BOREHOLE ENGINEERING LOG

HOLE NO : N071B_BH02

CLIENT : TRANSPORT AND MAIN ROADS	POSITION : E: 358649, N: 8137285 (56 MGA94)	PAGE : 1 OF 3
PROJECT : TNRP	SURFACE ELEVATION : 336.1 (AHD)	DATE DRILLED : 11/2/12 TO 11/2/12
JOB NO : CB27000.F687	DIP / AZIMUTH : 90°	LOGGED BY : KMF
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		H	NOT OBSERVED		336.1	0.0			0.08m ASPHALT: (0.08 m). SANDY GRAVEL: Grey, fine to medium gravel, angular, fine to coarse grained sand. 0.80m	D		FILL
		F			335.1	1.0		CI-CH	SILTY CLAY (CI-CH): Red brown, medium to high plasticity, with fine to coarse grained sand and fine and medium grained gravel. 1.50m			COLLUVIUM
				1.50m SPT 4, 4, 4 N=8 1.95m	334.1	2.0			SOIL (40%) AND ROCK FRAGMENTS (60%): Soil comprises of SILTY CLAY (CI-CH), medium to high plasticity, rock fragments comprise of fine to coarse grained angular gravel and cobbles. 3.00m		F	
				3.00m SPT 3, 5, 5 N=10 3.45m	333.1	3.0			SOIL (70%) AND ROCK FRAGMENTS (30%): Soil comprises of SILTY CLAY (CI-CH), medium to high plasticity, with some fine to medium grained angular gravel, rock fragments comprise of fine to coarse grained angular gravel and cobbles. 3.80m		St	
					332.1	4.0		CH	SILTY CLAY (CH): Red brown, high plasticity, with fine to medium grained angular gravel, trace of rootlets. 4.75m		H	RESIDUAL SOIL
				4.50m SPT 4, 6, 30 N=36 4.95m	331.1	5.0			QUARTZITE: Orange grey, extremely weathered, extremely low strength appears as clayey gravel (GC), fine to medium grained, angular, with fine grained sand.		VD	EXTREMELY WEATHERED ROCK
				6.00m	330.1	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; E Easy; F Firm; H Hard; VH Very 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 : N071B_BH02

CLIENT : TRANSPORT AND MAIN ROADS	POSITION : E: 358649, N: 8137285 (56 MGA94)	PAGE : 2 OF 3
PROJECT : TNRP	SURFACE ELEVATION : 336.1 (AHD)	DATE DRILLED : 11/2/12 TO 11/2/12
JOB NO : CB27000.F687	DIP / AZIMUTH : 90°	LOGGED BY : KMF
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		F		SPT 30/130mm N=R, HB 6.13m	330.1	6.0			EXTREMELY WEATHERED ROCK 6.20m Continued as Cored Drill Hole	D	VD	
					329.1	7.0						
					328.1	8.0						
					327.1	9.0						
					326.1	10.0						
					325.1	11.0						
					324.1	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

▼ = 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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CORED BOREHOLE ENGINEERING LOG

HOLE NO : N071B_BH02

CLIENT : TRANSPORT AND MAIN ROADS	POSITION : E: 358649, N: 8137285 (56 MGA94)	PAGE : 3 OF 3
PROJECT : TNRP	SURFACE ELEVATION : 336.1 (AHD)	DATE DRILLED : 2/11/12 TO 2/11/12
JOB NO : CB27000.F687	DIP / AZIMUTH : 90°	LOGGED BY : KMF
LOCATION : KENNEDY HWY (CAIRNS - MAREEBA)	CONTRACTOR : SAXON DRILLING	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	COMMENTS Description of joints, seams, defects, additional observations and comments
			330.1	6.0		START CORING AT 6.20m				
NMLC		100% TCR 33% RQD 7.15	329.1	7.0		QUARTZITE: orange brown, grey green	EW - HW HW - MW EW HW - MW			SZ GC 250 mm JT JT 20° PR RF JT 40° UN RF JT 40° UN RF JT 30° PR S SZ GC 150 mm JT 20° PR RF SZ 20° UN RF SZ 20° UN RF JT 30° UN RF JT 40° UN RF SZ 30° GC UN RF 20 mm
		69% TCR 0% RQD 7.80				CORE LOSS 0.20m (7.60-7.80)				
		0% TCR % RQD 8.50	328.1	8.0		CORE LOSS 0.70m (7.80-8.50)				
						End of Borehole				
			327.1	9.0						
			326.1	10.0						
			325.1	11.0						
			324.1	12.0						

DRILLING

NMLC NMLC Coring
NQ NQ Coring
HQ HQ 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
W Water Sample
ES Env Soil Sample
EW Env Water Sample
SPT SPT Sample
U Undisturbed Tube Sample

DEFECT ABBREVIATIONS

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

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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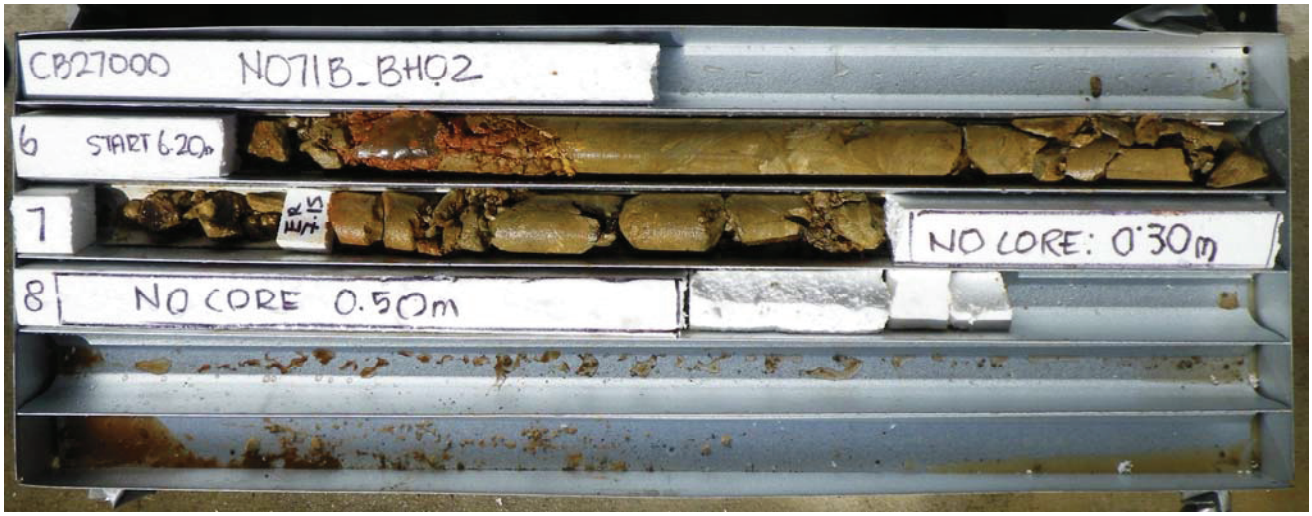

SINCLAIR KNIGHT MERZ SKM		Client: Transport and Main Roads	
drawn	KMF	Project: Transport Network Reconstruction Program	
date	8/11/2012	Core Photograph – N071B_BH02	
scale	NTS	Project no. CB27000	Photo No: N071B_BH02 1 of 1