BOREHOLE ENGINEERING LOG

HOLE NO : CURVE 22_BH04

CLIENT : TRANSPORT AND MAIN ROADS	POSITION : E: 359389, N: 8137542 (56 MGA94)	PAGE : 1 OF 3
PROJECT : BLACK SPOT PROJECT	SURFACE ELEVATION : 112.6 (AHD)	DATE DRILLED : 6/8/13 TO 6/8/13
JOB NO : CB24735.04	DIP / AZIMUTH : 90°	LOGGED BY : JP
LOCATION : KENNEDY HWY (CAIRNS - MAREEBA)		CHECKED BY : AJ

DRILLING | MATERIAL

PROGRESS: DRILLING & CASING	PROGRESS: WATER	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 CONDITION	CONSISTENCY	STRUCTURE & Other Observations
AD/T		VH			112.6	0.0			0.10m ASPHALT: 0.10 m.			FILL
									GRAVELLY SILT (ML): Brown, red brown, low plasticity, fine to medium, sub-angular gravel, with fine to coarse grained sand and clay.	D		
				1.00m SPT 6, 5, 8 N=13	111.6	1.0		ML	From 1.00 m trace of cobbles comprising of high strength angular quartzite			
		F		1.45m								
					110.6	2.0						
				2.50m					2.50m			
				SPT 8, 7, 5 N=12					GRAVELLY SILT (ML): Orange brown, red brown, low plasticity, fine to medium grained angular gravel comprising quartzite with fine to medium grained sand.		MD	RESIDUAL SOIL
WB			NOT OBSERVED	2.95m	109.6	3.0		ML				
				4.00m					4.00m			
				SPT 10, 15, 20 N=35	108.6	4.0			GNEISS: Red brown, extremely weathered, extremely low strength, appears as SILTY GRAVEL (GM), fine to medium grained angular gravel, fine to coarse grained sand, with clay.		D	EXTREMELY WEATHERED ROCK 4.00: Moisture Content (%) = 13.8, Liquid Limit (%) = 29, Plastic Limit (%) = 21, Plasticity Index (%) = 8, Linear Shrinkage (%) = 4, % Passing 2.36mm: 68, % Passing 0.425mm: 54, % Passing 0.075mm: 39, % Passing 0.002mm: 9 EXTREMELY WEATHERED ROCK
		H		4.45m								
					107.6	5.0						
				5.50m					5.50m			
				SPT 15, 23, 38 N=61					GNEISS: Grey, orange, brown, grey brown, extremely to highly weathered extremely low to low strength, appearing as SILTY GRAVEL (GM), fine to medium grained angular gravel, fine to coarse grained sand.		VD	HIGHLY WEATHERED ROCK 5.50: Moisture Content (%) = 10.3, Liquid Limit (%) = 25, Plastic Limit (%) = 21, Plasticity Index (%) = 4, Linear Shrinkage (%) = 1.5, % Passing 2.36mm: 54, % Passing 0.425mm: 32, % Passing 0.075mm: 20, % Passing 0.002mm: 2
		VH		5.95m								
					106.6	6.0						

DRILLING

HA	Hand Auger	RR	Rock Rolling
AS	Auger Screw	AT	Air Track
AD/T	Auger Drill TC-bit	HQ	HQ Coring
AD/V	Auger Drill V-bit	NQ	NQ Coring
WB	Washbore	NMLC	NMLC Coring

DRILLING PENETRATION

VE	Very Easy	F	Firm	VH	Very Hard
E	Easy	H	Hard		

GROUNDWATER SYMBOLS

▼ = Water level (static)

▽ = Water level (during drilling)

SAMPLES & FIELD TESTS

DS	Disturbed Sample	SPT	Standard Penetration Test
ES	Env Soil Sample	U	Undisturbed Tube Sample
EW	Env Water Sample	W	Water Sample

HP Hand Penetrometer
HV Hand Vane Shear
(P: Peak Su R: Residual Su)
N SPT blows per 300mm
HW SPT penetration by hammer weight
RW SPT penetration by rod weight

MOISTURE CONDITION
D = Dry M = Moist W = Wet

DENSITY (SPT N-value)

VL	Very Loose	0 - 4
L	Loose	4 - 10
MD	Medium Dense	10 - 30
D	Dense	30 - 50
VD	Very Dense	50 - 100
CO	Compact	>50/150mm

CONSISTENCY (Su) {N-value}

VS	Very Soft	< 12 kPa {0-2}
S	Soft	12 - 25 {2-4}
F	Firm	25 - 50 {4-8}
St	Stiff	50 - 100 {8-15}
VSt	Very Stiff	100 - 200 {15-30}
H	Hard	> 200 kPa {>30}

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BOREHOLE ENGINEERING LOG

HOLE NO : CURVE 22_BH04

CLIENT : TRANSPORT AND MAIN ROADS	POSITION : E: 359389, N: 8137542 (56 MGA94)	PAGE : 2 OF 3
PROJECT : BLACK SPOT PROJECT	SURFACE ELEVATION : 112.6 (AHD)	DATE DRILLED : 6/8/13 TO 6/8/13
JOB NO : CB24735.04	DIP / AZIMUTH : 90°	LOGGED BY : JP
LOCATION : KENNEDY HWY (CAIRNS - MAREEBA)		CHECKED BY : AJ

DRILLING							MATERIAL				
PROGRESS											
DRILLING & CASING	WATER	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 CONDITION	CONSISTENCY	STRUCTURE & Other Observations
WB		VH			106.6	6.0			GNEISS: Grey, orange, brown, grey brown, extremely to highly weathered extremely low to low strength, appearing as SILTY GRAVEL (GM), fine to medium grained angular gravel, fine to coarse grained sand. *(continued)*		VD	HIGHLY WEATHERED ROCK HIGHLY WEATHERED ROCK
									6.70m Continued as Cored Drill Hole			
					105.6	7.0						
					104.6	8.0						
					103.6	9.0						
					102.6	10.0						
					101.6	11.0						
					100.6	12.0						

DRILLING

HA	Hand Auger	RR	Rock Rolling
AS	Auger Screw	AT	Air Track
AD/T	Auger Drill TC-bit	HQ	HQ Coring
AD/V	Auger Drill V-bit	NQ	NQ Coring
WB	Washbore	NMLC	NMLC Coring

DRILLING PENETRATION

VE Very Easy F Firm VH Very Hard
E Easy H Hard

GROUNDWATER SYMBOLS

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SAMPLES & FIELD TESTS

DS	Disturbed Sample	SPT	Standard Penetration Test
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HP Hand Penetrometer
HV Hand Vane Shear
(P: Peak Su R: Residual Su)
N SPT blows per 300mm
HW SPT penetration by hammer weight
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MOISTURE CONDITION
D = Dry M = Moist W = Wet

DENSITY (SPT N-value)

VL	Very Loose	0 - 4
L	Loose	4 - 10
MD	Medium Dense	10 - 30
D	Dense	30 - 50
VD	Very Dense	50 - 100
CO	Compact	>50/150mm

CONSISTENCY (Su) {N-value}

VS	Very Soft	< 12 kPa {0-2}
S	Soft	12 - 25 {2-4}
F	Firm	25 - 50 {4-8}
St	Stiff	50 - 100 {8-15}
VSt	Very Stiff	100 - 200 {15-30}
H	Hard	> 200 kPa {>30}

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CORED BOREHOLE ENGINEERING LOG

HOLE NO : CURVE 22_BH04

CLIENT : TRANSPORT AND MAIN ROADS | POSITION : E: 359389, N: 8137542 (56 MGA94) | PAGE : 3 OF 3

PROJECT : BLACK SPOT PROJECT | SURFACE ELEVATION : 112.6 (AHD) | DATE DRILLED : 6/8/13 TO 6/8/13

JOB NO : CB24735.04 | DIP / AZIMUTH : 90° | LOGGED BY : JP

LOCATION : KENNEDY HWY (CAIRNS - MAREEBA) | CHECKED BY : AJ

DRILLING					MATERIAL			DEFECTS & COMMENTS	
DRILLING	WATER DETAIL	TCR/RQD DRILL DEPTH	RL (m)	DEPTH (m)	GRAPHIC LOG	DESCRIPTION ROCK TYPE : Colour, Grain size, Structure (texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)	Weathering	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral EL -0.03 / VL -0.1 / L -0.3 / M -1 / H -3 / VH -10 / EH	DEFECT SPACING (mm) 20 / 60 / 200 / 600 / 2000	Description of joints, seams, defects, additional observations and comments	GENERAL
			106.6	6.0		START CORING AT 6.70m					
NMLC		82% TCR 20% RQD	105.6	7.0		GNEISS: Grey brown, dark grey, distinctly foliated at 30° to 40°, schistose.	MW			6.73 SS 50° GC IR RF 90 mm 6.81 JT 50° CU RF 6.82 JT 90° CU RF 6.89 JT 70° ST RF 6.90 JT 80° IR RF 6.93 JT 70° IR RF 7.03 JT 60° IR RF 7.05 JT 70° IR RF 7.06 JT 90° IR RF 7.08 JT 60° IR RF 7.10 JT 50° CH IR RF 3 mm 7.13 JT 20° IR RF 7.14 JT 80° IR RF 7.27 SZ 70° UN VR 7.28 JT 70° IR VR 7.35 JT 40° UN VR 7.40 JT 80° IR RF 7.43 JT 80° UN RF 7.52 JT 80° IR RF 7.54 JT 80° IR RF 7.56 JT 0 - 30° CH UN RF 5 mm	JT 30° - 90° IR RF 10 - 30 mm spacing
						CORE LOSS 0.14m (7.73-7.87)					
		7.95 100% TCR 70% RQD	104.6	8.0		GNEISS: Dark grey, grey, distinctly foliated at 40° to 50°, schistose.	MW			7.58 JT 60° IR RF 7.63 SS 70° IR VR 100 mm 8.00 JT 60° CH IR RF 8.19 JT 60° UN RF 8.28 JT 80° UN RF 8.52 VN 50° Qz IR RF 8.59 JT 40° PR RF 8.63 JT 40° UN RF 8.77 JT 90° IR RF 8.80 JT 80 - 90° IR RF 8.90 JT 70° PR RF 8.95 JT 20° CU RF 9.00 JT 90° IR RF	
		9.10	103.6	9.0							
						Terminated Cored Drill Hole at 9.10 m					
			102.6	10.0							
			101.6	11.0							
			100.6	12.0							

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
▼ = Water level (static)
▽ = Water level (during drilling)

SAMPLES & FIELD TESTS

D Disturbed Sample | ES Env Soil Sample
W Water Sample | EW Env Water Sample
SPT SPT Sample
U Undisturbed Tube Sample

DEFECT ABBREVIATIONS

CS Crushed Seam | CN Clean | Cu Curved
CZ Crushed Zone | CT Coating | IR Irregular
DB Drill Break | SN Stain | PR Planar
FZ Fractured Zone | VR Veneer | ST Stepped
JT Joint | Un Undulated
IS Infilled Seam | POL Polished
SZ Shear Zone | RF Rough
VN Vein | S Smooth
SL Slickensided

ROCK STRENGTH (Is50 MPa)

0-0.03	Extremely Low
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

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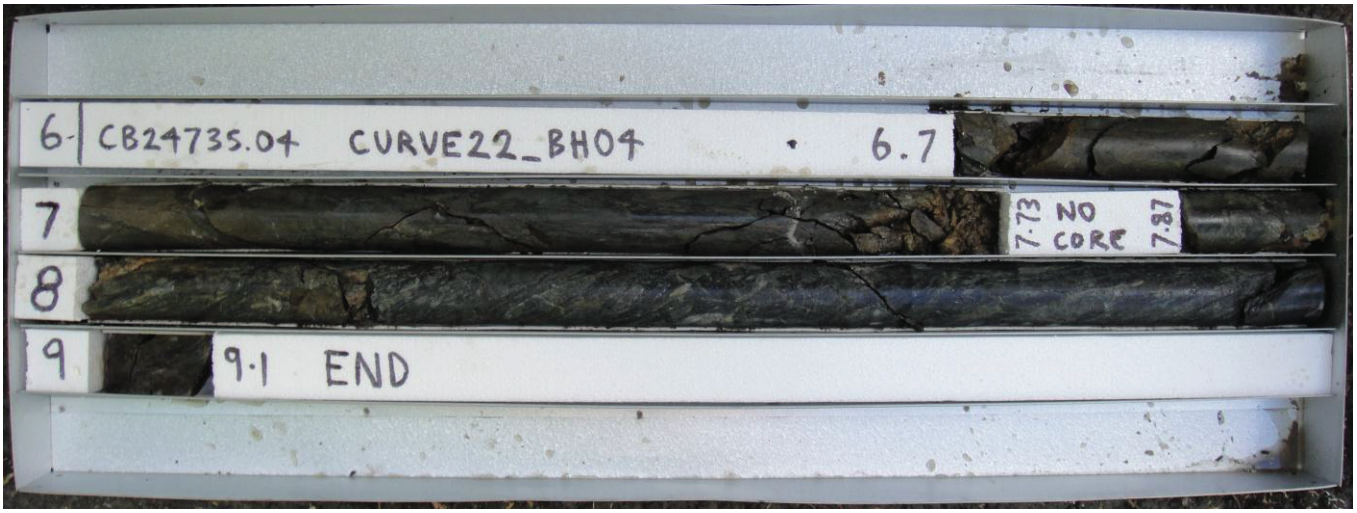

SINCLAIR KNIGHT MERZ SKM		Client: Transport and Main Roads	
drawn	AJ	Project: Black Spot	
date	14/08/2013	Core Photograph – Curve 22_BH04	
scale	NTS	Project no. CB24735.04	Photo No: Curve 22_BH04 1 of 1