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# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| Borehole ID. | ***BH07*** | | |
| sheet: | 2 of 2 | | |
| project no. | ***GEOTFYSH09703AA*** | | |
| client: | ***Opus International Consultants NSW Pty Ltd*** | date started: | ***12 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***12 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC/ RB*** |
| location: | ***Queanbeyan, NSW*** | checked by: | ***BC*** |

position: E: 704919; N: 6084551 (Datum Not Specified) surface elevation : 651.02m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance** | **rock mass defects**

| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 651 | | | | | | | | | |
| | | 650 | 1.0 | | start coring at 1.80m | | | | | | |
| NMLC | Not Observable | 649 | 2.0 | | **NO CORE:** 0.25 m | | | | | | |
| | | | | | **SANDSTONE**: fine to medium grained, brown, distinctly bedded at 40°. | XW / HW | | a=0.92 d=1.15 | 44% | | Highly Fractured Zone: 300mm comprising closely spaced joints and partings at various orientations<br>JT, 45°, PL, RO, Fe SN<br>PT, 30°, PL, RO, Fe SN<br>CS, 40°<br>Highly Fractured Zone: 800mm comprising joints and partings at various orientations |
| | | 648 | 3.0 | | **SILTSTONE**: pale brown, distinctly bedded at 45°. | HW / MW | | a=0.45 d=0.34 | 13% | | JT<br>JT<br>SM, Clay<br>Highly Fractured Zone: 340mm comprising closely spaced joints and parting at various orientations |
| | | 647 | 4.0 | | | | | a=0.39 d=0.39 | 93% | | PT, 5°, ST, RO, Fe SN |
| | | 646 | 5.0 | | | | | a=0.37 d=0.56 | | | |
| | | 645 | 6.0 | | with some interlaminated quartzite veins | | | a=0.29 d=0.36 | 57% | | Highly Fractured Zone: 220mm comprising closely spaced joints and partings at various orientations, iron stained |
| | | 644 | 7.0 | | | | | | 28% | | JT, 30°, PL, RO, Fe SN |

Defects are:JT, 40°, PL, RO, Fe SN, unless otherwise described

Borehole BH07 terminated at 8.00 m
Target depth

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH07 Depth Range: 1.80 - 8.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

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client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH07**

project no: GEOTFYSH09703AA | fig no: **21** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | **BH08** |
| sheet: | 1 of 2 |
| project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** |
| date started: | **13 May 2014** |
| principal: | **Queanbeyan City Council** |
| date completed: | **13 May 2014** |
| project: | **Ellerton Drive Extension** |
| logged by: | **BC/ RB** |
| location: | **Queanbeyan, NSW** |
| checked by: | **BC** |

position: E: 704845; N: 6084261 (Datum Not Specified) surface elevation : 648.12m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : HQ

**drilling information** | **material substance**

| method & support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description<br>**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS CASING | | Not Observable | | 648 | | | ML | **Sandy SILT**: low liquid limit, pale brown, fine to medium grained sand with some fine grained angular gravel. | <WI | Fb | | **COLLUVIUM** |
| | | | | | | | | **SANDSTONE**: pale brown, highly weathered, estimated low strength. | | | | **BEDROCK** |
| | | | | 647 | 1.0 | | | Borehole BH08 continued as cored hole | | | | |
| | | | | 646 | 2.0 | | | | | | | |
| | | | | 645 | 3.0 | | | | | | | |
| | | | | 644 | 4.0 | | | | | | | |
| | | | | 643 | 5.0 | | | | | | | |
| | | | | 642 | 6.0 | | | | | | | |
| | | | | 641 | 7.0 | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:07

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
WI liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | **BH08** |
| | | sheet: | 2 of 2 |
| | | project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** | date started: | **13 May 2014** |
| principal: | **Queanbeyan City Council** | date completed: | **13 May 2014** |
| project: | **Ellerton Drive Extension** | logged by: | **BC/ RB** |
| location: | **Queanbeyan, NSW** | checked by: | **BC** |

position: E: 704845; N: 6084261 (Datum Not Specified) surface elevation : 648.12m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : HQ

| drilling information | | | | material substance | | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular | general |
| | | 648 | | | | | | | | | | |
| | | | | | start coring at 1.00m | | | | | | | |
| NMLC | Not Observable | 647 | 1.0 | | **SANDSTONE**: fine grained, pale brown/ pale grey, distinctly bedded at 65°. | SW | | a=0.76<br>d=1.14 | 100% | | PT, 65°, PL, RO, Fe SN<br>JT, 60°, PL, RO, Fe SN<br>JT, 60°, PL, RO, Fe SN | |
| | | 646 | 2.0 | | | | | | 94% | | | |
| | | 645 | 3.0 | | | | | | 100% | | | Defects are:PT, 65°, PL, RO, Fe SN, unless otherwise described |
| | | 644 | 4.0 | | | | | a=0.47<br>d=0.10 | | | PT, 20°, ST, RO, CN<br>PT, 20°, PL, RO, Fe SN | |
| | | | | | | | | a=0.89<br>d=0.92 | 100% | | | |
| | | 643 | 5.0 | | **NO CORE:** 0.15 m<br>**SANDSTONE**: fine grained, pale brown/ pale grey, distinctly bedded at 65°. | SW | | a=0.57<br>d=0.68 | 100% | | PT, 0°, PL, RO, CN | |
| | | 642 | 6.0 | | Borehole BH08 terminated at 6.00 m<br>Target depth | | | | | | | |
| | | 641 | 7.0 | | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH08 Depth Range: 1.00 - 6.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

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client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH08**

project no: GEOTFYSH09703AA | fig no: **22** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***BH09*** |
| sheet: | 1 of 2 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** |
| date started: | ***14 May 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***14 May 2014*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***RB*** |
| location: | ***Queanbeyan, NSW*** |
| checked by: | ***BC*** |

position: E: 704846; N: 6084171 (Datum Not Specified) surface elevation : 648.52m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : HQ

**drilling information** | **material substance**

| method & support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description<br>**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS - CASING | | Not Observable | | | | | | **SANDSTONE**: pale brown, highly weathered, estimated low strength. | | | | **BEDROCK** |
| | | | | 648 | 1.0 | | | Borehole BH09 continued as cored hole | | | | |
| | | | | 647 | 2.0 | | | | | | | |
| | | | | 646 | 3.0 | | | | | | | |
| | | | | 645 | 4.0 | | | | | | | |
| | | | | 644 | 5.0 | | | | | | | |
| | | | | 643 | 6.0 | | | | | | | |
| | | | | 642 | 7.0 | | | | | | | |
| | | | | 641 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:07

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | **BH09** |
| | | sheet: | 2 of 2 |
| | | project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** | date started: | **14 May 2014** |
| principal: | **Queanbeyan City Council** | date completed: | **14 May 2014** |
| project: | **Ellerton Drive Extension** | logged by: | **RB** |
| location: | **Queanbeyan, NSW** | checked by: | **BC** |

position: E: 704846; N: 6084171 (Datum Not Specified) surface elevation : 648.52m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : HQ

| drilling information | | | | material substance | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
| | | | | | start coring at 0.40m | | | | | | |
| NMLC | Not Observable | 648 | | | **NO CORE:** 0.25 m | | | | | | Highly Fractured Zone: 950mm comprising joints and partings at various orientations, iron stained |
| | | | 1.0 | | **SANDSTONE**: fine grained, pale brown, distinctly bedded at 45º. | HW | | a=0.65 d=0.40 | 0% | | |
| | | 647 | | | | XW | | | | | |
| | | | | | | MW | | a=1.21 d=1.12 | | | |
| | | | 2.0 | | | SW | | | 86% | | |
| | | | | | 2.2m: trace of quartz lenses | | | | | | |
| | | 646 | | | | | | a=2.36 d=1.67 | | | |
| | | | | | **NO CORE:** 0.15 m | | | | | | |
| | | | 3.0 | | **SANDSTONE**: fine grained, pale brown, distinctly bedded at 45º. | SW | | a=1.05 d=2.28 | | | |
| | | | | | 3.2m to 3.9m: interlaminated siltstone, dark grey, approximately 30% | | | | 84% | | SM, 45°, UN, Fe SN, URO, Clay, CO |
| | | 645 | | | | | | | | | PT, 40°, ST, RO, Fe SN |
| | | | 4.0 | | | | | a=1.59 d=1.79 | | | |
| | | 644 | | | | | | | | | SM, Clay, Grey, HP |
| | | | | | | | | | | | PT, 45°, PL, RO, Fe SN |
| | | | 5.0 | | | | | | | | PT, 30°, ST, RO, Fe SN |
| | | | | | | | | | 95% | | |
| | | | | | **QUARTZITE**: pale grey, phenocryst texture, indistinctly bedded, iron stained. | | | | | | Highly Fractured Zone: 290mm comprising closely spaced patrings at 40º |
| | | 643 | | | **SANDSTONE**: fine grained, pale brown, distinctly bedded at 45º. | | | a=0.89 d=0.60 | | | |
| | | | 6.0 | | | | | | 100% | | Highly Fractured Zone: 690mm comprising closely spaced joints and partings at various orientations |
| | | 642 | | | | | | | 82% | | |
| | | | | | | | | a=0.84 d=0.88 | | | |
| | | | 7.0 | | Borehole BH09 terminated at 7.00 m<br>Target depth | | | | | | |
| | | 641 | | | | | | | | | |

Defects are:PT, 45°, PL, RO, Fe SN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH09 Depth Range: 0.40 - 7.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH09**

project no: GEOTFYSH09703AA | fig no: **23** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***BH10*** |
| sheet: | 1 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** |
| date started: | ***14 May 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***15 May 2015*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***RB*** |
| location: | ***Queanbeyan, NSW*** |
| checked by: | ***BC*** |

position: E: 704854; N: 6084071 (Datum Not Specified) surface elevation : 648.26m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS / CASING | | Not Observable | | 648 | | | ML | **Sandy SILT**: low liquid limit, pale brown, fine grained sand. | <Wl | L | | **COLLUVIUM** |
| | | | | | | | | **SANDSTONE**: pale brown, highly weathered, estimated low strength. | | | | **BEDROCK** |
| | | | | | | | | Borehole BH10 continued as cored hole | | | | |
| | | | | 647 | 1.0 | | | | | | | |
| | | | | 646 | 2.0 | | | | | | | |
| | | | | 645 | 3.0 | | | | | | | |
| | | | | 644 | 4.0 | | | | | | | |
| | | | | 643 | 5.0 | | | | | | | |
| | | | | 642 | 6.0 | | | | | | | |
| | | | | 641 | 7.0 | | | | | | | |

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud N nil
C casing

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| Borehole ID. | ***BH10*** | | |
| sheet: | 2 of 3 | | |
| project no. | ***GEOTFYSH09703AA*** | | |
| client: | ***Opus International Consultants NSW Pty Ltd*** | date started: | ***14 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***15 May 2015*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***RB*** |
| location: | ***Queanbeyan, NSW*** | checked by: | ***BC*** |

position: E: 704854; N: 6084071 (Datum Not Specified) surface elevation : 648.26m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance** | **rock mass defects**

| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 648 | | | start coring at 0.80m | | | | | | |
| NMLC | Not Observable | 647 | 1.0 | | **SANDSTONE**: fine grained, pale brown, distinctly bedded at 55°, with a trace of interlaminated siltstone, dark grey. | MW<br>HW | | a=0.16<br>a=0.04 d=0.12 | 46%<br>45% | | PT<br>Highly Fractured Zone: 450mm comprising closely spaced partings at 20° to 70°<br>PT, 50°, PL, RO, Clay CO |
| | | 646 | 2.0 | | **NO CORE:** 0.40 m | | | | | | |
| | | 645 | 3.0 | | **SANDSTONE**: fine grained, pale brown, distinctly bedded at 55°, with a trace of interlaminated siltstone, dark grey. | MW | | a=1.82 d=2.32 | 96% | | PT, 50°, PL, RO, Clay CO |
| | | 644 | 4.0 | | **NO CORE:** 0.15 m<br>**SANDSTONE**: fine grained, pale brown, distinctly bedded at 55°, with a trace of interlaminated siltstone, dark grey. | MW | | a=0.66 d=2.27 | 73% | | PT, 20°, UN, RO, CN<br>PT, 20°, ST, RO, Fe SN<br>PT, 10°, ST, RO, CN<br>PT, 10°, ST, RO, CN |
| | | 643 | 5.0 | | **NO CORE:** 0.30 m | | | | | | |
| | | 642 | 6.0 | | **SANDSTONE**: fine grained, pale brown, distinctly bedded at 55°, with a trace of interlaminated siltstone, dark grey. | MW<br>SW | | a=0.16 d=0.29<br>d=1.42 | 88% | | PT, 10°, UN, RO, CN |
| | | 641 | 7.0 | | | | | a=1.89 d=1.90 | | | PT, 20°, PL, RO, Clay CO |

Defects are:PT, 50°, PL, RO, Fe SN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL — water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |

coffey

# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | ***BH10*** |
| sheet: | 3 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** |
| date started: | ***14 May 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***15 May 2015*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***RB*** |
| location: | ***Queanbeyan, NSW*** |
| checked by: | ***BC*** |

position: E: 704854; N: 6084071 (Datum Not Specified) surface elevation : 648.26m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

| drilling information | | | | material substance | | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
| | | | | | | SW | | | 88% | | PT, 50°, PL, RO, Fe SN |
| | | 640 | | | Borehole BH10 terminated at 8.20 m<br>Target depth | | | | | | |
| | | | 9.0 | | | | | | | | |
| | | 639 | | | | | | | | | |
| | | | 10.0 | | | | | | | | |
| | | 638 | | | | | | | | | |
| | | | 11.0 | | | | | | | | |
| | | 637 | | | | | | | | | |
| | | | 12.0 | | | | | | | | |
| | | 636 | | | | | | | | | |
| | | | 13.0 | | | | | | | | |
| | | 635 | | | | | | | | | |
| | | | 14.0 | | | | | | | | |
| | | 634 | | | | | | | | | |
| | | | 15.0 | | | | | | | | |
| | | 633 | | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH10 Depth Range: 0.08 - 8.20 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH10**

project no: GEOTFYSH09703AA | fig no: **24** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***BH11*** |
| sheet: | 1 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***15 May 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***15 May 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***RB*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704857; N: 6084021 (Datum Not Specified) surface elevation : 647.04m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS / CASING | | Not Observable | | 647 | | | ML | **Sandy SILT**: low liquid limit, pale brown, trace fine to medium grained angular gravel. | <Wl | L to MD | | **COLLUVIUM** |
| | | | | | | | | **SANDSTONE**: pale brown, highly weathered, estimated low strength. | | | | **BEDROCK** |
| | | | | 646 | 1.0 | | | Borehole BH11 continued as cored hole | | | | |
| | | | | 645 | 2.0 | | | | | | | |
| | | | | 644 | 3.0 | | | | | | | |
| | | | | 643 | 4.0 | | | | | | | |
| | | | | 642 | 5.0 | | | | | | | |
| | | | | 641 | 6.0 | | | | | | | |
| | | | | 640 | 7.0 | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:08

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | **BH11** |
| | | sheet: | 2 of 3 |
| | | project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** | date started: | **15 May 2014** |
| principal: | **Queanbeyan City Council** | date completed: | **15 May 2014** |
| project: | **Ellerton Drive Extension** | logged by: | **RB** |
| location: | **Queanbeyan, NSW** | checked by: | **BC** |

position: E: 704857; N: 6084021 (Datum Not Specified) surface elevation : 647.04m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

| drilling information | | | | material substance | | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |

647

start coring at 0.90m

646 1.0

**SANDSTONE**: fine to medium grained, brown, distinctly bedded at 70°, with a trace of siltstone lenses, dark brown.

XW
MW

a=1.52 d=3.32

34%

JT, 70°, PL, RO, Fe SN
Quartz vein, 5mm thick
PT, 0°, UN, RO, Sand CO
JT, 60°, PL, RO, CN
PT, 20°, UN, RO, Fe SN
PT, 45°, PL, RO, Fe SN

645 2.0

a=1.63 d=1.78

72%

JT, 70°, ST, RO, Fe SN

644 3.0

a=1.29 d=1.42

79%

JT, 70°, ST, RO, Fe SN
JT
PT, 10°, ST, RO, Fe SN

643 4.0

JT, 60°, PL, RO, Fe SN

a=0.65 d=0.86

PT, 30°, PL, RO, Fe SN
PT, 15°, PL, RO, Fe SN
Highly Fractured Zone: 250mm comprising closely spaced joints and partings at various orientations

642 5.0

a=0.62 d=1.33

59%

SM 8mm, Clay

Some interbedded siltstone bands, dark brown

PT, 15°, PL, RO, Fe SN
PT, 15°, PL, RO, Fe SN
PT, 15°, PL, RO, Fe SN

641 6.0

SM, 10°, VR, 40 mm, XW

SM, 70°, PL, Clay, 2 mm

a=0.59 d=0.00

75%

640 7.0

JT, 85°, PL, RO, Fe SN

a=1.23 d=1.47

83%

PT, 5°, PL, RO, Fe SN

NMLC

Not Observable

Defects are: JT, 70°, PL, RO, Fe SN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL — water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |

coffey

# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | ***BH11*** |
| sheet: | 3 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***15 May 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***15 May 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***RB*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704857; N: 6084021 (Datum Not Specified) surface elevation : 647.04m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

| drilling information | | | | material substance | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
| NMLC | Not Observable | 639 | | | **SANDSTONE**: fine to medium grained, brown, distinctly bedded at 70°, with a trace of siltstone lenses, dark brown. *(continued)* | MW | XO | a=0.28 d=0.42 | 83% | | JT, 45°, PL, RO, Fe SN<br>PT, 15°, PL, RO, Fe SN<br>SM 70mm, 60°, XW |
| | | | | | | XW to MW | | | | | |
| | | 638 | 9.0 | | | MW to SW | | | | | SM 130mm, Clay |
| | | | | | Borehole BH11 terminated at 9.32 m<br>Target depth | | | | | | |
| | | 637 | 10.0 | | | | | | | | |
| | | 636 | 11.0 | | | | | | | | |
| | | 635 | 12.0 | | | | | | | | |
| | | 634 | 13.0 | | | | | | | | |
| | | 633 | 14.0 | | | | | | | | |
| | | 632 | 15.0 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH11 Depth Range: 0.90 - 9.30 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH11**

project no: GEOTFYSH09703AA | fig no: **25** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***BH12*** |
| sheet: | 1 of 2 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***16 May 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***16 May 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***RB*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704334; N: 6083387 (Datum Not Specified) surface elevation : 603.12m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance**

| method & support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS — CASING | | Not Observable | | 603 | | | ML | **Sandy SILT**: low liquid limit, pale brown, fine grained sand, with some fine grained angular gravel. | <WI | MD | | **COLLUVIUM** |
| | | | | | | | | **SILTSTONE**: pale orange, highly weathered, estimated low strength. | | | | **BEDROCK** |
| | | | | | | | | Borehole BH12 continued as cored hole | | | | |
| | | | | 602 | 1.0 | | | | | | | |
| | | | | 601 | 2.0 | | | | | | | |
| | | | | 600 | 3.0 | | | | | | | |
| | | | | 599 | 4.0 | | | | | | | |
| | | | | 598 | 5.0 | | | | | | | |
| | | | | 597 | 6.0 | | | | | | | |
| | | | | 596 | 7.0 | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:08

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | **BH12** |
| | | sheet: | 2 of 2 |
| | | project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** | date started: | **16 May 2014** |
| principal: | **Queanbeyan City Council** | date completed: | **16 May 2014** |
| project: | **Ellerton Drive Extension** | logged by: | **RB** |
| location: | **Queanbeyan, NSW** | checked by: | **BC** |

position: E: 704334; N: 6083387 (Datum Not Specified) surface elevation : 603.12m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

| drilling information | | | | material substance | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
| | | 603 | | | start coring at 0.80m | | | | | | |
| NMLC | Not Observable | 603 | 1.0 | | **NO CORE:** 0.25 m | | | | | | |
| | | 602 | | | **SILTSTONE**: pale brown, distinctly bedded at 50°. | HW | | | 0% | | |
| | | 601 | 2.0 | | | | | a=0.96<br>d=0.48 | 0% | | |
| | | | | | **NO CORE:** 0.06 m | HW | | | | | |
| | | 600 | 3.0 | | **SILTSTONE**: pale brown, distinctly bedded at 50°. | MW to SW | | | | | |
| | | | | | | HW | | a=0.14<br>d=0.40 | 30% | | Highly Fractured Zone: Comprising partings along bedding at 40°, Fe, SN, PL, RO, with some perpendicular joints |
| | | 599 | 4.0 | | 4.3m to 4.7m: trace of fine grained quartz gravel lenses/ intrusions | | | a=0.17<br>d=0.37 | | | |
| | | 598 | 5.0 | | **NO CORE:** 0.07 m | HW | | | 0% | | |
| | | | | | **SILTSTONE**: pale brown, distinctly bedded at 50°. | | | a=0.46 | | | |
| | | 597 | 6.0 | | | | | | 0% | | |
| | | 596 | 7.0 | | Borehole BH12 terminated at 6.30 m<br>Target depth | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH12 Depth Range: 0.80 - 6.30 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH12**

project no: GEOTFYSH09703AA | fig no: **26** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***BH13*** |
| sheet: | 1 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** |
| date started: | ***19 May 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***19 May 2014*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***RB*** |
| location: | ***Queanbeyan, NSW*** |
| checked by: | ***BC*** |

position: E: 704305; N: 6083360 (Datum Not Specified) surface elevation : 603.58m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS / CASING | | Not Observable | | 603 | | | ML | **Sandy SILT**: low liquid limit, pale brown, fine grained sand. | <WI | MD | | **COLLUVIUM** |
| | | | | | | | | **SHALE**: pale brown, highly weathered, estimated low strength. | | | | **BEDROCK** |
| | | | | 602 | 1.0 | | | Borehole BH13 continued as cored hole | | | | |
| | | | | 601 | 2.0 | | | | | | | |
| | | | | 600 | 3.0 | | | | | | | |
| | | | | 599 | 4.0 | | | | | | | |
| | | | | 598 | 5.0 | | | | | | | |
| | | | | 597 | 6.0 | | | | | | | |
| | | | | 596 | 7.0 | | | | | | | |

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | ***BH13*** |
| | | sheet: | 2 of 3 |
| | | project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** | date started: | ***19 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***19 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***RB*** |
| location: | ***Queanbeyan, NSW*** | checked by: | ***BC*** |

position: E: 704305; N: 6083360 (Datum Not Specified) surface elevation : 603.58m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance** | **rock mass defects**

| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 603 | | | start coring at 0.80m | | | | | | SM 240mm |
| NMLC | Not Observable | 602 | 1.0 | | **SHALE**: fine grained, brown to pale brown, distinctly bedded at 50°, trace of iron staining. | XW<br>HW<br>HW to MW | | a=0.50 d=0.33 | 40% | | |
| | | 601 | 2.0 | | | XW to HW | | a=0.49 d=0.12 | 0% | | SM, XW |
| | | | | | **NO CORE:** 0.25 m | | | | | | JT, 50°, PL, RO, Fe SN |
| | | | 3.0 | | **SHALE**: fine grained, brown to pale brown, distinctly bedded at 50°, trace of iron staining. | MW<br>HW | | | | | |
| | | 600 | | | **NO CORE:** 0.15 m | | | | 0% | | |
| | | | 4.0 | | **SHALE**: fine grained, brown to pale brown, distinctly bedded at 50°, trace of iron staining. | MW | | a=0.00 d=0.00<br>a=0.64 d=0.45 | | | PT, 5°, PL, SL, Fe SN |
| | | 599 | 5.0 | | **SANDSTONE**: fine to coarse grained, pale brown, indistinctly bedded. | | | | 15% | | |
| | | 598 | | | **SHALE**: fine grained, brown to pale brown, distinctly bedded at 50°, trace of iron staining. | | | | | | |
| | | | 6.0 | | **SHALE**: fine grained, brown to pale brown, distinctly bedded at 50°, trace of iron staining. | | | a=0.58 d=0.76 | 47% | | |
| | | 597 | | | | | | a=0.50 d=0.56 | | | PT, 20°, ST, RO, Fe SN |
| | | | 7.0 | | 7.28m to 7.62m: quartz infilled seam, pale grey, highly fractured | | | | 62% | | Highly fractured zone, quartz intrusions |
| | | 596 | | | | | | | | | PT, 5°, ST, VR, Fe SN |

Defects are:JT, 50°, PL, RO, Fe SN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL — water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | **BH13** |
| | | sheet: | 3 of 3 |
| | | project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** | date started: | **19 May 2014** |
| principal: | **Queanbeyan City Council** | date completed: | **19 May 2014** |
| project: | **Ellerton Drive Extension** | logged by: | **RB** |
| location: | **Queanbeyan, NSW** | checked by: | **BC** |

position: E: 704305; N: 6083360 (Datum Not Specified) surface elevation : 603.58m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

| drilling information | | | | material substance | | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular | general |
| NMLC | | 595 | | | **SHALE**: fine grained, brown to pale brown, distinctly bedded at 50°, trace of quartz intrusions (approx. 5%). | HW | X | a=0.17<br>d=0.24 | 62% | | JT, 50°, PL, SL, Fe SN<br>Fractured Zone | |
| | | 594 | 9.0 | | Borehole BH13 terminated at 8.63 m<br>Target depth | | | | | | | |
| | | 593 | 10.0 | | | | | | | | | |
| | | 592 | 11.0 | | | | | | | | | |
| | | 591 | 12.0 | | | | | | | | | |
| | | 590 | 13.0 | | | | | | | | | |
| | | 589 | 14.0 | | | | | | | | | |
| | | 588 | 15.0 | | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH13 Depth Range: 0.80 - 8.63 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH13**

project no: GEOTFYSH09703AA | fig no: **27** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***BH14*** |
| sheet: | 1 of 2 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***20 May 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***20 May 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***RB*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704284; N: 608334 (Datum Not Specified) surface elevation : 600.64m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS / CASING | | Not Observable | | 600 | | | | **SHALE**: pale brown, extremely to highly weathered, estimated very low to low strength. | | | | **BEDROCK** |
| | | | | | 1.0 | | | Borehole BH14 continued as cored hole | | | | |
| | | | | 599 | 2.0 | | | | | | | |
| | | | | 598 | 3.0 | | | | | | | |
| | | | | 597 | 4.0 | | | | | | | |
| | | | | 596 | 5.0 | | | | | | | |
| | | | | 595 | 6.0 | | | | | | | |
| | | | | 594 | 7.0 | | | | | | | |
| | | | | 593 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:08

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | **BH14** |
| sheet: | 2 of 2 |
| project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** |
| principal: | **Queanbeyan City Council** |
| project: | **Ellerton Drive Extension** |
| location: | **Queanbeyan, NSW** |
| date started: | **20 May 2014** |
| date completed: | **20 May 2014** |
| logged by: | **RB** |
| checked by: | **BC** |

position: E: 704284; N: 608334 (Datum Not Specified) surface elevation : 600.64m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance** | **rock mass defects**

| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 600 | | | start coring at 0.84m | | | | | | |
| NMLC | Not Observable | 599 | 1.0 | | **SHALE**: fine grained, pale brown, distinctly bedded at 50°, iron stained. | XW<br>HW to MW | | | 39% | | PT, 15°, PL, RO, Fe SN |
| | | 598 | 2.0 | | **SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 50°. | MW | | a=3.11 d=1.17<br>a=2.05 d=1.07 | 93% | | PT, 50°, PL, RO, CN<br>PT, 50°, PL, RO, CN |
| | | 597 | 3.0 | | Becoming pale brown-grey | | | a=1.12 d=0.77 | 80% | | JT, 80°, ST, VR, Fe SN<br>PT, 50°, PL, RO, Clay CO |
| | | 596 | 4.0 | | | | | a=0.91 d=0.93 | 94% | | PT, 10°, UN, RO, Fe SN<br>JT, 30°, PL, RO, Fe SN<br>JT, 30°, PL, RO, Fe SN |
| | | 595 | 5.0 | | | | | a=0.84 d=1.34 | | | |
| | | 594 | 6.0 | | | | | | 100% | | |
| | | 593 | 7.0 | | Borehole BH14 terminated at 6.20 m<br>Target depth | | | | | | |

Defects are:PT, 50°, PL, RO, Fe SN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH14 Depth Range: 0.85 - 6.10 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH14**

project no: GEOTFYSH09703AA | fig no: **28** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***BH15*** |
| sheet: | 1 of 2 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** |
| date started: | ***20 May 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***20 May 2014*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***RB*** |
| location: | ***Queanbeyan, NSW*** |
| checked by: | ***BC*** |

position: E: 703900; N: 6082824 (Datum Not Specified) surface elevation : 622.28m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS / CASING | | Not Observable | | 622 | | | SC | **Clayey SAND**: medium to coarse grained, orange-brown, low plasticity clay. | D | MD | | **COLLUVIUM** |
| | | | | | | | | **SILTSTONE**: brown-grey, moderately weathered, estimated low to medium strength. | | | | **BEDROCK** |
| | | | | 621 | 1.0 | | | Borehole BH15 continued as cored hole | | | | |
| | | | | 620 | 2.0 | | | | | | | |
| | | | | 619 | 3.0 | | | | | | | |
| | | | | 618 | 4.0 | | | | | | | |
| | | | | 617 | 5.0 | | | | | | | |
| | | | | 616 | 6.0 | | | | | | | |
| | | | | 615 | 7.0 | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:08

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | **BH15** |
| | | sheet: | 2 of 2 |
| | | project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** | date started: | **20 May 2014** |
| principal: | **Queanbeyan City Council** | date completed: | **20 May 2014** |
| project: | **Ellerton Drive Extension** | logged by: | **RB** |
| location: | **Queanbeyan, NSW** | checked by: | **BC** |

position: E: 703900; N: 6082824 (Datum Not Specified) surface elevation : 622.28m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance** | **rock mass defects**

| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 622 | | | | | | | | | |
| | | | | | start coring at 1.00m | | | | | | |
| NMLC | Not Observable | | 1.0 | | **NO CORE:** 0.05 m | SW | | | 0% | | |
| | | 621 | | | **SILTSTONE**: dark grey, distinctly bedded at 40°, with a trace of quartz veins. | | O X | a=0.44<br>d=0.06 | | | |
| | | | 2.0 | | | | | | 0% | | Highly Fractured Zone: 2050mm comprising closely spaced partings at 40° |
| | | 620 | | | | | O X | a=0.94<br>d=0.63 | | | |
| | | | 3.0 | | | | | | | | |
| | | 619 | | | | | O X | a=0.90<br>d=0.36 | 60% | | |
| | | | 4.0 | | | | O X | a=0.96<br>d=0.44 | | | SM 5mm, Clay<br>Highly Fractured Zone: 610mm comprising closely spaced partings at 40° |
| | | 618 | | | | | | | | | |
| | | | 5.0 | | | | | | 0% | | JT, 80°, PL, RO, Fe SN |
| | | 617 | | | | | | | | | JT, 80°, PL, RO, Fe SN |
| | | | | | Borehole BH15 terminated at 5.50 m<br>Target depth | | | | | | |
| | | | 6.0 | | | | | | | | |
| | | 616 | | | | | | | | | |
| | | | 7.0 | | | | | | | | |
| | | 615 | | | | | | | | | |

Defects are:PT, 40°, PL, RO, Fe SN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH15 Depth Range: 1.00 - 5.50 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH15**

project no: GEOTFYSH09703AA | fig no: **29** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***BH16*** |
| sheet: | 1 of 2 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** |
| date started: | ***21 May 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***21 May 2014*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***RB*** |
| location: | ***Queanbeyan, NSW*** |
| checked by: | ***BC*** |

position: E: 703814; N: 6082774 (Datum Not Specified) surface elevation : 629.36m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance**

| method & support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description<br>**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS CASING | | Not Observable | | 629 | | | ML | **TOPSOIL: Sandy SILT**: low liquid limit, brown, fine grained sand. | <WI | | | **TOPSOIL** |
| | | | | | | | SM | **Silty SAND**: fine to medium grained, pale orange, low liquid limit. | D | L | | **COLLUVIUM** |
| | | | | | 1.0 | | | **ADAMELLITE**: brown, highly weathered, low to medium strength. | | | | **BEDROCK** |
| | | | | 628 | | | | Borehole BH16 continued as cored hole | | | | |
| | | | | 627 | 2.0 | | | | | | | |
| | | | | 626 | 3.0 | | | | | | | |
| | | | | 625 | 4.0 | | | | | | | |
| | | | | 624 | 5.0 | | | | | | | |
| | | | | 623 | 6.0 | | | | | | | |
| | | | | 622 | 7.0 | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:08

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | **BH16** |
| sheet: | 2 of 2 |
| project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** |
| principal: | **Queanbeyan City Council** |
| project: | **Ellerton Drive Extension** |
| location: | **Queanbeyan, NSW** |
| date started: | **21 May 2014** |
| date completed: | **21 May 2014** |
| logged by: | **RB** |
| checked by: | **BC** |

position: E: 703814; N: 6082774 (Datum Not Specified) surface elevation : 629.36m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance** | **rock mass defects**

| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 629 | | | | | | | | | |
| | | | 1.0 | | start coring at 1.40m | | | | | | |
| | | 628 | | | **NO CORE:** 0.20 m | | | | | | |
| NMLC | Not Observable | | 2.0 | | **ADAMELLITE**: fine grained, pale brown, indistinct bedding, with interlaminated quartz, phorphyritic texture. | HW | X O | a=0.16 d=0.47 | 29% | | |
| | | 627 | | | | MW to SW | | | | | |
| | | | | | | HW SW | X | a=0.67 | 0% | | |
| | | | 3.0 | | **NO CORE:** 0.10 m | | | | | | |
| | | 626 | | | **ADAMELLITE**: fine grained, pale grey, quartz phenocrysts, indistinct bedding. | SW | X | a=1.44 d=1.27 | 29% | | |
| | | | 4.0 | | **NO CORE:** 0.45 m | | | | | | Highly Fractured Zone comprising closely spaced joints and partings orientated at 30° to 70°, Fe, SN, PL/ ST |
| | | 625 | | | **ADAMELLITE**: fine grained, pale grey, with interlaminated quartz phenocrysts. | SW | X | a=1.37 | | | |
| | | | 5.0 | | Phorphyritic quartz texture | MW | | | 6% | | |
| | | 624 | | | | SW | X | a=1.15 | | | |
| | | | 6.0 | | Borehole BH16 terminated at 6.00 m Target depth | | | | | | |
| | | 623 | | | | | | | | | |
| | | | 7.0 | | | | | | | | |
| | | 622 | | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH16 Depth Range: 1.40 - 6.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH16**

project no: GEOTFYSH09703AA | fig no: **30** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***BH17*** |
| sheet: | 1 of 2 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** |
| date started: | ***21 May 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***21 May 2014*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***RB*** |
| location: | ***Queanbeyan, NSW*** |
| checked by: | ***BC*** |

position: E: 703597; N: 6082703 (Datum Not Specified) surface elevation : 630.14m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS / CASING | | Not Observable | | 630 | | | SC | **TOPSOIL: Sandy SILT**: low liquid limit, grey-brown, fine to medium grained sand. | <WI | | | **TOPSOIL** |
| | | | | | | | | **Clayey SAND**: medium grained, orange-brown, medium plasticity clay, with some fine to medium grained, sub-rounded to sub-angular gravel. | M | MD | | **COLLUVIUM** |
| | | | | | | + | | **ADAMELLITE**: orange-grey, highly to moderately weathered, estimated low to medium strength. | | | | **BEDROCK** |
| | | | | 629 | 1.0 | | | Borehole BH17 continued as cored hole | | | | |
| | | | | 628 | 2.0 | | | | | | | |
| | | | | 627 | 3.0 | | | | | | | |
| | | | | 626 | 4.0 | | | | | | | |
| | | | | 625 | 5.0 | | | | | | | |
| | | | | 624 | 6.0 | | | | | | | |
| | | | | 623 | 7.0 | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:08

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | **BH17** |
| sheet: | 2 of 2 |
| project no. | **GEOTFYSH09703AA** |
| client: | **Opus International Consultants NSW Pty Ltd** |
| principal: | **Queanbeyan City Council** |
| project: | **Ellerton Drive Extension** |
| location: | **Queanbeyan, NSW** |
| date started: | **21 May 2014** |
| date completed: | **21 May 2014** |
| logged by: | **RB** |
| checked by: | **BC** |

position: E: 703597; N: 6082703 (Datum Not Specified) surface elevation : 630.14m (Datum Not Specified) angle from horizontal: 90°

drill model: Camacchio mounting: Trailer casing diameter : 100 mm

**drilling information** | **material substance** | **rock mass defects**

| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 630 | | | | | | | | | |
| | | | 1.0 | | start coring at 1.00m | | | | | | |
| NMLC | Not Observable | 629 | | | **NO CORE:** 0.25 m | | | | 0% | | Highly Fractured Zone: 230mm comprising closely spaced joints and partings at various orientations<br>PT, 10°, PL, RO, Fe SN |
| | | | | + + + | **ADAMELLITE**: fine grained, pale grey, indistinct bedding, interlaminated quartz gravels of fine to medium grain size, trace of feldspar, phorphyritic texture. | MW | | a=0.00<br>d=0.00<br>a=0.00<br>d=0.00 | | | |
| | | 628 | 2.0 | | | | | | 49% | | PT, 10°, PL, RO, Fe SN |
| | | | | | | HW to MW | | d=0.12 | | | PT, 20°, PL, RO, Fe SN<br>SM, 40°, VR, Clay, 20 mm, HP<br>PT, 10°, PL, VR, Clay CO<br>PT, 15°, PL, VR, CO |
| | | | 3.0 | | | SW | | | | | |
| | | 627 | | | Borehole BH17 terminated at 3.00 m<br>Target depth | | | | | | |
| | | 626 | 4.0 | | | | | | | | |
| | | 625 | 5.0 | | | | | | | | |
| | | 624 | 6.0 | | | | | | | | |
| | | 623 | 7.0 | | | | | | | | |

Defects are: JT, 30 - 40°, PL, RO, Fe SN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:10

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : BH17 Depth Range: 1.00 - 3.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**BH17**

project no: GEOTFYSH09703AA | fig no: **31** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH01*** |
| sheet: | 1 of 2 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***29 May 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***26 May 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***SB*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704213; N: 6083253 (Datum Not Specified) surface elevation : 584.15m (Datum Not Specified) angle from horizontal: 90°

drill model: Track Rig mounting: Track casing diameter : NMLC

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/V - CASING | | Not Observable | | 584 | | | | **SHALE**: grey-brown, highly to moderately weathered, low to medium strength. | | | | **BEDROCK** |
| | | | | 583 | 1.0 | | | Borehole B-BH01 continued as cored hole | | | | |
| | | | | 582 | 2.0 | | | | | | | |
| | | | | 581 | 3.0 | | | | | | | |
| | | | | 580 | 4.0 | | | | | | | |
| | | | | 579 | 5.0 | | | | | | | |
| | | | | 578 | 6.0 | | | | | | | |
| | | | | 577 | 7.0 | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:07

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | ***B-BH01*** |
| | | sheet: | 2 of 2 |
| | | project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** | date started: | ***29 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***26 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***SB*** |
| location: | ***Queanbeyan, NSW*** | checked by: | ***BC*** |

position: E: 704213; N: 6083253 (Datum Not Specified) surface elevation : 584.15m (Datum Not Specified) angle from horizontal: 90°

drill model: Track Rig mounting: Track casing diameter : NMLC

| drilling information | | | | material substance | | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)<br>particular / general |
| | | 584 | | | start coring at 0.45m | | | | | | |
| NQ | Not Observable | 583 | 1.0 | | **SHALE**: grey, iron stained, distinctly bedded at 60° to 70° with some quartz veins. | MW<br>HW<br>MW<br>SW to FR | | | 0%<br>0%<br>0%<br>0%<br>63% | | |
| | | 582 | 2.0 | | | | | a=3.16 d=0.18<br>a=2.98 d=1.31 | 94%<br>35% | | |
| | | 581 | 3.0 | | | | | a=0.71 d=1.33 | | | |
| | | 580 | 4.0 | | | | | | 93% | | Highly Fractured: Comprising closely spaced patrtings at 60° to 70°, PL, RO, SN FE |
| | | 579 | 5.0 | | **LIMESTONE**: grey with pale grey laminations, distinctly bedded at 70°. | | | a=6.07 d=6.19 | 21% | | |
| | | 578 | 6.0 | | | | | a=4.31 d=1.64<br>a=3.51 d=1.79 | 0%<br>0%<br>54% | | |
| | | 577 | 7.0 | | | | | a=1.46 d=0.75 | 52% | | |
| | | | | | Borehole B-BH01 terminated at 7.60 m<br>Target depth | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:09

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

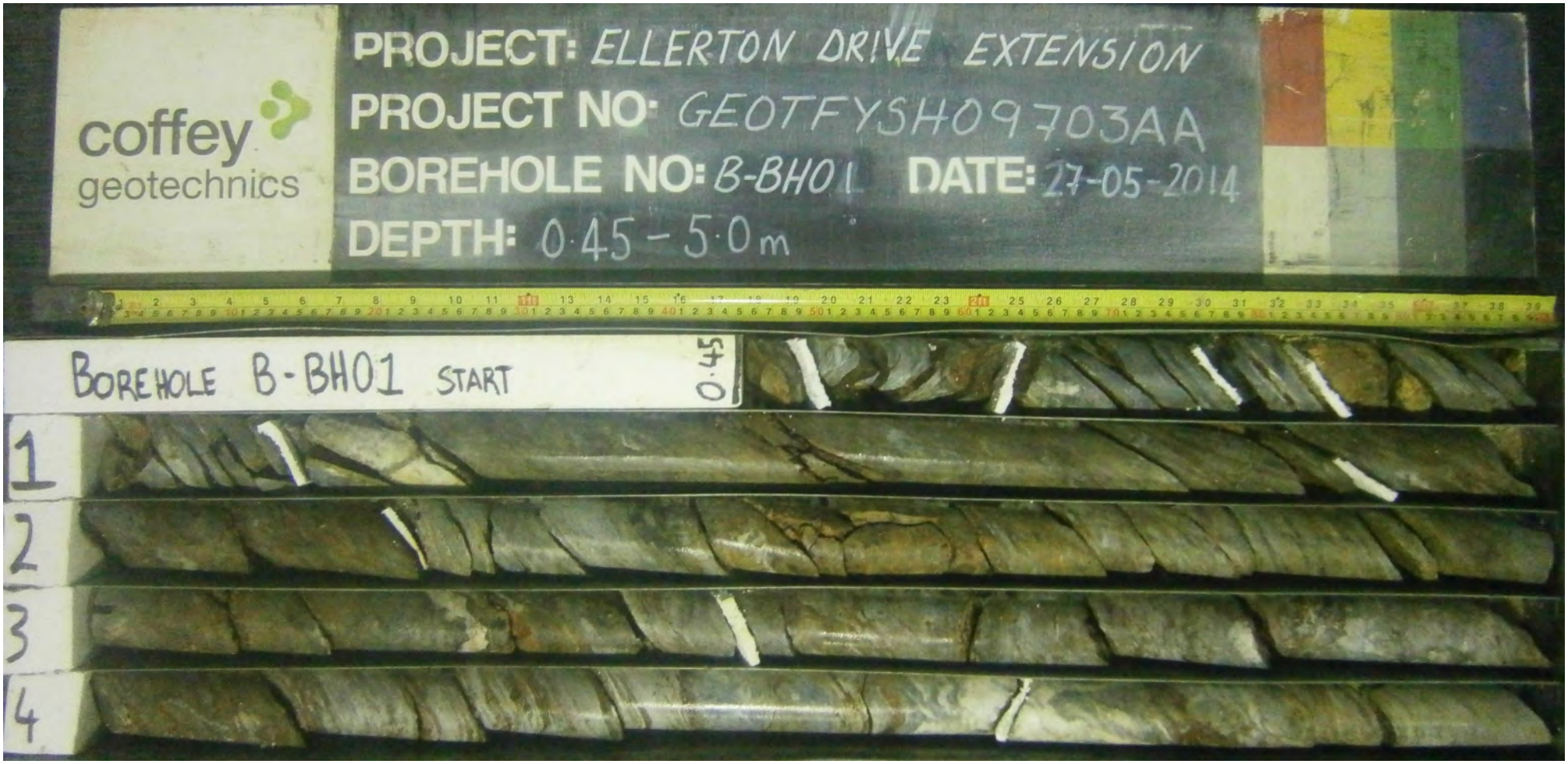
| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |




PointID : B-BH01 Depth Range: 0.45 - 5.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH01**

project no: GEOTFYSH09703AA | fig no: **1** | rev:


PointID : B-BH01 Depth Range: 5.00 - 7.60 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH01**

project no: GEOTFYSH09703AA | fig no: **2** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH02*** |
| sheet: | 1 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***26 May 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***27 May 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***SB*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704199; N: 6083226 (Datum Not Specified) surface elevation : 574.72m (Datum Not Specified) angle from horizontal: 90°

drill model: Track Rig mounting: Track casing diameter : NMLC

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/V, CASING | | Not Observable | | 574 | | | SM | **Silty SAND**: fine to coarse grained, brown. | D | L to MD | | **COLLUVIUM** |
| | | | DS | | 1.0 | | CL | **Sandy CLAY**: low plasticity, pale orange-brown, fine grained sand, with some sub-rounded gravel. | <WI | St to VSt | | |
| | | | U50 | 573 | 2.0 | | | | | | | |
| | | | | 572 | | | | **LIMESTONE**: pale brown, highly to moderately weathered, medium strength. | | | | **BEDROCK** |
| | | | | | 3.0 | | | Borehole B-BH02 continued as cored hole | | | | |
| | | | | 571 | 4.0 | | | | | | | |
| | | | | 570 | 5.0 | | | | | | | |
| | | | | 569 | 6.0 | | | | | | | |
| | | | | 568 | 7.0 | | | | | | | |
| | | | | 567 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:07

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH02*** |
| sheet: | 2 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***26 May 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***27 May 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***SB*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704199; N: 6083226 (Datum Not Specified) surface elevation : 574.72m (Datum Not Specified) angle from horizontal: 90°

drill model: Track Rig mounting: Track casing diameter : NMLC

**drilling information** | **material substance** | **rock mass defects**

| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 574 | 1.0 | | | | | | | | |
| | | 573 | 2.0 | | | | | | | | |
| | | 572 | | | start coring at 2.80m | | | | | | |
| NQ | Not Observable | 571 | 3.0 | | **LIMESTONE**: grey, distinclty bedded at 60° to 70°, with some quartz veins approximately 20mm to 50mm thick. | SW | | a=0.90<br>d=0.19 | 20% | | JT, 0 - 10°, IR, RO, CN<br>JT, 10 - 20°, PL, VR, Fe SN<br>CS 30mm<br>CS 10mm<br>JT, 20°, IR, RO, Fe SN |
| | | | 4.0 | | | FR | | a=1.77<br>d=0.98 | | | CS 40mm<br>JT, 20°, IR, RO, Fe SN<br>JT, 10 - 20°, UN, RO, CN<br>JT, 10°, UN, RO, Fe SN |
| | | 570 | 5.0 | | | | | a=1.33<br>d=1.09 | 44% | | JT, 10°, UN, RO, CN<br>CS 20mm<br>JT, 10°, PL, RO, CN<br>JT, 50°, IR, RO, Fe SN |
| | | 569 | 6.0 | | | | | a=1.72<br>d=0.59 | | | JT, 20 - 40°, ST, RO, CN<br>JT, 10°, PL, RO, CN<br>JT, 20 - 40°, IR, RO, CN |
| | | 568 | 7.0 | | | | | a=2.37<br>d=1.14 | 47% | | |
| | | 567 | | | | | | a=2.25<br>d=0.58 | 0% | | |

Defects are:PT, 60 - 70°, PL, RO, CN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:09

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL — water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |

coffey

# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH02*** |
| sheet: | 3 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***26 May 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***27 May 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***SB*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704199; N: 6083226 (Datum Not Specified) surface elevation : 574.72m (Datum Not Specified) angle from horizontal: 90°

drill model: Track Rig mounting: Track casing diameter : NMLC

| drilling information | | | | material substance | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)<br>particular / general |
| NQ | Not Observable | 566 | 9.0 | | **LIMESTONE**: grey, distinclty bedded at 60º to 70º, with some quartz veins approximately 20mm to 50mm thick. *(continued)* | FR | O X | a=3.48<br>d=0.68 | 0% | | PT, 60°, IR, RO, CN<br>Highly Fractured Zone: 60mm comprising closely spaced partings at 60º<br>Highly Fractured Zone: 530mm comprising closely spaced partings at 60º |
| | | 565 | | | | | O | d=0.19 | | | |
| | | 564 | 10.0 | | Borehole B-BH02 terminated at 9.75 m<br>Target depth | | | | | | |
| | | 563 | 11.0 | | | | | | | | |
| | | 562 | 12.0 | | | | | | | | |
| | | 561 | 13.0 | | | | | | | | |
| | | 560 | 14.0 | | | | | | | | |
| | | 559 | 15.0 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:09

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL — water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : B-BH02 Depth Range: 2.80 - 7.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH02**

project no: GEOTFYSH09703AA | fig no: **3** | rev:


PointID : B-BH02 Depth Range: 7.00 - 9.75 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH02**

| project no: | fig no: | rev: |
|---|---|---|
| GEOTFYSH09703AA | **4** | |

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH03*** |
| sheet: | 1 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** |
| date started: | ***30 May 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***31 May 2014*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***SB*** |
| location: | ***Queanbeyan, NSW*** |
| checked by: | ***BC*** |

position: E: 704167; N: 6083158 (Datum Not Specified) surface elevation : 576.95m (Datum Not Specified) angle from horizontal: 90°

drill model: Track Rig mounting: Track casing diameter : NMLC

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/V CASING | | | | | | | SM | **Silty SAND**: fine to medium grained, dark brown. | M | MD | | **ALLUVIUM** |
| | | | DS | | | | GP | **GRAVEL**: medium grained, rounded to sub-rounded, brown. | | | | |
| | | | | 576 | 1.0 | | SM | **Silty SAND**: fine grained, grey. | | | | |
| | | | U50 | | | | | | | | | |
| | | | | 575 | 2.0 | | SP | **Sandy GRAVEL**: medium grained, brown/white/orange, fine to coarse grained sand. | W | L to MD | | |
| | | | SPT 1, 4, 14 N=18 | | | | | | | | | |
| | | | | 574 | 3.0 | | | **LIMESTONE**: brown-grey, highly weathered, low strength. | | | | **BEDROCK** |
| | | | | | | | | Borehole B-BH03 continued as cored hole | | | | |
| | | | | 573 | 4.0 | | | | | | | |
| | | | | 572 | 5.0 | | | | | | | |
| | | | | 571 | 6.0 | | | | | | | |
| | | | | 570 | 7.0 | | | | | | | |
| | | | | 569 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:07

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**

| | |
|---|---|
| VS | very soft |
| S | soft |
| F | firm |
| St | stiff |
| VSt | very stiff |
| H | hard |
| Fb | friable |
| VL | very loose |
| L | loose |
| MD | medium dense |
| D | dense |
| VD | very dense |

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# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH03*** |
| sheet: | 2 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***30 May 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***31 May 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***SB*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704167; N: 6083158 (Datum Not Specified) surface elevation : 576.95m (Datum Not Specified) angle from horizontal: 90°

drill model: Track Rig mounting: Track casing diameter : NMLC

| drilling information | | | | material substance | | | | | rock mass defects | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |

| RL (m) | depth (m) | material description | weathering & alteration | samples, field tests & Is(50) (MPa) | core run & RQD | additional observations and defect descriptions |
|---|---|---|---|---|---|---|
| | | start coring at 2.90m | | | | |
| 574 | 3.0 | **NO CORE:** 0.35 m | | | | |
| | | **LIMESTONE**: grey, distinctly bedded at 60° to 70°. | MW | a=0.23 d=0.00 | 21% | |
| 573 | 4.0 | **NO CORE:** 0.15 m | | | | |
| | | **LIMESTONE**: grey, distinctly bedded at 60° to 70°. | MW | a=0.26 d=0.00 | 0% | Highly Fractured Zone: 2000mm comprising closely spaced partings at 60° to 70°, PL, RO, CN |
| 572 | 5.0 | | | a=0.06 d=0.00 | | |
| | | **NO CORE:** 0.45 m | | | | |
| 571 | 6.0 | **LIMESTONE**: grey, distinctly bedded at 60° to 70°. | MW | | 0% | |
| | | **NO CORE:** 0.42 m | | | | |
| | | **LIMESTONE**: grey, distinctly bedded at 60° to 70°. | MW | | | |
| 570 | 7.0 | **NO CORE:** 1.30 m | | | 0% | |
| 569 | | **LIMESTONE**: grey, distinctly bedded at 60° to | XW | | | |

NQ

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:09

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| Borehole ID. | ***B-BH03*** | | |
| sheet: | 3 of 3 | | |
| project no. | ***GEOTFYSH09703AA*** | | |
| client: | ***Opus International Consultants NSW Pty Ltd*** | date started: | ***30 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***31 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***SB*** |
| location: | ***Queanbeyan, NSW*** | checked by: | ***BC*** |

position: E: 704167; N: 6083158 (Datum Not Specified) surface elevation : 576.95m (Datum Not Specified) angle from horizontal: 90°

drill model: Track Rig mounting: Track casing diameter : NMLC

| drilling information | | | | material substance | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
| NQ | | 568 | 9.0 | | 70°.<br>**NO CORE:** 0.05 m<br>**LIMESTONE**: grey, distinctly bedded at 60° to 70°.<br>**NO CORE:** 0.19 m<br>**LIMESTONE**: grey, distinctly bedded at 60° to 70°.<br>**NO CORE:** 0.24 m<br>**LIMESTONE**: grey, distinctly bedded at 60° to 70°.<br>**NO CORE:** 0.14 m | HW to MW<br>HW<br>HW<br>MW | | a=5.11 d=5.91<br>a=1.46 d=0.28 | 0%<br>0%<br>41% | | Highly Fractured Zone: 350mm comprising closely spaced partings at 60° to 70°, PL, RO, CN<br>Highly Fractured Zone: 200mm comprising closely spaced partings at 60° to 70°, PL, RO, CN<br>PT, 80°, PL, RO, CN<br>PT, 40°, IR, RO, CN<br>JT, 20°, UN, RO, Silt VN |
| | | 567 | 10.0 | | **LIMESTONE**: grey, distinctly bedded at 60° to 70°.<br>**NO CORE:** 0.44 m | | | | | | |
| | | 566 | 11.0 | | **LIMESTONE**: grey, distinctly bedded at 60° to 70°.<br>**NO CORE:** 0.25 m<br>**LIMESTONE**: grey, distinctly bedded at 60° to 70°. | MW<br>MW | | a=0.50 d=0.38 | 23%<br>0% | | JT, 30°, UN, RO, CN<br>CS 30mm<br>CS 40mm<br>PT, 30°, UN, RO, CN<br>PT, 80°, PL, RO, Silt CO<br>PT, 80°, UN, RO, CN |
| | | 565 | 12.0 | | **NO CORE:** 0.50 m | | | | | | |
| | | 564 | 13.0 | | **LIMESTONE**: grey, distinctly bedded at 60° to 70°.<br>**NO CORE:** 0.40 m<br>**LIMESTONE**: grey, distinctly bedded at 60° to 70°. | MW<br>MW | | | 13% | | |
| | | 563 | 14.0 | | **NO CORE:** 0.50 m<br>**LIMESTONE**: grey, distinctly bedded at 60° to 70°. | MW | | | 0% | | Highly Fractured Zone: 420mm comprising closely spaced partings at 60° to 70°, PL, RO, CN |
| | | 562 | 15.0 | | **NO CORE:** 0.05 m<br>**LIMESTONE**: grey, distinctly bedded at 60° to 70°.<br>**NO CORE:** 0.15 m<br>**LIMESTONE**: grey, distinctly bedded at 60° to 70°. | MW<br>MW | | a=3.23 d=2.51 | 0%<br>30% | | Highly Fractured Zone: 150mm comprising closely spaced partings at 60° to 70°, PL, RO, CN |
| | | 561 | | | Borehole B-BH03 terminated at 15.23 m<br>Target depth | | | | | | |

Defects are:PT, 60 - 70°, PL, RO, CN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:09

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

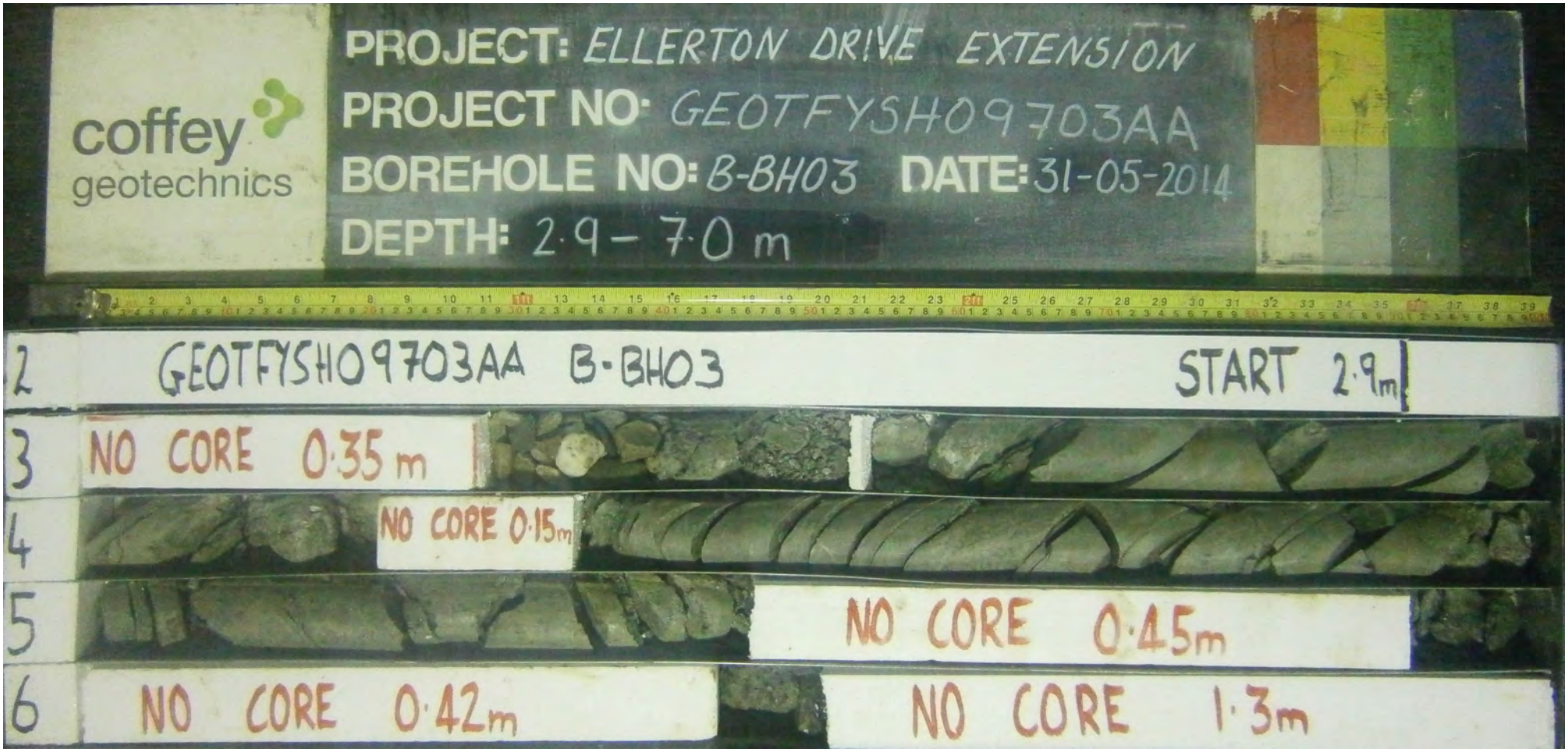
| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |




PointID : B-BH03 Depth Range: 2.90 - 7.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH03**

project no: GEOTFYSH09703AA | fig no: **5** | rev:


PointID : B-BH03 Depth Range: 7.00 - 12.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

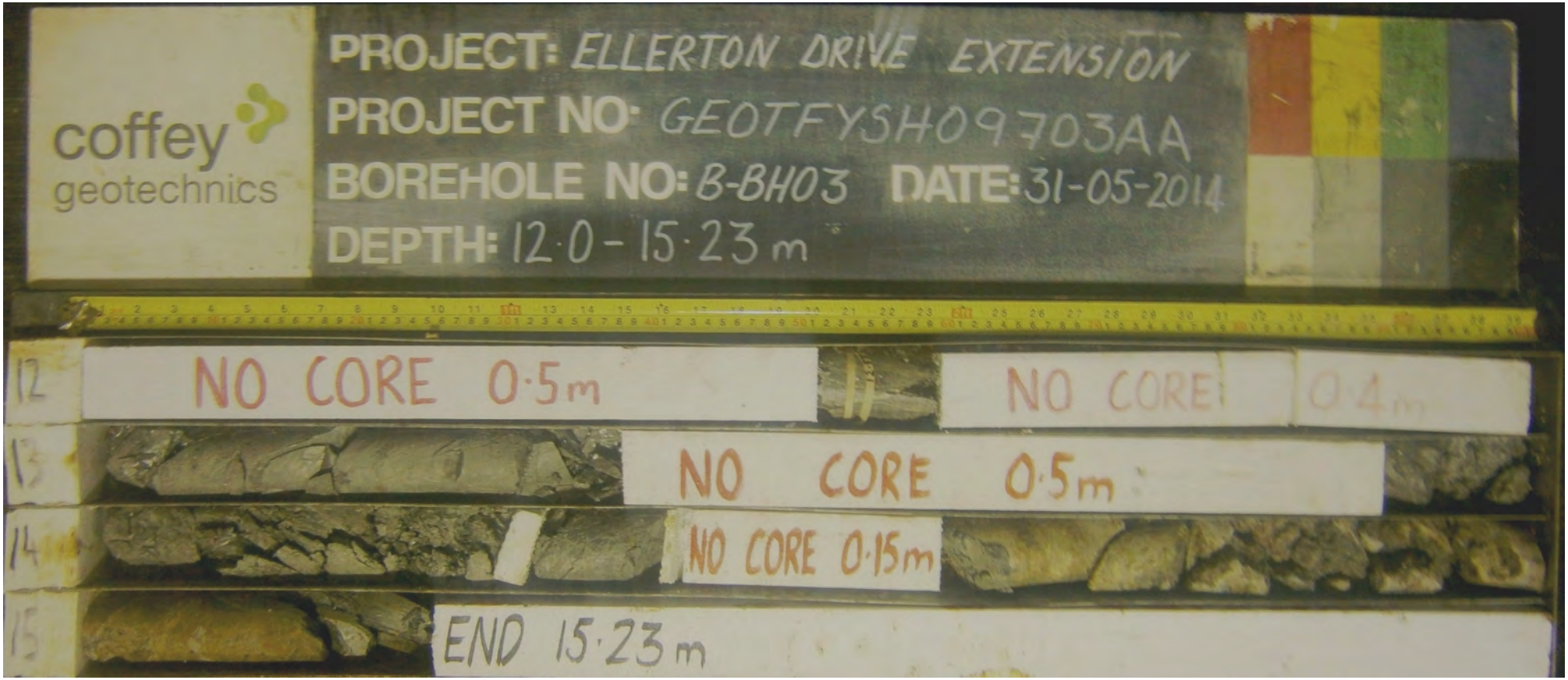
coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH03**

project no: GEOTFYSH09703AA | fig no: **6** | rev:




PointID : B-BH03 Depth Range: 12.00 - 15.23 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH03**

project no: GEOTFYSH09703AA | fig no: **7** | rev:

coffey

# Engineering Log - Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | ***B-BH04*** |
| | | sheet: | 1 of 3 |
| | | project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** | date started: | ***02 Jun 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***02 Jun 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***SB*** |
| location: | ***Queanbeyan, NSW*** | checked by: | ***BC*** |

position: E: 704154; N: 6083131 (Datum Not Specified) surface elevation : 580.47m (Datum Not Specified) angle from horizontal: 90°

drill model: Edson mounting: Truck casing diameter : HQ

**drilling information** | **material substance**

| method & support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/V, CASING | | Not Observable | | | | | | **TOPSOIL: Silty SAND**: fine to medium grained, dark brown. | M | | | **TOPSOIL** |
| | | | | 580 | | | CH | **Sandy CLAY**: medium to high plasticity, brown, fine to medium grained sand. | =Wp | F | | **ALLUVIUM** |
| | | | U50 | 579 | 1.0 | | | | | | | |
| | | | | | 2.0 | | | | | | | |
| | | | SPT 14, 24/100mm, N=R | 578 | | | | **LIMESTONE**: grey, extremely to highly weathered, very low to low strength. | | | | **BEDROCK** |
| | | | | 577 | 3.0 | | | | | | | |
| | | | | | 4.0 | | | Borehole B-BH04 continued as cored hole | | | | |
| | | | | 576 | | | | | | | | |
| | | | | | 5.0 | | | | | | | |
| | | | | 575 | | | | | | | | |
| | | | | | 6.0 | | | | | | | |
| | | | | 574 | | | | | | | | |
| | | | | | 7.0 | | | | | | | |
| | | | | 573 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:07

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | ***B-BH04*** |
| | | sheet: | 2 of 3 |
| | | project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** | date started: | ***02 Jun 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***02 Jun 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***SB*** |
| location: | ***Queanbeyan, NSW*** | checked by: | ***BC*** |

position: E: 704154; N: 6083131 (Datum Not Specified) surface elevation : 580.47m (Datum Not Specified) angle from horizontal: 90°

drill model: Edson mounting: Truck casing diameter : HQ

| drilling information | | | | material substance | | | | | | rock mass defects | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular | general |
| | | 580 | | | | | | | | | | |
| | | | 1.0 | | | | | | | | | |
| | | 579 | | | | | | | | | | |
| | | | 2.0 | | | | | | | | | |
| | | 578 | | | | | | | | | | |
| | | | 3.0 | | | | | | | | | |
| | | 577 | | | | | | | | | | |
| | | | 4.0 | | start coring at 4.00m | | | | | | | |
| NMLC | Not Observable | 576 | | | **LIMESTONE**: grey, distinctly bedded at 60° to 70°. | XW to HW | | | | | | |
| | | | | | **NO CORE:** 0.32 m | | | | | | | |
| | | | | | **LIMESTONE**: grey, iron stained, distinctly bedded at 60° to 70°. | MW | | a=1.64 d=5.31 | 0% | | | |
| | | 575 | 5.0 | | | | X O | | 13% | | JT, 20°, UN, RO, Fe SN<br>JT, 20°, UN, RO, Fe SN | |
| | | | | | | | | | | | JT, 20 - 30°, UN, RO, Fe SN | |
| | | | 6.0 | | **NO CORE:** 0.72 m | | | | | | | |
| | | 574 | | | | | | | 9% | | | |
| | | | 7.0 | | **LIMESTONE**: grey, distinctly bedded at 60° to 70°. | XW to HW | | a=3.96 d=2.88 | | | | |
| | | 573 | | | | MW | X | | | | JT, 20°, UN, RO, Silt CO | |
| | | | | | | SW to FR | | | 38% | | JT, 60 - 70°, PL, RO, CN<br>CS 40mm | |

Defects are:PT, 60 - 70°, PL, RO, Fe SN, unless otherwise described

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**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL — water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |

# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH04*** |
| sheet: | 3 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** |
| principal: | ***Queanbeyan City Council*** |
| project: | ***Ellerton Drive Extension*** |
| location: | ***Queanbeyan, NSW*** |
| date started: | ***02 Jun 2014*** |
| date completed: | ***02 Jun 2014*** |
| logged by: | ***SB*** |
| checked by: | ***BC*** |

position: E: 704154; N: 6083131 (Datum Not Specified) surface elevation : 580.47m (Datum Not Specified) angle from horizontal: 90°

drill model: Edson mounting: Truck casing diameter : HQ

| drilling information | | | | material substance | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
| NMLC | Not Observable | 572 | 9.0 | | **LIMESTONE**: grey, distinctly bedded at 60° to 70°. *(continued)* | SW to FR | | a=2.80<br>d=7.30 | 38% | | JT, 60 - 70°, PL, RO, CN<br>JT, 60 - 70°, PL, RO, CN |
| | | 571 | 10.0 | | | | | a=1.30<br>d=1.76 | 44% | | |
| | | 570 | 11.0 | | | | | a=1.33<br>d=2.78 | 50% | | Highly Fractured Zone: 250mm comprising closely spaced partings at 60° to 70°<br>JT, 10°, UN, RO, CN<br>CS 20mm |
| | | 569 | 12.0 | | | | | a=3.13<br>d=1.25<br>a=4.07<br>d=0.77 | | | |
| | | 568 | 13.0 | | | | | | 0% | | CS 30mm<br>JT, 10°, UN, RO, CN<br>Highly Fractured Zone: 360mm comprising closely spaced partings at 60° to 70° |
| | | 567 | 14.0 | | | | | a=3.06<br>d=1.35 | 78% | | JT, 20°, PL, RO, CN<br>JT, 20°, UN, RO, CN |
| | | 566 | 15.0 | | Borehole B-BH04 terminated at 14.90 m<br>Target depth | | | | | | |
| | | 565 | | | | | | | | | |

Defects are:PT, 60 - 70°, PL, RO, CN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:09

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL — water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

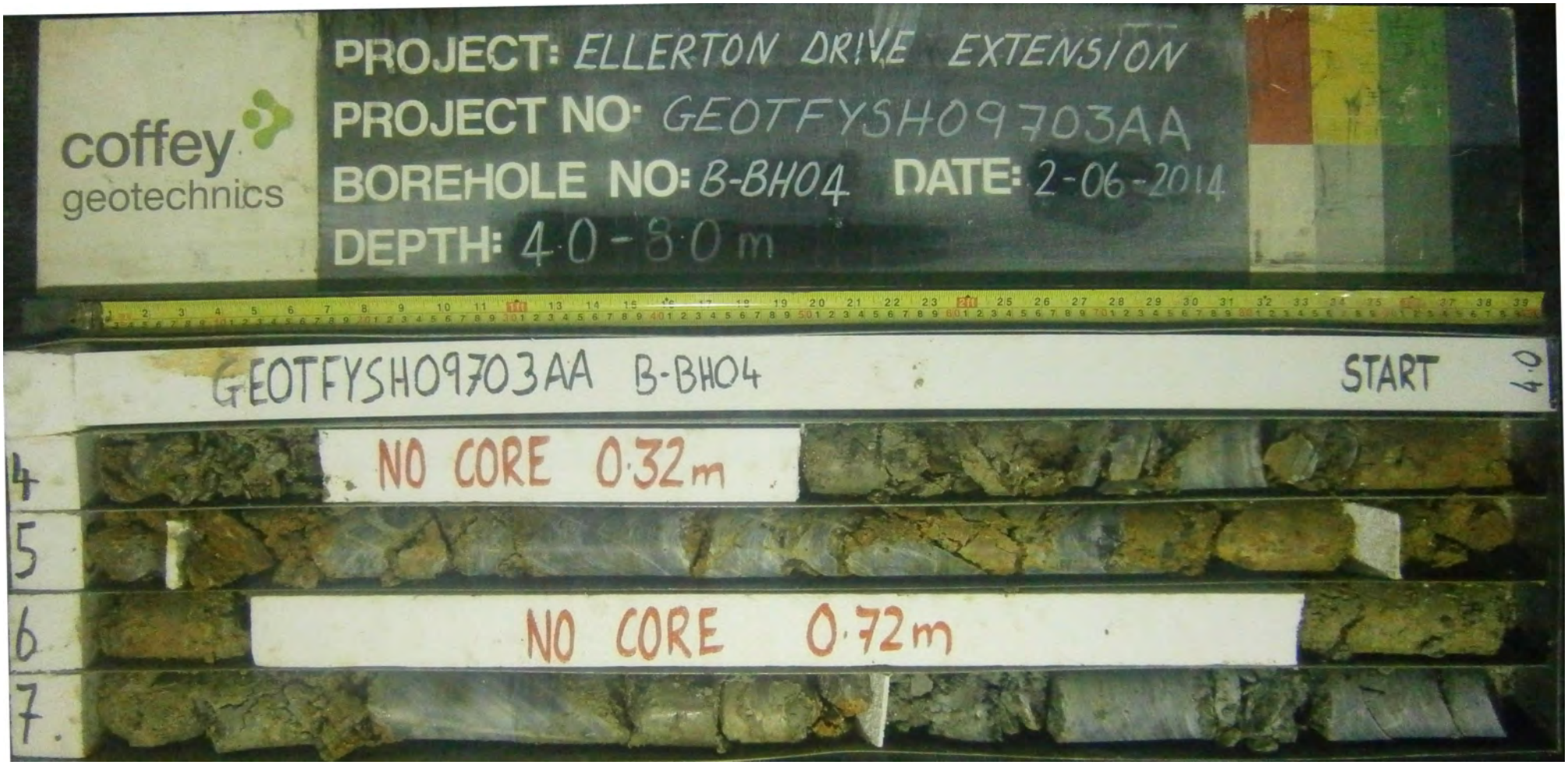
| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |




PointID : B-BH04 Depth Range: 4.00 - 8.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH04**

project no: GEOTFYSH09703AA | fig no: **8** | rev:


PointID : B-BH04 Depth Range: 8.00 - 13.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH04**

project no: GEOTFYSH09703AA | fig no: **9** | rev:


PointID : B-BH04 Depth Range: 13.00 - 14.90 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH04**

project no: GEOTFYSH09703AA | fig no: **10** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH05*** |
| sheet: | 1 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***03 Jun 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***04 Jun 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***BC*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704141; N: 6083104 (Datum Not Specified) surface elevation : 583.11m (Datum Not Specified) angle from horizontal: 90°

drill model: Edson mounting: Truck casing diameter : HQ

**drilling information** | **material substance**

| method & support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/V | | Not Observable | U50 | 583 | | | | **TOPSOIL: Sandy SILT**: low liquid limit, dark brown, fine grained sand. | <WI | | | **TOPSOIL** |
| | | | | | | | | **FILL: Clayey SAND**: medium to coarse grained, orange-brown, medium plasticity clay fines, with some large cobbles. | M | | | **FILL** |
| | | | | 582 | 1.0 | | | | | | | |
| CASING | | | | | | | | Borehole B-BH05 continued as cored hole | | | | |
| | | | | 581 | 2.0 | | | | | | | |
| | | | | 580 | 3.0 | | | | | | | |
| | | | | 579 | 4.0 | | | | | | | |
| | | | | 578 | 5.0 | | | | | | | |
| | | | | 577 | 6.0 | | | | | | | |
| | | | | 576 | 7.0 | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:07

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH05*** |
| sheet: | 2 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***03 Jun 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***04 Jun 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***BC*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704141; N: 6083104 (Datum Not Specified) surface elevation : 583.11m (Datum Not Specified) angle from horizontal: 90°

drill model: Edson mounting: Truck casing diameter : HQ

**drilling information** | **material substance** | **rock mass defects**

| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 583 | | | | | | | | | |
| | | | 1.0 | | start coring at 1.40m | | | | | | |
| | | 582 | | | | | | | | | |
| NMLC | Not Observable | 581 | 2.0 | | **Sandy CLAY (CH)**: medium to high plasticity, orange, medium to coarse grained sand, with some coarse grained, sub-rounded gravel. (ALLUVIUM) | | | | 0% | | |
| | | | 3.0 | | **NO CORE:** 0.18 m | | | | 0% | | |
| | | 580 | | | **LIMESTONE**: grey with dark grey laminations, distinctly bedded at 60° to 70°. | SW | | a=2.70 d=2.17 | 52% | | JT, 15°, IR, RO, Fe SN |
| | | 579 | 4.0 | | | | | d=1.05 | 50% | | PT, 60°, ST, RO, Fe SN<br>JT, 10°, ST, RO, Fe SN |
| | | | | | | | | | 0% | | Highly Fractured Zone: 300mm comprising closely spaced joints and partings at various orientations |
| | | 578 | 5.0 | | | | | | 0% | | SM 130mm, Silty Clay |
| | | | | | | | | a=2.51 d=2.00 | 18% | | JT, 5°, IR, RO, Fe SN<br>Highly Fractured Zone: 100mm comprising closely spaced joints and partings at various orientations |
| | | | 6.0 | | **NO CORE:** 0.12 m | | | | | | |
| | | 577 | | | **LIMESTONE**: grey with pale grey and white laminations, distinctly bedded at 60° to 70°, with pyrite and calcite mineralisation. | SW | | a=4.88 d=0.19 | 0% | | CS 200mm<br>CS 50mm<br>JT, 60°, PL, SO, Fe SN |
| | | | 7.0 | | | HW | | | 23% | | CS 50mm<br>JT x2, 10°, IR, RO, Fe SN |
| | | 576 | | | | SW | | a=1.80 d=2.05 | | | |
| | | | | | | | | | 0% | | Highly Fractured Zone: 500mm comprising closely spaced joints and |

Defects are:PT, 50 - 60°, PL, SO, Fe SN, unless otherwise described

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**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |

coffey

# Engineering Log - Cored Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH05*** |
| sheet: | 3 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***03 Jun 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***04 Jun 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***BC*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704141; N: 6083104 (Datum Not Specified) surface elevation : 583.11m (Datum Not Specified) angle from horizontal: 90°

drill model: Edson mounting: Truck casing diameter : HQ

| drilling information | | | | material substance | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other)<br>particular / general |
| NMLC | Not Observable | 575 | | | **LIMESTONE**: grey with pale grey and white laminations, bedding becoming distinctly twisted and wavy. | SW | | | 0% | | partings at various orientations<br>SM 40mm |
| | | | | | Becoming distinclty bedded at 30º to 40º | | | | | | SM 40mm, Clay<br>PT, 20°, CU, RO, Fe SN<br>PT, 30°, CU, RO, Clay VN<br>CS 50mm<br>JT, 90°, ST, VR, CN<br>SM 20mm, Clay |
| | | 574 | 9.0 | | | | | | 24% | | JT, 0°, ST, RO, CN<br>JT, 5°, UN, RO, Silty Clay VN<br>Highly Fractured Zone: 100mm comprising closely spaced joints and partings at various orientations<br>JT, 70°, CU, RO, Sandy clay CO |
| | | | | | Becoming indistinclty bedded | | X O | a=3.23<br>d=5.34 | 85% | | |
| | | 573 | 10.0 | | | | O X | a=5.26<br>d=2.45 | | | PT, 50°, PL, RO, Pale grey SN<br>SM 60mm, Silty Clay<br>CS 60mm |
| | | 572 | 11.0 | | | | ⊗ | a=4.21<br>d=4.63 | 69% | | CS 30mm<br>CS 20mm<br>CS 40mm<br>JT, 5°, IR, VR, Silt CO<br>JT, 60°, UN, RO, Silty Clay CO<br>PT, 30°, PL, RO, Silty Clay CO |
| | | | | | Becoming distinctly bedded at 30º to 40º | | O X | a=1.23<br>d=0.17 | | | JT, 30°, UN, RO, CN<br>JT, 60°, PL, SO, Calcite VN<br>JT, 40°, ST, RO, CN |
| | | 571 | 12.0 | | | | | | 55% | | CS 5mm<br>CS 10mm<br>CS 30mm |
| | | 570 | 13.0 | | | | ⊗ | a=4.86<br>d=5.62 | 15% | | CS 30mm<br>PT, 30°, UN, RO, Silt CO<br>JT, 5°, UN, RO, Silt CO<br>Highly Fractured Zone: 850mm comprising closely spaced crushed seams and partings at 30º to 40º |
| | | 569 | 14.0 | | | | | | 33% | | JT x2, 60°, UN, RO, Fe SN |
| | | 568 | 15.0 | | Borehole B-BH05 terminated at 15.00 m<br>Target depth | | O X | a=0.98<br>d=0.27 | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:09

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

10/10/12, water level on date shown
water inflow
complete drilling fluid loss
partial drilling fluid loss
25uL water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

core recovered (graphic symbols indicate material)
no core recovered

**core run & RQD**

barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : B-BH05 Depth Range: 1.40 - 5.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH05**

project no: GEOTFYSH09703AA | fig no: **11** | rev:


PointID : B-BH05 Depth Range: 5.00 - 10.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH05**

project no: GEOTFYSH09703AA | fig no: **12** | rev:


PointID : B-BH05 Depth Range: 10.00 - 15.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH05**

project no: GEOTFYSH09703AA | fig no: **13** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***B-BH06*** |
| sheet: | 1 of 3 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants NSW Pty Ltd*** | date started: ***05 Jun 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***06 Jun 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***BC*** |
| location: ***Queanbeyan, NSW*** | checked by: ***BC*** |

position: E: 704127; N: 6083078 (Datum Not Specified) surface elevation : 586.21m (Datum Not Specified) angle from horizontal: 90°

drill model: Edson mounting: Truck casing diameter : HQ

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/V, CASING | | Not Observable | | 586 | | | | **FILL: Silty CLAY**: medium plasticity, red-brown, trace fine grained sand. | =Wp | | | **FILL** |
| | | | | 585 | 1.0 | | GC | **Clayey GRAVEL**: fine to coarse grained, sub-rounded, orange-brown, medium to high plasticity clay fines. | M | MD | | **ALLUVIUM** |
| | | | | 584 | 2.0 | | | | | | | |
| | | | | 583 | 3.0 | | | | | | | |
| | | | | 582 | 4.0 | | | Borehole B-BH06 continued as cored hole | | | | |
| | | | | 581 | 5.0 | | | | | | | |
| | | | | 580 | 6.0 | | | | | | | |
| | | | | 579 | 7.0 | | | | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:07

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | ***B-BH06*** |
| | | sheet: | 2 of 3 |
| | | project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** | date started: | ***05 Jun 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***06 Jun 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC*** |
| location: | ***Queanbeyan, NSW*** | checked by: | ***BC*** |

position: E: 704127; N: 6083078 (Datum Not Specified) surface elevation : 586.21m (Datum Not Specified) angle from horizontal: 90°

drill model: Edson mounting: Truck casing diameter : HQ

| drilling information | | | | material substance | | | | | | rock mass defects | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular | general |
| | | 586 | | | | | | | | | | |
| | | | 1.0 | | | | | | | | | |
| | | 585 | | | | | | | | | | |
| | | | 2.0 | | | | | | | | | |
| | | 584 | | | | | | | | | | |
| | | | 3.0 | | | | | | | | | |
| | | 583 | | | start coring at 4.00m | | | | | | | |
| NMLC | Not Observable | | 4.0 | | **NO CORE:** 0.70 m | | | | | | | |
| | | 582 | | | | | | | 0% | | | |
| | | | 5.0 | | **Clayey GRAVEL (GC)**: medium grained, sub-rounded, orange-brown, medium to high plasticity clay fines. (ALLUVIUM) | | | | | | | |
| | | 581 | | | | | | | | | | |
| | | | 6.0 | | | | | | 0% | | | |
| | | 580 | | | | | | | | | | |
| | | | 7.0 | | | | | | | | | |
| | | 579 | | | **LIMESTONE**: grey with pale grey laminations, distinctly bedded at 60°. | SW | | d=6.00 | 62% | | Highly Fractured Zone: 300mm comprising closely spaced partings at 20°, PL, RO, SN pale grey<br>SM 60mm, Clayey silt<br>SM 100mm, Clayey silt<br>CS 80mm | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:09

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL — water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |

coffey

# Engineering Log - Cored Borehole

| | | | |
|---|---|---|---|
| | | Borehole ID. | ***B-BH06*** |
| | | sheet: | 3 of 3 |
| | | project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants NSW Pty Ltd*** | date started: | ***05 Jun 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***06 Jun 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC*** |
| location: | ***Queanbeyan, NSW*** | checked by: | ***BC*** |

position: E: 704127; N: 6083078 (Datum Not Specified) surface elevation : 586.21m (Datum Not Specified) angle from horizontal: 90°

drill model: Edson mounting: Truck casing diameter : HQ

| drilling information | | | | material substance | | | | | | rock mass defects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method & support | water | RL (m) | depth (m) | graphic log | material description<br>**ROCK TYPE**: grain characterisics, colour, structure, minor components | weathering & alteration | estimated strength & Is50 (X = axial; O = diametral) VL L M H VH EH | samples, field tests & Is(50) (MPa) a = axial; d = diametral | core run & RQD | defect spacing (mm) 30 100 300 1000 3000 | additional observations and defect descriptions (type, inclination, planarity, roughness, coating, thickness, other) particular / general |
| NMLC | Not Observable | 578 | | | **NO CORE:** 0.30 m | | | | | | |
| | | | | | **LIMESTONE**: orange-grey, distinctly bedded at 20°. | HW | | | 0% | | Highly Fractured Zone: 500mm comprising closely spaced partings and joints at various orientations |
| | | | 9.0 | | **NO CORE:** 0.45 m | | | | | | |
| | | 577 | | | **LIMESTONE**: grey with pale grey laminations, distinctly bedded at 40° to 60°. | SW | | a=3.46 d=0.35 | 29% | | CS 80mm<br>CS 10mm<br>PT, 50°, PL, RO, Calcite VN |
| | | | 10.0 | | | | | a=2.01 d=1.26 | | | |
| | | 576 | | | **NO CORE:** 0.20 m | | | | | | |
| | | | | | **LIMESTONE**: grey with pale grey laminations, distinctly bedded at 40° to 60°. | SW | | | 11% | | Highly Fractured Zone: 110mm comprising closely spaced partings and joints at various orientations<br>JT, 0°, IR, VR, Fe SN<br>JT, 0°, PL, RO, Calcite VN<br>JT, 0°, PL, RO, Calcite VN |
| | | | 11.0 | | | HW | | | | | Highly Fractured Zone: 300mm comprising closely spaced partings and joints at various orientations |
| | | 575 | | | **NO CORE:** 0.30 m | | | | | | |
| | | | | | **LIMESTONE**: grey with pale grey laminations, distinctly bedded at 40° to 60°. | SW | | | 0% | | JT, UN, RO, Calcite VN<br>SM 50mm, Gravelly Clay<br>JT, 45°, UN, RO, Calcite VN |
| | | | 12.0 | | **NO CORE:** 0.20 m | | | | | | |
| | | 574 | | | **LIMESTONE**: grey with pale grey laminations, distinctly bedded at 40° to 60°. | SW | | a=5.01 d=0.66 | 34% | | SM 15mm, Sandy clay<br>CS 30mm |
| | | | 13.0 | | | | | | | | |
| | | 573 | | | | | | a=4.05 d=1.34 | 90% | | |
| | | | 14.0 | | | | | | | | |
| | | 572 | | | | | | a=2.35 d=3.06 | | | JT, 70°, UN, RO, Calcite VN |
| | | | 15.0 | | | | | | 88% | | |
| | | 571 | | | | | | a=0.73 d=0.93 | | | JT, 10°, CU, RO, CN<br>CS 10mm |
| | | | | | Borehole B-BH06 terminated at 15.80 m<br>Target depth | | | | | | |

Defects are:PT, 60°, PL, SO, Pale grey SN, unless otherwise described

CDF_0_9_04BA.GLB Log COF BOREHOLE: CORED GEOTFYSH09703AA - CBH LOGS.GPJ <<DrawingFile>> 27/06/2014 16:09

**method & support**

| | |
|---|---|
| DT | diatube |
| AS | auger screwing |
| AD | auger drilling |
| RR | roller/tricone |
| CB | claw or blade bit |
| W | washbore |
| NMLC | NMLC core (51.9 mm) |
| NQ | wireline core (47.6mm) |
| HQ | wireline core (63.5mm) |
| PQ | wireline core (85.0mm) |
| SPT | standard penetration test |

**water**

- 10/10/12, water level on date shown
- water inflow
- complete drilling fluid loss
- partial drilling fluid loss
- 25uL: water pressure test result (lugeons) for depth interval shown

**graphic log / core recovery**

- core recovered (graphic symbols indicate material)
- no core recovered

**core run & RQD**

- barrel withdrawn

RQD = Rock Quality Designation (%)

**weathering & alteration***

| | |
|---|---|
| RS | residual soil |
| XW | extremely weathered |
| HW | highly weathered |
| DW | distinctly weathered |
| MW | moderately weathered |
| SW | slightly weathered |
| FR | fresh |

*W replaced with A for alteration

**strength**

| | |
|---|---|
| VL | very low |
| L | low |
| M | medium |
| H | high |
| VH | very high |
| EH | extremely high |

**defect type**

| | |
|---|---|
| PT | parting |
| JT | joint |
| SZ | shear zone |
| SS | shear surface |
| CS | crushed seam |
| SM | seam |
| DB | drilling break |

**roughness**

| | |
|---|---|
| SL | slickensided |
| POL | polished |
| SO | smooth |
| RO | rough |
| VR | very rough |

**planarity**

| | |
|---|---|
| PL | planar |
| CU | curved |
| UN | undulating |
| ST | stepped |
| IR | Irregular |

**coating**

| | |
|---|---|
| CN | clean |
| SN | stain |
| VN | veneer |
| CO | coating |


PointID : B-BH06 Depth Range: 4.00 - 8.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH06**

project no: GEOTFYSH09703AA | fig no: **14** | rev:


PointID : B-BH06 Depth Range: 8.00 - 13.00 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH06**

project no: GEOTFYSH09703AA | fig no: **15** | rev:


PointID : B-BH06 Depth Range: 13.00 - 15.80 m

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **24/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

coffey

client: Opus International Consultants NSW Pty Ltd

project: Ellerton Drive Extension
Ellerton Drive, Quanbeyan, NSW

title: **CORE PHOTOGRAPH**
**B-BH06**

project no: GEOTFYSH09703AA | fig no: **16** | rev:

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***A-BH01*** |
| sheet: | 1 of 1 |
| project no. | ***GEOTFYSH09703AA*** |
| client: ***Opus International Consultants Pty Ltd*** | date started: ***02 Jun 2014*** |
| principal: ***Queanbeyan City Council*** | date completed: ***02 Jun 2014*** |
| project: ***Ellerton Drive Extension*** | logged by: ***SB*** |
| location: ***Queanbeyan NSW*** | checked by: ***BC*** |

position: E: 704147; N: 6085783 (WGS84 Zone 55) surface elevation : 602.54m (AHD) angle from horizontal: 90°

drill model: 13 Tonne Excavator mounting: Track hole diameter : 300 mm

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/T, N | | None Observed | | | | | | **ROAD SURFACE**: **ASPHALT**. | M | | | **ROAD SEAL** |
| | | | | | | | | **FILL: Gravelly SAND**: medium grained, grey, fine to coarse grained, sub-angular gravel. | | | | **ROAD BASE** |
| | | | | | | | | **FILL: Gravelly SAND**: medium grained, orange-brown, medium to coarse grained, sub-angular gravel, with some small cobbles. | | | | **FILL** |
| | | | BS | 602 | 0.5 | | SC | **Clayey SAND**: fine grained, brown, medium plasticity clay, trace fine to medium grained sub-angular gravel. | | MD | | **COLLUVIUM** |
| | | | | 601 | 1.5 | | | Borehole A-BH01 terminated at 1.5 m<br>Target depth | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - EXISTING ELLERTON DRIVE GI.GPJ <<DrawingFile>> 27/06/2014 16:49

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***A-BH02*** |
| sheet: | 1 of 1 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** |
| date started: | ***02 Jun 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***02 Jun 2014*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***SB*** |
| location: | ***Queanbeyan NSW*** |
| checked by: | ***BC*** |

position: E: 704244; N: 6085641 (WGS84 Zone 55) surface elevation : 603.89m (AHD) angle from horizontal: 90°

drill model: 13 Tonne Excavator mounting: Track hole diameter : 300 mm

**drilling information** | **material substance**

| method & support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/T | N | None Observed | BS | | | | | **ROAD SURFACE**: **ASPHALT**. | D | | | **ROAD SEAL** |
| | | | | | | | | **FILL: Clayey Sandy GRAVEL**: fine to medium grained, sub-angular, grey, fine to coarse grained sand, medium plasticity clay. | | | | **ROAD BASE** |
| | | | | | 0.5 | | | **FILL: Clayey SAND**: fine to medium grained, pale orange, medium plasticity clay. | | | | **FILL** |
| | | | BS | 603 | 1.0 | | CH | **CLAY**: medium to high plasticity, orange, with some fine grained sand. | =Wp | St | | **RESIDUAL SOIL** |
| | | | | | | | | **SANDSTONE**: fine to medium grained, orange, extremely to highly weathered, estimated very low strength. | | | | **BEDROCK** |
| | | | | 602 | 1.5 | | | Borehole A-BH02 terminated at 1.5 m Target depth | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - EXISTING ELLERTON DRIVE GI.GPJ <<DrawingFile>> 27/06/2014 16:49

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remoulded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***A-BH03*** |
| sheet: | 1 of 1 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** |
| date started: | ***02 Jun 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***02 Jun 2014*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***SB*** |
| location: | ***Queanbeyan NSW*** |
| checked by: | ***BC*** |

position: E: 704414; N: 6085549 (WGS84 Zone 55) surface elevation : 606.76m (AHD) angle from horizontal: 90°

drill model: 13 Tonne Excavator mounting: Track hole diameter : 300 mm

**drilling information** | **material substance**

| method & support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/T | | None Observed | | | | | | **ROAD SURFACE**: **ASPHALT**. | | | | **ROAD SEAL** |
| | | | | | | | | **FILL: Clayey Sandy GRAVEL**: fine to medium grained, sub-angular, grey, fine to coarse grained sand, medium plasticity clay. | D | | | **ROAD BASE** |
| | | | D | | 0.5 | | | **FILL: Clayey GRAVEL**: medium grained, sub-angular, orange, medium plasticity clay, with some fine to medium grained sand. | M | | | **FILL** |
| N | | | | 606 | 1.0 | | SC | **Clayey SAND**: fine to medium grained, red-brown, medium plasticity clay, with some fine to medium grained, sub-angular gravel. | =Wp | St | | **COLLUVIUM** |
| | | | | 605 | 1.5 | | | Borehole A-BH03 terminated at 1.5 m<br>Target depth | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - EXISTING ELLERTON DRIVE GI.GPJ <<DrawingFile>> 27/06/2014 16:49

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

coffey

# Engineering Log - Borehole

| | |
|---|---|
| Borehole ID. | ***A-BH04*** |
| sheet: | 1 of 1 |
| project no. | ***GEOTFYSH09703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** |
| date started: | ***02 Jun 2014*** |
| principal: | ***Queanbeyan City Council*** |
| date completed: | ***02 Jun 2014*** |
| project: | ***Ellerton Drive Extension*** |
| logged by: | ***SB*** |
| location: | ***Queanbeyan NSW*** |
| checked by: | ***BC*** |

position: E: 704582; N: 6085509 (WGS84 Zone 55) surface elevation : 608.13m (AHD) angle from horizontal: 90°

drill model: 13 Tonne Excavator mounting: Track hole diameter : 300 mm

**drilling information** | **material substance**

| method & support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AD/T, N | | None Observed | | 608 | | | | **ROAD SURFACE**: **ASPHALT**. | D | | | **ROAD SEAL** |
| | | | | | | | | **FILL: Clayey Sandy GRAVEL**: fine to medium grained, sub-angular, grey, fine to coarse grained sand, medium plasticity clay. | | | | **ROAD BASE** |
| | | | D | | 0.5 | | | **FILL: Gravelly CLAY**: medium to high plasticity, orange, medium grained, sub-rounded gravel. | =Wp | | | **FILL** |
| | | | BS | | | | SC | **Clayey SAND**: medium grained, red-brown, medium plasticity clay, with some fine to medium grained, sub-angular gravel. | M | MD | | **COLLUVIUM** |
| | | | BS | 607 | 1.0 | | | | | | | |
| | | | | | 1.5 | | | Borehole A-BH04 terminated at 1.5 m<br>Target depth | | | | |

CDF_0_9_04BA.GLB Log COF BOREHOLE: NON CORED GEOTFYSH09703AA - EXISTING ELLERTON DRIVE GI.GPJ <<DrawingFile>> 27/06/2014 16:49

**method**
AD auger drilling*
AS auger screwing*
RR roller/tricone
W washbore
CT cable tool
HA hand auger
DT diatube
B blank bit
V V bit
T TC bit
* bit shown by suffix
e.g. AD/T

**support**
M mud
C casing
N nil

**penetration**
1 2 3 no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
B bulk disturbed sample
D disturbed sample
E environmental sample
SS split spoon sample
U## undisturbed sample ##mm diameter
HP hand penetrometer (kPa)
N standard penetration test (SPT)
N* SPT - sample recovered
Nc SPT with solid cone
VS vane shear; peak/remouded (kPa)
R refusal
HB hammer bouncing

**classification symbol & soil description**
based on Unified Classification System

**moisture**
D dry
M moist
W wet
Wp plastic limit
Wl liquid limit

**consistency / relative density**
VS very soft
S soft
F firm
St stiff
VSt very stiff
H hard
Fb friable
VL very loose
L loose
MD medium dense
D dense
VD very dense

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# **Soil Description** Explanation Sheet (1 of 2)

### DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

### CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

### PARTICLE SIZE DESCRIPTIVE TERMS

| NAME | SUBDIVISION | SIZE |
|---|---|---|
| Boulders | | >200 mm |
| Cobbles | | 63 mm to 200 mm |
| Gravel | coarse | 20 mm to 63 mm |
| | medium | 6 mm to 20 mm |
| | fine | 2.36 mm to 6 mm |
| Sand | coarse | 600 μm to 2.36 mm |
| | medium | 200 μm to 600 μm |
| | fine | 75 μm to 200 μm |

### MOISTURE CONDITION

**Dry** Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

**Moist** Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

**Wet** As for moist but with free water forming on hands when handled.

### CONSISTENCY OF COHESIVE SOILS

| TERM | UNDRAINED STRENGTH $s_u$ (kPa) | FIELD GUIDE |
|---|---|---|
| Very Soft | <12 | A finger can be pushed well into the soil with little effort. |
| Soft | 12 - 25 | A finger can be pushed into the soil to about 25mm depth. |
| Firm | 25 - 50 | The soil can be indented about 5mm with the thumb, but not penetrated. |
| Stiff | 50 - 100 | The surface of the soil can be indented with the thumb, but not penetrated. |
| Very Stiff | 100 - 200 | The surface of the soil can be marked, but not indented with thumb pressure. |
| Hard | >200 | The surface of the soil can be marked only with the thumbnail. |
| Friable | – | Crumbles or powders when scraped by thumbnail. |

### DENSITY OF GRANULAR SOILS

| TERM | DENSITY INDEX (%) |
|---|---|
| Very loose | Less than 15 |
| Loose | 15 - 35 |
| Medium Dense | 35 - 65 |
| Dense | 65 - 85 |
| Very Dense | Greater than 85 |

### MINOR COMPONENTS

| TERM | ASSESSMENT GUIDE | PROPORTION OF MINOR COMPONENT IN: |
|---|---|---|
| Trace of | Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component. | Coarse grained soils: <5%<br>Fine grained soils: <15% |
| With some | Presence easily detected by feel or eye, soil properties little different to general properties of primary component. | Coarse grained soils: 5 - 12%<br>Fine grained soils: 15 - 30% |

### SOIL STRUCTURE

| ZONING | | CEMENTING | |
|---|---|---|---|
| Layers | Continuous across exposure or sample. | Weakly cemented | Easily broken up by hand in air or water. |
| Lenses | Discontinuous layers of lenticular shape. | Moderately cemented | Effort is required to break up the soil by hand in air or water. |
| Pockets | Irregular inclusions of different material. | | |

### GEOLOGICAL ORIGIN

#### WEATHERED IN PLACE SOILS

| | |
|---|---|
| Extremely weathered material | Structure and fabric of parent rock visible. |
| Residual soil | Structure and fabric of parent rock not visible. |

#### TRANSPORTED SOILS

| | |
|---|---|
| Aeolian soil | Deposited by wind. |
| Alluvial soil | Deposited by streams and rivers. |
| Colluvial soil | Deposited on slopes (transported downslope by gravity). |
| Fill | Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils. |
| Lacustrine soil | Deposited by lakes. |
| Marine soil | Deposited in ocean basins, bays, beaches and estuaries. |

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# **Soil Description** Explanation Sheet (2 of 2)

## SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

| FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass) | | | | | | | | USC | PRIMARY NAME |
|---|---|---|---|---|---|---|---|---|---|
| COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm | (A 0.075 mm particle is about the smallest particle visible to the naked eye) | GRAVELS More than half of coarse fraction is larger than 2.36 mm | CLEAN GRAVELS (Little or no fines) | Wide range in grain size and substantial amounts of all intermediate particle sizes. | | | | GW | GRAVEL |
| | | | | Predominantly one size or a range of sizes with more intermediate sizes missing. | | | | GP | GRAVEL |
| | | | GRAVELS WITH FINES (Appreciable amount of fines) | Non-plastic fines (for identification procedures see ML below) | | | | GM | SILTY GRAVEL |
| | | | | Plastic fines (for identification procedures see CL below) | | | | GC | CLAYEY GRAVEL |
| | | SANDS More than half of coarse fraction is smaller than 2.36 mm | CLEAN SANDS (Little or no fines) | Wide range in grain sizes and substantial amounts of all intermediate sizes | | | | SW | SAND |
| | | | | Predominantly one size or a range of sizes with some intermediate sizes missing. | | | | SP | SAND |
| | | | SANDS WITH FINES (Appreciable amount of fines) | Non-plastic fines (for identification procedures see ML below). | | | | SM | SILTY SAND |
| | | | | Plastic fines (for identification procedures see CL below). | | | | SC | CLAYEY SAND |
| FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm | | | IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm. | | | | | | |
| | | | | **DRY STRENGTH** | **DILATANCY** | **TOUGHNESS** | | | |
| | | SILTS & CLAYS Liquid limit less than 50 | | None to Low | Quick to slow | None | | ML | SILT |
| | | | | Medium to High | None | Medium | | CL | CLAY |
| | | | | Low to medium | Slow to very slow | Low | | OL | ORGANIC SILT |
| | | SILTS & CLAYS Liquid limit greater than 50 | | Low to medium | Slow to very slow | Low to medium | | MH | SILT |
| | | | | High | None | High | | CH | CLAY |
| | | | | Medium to High | None | Low to medium | | OH | ORGANIC CLAY |
| HIGHLY ORGANIC SOILS | | | Readily identified by colour, odour, spongy feel and frequently by fibrous texture. | | | | | Pt | PEAT |

• Low plasticity – Liquid Limit $w_L$ less than 35%. • Medium plasticity – $w_L$ between 35% and 50%. • High plasticity – $w_L$ greater than 50%.

## COMMON DEFECTS IN SOIL

| TERM | DEFINITION | DIAGRAM |
|---|---|---|
| PARTING | A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed. |  |
| JOINT | A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length. |  |
| SHEARED ZONE | Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks. |  |
| SHEARED SURFACE | A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect. |  |

| TERM | DEFINITION | DIAGRAM |
|---|---|---|
| SOFTENED ZONE | A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere. |  |
| TUBE | Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter |  |
| TUBE CAST | Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented. |  |
| INFILLED SEAM | Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints. |  |

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# **Rock Description** Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

**DEFINITIONS:** Rock substance, defect and mass are defined as follows:

| | |
|---|---|
| **Rock Substance** | In engineering terms rock substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic. |
| **Defect** | Discontinuity or break in the continuity of a substance or substances. |
| **Mass** | Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects. |

## SUBSTANCE DESCRIPTIVE TERMS:

| | |
|---|---|
| **ROCK NAME** | Simple rock names are used rather than precise geological classification. |
| **PARTICLE SIZE** | Grain size terms for sandstone are: |
| Coarse grained | Mainly 0.6mm to 2mm |
| Medium grained | Mainly 0.2mm to 0.6mm |
| Fine grained | Mainly 0.06mm (just visible) to 0.2mm |
| **FABRIC** | Terms for layering of penetrative fabric (eg. bedding, cleavage etc. ) are: |
| Massive | No layering or penetrative fabric. |
| Indistinct | Layering or fabric just visible. Little effect on properties. |
| Distinct | Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric. |

## CLASSIFICATION OF WEATHERING PRODUCTS

| Term | Abbreviation | Definition |
|---|---|---|
| **Residual Soil** | **RS** | Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported. |
| **Extremely Weathered Material** | **XW** | Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible. |
| **Highly Weathered Rock** | **HW** | Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores. |
| **Moderately Weathered Rock** | **MW** | The whole of the rock substance is discoloured, usually by iron staining or bleaching , to the extent that the colour of the fresh rock is no longer recognisable. |
| **Slightly Weathered Rock** | **SW** | Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance. |
| **Fresh Rock** | **FR** | Rock substance unaffected by weathering. |

**Notes on Weathering:**

1. AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726.
2. Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

## ROCK SUBSTANCE STRENGTH TERMS

| Term | Abbrev-iation | Point Load Index, $I_{s(50)}$ (MPa) | Field Guide |
|---|---|---|---|
| **Very Low** | **VL** | Less than 0.1 | Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure. |
| **Low** | **L** | 0.1 to 0.3 | Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling. |
| **Medium** | **M** | 0.3 to 1.0 | Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty. |
| **High** | **H** | 1 to 3 | A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer. |
| **Very High** | **VH** | 3 to 10 | Hand specimen breaks after more than one blow of a pick; rock rings under hammer. |
| **Extremely High** | **EH** | More than 10 | Specimen requires many blows with geological pick to break; rock rings under hammer. |

**Notes on Rock Substance Strength:**

1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
2. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
3. The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index $I_{s(50)}$. The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

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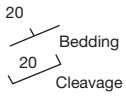
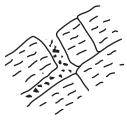
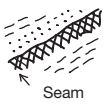
# **Rock Description** Explanation Sheet (2 of 2)

| COMMON DEFECTS IN ROCK MASSES<br>Term | Definition | Diagram | Map Symbol | Graphic Log (Note 1) |
|---|---|---|---|---|
| **Parting** | A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed. |  |  |  <br>(Note 2) |
| **Joint** | A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed. |  |  |  <br>(Note 2) |
| **Sheared Zone** (Note 3) | Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks. |  |  |  |
| **Sheared Surface** (Note 3) | A near planar, curved or undulating surface which is usually smooth, polished or slickensided. |  |  |  |
| **Crushed Seam** (Note 3) | Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties. |  |  |  |
| **Infilled Seam** | Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface. |  |  |  |
| **Extremely Weathered Seam** | Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place. |  |  |  |

**Notes on Defects:**

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

| DEFECT SHAPE TERMS | |
|---|---|
| **Planar** | The defect does not vary in orientation |
| **Curved** | The defect has a gradual change in orientation |
| **Undulating** | The defect has a wavy surface |
| **Stepped** | The defect has one or more well defined steps |
| **Irregular** | The defect has many sharp changes of orientation |

**Note:** The assessment of defect shape is partly influenced by the scale of the observation.

| ROUGHNESS TERMS | |
|---|---|
| **Slickensided** | Grooved or striated surface, usually polished |
| **Polished** | Shiny smooth surface |
| **Smooth** | Smooth to touch. Few or no surface irregularities |
| **Rough** | Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper. |
| **Very Rough** | Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper. |

| COATING TERMS | |
|---|---|
| **Clean** | No visible coating |
| **Stained** | No visible coating but surfaces are discoloured |
| **Veneer** | A visible coating of soil or mineral, too thin to measure; may be patchy |
| **Coating** | A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein. |

| BLOCK SHAPE TERMS | |
|---|---|
| **Blocky** | Approximately equidimensional |
| **Tabular** | Thickness much less than length or width |
| **Columnar** | Height much greate than cross section |

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# Appendix B - Engineering Test Pit Logs

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# Engineering Log - Excavation

| | | | |
|---|---|---|---|
| | | Excavation ID. | ***TP01*** |
| | | sheet: | 1 of 1 |
| | | project no. | ***GEOTFYSH9703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** | date excavated: | ***15 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***15 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC*** |
| location: | ***Queanbeyan NSW*** | checked by: | ***DB*** |

position: E: 704651; N: 6085474 (WGS84 Zone 55) surface elevation : 615.85m (AHD) pit orientation:

equipment type: 13 Tonne Excavator excavation method: Excavator excavation dimensions: 2.9 m long 1.1 m wide DCP id.:

**excavation information** | **material substance**

| method | support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | DCP (blows/100 mm) 5 10 15 20 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | N | | None Observed | D | 615.5 | 0.5 | | CL | **Sandy CLAY**: low plasticity, pale brown, fine grained sand, with some fine to medium grained, sub-angular gravel. | <Wp | F<br>H to Fb | | 25/20 mm | **COLLUVIUM** |
| | | | | | 615.0 | 1.0 | | | | | | | | |
| | | | | | 614.5 | 1.5 | | CL | **Sandy CLAY**: low plasticity, red-brown, fine to medium grained sand. | | | | | |
| | | | | | 614.0 | 2.0 | | | | | | | | |
| | | | | | 613.5 | 2.5 | | | | | | | | |
| | | | | | 613.0 | 3.0 | | | | | | | | |
| | | | | | 612.5 | 3.5 | | | Test pit TP01 terminated at 3.1 m<br>Target depth | | | | | |
| | | | | | 612.0 | | | | | | | | | |

CDF_0_9_04BA.GLB Log COF EXCAVATION + PSP/DCP GEOTFYSH09703AA.GPJ <<DrawingFile>> 27/06/2014 15:41

**method**
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

**support**
- N none
- S shoring

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

**classification symbol & soil description**
based on Unified Classification System

**moisture**
- D dry
- M moist
- W wet
- $W_P$ plastic limit
- $W_L$ liquid limit

**consistency / relative density**

| | |
|---|---|
| VS | very soft |
| S | soft |
| F | firm |
| St | stiff |
| VSt | very stiff |
| H | hard |
| Fb | friable |
| VL | very loose |
| L | loose |
| MD | medium dense |
| D | dense |
| VD | very dense |

TP01

| | |
|---|---|
| drawn | **SB** |
| approved | **BC** |
| date | **20/06/2014** |
| scale | **N.T.S.** |
| original size | **A4** |

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| | | | |
|---|---|---|---|
| client: | Opus International Consultants Pty Ltd | | |
| project: | Ellerton Drive Extension | | |
| title: | **TEST PIT PROFILE** | | |
| project no: GEOTFYSH9703AA | | fig no: **1** | rev: |

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# Engineering Log - Excavation

| | | | |
|---|---|---|---|
| | | Excavation ID. | ***TP02*** |
| | | sheet: | 1 of 1 |
| | | project no. | ***GEOTFYSH9703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** | date excavated: | ***01 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***01 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC*** |
| location: | ***Queanbeyan NSW*** | checked by: | ***DB*** |

position: E: 704676; N: 6085447 (WGS84 Zone 55) surface elevation : 617.54m (AHD) pit orientation:

equipment type: 6 Tonne Excavator excavation method: Excavator excavation dimensions: 2.0 m long 0.5 m wide DCP id.:

**excavation information** | **material substance**

| method | support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | DCP (blows/100 mm) 5 10 15 20 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | N | | None Observed | BX2 | 617.5 | 0.5 | | CL | **Sandy CLAY**: low plasticity, pale brown, fine grained sand, with some fine to medium grained, sub-angular gravel. | <Wp | H | | 25/50 mm | **COLLUVIUM** |
| | | | | D | 617.0 | 1.0 | | CL | **Sandy CLAY**: low plasticity, mottled orange/grey, fine grained sand, with some clay. | | | | | |
| | | | | | 616.5 | | | | Test pit TP02 terminated at 1.2 m<br>Bucket Refusal | | | | | |
| | | | | | 616.0 | 1.5 | | | | | | | | |
| | | | | | 615.5 | 2.0 | | | | | | | | |
| | | | | | 615.0 | 2.5 | | | | | | | | |
| | | | | | 614.5 | 3.0 | | | | | | | | |
| | | | | | 614.0 | 3.5 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF EXCAVATION + PSP/DCP GEOTFYSH09703AA.GPJ <<DrawingFile>> 27/06/2014 15:41

**method**
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

**support**
- N none
- S shoring

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

**classification symbol & soil description** based on Unified Classification System

**moisture**
- D dry
- M moist
- W wet
- $W_P$ plastic limit
- $W_L$ liquid limit

**consistency / relative density**

| | |
|---|---|
| VS | very soft |
| S | soft |
| F | firm |
| St | stiff |
| VSt | very stiff |
| H | hard |
| Fb | friable |
| VL | very loose |
| L | loose |
| MD | medium dense |
| D | dense |
| VD | very dense |

TP02

| | | | | | |
|---|---|---|---|---|---|
| drawn | **SB** | coffey | client: | Opus International Consultants Pty Ltd | |
| approved | **BC** | | project: | Ellerton Drive Extension | |
| date | **20/06/2014** | | title: | **TEST PIT PROFILE** | |
| scale | **N.T.S.** | | project no: GEOTFYSH9703AA | fig no: **2** | rev: |
| original size | **A4** | | | | |

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# Engineering Log - Excavation

| | | | |
|---|---|---|---|
| | | Excavation ID. | ***TP03*** |
| | | sheet: | 1 of 1 |
| | | project no. | ***GEOTFYSH9703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** | date excavated: | ***15 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***15 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC*** |
| location: | ***Queanbeyan NSW*** | checked by: | ***DB*** |

position: E: 704698; N: 6085422 (WGS84 Zone 55) surface elevation : 618.55m (AHD) pit orientation:

equipment type: 13 Tonne Excavator excavation method: Excavator excavation dimensions: 2.7 m long 1.0 m wide DCP id.:

**excavation information** | **material substance**

| method | support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | DCP (blows/100 mm) 5 10 15 20 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | N | | None Observed | BX2 | 618.5 | 0.0 | | CL | **Sandy CLAY**: low plasticity, pale grey-brown, fine grained sand, with some fine grained, sub-angular gravel. | <Wp | F<br>H to Fb | | 17/70 mm | **COLLUVIUM** |
| | | | | | 618.0 | 0.5 | | | | | | | | |
| | | | | | 617.5 | 1.0 | | | | | | | | |
| | | | | | | | | CL | **Sandy CLAY**: low plasticity, mottled orange/grey, fine grained sand. | | | | | |
| | | | | D | 617.0 | 1.5 | | | | | | | | |
| | | | | | 616.5 | 2.0 | | | | | | | | |
| | | | | | 616.0 | 2.5 | | | | | | | | |
| | | | | | 615.5 | 3.0 | | | Test pit TP03 terminated at 3.0 m<br>Target depth | | | | | |
| | | | | | 615.0 | 3.5 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF EXCAVATION + PSP/DCP GEOTFYSH09703AA.GPJ <<DrawingFile>> 27/06/2014 15:41

**method**
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

**support**
- N none
- S shoring

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

**classification symbol & soil description**
based on Unified Classification System

**moisture**
- D dry
- M moist
- W wet
- $W_P$ plastic limit
- $W_L$ liquid limit

**consistency / relative density**

| | |
|---|---|
| VS | very soft |
| S | soft |
| F | firm |
| St | stiff |
| VSt | very stiff |
| H | hard |
| Fb | friable |
| VL | very loose |
| L | loose |
| MD | medium dense |
| D | dense |
| VD | very dense |

TP03

| | | | | | |
|---|---|---|---|---|---|
| drawn | SB | coffey | client: | Opus International Consultants Pty Ltd | |
| approved | BC | | project: | Ellerton Drive Extension | |
| date | 20/06/2014 | | title: | **TEST PIT PROFILE** | |
| scale | N.T.S. | | project no: GEOTFYSH9703AA | fig no: 3 | rev: |
| original size | A4 | | | | |

coffey

# Engineering Log - Excavation

| | | | |
|---|---|---|---|
| | | Excavation ID. | ***TP04*** |
| | | sheet: | 1 of 1 |
| | | project no. | ***GEOTFYSH9703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** | date excavated: | ***15 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***15 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC*** |
| location: | ***Queanbeyan NSW*** | checked by: | ***DB*** |

position: E: 704676; N: 6085384 (WGS84 Zone 55) surface elevation : 613.79m (AHD) pit orientation:

equipment type: 6 Tonne Excavator excavation method: Excavator excavation dimensions: 0.0 m long 0.0 m wide DCP id.:

**excavation information** | **material substance**

| method | support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description<br>**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | DCP (blows/100 mm) 5 10 15 20 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | N | | None Observed | BX2 | 613.5 | 0.5 | | CL | **Sandy CLAY**: low plasticity, pale grey, fine grained sand, trace fine grained, sub-angular gravel. | <Wp | F / H | | 25/20 mm | **COLLUVIUM** |
| | | | | | 613.0 | 1.0 | | CL | **Gravelly Silty CLAY**: low plasticity, pale orange, medium plasticity clay, medium grained, sub-angular to sub-rounded gravel, trace fine grained sand. | | | | | |
| | | | | | 612.5 | 1.5 | | | | | | | | |
| | | | | | 612.0 | 2.0 | | | **SHALE**: grey, highly weathered, low to medium strength. | | | | | **BEDROCK** |
| | | | | | 611.5 | 2.5 | | | Test pit TP04 terminated at 2.1 m<br>Refusal on Bedrock | | | | | |
| | | | | | 611.0 | 3.0 | | | | | | | | |
| | | | | | 610.5 | 3.5 | | | | | | | | |
| | | | | | 610.0 | | | | | | | | | |

CDF_0_9_04BA.GLB Log COF EXCAVATION + PSP/DCP GEOTFYSH09703AA.GPJ <<DrawingFile>> 27/06/2014 15:41

**method**
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

**support**
- N none
- S shoring

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

**classification symbol & soil description**
based on Unified Classification System

**moisture**
- D dry
- M moist
- W wet
- $W_P$ plastic limit
- $W_L$ liquid limit

**consistency / relative density**

| | |
|---|---|
| VS | very soft |
| S | soft |
| F | firm |
| St | stiff |
| VSt | very stiff |
| H | hard |
| Fb | friable |
| VL | very loose |
| L | loose |
| MD | medium dense |
| D | dense |
| VD | very dense |

TP04

| | | | | | |
|---|---|---|---|---|---|
| drawn | **SB** | coffey | client: | Opus International Consultants Pty Ltd | |
| approved | **BC** | | project: | Ellerton Drive Extension | |
| date | **20/06/2014** | | title: | **TEST PIT PROFILE** | |
| scale | **N.T.S.** | | project no: GEOTFYSH9703AA | fig no: **4** | rev: |
| original size | **A4** | | | | |

coffey

# Engineering Log - Excavation

| | | | |
|---|---|---|---|
| | | Excavation ID. | ***TP05*** |
| | | sheet: | 1 of 1 |
| | | project no. | ***GEOTFYSH9703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** | date excavated: | ***01 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***01 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC*** |
| location: | ***Queanbeyan NSW*** | checked by: | ***DB*** |

position: E: 704718; N: 6085386 (WGS84 Zone 55) surface elevation : 618.48m (AHD) pit orientation:

equipment type: 6 Tonne Excavator excavation method: Excavator excavation dimensions: 1.9 m long 0.5 m wide DCP id.:

**excavation information** | **material substance**

| method | support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | DCP (blows/100 mm) 5 10 15 20 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | N | | None Observed | D | 618.0 | 0.5 | | CL | **Sandy CLAY**: low plasticity, pale brown, fine grained sand. | <Wp | F / H | | 25/80 mm | **COLLUVIUM** |
| | | | | | 617.5 | 1.0 | | CL | **Sandy CLAY**: low plasticity, mottled orange/grey, fine grained sand, with some fine to medium grained, sub-angular gravel. | | | | | |
| | | | | D | 617.0 | 1.5 | | | **SHALE**: grey, highly weathered, low to medium strength. | | | | | **BEDROCK** |
| | | | | | | | | | Test pit TP05 terminated at 1.5 m<br>Refusal on Bedrock | | | | | |
| | | | | | 616.5 | 2.0 | | | | | | | | |
| | | | | | 616.0 | 2.5 | | | | | | | | |
| | | | | | 615.5 | 3.0 | | | | | | | | |
| | | | | | 615.0 | 3.5 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF EXCAVATION + PSP/DCP GEOTFYSH09703AA.GPJ <<DrawingFile>> 27/06/2014 15:41

**method**
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

**support**
- N none
- S shoring

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

**classification symbol & soil description** based on Unified Classification System

**moisture**
- D dry
- M moist
- W wet
- $W_P$ plastic limit
- $W_L$ liquid limit

**consistency / relative density**

| | |
|---|---|
| VS | very soft |
| S | soft |
| F | firm |
| St | stiff |
| VSt | very stiff |
| H | hard |
| Fb | friable |
| VL | very loose |
| L | loose |
| MD | medium dense |
| D | dense |
| VD | very dense |

TP05

| | | | | | |
|---|---|---|---|---|---|
| drawn | **SB** | coffey | client: | Opus International Consultants Pty Ltd | |
| approved | **BC** | | project: | Ellerton Drive Extension | |
| date | **20/06/2014** | | title: | **TEST PIT PROFILE** | |
| scale | **N.T.S.** | | project no: GEOTFYSH9703AA | fig no: **5** | rev: |
| original size | **A4** | | | | |

coffey

# Engineering Log - Excavation

| | | | |
|---|---|---|---|
| | | Excavation ID. | ***TP06*** |
| | | sheet: | 1 of 1 |
| | | project no. | ***GEOTFYSH9703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** | date excavated: | ***15 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***15 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC*** |
| location: | ***Queanbeyan NSW*** | checked by: | ***DB*** |

position: E: 704707; N: 6085333 (WGS84 Zone 55) surface elevation : 615.64m (AHD) pit orientation:

equipment type: 13 Tonne Excavator excavation method: Excavator excavation dimensions: 3.0 m long 1.0 m wide DCP id.:

**excavation information** | **material substance**

| method | support | penetration (1 2 3) | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (**SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | DCP (blows/100 mm) 5 10 15 20 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | N | | None Observed | | 615.5 | 0.5 | | CL | **Sandy CLAY**: low plasticity, pale brown, fine grained sand, trace fine grained, angular gravel. | <Wp | VSt<br>H to Fb | | 25/80 mm | **COLLUVIUM** |
| | | | | BX2 | 615.0 | | | | **SHALE**: grey, highly weathered, low to medium strength. | | | | | **BEDROCK** |
| | | | | | 614.5 | 1.0 | | | Test pit TP06 terminated at 0.9 m<br>Refusal on Bedrock | | | | | |
| | | | | | 614.0 | 1.5 | | | | | | | | |
| | | | | | 613.5 | 2.0 | | | | | | | | |
| | | | | | 613.0 | 2.5 | | | | | | | | |
| | | | | | 612.5 | 3.0 | | | | | | | | |
| | | | | | 612.0 | 3.5 | | | | | | | | |

CDF_0_9_04BA.GLB Log COF EXCAVATION + PSP/DCP GEOTFYSH09703AA.GPJ <<DrawingFile>> 27/06/2014 15:41

**method**
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

**support**
- N none
- S shoring

**penetration**
1 2 3 — no resistance ranging to refusal

**water**
10-Oct-12 water level on date shown
water inflow
water outflow

**samples & field tests**
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

**classification symbol & soil description** based on Unified Classification System

**moisture**
- D dry
- M moist
- W wet
- $W_P$ plastic limit
- $W_L$ liquid limit

**consistency / relative density**

| | |
|---|---|
| VS | very soft |
| S | soft |
| F | firm |
| St | stiff |
| VSt | very stiff |
| H | hard |
| Fb | friable |
| VL | very loose |
| L | loose |
| MD | medium dense |
| D | dense |
| VD | very dense |

TP06

| | | | | | |
|---|---|---|---|---|---|
| drawn | **SB** | coffey | client: | Opus International Consultants Pty Ltd | |
| approved | **BC** | | project: | Ellerton Drive Extension | |
| date | **20/06/2014** | | title: | **TEST PIT PROFILE** | |
| scale | **N.T.S.** | | project no: GEOTFYSH9703AA | fig no: **6** | rev: |
| original size | **A4** | | | | |

coffey

# Engineering Log - Excavation

| | | | |
|---|---|---|---|
| | | Excavation ID. | ***TP07*** |
| | | sheet: | 1 of 1 |
| | | project no. | ***GEOTFYSH9703AA*** |
| client: | ***Opus International Consultants Pty Ltd*** | date excavated: | ***15 May 2014*** |
| principal: | ***Queanbeyan City Council*** | date completed: | ***15 May 2014*** |
| project: | ***Ellerton Drive Extension*** | logged by: | ***BC*** |
| location: | ***Queanbeyan NSW*** | checked by: | ***DB*** |

position: E: 704738; N: 6085330 (WGS84 Zone 55) surface elevation : 619.21m (AHD) pit orientation:

equipment type: 13 Tonne Excavator excavation method: Excavator excavation dimensions: 3.1 m long 1.0 m wide DCP id.:

**excavation information** | **material substance**

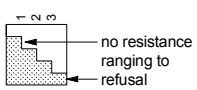
| method | support | penetration 1 2 3 | water | samples & field tests | RL (m) | depth (m) | graphic log | classification symbol | material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components) | moisture condition | consistency / relative density | hand penetrometer (kPa) 100 200 300 400 | DCP (blows/100 mm) 5 10 15 20 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | N | | None Observed | | 619.0 | 0.5 | | CL | **Gravelly CLAY**: low plasticity, pale brown, fine grained, angular gravel. | <Wp | VSt<br>H to Fb | | 25/50 mm | **COLLUVIUM** |
| | | | | | 618.5 | 1.0 | | | | | | | | |
| | | | | | 618.0 | 1.5 | | | | | | | | |
| | | | | | 617.5 | 2.0 | | | | | | | | |
| | | | | | 617.0 | 2.5 | | | **SHALE**: grey, highly weathered, low to medium strength. | | | | | **BEDROCK** |
| | | | | | 616.5 | 3.0 | | | Test pit TP07 terminated at 2.5 m<br>Refusal on Bedrock | | | | | |
| | | | | | 616.0 | 3.5 | | | | | | | | |
| | | | | | 615.5 | | | | | | | | | |

CDF_0_9_04BA.GLB Log COF EXCAVATION + PSP/DCP GEOTFYSH09703AA.GPJ <<DrawingFile>> 27/06/2014 15:41

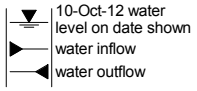
**method**
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

**support**
- N none
- S shoring

**penetration**




**water**




**samples & field tests**
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shear peak/remouded (uncorrected kPa)
- R refusal

**classification symbol & soil description**
based on Unified Classification System

**moisture**
- D dry
- M moist
- W wet
- $W_P$ plastic limit
- $W_L$ liquid limit

**consistency / relative density**

| | |
|---|---|
| VS | very soft |
| S | soft |
| F | firm |
| St | stiff |
| VSt | very stiff |
| H | hard |
| Fb | friable |
| VL | very loose |
| L | loose |
| MD | medium dense |
| D | dense |
| VD | very dense |