURRENT.GLB Log DRILLING SAMPLES & FIELD TESTS CONSISTENCY (Su) {N-value} DENSITY (SPT N-value) Hand Auger D Disturbed Sample ES Env Soil Sample EW Env Water Sample SPT Standard Penetration Test U Undisturbed Tube Sample Rock Rolling RR VL Very Loose 0 - 4 < 12 kPa {0-2} Auger Screw HQ HQ Coring Auger Drill TC-bit NQ NQ Coring Auger Drill V-bit PQ PQ Coring Washbore NMLC NMLC Coring Undisturbed Tube Sample Loose 4 - 10 S Soft 12 - 25 {2-4} W Water Sample MD Medium Dense 10 - 30 25 - 50 {4-8} AD/V WB D Dense 30 - 50 St Stiff 50 - 100 {8-15} **HP Hand Penetrometer** MOISTURE CONDITION D = Dry M = Moist W = Wet DRILLING PENETRATION VEASY F Firm VH VD Very Dense 50 - 100 VSt Very Stiff 100 - 200 {15-30} HV Hand Vane Shear VE Very Easy E Easy F Firm H Hard VH Very Hard (P: Peak Su R: Residual Su) CO Compact >50/150mm Hard > 200 kPa {>30} N SPT blows per 300mm HW SPT penetration by hammer weight **GROUNDWATER SYMBOLS** RW SPT penetration by rod weight = Water level (static) = Water level (during drilling)

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