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BOREHOLE ENGINEERING LOG BOREHOLE NO: BH-SKM-24 POSITION: E: 10525, N: 152794 (56 South East Transit Horizontal Datum) PAGE: 1 OF 7 CLIENT: TMR PROJECT: GUSBUS DATE DRILLED: 27/8/12 to 27/8/12 SURFACE ELEVATION: 36.2 (AHD) JOB NO: QB10312.540 DIP / AZIMUTH : 90° LOGGED BY: NC CONTRACTOR: Geodrill CHECKED BY: DWL LOCATION: Adjacent to Gateway Mwy (Southbound) DRILLING MATERIAL GROUND WATER LEVELS LES & TESTS CLASSIFICATIO CONSISTENCY Ξ MATERIAL DESCRIPTION MOISTURE Ξ DRILLING PENETRAT STRUCTURE CASING DEPTH GRAPHIC Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components & Other Observations WATER 귒 SAMPLI FIELD T 90 36.2 FILL (SILT) (MH): Black and dark grey, high plasticity, trace sand, trace fine sized gravel, 0.00: - 3.20m FILL organics and rootlets presents. 3.20-3.40m ALLUVIUM 3.40-7.00m RESIDUAL MH -0.5 S 35.7 М 7.00-14.60m XW ROCK 14.60-TD HW-MW Rock (MH): With coarse sized gravel. МН 1.00m 1.00m 35.2 -1.0 FILL (SANDY SILT) (MH): Dark grey and black, high plasticity, fine to medium grained, sub-rounded, sand, trace sandstone gravel, trace rootlets. SPT 1, 1, 2 N=3 1.45m 34 7--1.5 S МН 34.2 -2.0 М CASING 33.7 -2.5 (MH): Dark grey mottled orange and brown, trace fine sized gravel, trace rootlets and wood. U50 Н MH 33.2 -3.0 SPT 9, 21, 23 N=44 SM 3.30m SILTY SAND (SM): Dark grey, fine grained sand. D SM 3.40m (SM): Fine to coarse grained sand. 3.45m SANDY CLAY (CI): Pale grey, medium plasticity, fine 32.7 -3.5 to coarse grained sand. GUSBUS.GPJ BH_SKM_24_SOIL.GDW St WB (CI): Orange grey mottled red. 4.00m 4.00m 32.2 4.0 SPT 14, 15, 24 N=39 CLAYEY SAND (SC): Grey, coarse grained sand, with fine sized, sub-angular, quartz gravel. 31.7 -4.5 SC М D GLB Log DRILLING SAMPLES & FIELD TESTS CONSISTENCY (Su) {N-value} DENSITY (SPT N-value) Hand Auger Disturbed Sample Env Soil Sample SPT Standard Penetration Tes
U Undisturbed Tube Sample Rock Rolling RR VL Very Loose 0 - 4 VS < 12 kPa {0-2} Undisturbed Tube Sample Auger Screw HQ Auger Drill TC-bit NQ HQ Coring NQ Coring Loose 4 - 10 S Soft 12 - 25 {2-4} EW Env Water Sample Water Sample MD Medium Dense 10 - 30 25 - 50 {4-8} Auger Drill V-bit Washbore PQ PQ Coring NMLC NMLC Coring AD/V WB D Dense 30 - 50 50 - 100 {8-15} St Stiff **HP Hand Penetrometer** MOISTURE CONDITION
D = Dry M = Moist W = Wet DRILLING PENETRATION VD Very Dense 50 - 100 VSt Very Stiff 100 - 200 {15-30} HV Hand Vane Shear VE Very Easy E Easy Firm Hard 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)

19/12/2012 07:39

BOREHOLE

CURRENT

JBRARY

OFFICE

File: QB10312.540 BH-SKM-24 Page 1 OF 7

	S	卫		1	В	OR	EHC)L	E ENGINEERING LOG			BORE	HOLE NO : E	3H-SKM-24				
CLIE	ENT	: TMR							POSITION : E: 10525, N: 152794 (56 Sou	uth East Tr	ansit F	lorizontal	Datum) PAG	E:2 OF 7				
PRO	DJEC	CT : GL	JSBU	S					SURFACE ELEVATION : 36.2 (AHD)				ILLED : 27/8/12 t	o 27/8/12				
_		: QB10							DIP / AZIMUTH : 90°				BY : NC					
LOC	ATIO	ON : Ad		nt to Gate LING	eway N	1wy (S	outhbo	und)	CONTRACTOR : Geodrill MATER	RIAI	CHECKED BY : DWL							
PROG	GRES	ss z	_			ē		N O			7							
- DRILLING - & CASING	WATER	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	(E)	- -5. DEPTH (m)	GRAPHIC	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Character Secondary and Minor Components	MOIST	CONSISTENCY		STRUCTUR & Other Observ					
					01.2	- - -		SC	CLAYEY SAND (SC): Grey, coarse grained san with fine sized, sub-angular, quartz gravel. (continued)	nd,								
				SPT 12, 15, 16 N=31	30.7-	5.5 		sc	(SC): Fine to coarse, stained orange and red.									
			_ <u></u>	5.95m		-		sc	(SC): Fine to medium, with some thin bands (to 10mm) clay, without orange and red staining.	M	D							
				0.5011	30.2-	-6.0 -		sc	(SC): Increased clay content.									
					29.7-	- 6.5 -			6.60m SANDY CLAY (CH): Pale grey, high plasticity, fi grained sand.	fine								
				7.00m	29.2-	- - -7.0		СН	7.00m	D	VSt							
				SPT 5, 8, 11 N=19	29.2	- 7.0 - -			CLAYSTONE: Pale grey, with sand lenses (fine grained), extremely weathered, extremely low strength, with orange and red iron staining.	e		7.00: [Pro	perties of CLAY]					
				7.45m	28.7-	- -7.5 - -												
					28.2-	- - - -												
				8.50m SPT 7, 8, 13 N=21	27.7-	- - -8.5					VSt							
				8.95m	27.2-	- - - -9.0												
						- - -												
					26.7-	- -9.5 -												
HA AS AD/ WB VE E				10.00m	26.2-	- - - 10.0			10.00m									
	Au T Ai V Au Wa	and Auge iger Scre uger Dril iger Drill ashbore DRILLIN Easy	W I TC-bit V-bit G PEN F I H I	RR RO HQ HO IT NQ NO PQ PO NMLC N NETRATIO	N H Very	iring	ES En EW En HP Han HV Han (P: Pea N SPT	v Soil v Wat d Per d Var k Su I blows	etrometer MOISTURE CONDITION e Shear D = Dry M = Moist W = Wet	ID Medium D	e 0 4 ense 1 3 se 5	- 4 - 10	CONSISTENCY VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard	(Su) (N-value) < 12 kPa (0-2) 12 - 25 {2-4} 25 - 50 {4-8} 50 - 100 {8-15} 100 - 200 {15-30} > 200 kPa {>30}				
	∇	= Wate	r level	(static) (during dri					etration by rod weight	-	ile: O	B10313	540 BH-SKM-24	Page 2 OF				

(S	L		1	В	OR	EHC	DLE	ENGINEERING LOG		BOREH	IOLE NO : B	H-SKM-24					
CLIE	NT :	TMR							POSITION : E: 10525, N: 152794 (56 South East Tr	ansit H	lorizontal D	Datum) PAGE	: 3 OF 7					
PRO	JEC.	T : GL	JSBU	S					SURFACE ELEVATION : 36.2 (AHD)		DATE DRI	LLED: 27/8/12 to	27/8/12					
-		QB1							DIP / AZIMUTH : 90°		LOGGED BY: NC							
LOC	ATIO	N : Ad		nt to Gate LING	eway N	1wy (S	outhbo	und)	CONTRACTOR : Geodrill CHECKED BY : DWL MATERIAL									
PROG	RESS	z	_			<u> </u>		Z O	IVI/(I EI (I) (E									
DRILLING - & CASING	WATER	DRILLING	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	(E) □ 12 - 26.2-	0.0 DEPTH (m)	GRAPHIC	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	CONSISTENCY	10 00: [Pro	STRUCTURE & Other Observat						
				SPT 4, 9, 10 N=19		- - -			CLAYSTONE: Pale grey, extremely weathered, extremely low strength, with orange and red iron staining.		10.00. į1 10	portion of OEAT						
				10.45m	25.7-	- - - -							-					
					25.2-	11.0 												
				11.50m SPT 9, 16, 22 N=38	- 24.7-	- 11.5 - -		11.	Purple grey mottled pink and red, some orange iron staining.	VSt			-					
3				11.95m	24.2-	- - 12.0 -												
——————————————————————————————————————					23.7-	- 12.5 - -												
				13.00m SPT 9, 30/100mm HB N=R 13.25m	- 23.2-	- 13.0 - -		13.	SANDSTONE: Orange brown, fine to medium grained sand , with medium sized gravel, extremely weathered, extremely low strength.		_		-					
					22.7-	- 13.5 - -												
					22.2-	14.0 - -				VD			-					
				14.50m SPT 10/0mm HB N=R	21.7-	- 14.5 -		14.	60m Continued as Cored Drill Hole				-					
,			DRILL	ING	21.2-	_ - - - 15.0-		9	AMPLES & FIELD TESTS DENSITY	(057::		CONICIOTENCY	(C.) (Ml.)					
AD/V WB	HA Hand Auger RR Rock Rolling AS Auger Screw HQ HQ Coring AD/T Auger Drill TC-bit NQ NQ Coring WB Washbore NMLC NMLC Coring DRILLING PENETRATION HP Hand Vane (P: Peak Su R: Easy H Hard GROUNDWATER SYMBOLS Disturbed ES Env Soil S EW Env Water HV Hand Vane (P: Peak Su R: N SPT blows F HW SPT penet							turbed Solve Soil Salve Water Solve Penetral Vane Solve Solv	ample SPT Standard Penetration Test mple U Undisturbed Tube Sample W Water Sample Demoter Schear	0 4 Dense 1 3 3sse 5	- 4 - 10 0 - 30 0 - 50 0 - 100 50/150mm	S Soft F Firm St Stiff VSt Very Stiff H Hard	< 12 kPa {0-2} 12 - 25 {2-4} 25 - 50 {4-8} 50 - 100 {8-15} 100 - 200 {15-30} > 200 kPa {>30}					
									F	ile: Q	B10312.5	40 BH-SKM-24	Page 3 OF					

- 5	上		1		C	ORE	BOI	REHO	LE E	ENGIN	NEI	ΕĮ	RII	NG	L	.OG	во	REHOLE	NO : BH	1-SKM-24		
CLIENT								POSITION	N : E: 10	525, N: 152	2794 (56	Sou	th Ea	ast Tı	ransit Horizontal Datum) PAGE: 4 OF 7						
PROJEC										TION : 36.	2 (Al-	HD))			DATE DRILLED: 27/8/12 to 27/8/12						
JOB NO						. 14 (0 !!	- I I)	DIP / AZIMUTH: 90° CONTRACTOR: Geodrill								LOGGED BY : NC CHECKED BY : DWL						
	ON : A	djace	ent 1	10 G	iateway	/ Mwy (Sout	nbound)	MATER					_									
Dixii		(0.0							Τ.	ESTIMATED STRENGTH				DEFECT SPACING		CTS & COM	+					
DRILLING & WATER DETAIL	TCR/RQD	SARMIDLESSES FIELD TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	(texture, t	YPE : Col abric, mine	CRIPTION our, Grain s eral compos tation, etc a	ition, ha	rdness	Weathering	, vealing	0.03	Is(50) ■ - Axial - Diamet	ral e	(mr	n)	Description of defects,	joints, seams, additional and comments	INSTALLATION DETAIL		
NMLC I NQ N	DRILL DEPTH		25.7—25.2—24.7—23.7—23.7—23.2—	- - - - -10.5		START COR	NG AT 14.60	m wn, fine to med							©			OUSEIVALIOTIS 3	and continents			
NMLC I NQ N T F	SPT SP									TESTS Inv Soil Samp Inv Water Sar	mple	CS Crushed Seam				CT Coating IR Irregular SN Stain PR Planar			0-0.03 E 0.03-0.1 V 0.1-0.3 L 0.3-1.0 N 1.0-3.0 F	NGTH (Is50 MPa extremely Low /ery Low ow Medium ligh /ery High		
GROUNDWATER SYMBOLS W = Water level (static) W = Water level (during drilling)								RAPHS 🔀	YES			SZ Shear Zone RF Rougi VN Vein S Smoo SL Slicke					ooth	led		· -		
																	File:	OB10312 F	540 BH-SKI	M-24 4 OF		

	: TMF CT : G		บร				SURFACE ELEV				uı Lası	ransit Horizontal Datum) PAGE: 5 OF 7 DATE DRILLED: 27/8/12 to 27/8/12							
	: QB			10			DIP / AZIMUTH		(/// 11	LOGGED BY : NC									
					Sateway	/ Mwy (Southbound							CHECKED BY: DWL						
	LLING) (000000000000000000000000000000000	MATERIAL						CTS & COM						
i	_	တ္ပ		٦	()	Г	ESCRIPTION		D	ESTIMAT	ED STRENG	TH DEFECT		MENTS					
WATER	TCR/RQD	SARWIDLESSES	RL (m)	DEPTH (m)	GRAPHIC LOG	ROCK TYPE : (texture, fabric, n	Colour, Grain size, St nineral composition, h entation, etc as appli	ardness	Weathering	0.03	- Axial Diametral	SPACING (mm)	defects,	joints, seams, additional and comments	INSTALLA DETAI				
	DEPTH	15 I		_		SANDSTONE: Orange black manganese stain	brown, fine to medium graining of defects (continued)	ned, with dark red	HW		. ≥ ± ₹	2000 B B B E E E E E E E E E E E E E E E			_				
				-		With grey nodules (up	o 10mm)												
			20.7-	-15.5							d•		— JT 5° SN P Sample - 19	_	_				
				-		Grey with pale orange	and pink tiecks		MW	i i			15.88m UCS = 21.7		-				
				-									E = 19.5 GI		1				
Run 1													— JT 15° CN	PR RF					
			20.2-	-16.0										_					
	100% TCR			-									— JT 30° CN	CU RF	-				
	100% RQD			-											-				
				-									— JT 10° CT (CU RF					
			19.7-	- -16.5										_					
				_										-	_				
				-											-				
				-											-				
			19.2-	17.0										_					
	17.05	17.05m	19.2	-17.0															
				-										-	_				
				-											-				
				-									— JT 55° CT I	PR S	-				
			18.7-	-17.5										-					
				_											-				
				-											-				
			18.2-	-18.0					HW		의			-	1				
	100%			_									— JT 10° CN	PR RF					
Run 2	100% TCR	C		-											-				
	100% RQD		17.7-	-18.5									— JT 35° CN	cus -	-				
				-															
			17.2-	19.0	: : : : :									-	-				
				-											-				
				_															
													— JT 15° CN	PR RF					
			16.7-	19.5		CLAYSTONE: Dark gre	y to black		EW		1			-					
	19.70	10 70-		-					to HW						-				
		19.70m	\vdash												1				
	100% TCR					With orange brown iron	staining along healed defe	cts	1										
	100% RQD		L						<u> </u>			COCONODO							
IMLC I	NMLC (RILL	.ING				Env Soil Sample			hed Seam	ABBREVIATI	Cu Curved	0-0.03 E	Extremely Lo				
Q N	IQ Cori	ng					Vater Sample EW PT Sample	Env Water Sample	D	B Drill E	Break	CT Coating SN Stain	IR Irregular PR Planar	0.03-0.1 \ 0.1-0.3 L	ery Low ow				
							ndisturbed Tube Sample		F.	Z Fracti T Joint	ured Zone	VR Veneer	ST Stepped Un Undulated	0.3-1.0 N	/ledium High				
					measure				IS	Infilled Z Shea		POL Polished RF Rough			ery High				
_					SYMBO		AOD ADUO			N Vein	. 20110	S Smooth SL Slickensi	ded						
,	= V	Vater I	evel	(stat	ic)	PHOTO	OGRAPHS YES	NO NO	1			OL OHUKEIISI	udu						

			1		C	ORED BOI	REHOL	E ENGINI	EE	RII	NG	i L	OGBO	REHOLE				
CLIENT								E: 10525, N: 15279			th Ea	st Tr				: 6 OF 7		
PROJE								LEVATION : 36.2	(AHI	D)			DATE DRILLED: 27/8/12 to 27/8/12					
JOB NO						M (O	DIP / AZIMUT				LOGGED BY: NC CHECKED BY: DWL							
	UN : A		ent	to C	ateway	Mwy (Southbound)	CONTRACTO											
DIXI				_				-	Τ_	ESTIMA	TED STR	ENGTH	DEFECT	CTS & COM	MENTS			
DRILLING & WATER DETAIL	TCR/RQD	ARMIDITESSES	RL (m)	DEPTH (m)	GRAPHIC LOG	DES ROCK TYPE : Col (texture, fabric, min- alteration, cemen	eral composition	n, hardness	Weathering	0.03	Is(50) - Axial - Diametri	al 01	SPACING (mm)	Description of defects,	joints, seams, additional and comments	DETAIL		
	DEPTH	9 5 L	15.7—	- - - -20.5		CLAYSTONE: Dark grey to along healed defects			EW to HW						-	- - - - - -		
Run 3	100% TCR 100% RQD		15.2-			Grey, war nearest control	and all mage date	and applied anything						— JT 40° CT (-	- - - - - - - -		
NMLC	22.70	22.70m	14.2—			SANDSTONE: Grey, fine g	rained, within clay r	matrix	MW						-	- - - - - -		
			13.2—			CLAY: Grey, (100mm) SANDSTONE: Pale grey, f			EW MW					— IS Clay (10	- (Omm	- - - - -		
NMLC NQ N	100% TCR 97% RQD		12.7-	-23.5 - - - - -24.0										Sample: 23 24,07m UCS = 1.15 E = 0.1 GP	MPa	- - - - - - -		
			11.7-	-24.5 - - -		I	SAMPLES & I	FIFI D TESTS					ABBREVIATION	ONS	BOCK STRE	NGTH (Is50 MPa		
NMLC NMLC Coring HQ HQ Coring NQ NQ Coring PQ PQ Coring W Wat SPT SPT U Und GROUNDWATER SYMBOLS Well and the second HQ HQ Coring PHOTOGRAPH PROTECTION OF THE STANDARD PROTECTI							urbed Sample er Sample Sample Sample sturbed Tube Sam	ES Env Soil Sample EW Env Water Sampl ple	le CDF	Z Crus B Drill	hed Se hed Zo Break ured Z d Sean ir Zone	eam (one) Yone \(\)	CN Clean CT Coating SN Stain VR Veneer POL Polished RF Rough S Smooth SL Slickensi	Cu Curved IR Irregular PR Planar ST Stepped Un Undulated	0-0.03 1 0.03-0.1 1 0.1-0.3 1 0.3-1.0 1 1.0-3.0 1	Extremely Low Very Low		
-					ic) ing drilling	NOTES	A 110	YES NO							-40 DI / 011	M-24 6 OF		

	S	L		1		C	ORE	BOI	REHO	LE E	NGINI	EΕ	R	IN	G	L	OGB	ORE	HOLE	NO : BH	I-SKM-24			
CL	IENT	: TMF	3						POSITION	: E: 1052	25, N: 15279	4 (56	So	outh	Eas	st Tr	ansit Horizontal Datum) PAGE: 7 OF 7							
_	OJEC			US							TON: 36.2						DATE DRILLED: 27/8/12 to 27/8/12							
-	B NO								DIP / AZIN	IUTH: 9	0°						LOGGED BY: NC							
LO				ent	to G	ateway	Mwy (Sout	nbound)										CHECKED BY: DWL						
\vdash	DRII	LING							MATER	ESTIMATED STRENGTH					DEFEC*		& COM	MENTS MENTS						
S CINI	WATER	HIGH TCR/RQD	FIELD TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	(texture,	YPE : Colabric, min	CRIPTION our, Grain si eral composi tation, etc as	ition, hard	Iness	Weathering	6	• O - Dia	50) Axial ametral	ı	SPACIN (mm)	G De:	scription of defects,	f joints, seams, additional and comments	INSTALLATION DETAIL			
NMLC		100% TCR 97% RQD		10.7-	- - - -25.5		CLAYSTONE	: Brown grey,	with some shrir	nkage crack	s (continued)	MW		 - - - - -				***************************************		- - - -				
RENT.GIB Log CORED BOREHOLE GUSBUS.GPJ BH_SKM_24_CORE.GDW 19/12/2012 08:00		TCR 97% RQD 25.60 ;		9.7- 9.2- 8.7- 7.7-			IO Carino	D. Dich		& FIELD T							ABBREVIA		25.60: BH Terminated Piezometer to 19.30m	ROCK STREN	NGTH (Is50 MPa)			
VE_OFFICE_LIBRARY_CURR	NMLC NMLC Coring HQ HQ Coring NQ NQ Coring PQ PQ Coring TCR % core run recovered RQD % core run > 100mm long (rock fraction only measured) GROUNDWATER SYMBOLS - Water layel (static) PHOTOG								urbed Sample er Sample Sample sturbed Tube S	ES En EW En	v Soil Sample v Water Sampl	e CZ DI FZ JT IS SZ	Z Cru B Dri Z Fra Joir Infill	ushe ill Bre acture nt led S ear Z	d Zoı eak	ne (CN Clean CT Coating SN Stain /R Veneer POL Polish RF Rough S Smootl Slicker	IR I PR I ST S Un I ed	Curved rregular Planar Stepped Jndulated	0-0.03 E 0.03-0.1 V 0.1-0.3 L 0.3-1.0 M 1.0-3.0 H	xtremely Low ery Low			
BRISBAN	■ Water level (static) □ Water level (during drilling)									YES	NO								310312	540 RH-SKI	M-24 7 OF 7			



