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BOREHOLE ENGINEERING LOG

HOLE NO : CURVE 22_BH02

CLIENT : TRANSPORT AND MAIN ROADS

POSITION : E: 359418, N: 8137541 (56 MGA94)

PAGE : 1 OF 3

PROJECT : BLACK SPOT PROJECT

SURFACE ELEVATION : 133.9 (AHD)

DATE DRILLED : 7/8/13 TO 7/8/13



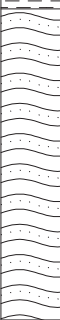
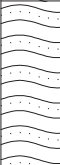

JOB NO : CB24735.04

DIP / AZIMUTH : 90°

LOGGED BY : JP

LOCATION : KENNEDY HWY (CAIRNS - MAREEBA)

CHECKED BY : AJ

| DRILLING | | | | | MATERIAL | | | | | | | |
|--|-------|-------------------------|------------------------|--|----------|-----------|---|--------------------------|---|-----------------------|-------------|-----------------------------------|
| PROGRESS | | 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 |
| DRILLING & CASING | WATER | | | | | | | | | | | |
| <div><div></div><div>AD/T</div><div></div><div>WB</div><div></div></div> | | VH | | | 133.9 | 0.0 |  | | 0.10m ASPHALT: 0.10 m. | | | FILL |
| | | H | | | | |  | ML | SANDY SILT (ML): Grey brown, orange brown, low plasticity, coarse grained sand, with fine grained angular gravel and cobbles comprising of high strength quartzite. | D | D | RESIDUAL SOIL? |
| | | F | | 1.00m SPT 24, 30, 25 N=55 | 132.9 | 1.0 |  | SM | GNEISS (SM): Orange brown, grey brown, extremely weathered, extremely low strength, appears as SILTY SAND (SM), fine to coarse grained, with fine to medium grained angular gravel. | | | EXTREMELY WEATHERED ROCK |
| | | H | | 1.45m 2.50m SPT 30/70mm, HB N=R 2.57m | 131.9 | 2.0 |  | | GNEISS: Orange brown, grey brown, highly weathered, very low to low strength. | | D - VD | HIGHLY WEATHERED ROCK |
| | | | NOT OBSERVED | | 130.9 | 3.0 |  | | Continued as Cored Drill Hole | | | |
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| DRILLING | | | | SAMPLES & FIELD TESTS | | | | DENSITY (SPT N-value) | | CONSISTENCY (Su) {N-value} | | | |
|----------------------|--------------------|------|--------------|-------------------------------------|-------------------|-----------------------------|---------------------------|-----------------------|--------------|----------------------------|-----|------------|-------------------|
| HA | Hand Auger | RR | Rock Rolling | DS | Disturbed Sample | SPT | Standard Penetration Test | VL | Very Loose | 0 - 4 | VS | Very Soft | < 12 kPa {0-2} |
| AS | Auger Screw | AT | Air Track | ES | Env Soil Sample | U | Undisturbed Tube Sample | L | Loose | 4 - 10 | S | Soft | 12 - 25 {2-4} |
| AD/T | Auger Drill TC-bit | HQ | HQ Coring | EW | Env Water Sample | W | Water Sample | MD | Medium Dense | 10 - 30 | F | Firm | 25 - 50 {4-8} |
| AD/V | Auger Drill V-bit | NQ | NQ Coring | | | | | D | Dense | 30 - 50 | St | Stiff | 50 - 100 {8-15} |
| WB | Washbore | NMLC | NMLC Coring | HP | Hand Penetrometer | | | VD | Very Dense | 50 - 100 | VSt | Very Stiff | 100 - 200 {15-30} |
| DRILLING PENETRATION | | | | HV | Hand Vane Shear | MOISTURE CONDITION | | CO | Compact | >50/150mm | H | Hard | > 200 kPa {>30} |
| VE | Very Easy | F | Firm | VH | Very Hard | (P: Peak Su R: Residual Su) | | | | | | | |
| E | Easy | H | Hard | | | D = Dry M = Moist W = Wet | | | | | | | |
| GROUNDWATER SYMBOLS | | | | N SPT blows per 300mm | | | | | | | | | |
| | | | | HW SPT penetration by hammer weight | | | | | | | | | |
| | | | | RW SPT penetration by rod weight | | | | | | | | | |



CORED BOREHOLE ENGINEERING LOG HOLE NO : CURVE 22_BH02

CLIENT : TRANSPORT AND MAIN ROADS

POSITION : E: 359418, N: 8137541 (56 MGA94)

PAGE : 2 OF 3

PROJECT : BLACK SPOT PROJECT

SURFACE ELEVATION : 133.9 (AHD)

DATE DRILLED : 7/8/13 TO 7/8/13

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 | DEFECT SPACING (mm) | Description of joints, seams, defects, additional observations and comments | GENERAL |
| | | | 133.9 | 0.0 | | | | | | | |
| | | | | 132.9 | 1.0 | | | | | | |
| | | | | 131.9 | 2.0 | | | | | | |
| | | | 130.9 | 3.0 | | START CORING AT 3.00m GNEISS: Grey, grey brown | MW | | | 3.05 CZ 5° IR RF 50 mm 3.12 JT 70° IR RF 3.18 JT 70° IR RF 3.24 JT 70° IR RF 3.35 JT 60° IR RF 3.40 JT 60° UN RF 3.48 SZ 80 - 90° IR RF 3.49 JT 40° IR RF 3.50 JT 40° IR RF 3.56 JT 60° IR RF 3.75 JT 80° PR RF 3.78 JT 40° IR RF 3.85 JT 5° IR RF 3.87 JT 90° IR RF 3.90 CZ 50° GC IR RF 190 mm | |
| | | 100% TCR 54% RQD | | 129.9 | 4.0 | | HW | | | 4.24 JT 50° CH UN RF 3 mm 4.35 CZ 0 - 60° GC IR RF 80 mm 4.48 JT 50° IR RF 4.68 JT 80° CH UN RF 1 mm 4.90 JT 5° CH IR VR 10 mm | |
| | | 4.40 | | 128.9 | 5.0 | | MW | | | 5.09 JT 10° PR S 5.16 JT 80° CH IR RF 5.17 JT 5° PR RF 5.25 JT 70° PR RF 5.30 JT 80 - 90° IR RF 5.33 JT 80° CH IR VR 5 mm 5.40 JT 50° IR RF 5.47 JT 30° PR RF 5.64 JT 5° CH IR RF 1 mm 5.65 JT 80° PR RF 5.70 JT 90° IR RF 5.77 JT 30° IR RF 5.79 JT 50° PR RF 5.89 JT 50° PR RF | JT 60° - 90° IR RF spacing 5 - 20 mm JT 0° - 90° IR RF spacing 5 - 20 mm |
| | | 100% TCR 75% RQD | | 127.9 | 6.0 | | | | | | |

DRILLING

NMLC NMLC Coring HQ HQ Coring
NQ NQ Coring PQ PQ CoringTCR % 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

CLIENT : TRANSPORT AND MAIN ROADS

POSITION : E: 359418, N: 8137541 (56 MGA94)

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PROJECT : BLACK SPOT PROJECT

SURFACE ELEVATION : 133.9 (AHD)

DATE DRILLED : 7/8/13 TO 7/8/13

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 | DEFECT SPACING (mm) | Description of joints, seams, defects, additional observations and comments | GENERAL |
| NMLC ↓ | | 100% TCR | 127.9 | 6.0 | | GNEISS: Grey, grey brown (continued) | MW | | | 5.93 JT 70° IR RF 5.95 JT 40° IR RF 5.97 JT 60° PR RF 6.03 JT 60° IR RF 6.10 CZ 0 - 70° GC IR RF 190 mm 6.36 JT 70° CH IR RF 6.44 JT 60° IR RF 6.50 JT 30° IR RF 6.55 JT 60° IR RF 6.58 JT 50° IR RF 6.62 JT 5° IR RF 6.65 JT 50° UN RF 6.74 VN 0° Qz ST S 6.78 JT 10° PR RF 6.81 VN 5° Qz IR S 6.89 VN 30° Qz IR S 6.94 JT 0 - 5° IR VR 6.98 JT 60° IR RF 7.05 JT 70° IR RF 7.10 CZ 0° GC IR RF 100 mm | |
| | | 24% RQD 6.50 | | EW - HW | | | | | | | |
| | | 100% TCR | 126.9 | 7.0 | | From 2.95 m becoming grey, grey brown | SW | | | | |
| | | 39% RQD | 7.20 | | | Terminated Cored Drill Hole at 7.20 m | HW | | | | |
| | | | 125.9 | 8.0 | | | | | | | |
| | | | 124.9 | 9.0 | | | | | | | |
| | | | 123.9 | 10.0 | | | | | | | |
| | | | 122.9 | 11.0 | | | | | | | |
| | | | 121.9 | 12.0 | | | | | | | |

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| <p>DRILLING</p> <p>NMLC NMLC Coring HQ HQ Coring NQ NQ Coring PQ PQ Coring</p> <p>TCR % core run recovered RQD % core run > 100mm long (rock fraction only measured)</p> <p>GROUNDWATER SYMBOLS</p> <p> = Water level (static)  = Water level (during drilling)</p> | | | | <p>SAMPLES & FIELD TESTS</p> <p>D Disturbed Sample ES Env Soil Sample W Water Sample EW Env Water Sample SPT SPT Sample U Undisturbed Tube Sample</p> | | | | <p>DEFECT ABBREVIATIONS</p> <p>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</p> | | | | <p>ROCK STRENGTH (Is50 MPa)</p> <p>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</p> | |
|--|--|--|--|--|--|--|--|---|--|--|--|---|--|



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|---|------------|----------------------------------|--------|
|  | | Client: Transport and Main Roads | |
| | | Project: Black Spot | |
| drawn | AJ | Core Photograph – Curve 22_BH02 | |
| date | 14/08/2013 | Project no. CB24735.04 | |
| scale | NTS | Photo No: Curve 22_BH02 | 1 of 1 |