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BOREHOLE ENGINEERING LOG HOLE NO: CURVE 59 BH04 POSITION: E: 358653, N: 8137047 (55 MGA94) PAGE: 1 OF 4 CLIENT: TMR PROJECT: SAFER ROADS SOONER PROJECT SURFACE ELEVATION: 318.8 (AHD) DATE DRILLED: 30/7/13 TO 30/7/13 LOGGED BY: NC JOB NO: CB24735.01 DIP / AZIMUTH : 90° CHECKED BY: AJ LOCATION: KENNEDY HWY (CAIRNS - MAREEBA) DRILLING **MATERIAL** Œ CONSISTENCY MATERIAL DESCRIPTION ES & MOISTURE $\widehat{\Xi}$ STRUCTURE **3RAPHIC** DEPTH & CASING Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components DRILLING GROUND \ & Other Observations WATER Ζ 90. Н ASPHALT: (0.05). F-H SANDY GRAVEL (GM): Grey brown, fine to medium GM gravel, fine to coarse grained sand, trace of clay. 0.30m 0.30: Moisture Content (%) = 6.3, Liquid Limit (%) = 28, Plastic Limit (%) = 19, Plasticity Index (%) = 9, Linear Shrinkage (%) = 4, % Passing 37.5mm: 100, % Passing 2.36mm: 59, % Passing 0.425mm: 39, % Passing 0.075mm: 26, % Passing 0.002mm: 3, Max. Dry Density (t/m³) = 2.07, OMC (%) = 10 SANDY GRAVEL (GM): Orange brown, fine to medium gravel, angular, fine to coarse grained sand, with fines. GM 317.8 -1.0 CLAYEY SILT (CI-ML): Red brown, orange brown, medium plasticity, with coarse grained sub-angular gravel, trace of fine to coarse grained sand. RESIDUAL SOIL 3, 4, 6 N=10 1.00: Moisture Content (%) = 19.2, Liquid Limit (%) = 40, Plastic Limit (%) = 27, Plasticity Index (%) = 13, % Passing 2.36mm: 85, % Passing 0.425mm: 80, % Passing 0.075mm: 73, % Passing 0.002mm: 18, % Passing 0.075mm: 73, % Pass AD/ D Passing 0.002mm: 18 RESIDUAL SOIL 1.45m F CI-ML -2.0 From 2.00 m becoming pale red brown, orange brown. St 2.50m SPT 2, 8, 25/95mm H-VH EXTREMELY WEATHERED ROCK OBSERVED N=R QUARTZITE: Pale brown mottled orange brown extremely weathered, extremely low strength, appears as SANDY SILT (ML), low plasticity, fine to medium grained sand, with fine to medium grained angular 2.90m 315.8 -3.0 gravel, comprising of medium strength quartzite NOT Н 4.00m SPT 30, 0 N=R WB 314.8 4.0 HIGHLY WEATHERED ROCK QUARTZITE: Pale brown mottled orange brown, extremely to highly weathered, very low to low 05/12/2013 11:42 4.37m H-VH <<DrawingFile>> 313.8--5.0 CB24735.01.GPJ PHYLLITE: Pale brown mottled orange brown, highly VH weathered, low strength BOREHOLE Continued as Cored Drill Hole Log CURRENT.GLB DRILLING SAMPLES & FIELD TESTS CONSISTENCY (Su) {N-value} DENSITY (SPT N-value) Hand Auger Disturbed Sample SPT Standard Penetration Test RR Rock Rolling VL Very Loose 0 - 4 VS < 12 kPa {0-2} Env Soil Sample Undisturbed Tube Sample Auger Screw AT Auger Drill TC-bit HQ AS Air Track HQ Coring Loose 4 - 10 S Soft 12 - 25 {2-4} Water Sample EW Env Water Sample **IBRARY** MD Medium Dense 10 - 30 F 25 - 50 {4-8} Firm Auger Drill V-bit Washbore NQ NQ Coring NMLC NMLC Coring AD/V WB D Dense 30 - 50 St Stiff 50 - 100 {8-15} HP Hand Penetrometer HV Hand Vane Shear MOISTURE CONDITION
D = Dry M = Moist W = Wet DRILLING PENETRATION VD Very Dense 50 - 100 VSt Very Stiff 100 - 200 {15-30} OFFICE F Firm H Hard VE Very Easy E Easy 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)

File: CB24735.01 CURVE 59_BH04 Page 1 OF 4

	SKM CORED BOREHOLE ENGINEERING LOG										G	HOLE NO : CURVE 59_BH04								
Ī	CLIENT : TMR PROJECT : SAFER ROADS SOONER PROJECT JOB NO : CB24735.01							SURFACE	: E: 358653			GA94)			PAGE: 2 OF 4 DATE DRILLED: 30/7/13 TO 30/7/13 LOGGED BY: NC					
	LOCATION: KENNEDY HWY (CAIRNS - MAREEBA)								UTH : 90°								DBY:			
	DRILLING								IAL								EFECT	S & COM	MENTS	
	ROCK TYPE : Co					SCRIPTION olour, Grain size, Structure neral composition, hardness entation, etc as applicable)				We dather in the interior of t			()			ription of join defects, addi vations and	tional	GENERAL		
BRISBANE_OFFICE_LIBRARY_CURRENT.GLB Log CORED BOREHOLE CB24735.01.GPJ <-DrawingFile>> 04/12/2013 17:53	NAME	97% TCR 26% RQD	317.8- 316.8- 315.8- 313.8-				ING AT 5.50m Pale grey bro	own, orange bro	wn, massive.		MW						5.58 c mm 5.68 c 5.70 c	IT 90° PR RF IT 90° CH PF IT 90° IR RF IT 80 - 90° F IT 80 - 90° F	R RF 1 - 4 1 - 3 mm e IR RF 1 mm	
ANE_OFFICE_LIBRARY_CURREN	DRILLING 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 W = Water level (static)							rbed Sample r Sample	ES Env So EW Env W					ean Cu Curved ating IR Irregular nin PR Planar neer ST Stepped Un Undulated			0-0.03	Extremely I Very Low		
BRISE		<u>×</u> = 1	vater le	vei (durii	ng drilling)									File:	CB2	4735	5.01 Cl	JRVE 59	_BH04_2	OF 4

	(S	1		Y		ORED BOR	REHOLE ENGIN	EERII	NG L	OG	HOLE	NO : 0	CURVE 59_BH0	4				
Р	RO	JEC				os soo	NER PROJECT	POSITION : E: 358653, N: 813 SURFACE ELEVATION : 318. DIP / AZIMUTH : 90°	•	//GA94)		DATE D	3 OF 4 RILLED:	30/7/13 TO 30/7/13					
-	_					WY (CA	IRNS - MAREEBA)	DII TAZIMOTTI . 90					ED BY:						
	_		DRILL	ING				MATERIAL		T				S & COMMENTS					
SNI II		DETAIL	HITAGO TCR/ROD	(m)	9 DEPTH (m)	GRAPHIC LOG	ROCK TYPE : C (texture, fabric, mi	ESCRIPTION Colour, Grain size, Structure ineral composition, hardness entation, etc as applicable)	Weathering	ESTIMATED S Is(50 - A O - Dian	i)) dal	DEFECT SPACING (mm)	Desci Obser	ription of joints, seams, defects, additional vations and comments	GENERAL				
		RETURN (from 6.00 m)	97% TCR 26% RQD		- - -		QUARTZITE: Pale grey bring from 6.00 m becoming orabedding at 60° to 70°.	own, orange brown, massive. (continued) ange brown, grey, indistinct to distinct	HW				 = _{6.31}	JT 50° IR RF 2 mm JT 10° UN RF JT 10° CH PR S 10 mm	-				
		RETUR	6.50		_		CORE LOSS 0.03m (6.47-	-6.50)	HW	+++			#		_				
		50% R		311.8-	- - - - -7.0			grey brown and orange brown, indistinct					6.67 \$ -6.88 \$ -6.94 \$	JT 75° PR RF SS 10° Fe IR RF 30 mm JT 80° CH IR RF 2 - 3 mm JT 5° IR RF 2 mm JT 5° Fe IR RF 3 mm	- - - -				
						-	- - - - - -								7.25 7.32 7.34 7.35 7.36 7.43 7.45 7.60 7.60	JT 5° Fe IR RF 3 mm SS 55° CH PR S 10 mm JT 70 - 80° Fe IR RF VN 10 - 25° Fe CU RF VN 45 - 70° Fe CU RF JT 80° Fe IR RF JT 80° IR RF JT 10° Fe IR RF JT 10° Fe IR RF SS 60 - 80° GC IR RF	- - - - -		
				310.8-	8.0 - - -		From 8.15 m to 8.30 m SIL	LTY CLAY (CI).	HW				7.90 ·	JT 5° IR RF 5 mm JT 5° IR RF 3 - 4 mm	- - - -				
				100% TCR 33% RQD	309.8-	9.0				MW				8.52 s 8.81 s 8.81 s 8.88 s 8.90 s 9.10 s	SS 5° CH IR RF 30 mm SS 10° GC IR RF 60 mm SS 10° Fe PR RF 2 mm IT 5° IR RF 1 mm IT 70° Fe IR RF 2 mm IT 70° Fe IR				
3				-			bands throughout.	distinct bedding at 10° to 40°, with pale grange brown, grey indistinct bedding.	HW				9.36 · 9.	JT 5° IR RF 1 mm 2' JT 5 - 15° Fe CU RF 1 mm E JT 80° IR RF 1 mm JT 80° Fe IR RF 1 mm JT 80° Fe IR RF 2 - 3 mm JT 80 To GO GO IR RF					
12/2013 17:5			10.00	308.8-	10.0		CORE LOSS 0.05m (9.95- QUARTZITE: Grey brown,	-10.00) , orange brown, indistinct bedding.	MW				10.10	m 5 JT 10° CH PR S 1 mm 5 JT 80 - 90° PR RF 1 mm	-				
< <drawing file="">> 04/12/2013 17:53</drawing>								-	- - - -		From 10.43 m to 10.63 m	SILTY CLAY (CI).	HW				10.33 10.35 10.43 RF 20 10.64	J JT 10° Fe PR RF 1 mm JT 10 - 30° CU RF SS 30 - 40° CH-CG IR JU JT 70° CH IR 15 mm JT 70° PR RF 1 mm	- - - -
CORED BOREHOLE CB24735.01.GPJ							307.8-	- - - 11.0 - -		From 10.75 m to 11.05 m	SILTY CLAY (CI)/ CLAYEY GRAVEL (GC	MW	-			10.75 10.85 200 n 11.08 11.17 11.18	JT 90° Fe IR RF 1 mm JT 70 - 80° PR RF 1 mm JT 70 - 80° PR RF 1 mm	- - - -	
GLB Log CORED BORE					- -306.8	- - - - - 12.0		From 11.85 m becoming in grey blue.	ndistinct to distinct bedding at 30° to 60° ,	SW				1 mm 11.37 1 mm 11.42 11.51 11.66 11.68	' JT 70 - 90° Fe PR RF	- - - - -			
BRISBANE_OFFICE_LIBRARY_CURRENT.GLB Log	NM NQ	N T	QD % (rd GR Z = V	DF Coring ng 6 core r 6 core r ock fract OUND\ Vater le	un reco un > 10 tion only WATER vvel (stat	HQ F PQ F vered 0mm long measured	'Q Coring W Wate SPT SPT U Undi	SAMPLES & FIELD TESTS urbed Sample ES Env Soil Sample er Sample EW Env Water Sam 'Sample isturbed Tube Sample	ple CZ Cru DB Dri FZ Fra JT Joir IS Infill	ushed Seam ushed Zone ill Break actured Zone nt led Seam ear Zone	CN Cle CT Coa SN Sta VR Ver POL Po RF Ro S Sn	ating IR in PR neer ST Un olished	Curved Irregular Planar Stepped Undulated	ROCK STRENGTH (Is50 0-0.03 Extremely Lo 0.03-0.1 Very Low 0.1-0.3 Low 0.3-1.0 Medium 1.0-3.0 High 3.0-10 Very High	,				
#_											File	: CB247	35.01 CI	JRVE 59_BH04_3	OF 4				

NQ Coring PQ PQ Coring W Water Sample EW Env Water Sample CZ Crushed Zone CT Coating IR Irregular 0.03-0.1 Very IN NQ Coring PQ PQ Coring W Water Sample EW Env Water Sample CZ Crushed Zone CT Coating IR Irregular 0.03-0.1 Very IN DB Drill Break SN Statin PR Flanar 0.1-0.3 Low PC PX Fractured Zone VR Veneer ST Stepped 0.3-1.0 Medical PX		S	1		V.	C	CORE	BORE	HOLE	ENGIN	IEE	RIN	IG	LC	G	НО	LE N	10 : 0	CURVE	59_BH	04
DORUMO DRILLING MATERIAL DEFECTS & COMMENT DEFOTS & COMMENT DE	PF	OJEC	CT : S	AFER		S SOO	NER PROJE	ECT SUR	RFACE ELE	/ATION : 31			GA94))		DATI	E DRI	LLED :	30/7/13 T	O 30/7/13	1
Description	LO				EDY H	WY (CA	IRNS - MAR	REEBA)									CKEE	BY:	AJ	IEN IEO	
OLIANTITIC Gety brown, crarge brown, inclaimed bedding. From 12.40 in bocoming gray brown. From 12.40 in bocoming gray blue. From 12.45 in bocoming gray	DRILLING		TCR/RQD	RL (m)		GRAPHIC LOG	(texture	DESCRIF CTYPE : Colour, or, fabric, mineral co	DESCRIPTION YPE : Colour, Grain size, Structure abric, mineral composition, hardness abric, mineral composition, hardness						DEFECT SPACING (mm)			Description of joints, sea defects, additional observations and comm			GENERAL
305.8 - 13.0 From 12.95 m becoming grey blue. From 13.47 m becoming pale grey brown. From 13.47 m becoming grey blue. From 14.50 m becoming				-300.0	- - - - -		(continued) From 12.40 r	n becoming grey brow	vn.	ct bedding.		SW						20 - 5 11.84 11.85 12.08 12.10 12.19 1 mm 12.25 12.29 12.38	00 mm JT 10 - 20° IF JT 10 - 20° IF JT 80° PR RI JT 70° Fe PF JT 70° Fe PF JT 70° Fe PF JT 70° Fe PF JT 70° Fe RF JT 70° Fe RF	R RF 1 mm R RF 1 mm R RF 1 mm R RF 1 mm R RF 1 mm e IR RF R S 1 mm 1 mm 1 mm	- - - - - -
## 15:00 303.8 15:0	NMLC		TCR 98%	-	- - - - - -													12.47 12.49 12.83	JT 70° Fe PF JT 70° Fe PF	RF1-5 RF1mm	JT 30° - 60° Fe/ CH IR RF 1 - 3 mm
End of Cored Drill Hole at 15.00 m 302.8—16.0 301.8—17.0 301.8—17.0 DRILLING NMLC NMLC Coring NQ NQ Coring PQ PQ Coring NQ NQ Coring TCR W core run recovered ST SPT Sample SPT SPT S			15.00	- -303.8	- - - - - - -													14.27 14.30 mm 14.35 40 mr	JT 10° IR RF JT 0° CG PR JT 0 - 30° CG	1 - 7 mm RF 7 - 15 PR RF 5 -	- - - - - - -
NMLC NMLC Coring HQ HQ Coring D Disturbed Sample ES Env Soil Sample CS Crushed Seam CN Clean Cu Curved 0-0.03 Extrer CZ Crushed Zone CT Coating IR Irregular 0.03-0.1 Very I DB Drill Break SN Stain PR Planar 0.1-0.3 Low TCR % core run recovered I Understand Tube Sample FZ Fractured Zone VR Veneer ST Stepped 0.3-1.0 Medicine State of the Carbon S				302.8-			_	Drill Hole at 15.00 m		D. TEOTO									DOOK OT D	FNOTULE	
RQD % core run > 100mm long JT Joint Un Undulated 1.0-3.0 High		NQ N	IQ Cori CR % RQD % (rc GR	DF Coring ng 6 core r 6 core r ock fract	un recovun > 100 ion only WATER	HQ F PQ F rered 0mm long measure SYMBOL	PQ Coring d)	D Disturbed Sa W Water Sample SPT SPT Sample	ample ES le EW	Env Soil Sam	imple	CZ Crus DB Drill FZ Frac JT Joint IS Infille SZ Shea	shed Se shed Zo Break tured Z d Seam ar Zone	eam (one)	CN Cle CT Coa SN Stai VR Ver POL Po RF Ro S Sm SL Sli	an ating in eeer olished ough nooth ckenside	Cu Cu IR Irre PR Pla ST Ste Un Un	gular Inar Ipped dulated	0-0.03 0.03-0.1 0.1-0.3 0.3-1.0 1.0-3.0 3.0-10	Extremely Very Low Low Medium High Very High	Low



	SINCLAIR KNIGHT MERZ	Client: Transport and Main Roads								
duarrin		Project: Safer Road Sooner								
drawn	AJ									
date	14/08/2013	Core Photograph – Curve 59	9_BH04							
scale	NTS	Project no. CB24735.01	Photo No: Curve 59_BH04	1 of 1						