coffey geotechnics

Borehole No. **EBH013/MW1**

Sheet 1 of 1

# Engineering Log - Piezometer

Project No: **GEOTKARI02021AA**

Client: ***WYONG SHIRE COUNCIL***

Date started: ***13.9.2007***

Principal:

Date completed: ***13.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model & mounting: MOBILE DRILL | Easting: 356900 | slope: -90° | R.L. Surface: 50.36

hole diameter: 125MM | Northing: 6321242 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | well details | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | ▼ | E | | 50 | 1 | | | **FILL;** Clayey SAND, fine to coarse grained sand, dark grey, some gravel, some demolition rubble including concrete in top 1.5m | M | | FILL.<br>ASBESTOS SAMPLE COLLECTED.<br>MW FINISHED WITH MONUMENT ABOVE GROUND LEVEL. |
| | | | | E | | | | | | | | | |
| | | | | | | 49 | 2 | | | | W | | NO H.C. ODOUR |
| | | | | | | 48 | 3 | | | | | | |
| | | | | E | | | | | | | | | |
| | | | | | | 47 | 4 | | | | | | |
| | | | | E | | | | | | | | | DUP 8 |
| | | | | | | 46 | 5 | | CL | **Sandy CLAY;** Low plasticity, pale grey, medium to coarse grained sand. | M>PL | | RESIDUAL |
| | | | | | | 45 | 6 | | | Borehole terminated at 5.5m | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| RR | roller/tricone |
| W | washbore |
| CT | cable tool |
| DT | diatube |
| B | blank bit |
| V | V bit |
| T | TC bit |
| TBX | Tubex |

*bit shown by suffix e.g. ADT

**support**: C casing; N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: ▼ 10/1/98 water level on date shown; ► water inflow; ◄ water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| P | pressure meter |
| Bs | bulk sample |
| R | refusal |
| E | environmental sample |
| PID | PID measurement |
| WS | water sample |
| PZ | piezometer |
| ALT | air lift test |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Piezometer

Borehole No. **EBH014/MW2**

Sheet 1 of 1

Project No: **GEOTKARI02021AA**

Client: ***WYONG SHIRE COUNCIL***

Date started: ***14.9.2007***

Principal:

Date completed: ***14.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model & mounting: MOBILE DRILL | Easting: 357066 | slope: -90° | R.L. Surface: 36.06

hole diameter: 125MM | Northing: 6321280 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | well details | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | None Observed | E | | 36 | | | CL | **FILL;** Gravelly SAND, fine to medium grained sand, brown, fine to medium grained gravel. | D | | FILL FROM TRACK CONSTRUCTION. DUP 9 |
| | | | | | | | | | | **Sandy CLAY;** Medium plasticity, orange/brown, fine to medium grained sand. | M>WP | | ALLUVIAL<br>MW FINISHED WITH MONUMENT ABOVE GROUND LEVEL |
| | | | | E | | 35 | 1 | | | **SILTSTONE;** Pale grey/orange. | M | | EXTREMELY WEATHERED SILTSTONE. |
| | | | | | | 34 | 2 | | | | | | HIGHLY WEATHERED SILTSTONE |
| | | | | | | | 3 | | | | | | |
| | | | | | | 33 | | | | Borehole terminated at 3m | | | |
| | | | | | | 32 | 4 | | | | | | |
| | | | | | | 31 | 5 | | | | | | |
| | | | | | | | 6 | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| RR | roller/tricone |
| W | washbore |
| CT | cable tool |
| DT | diatube |
| B | blank bit |
| V | V bit |
| T | TC bit |
| TBX | Tubex |

*bit shown by suffix e.g. ADT

**support**

C casing N nil

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| P | pressure meter |
| Bs | bulk sample |
| R | refusal |
| E | environmental sample |
| PID | PID measurement |
| WS | water sample |
| PZ | piezometer |
| ALT | air lift test |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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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Borehole No. **EBH015/MW3**

Sheet 1 of 1

# Engineering Log - Piezometer

Project No: **GEOTKARI02021AA**

Client: ***WYONG SHIRE COUNCIL***

Date started: ***14.9.2007***

Principal:

Date completed: ***14.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model & mounting: MOBILE DRILL | Easting: 356939 | slope: -90° | R.L. Surface: 42.16

hole diameter: 125MM | Northing: 6321258 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | well details | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | | E | | 42 | | | SC | **FILL;** Gravelly SAND, fine to medium grained, brown, fine to medium grained gravel. | D | | FILL |
| | | | | | | | | | | **Clayey SAND;** Fine to medium grained, orange/grey, medium plasticity clay. | M | | COLLUVIUM |
| | | | | E | | | 1 | | | | | | WELL FINISHED WITH MONUMENT ABOVE GROUND LEVEL. |
| | | | | | | 41 | | | CL | **Sandy CLAY;** Medium plasticity, orange/grey, fine to medium grained sand. | M>WP | | RESIDUAL |
| | | | | | | | 2 | | | | | | |
| | | | | | | 40 | | | | **SANDSTONE;** Orange/pale grey. | M | | EXTREMELY WEATHERED BEDROCK. |
| | | | | | | | 3 | | | | | | |
| | | | | | | 39 | | | | Borehole terminated at 3m | | | |
| | | | | | | | 4 | | | | | | |
| | | | | | | 38 | | | | | | | |
| | | | | | | | 5 | | | | | | |
| | | | | | | 37 | | | | | | | |
| | | | | | | | 6 | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| RR | roller/tricone |
| W | washbore |
| CT | cable tool |
| DT | diatube |
| B | blank bit |
| V | V bit |
| T | TC bit |
| TBX | Tubex |

*bit shown by suffix e.g. ADT

**support**

C casing N nil

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| P | pressure meter |
| Bs | bulk sample |
| R | refusal |
| E | environmental sample |
| PID | PID measurement |
| WS | water sample |
| PZ | piezometer |
| ALT | air lift test |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 |

PIEZOMETER GEOTKARI02021AA.GPJ COFFEY.GDT 12.12.07

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# Engineering Log - Borehole

| | |
|---|---|
| Borehole No. | ***EBH016*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***14.9.2007*** |
| Principal: | |
| Date completed: | ***14.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | MOBILE DRILL | Easting: | 356874 | slope: | -90° | R.L. Surface: | 51.5 |
| hole diameter: | 125 mm | Northing | 6321282 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | None Observed | E | 51 | 1 | | | **FILL;** Gravelly SAND, fine to medium grained, brown, fine to medium grained gravel. | | | | FILL<br>DUP 10<br>NO H.C ODOUR |
| | | | | E | | | | | **FILL;** Gravelly SAND, fine to medium grained, brown/orange, fine to medium grained gravel. | | | | |
| | | | | E | 50 | 2 | | CL | **Sandy CLAY;** Medium plasticity, orange/grey, fine to medium grained sand. | | | | RESIDUAL |
| | | | | | 49 | 3 | | | Borehole EBH016 terminated at 2m | | | | |
| | | | | | 48 | 4 | | | | | | | |
| | | | | | 47 | 5 | | | | | | | |
| | | | | | 46 | 6 | | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration** 1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***EBH017*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***14.9.2007*** |
| Principal: | |
| Date completed: | ***14.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | MOBILE DRILL | Easting: | 356817 | slope: | -90° | R.L. Surface: | 55.5 |
| hole diameter: | 125 mm | Northing | 6321287 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | None Observed | E | 55 | 1 | | | **FILL;** Gravelly SAND, fine to medium grained, brown, fine to medium grained gravel. | D | | | FILL |
| | | | | E | | | | | **FILL;** Gravelly Sandy CLAY, Low plasticity, brown/orange, fine to medium grained sand and gravel. | D | | | NO H.C ODOUR |
| | | | | E | 54 | 2 | | CL | **Sandy CLAY;** Medium plasticity, orange/pale white, fine to medium grained sand. | M>wp | | | RESIDUAL |
| | | | | | 53 | 3 | | | | | | | EXTREMELY WEATHERED BEDROCK |
| | | | | | 52 | 4 | | | **SANDSTONE;** Orange/pale grey. | M | | | HIGHLY WEATHERED BEDROCK |
| | | | | | 51 | 5 | | | | | | | |
| | | | | | 50 | 6 | | | Borehole EBH017 terminated at 5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

Borehole No. **EBH018**

Sheet 1 of 1

Project No: **GEOTKARI02021AA**

Client: **WYONG SHIRE COUNCIL**

Date started: **14.9.2007**

Principal:

Date completed: **14.9.2007**

Project: **WARNERVALE TOWN CENTRE**

Logged by: **DH**

Borehole Location: **See Figure -**

Checked by: **SD**

drill model and mounting: MOBILE DRILL | Easting: 356832 | slope: -90° | R.L. Surface: 53.9

hole diameter: 125 mm | Northing 6321262 | bearing: | datum: AHD

| drilling information | | | | | | | material substance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
| ADT | | NIL | None Observed | E | | | | | **FILL;** Gravelly SAND, fine to medium grained, brown, fine to medium grained gravel. | D | | | FILL |
| | | | | E | 53 | 1 | | | | | | | |
| | | | | E | 52 | 2 | | | | | | | |
| | | | | E | 51 | 3 | | | **FILL;** Gravelly SAND, fine to medium grained, dark brown, fine to medium grained gravel. | M | | | FILL |
| | | | | E | 50 | 4 | | | | | | | DUP 11 |
| | | | | E | | | | CL | **Sandy CLAY;** Medium plasticitty, orange/brown, fine to medium grained sand. | M>WP | | | RESIDUAL |
| | | | | | 49 | 5 | | | Borehole EBH018 terminated at 4.5m | | | | |
| | | | | | 48 | 6 | | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil

C casing

**penetration** 1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 |

BOREHOLE GEOTKARI02021AA.GPJ COFFEY.GDT 12.12.07

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# Engineering Log - Borehole

| | |
|---|---|
| Borehole No. | ***EBH019*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***14.9.2007*** |
| Principal: | |
| Date completed: | ***14.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | MOBILE DRILL | Easting: | 356839 | slope: | -90° | R.L. Surface: | 53.5 |
| hole diameter: | 125 mm | Northing | 6321229 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | None Observed | E | | | | | **FILL;** Gravelly SAND, fine to medium grained, brown, fine to medium grained gravel. | D | | | FILL |
| | | | | | 53 | | | CL | **Sandy CLAY;** Medium plasticity, orange/brown, fine to medium grained sand. | M>WP | | | RESIDUAL |
| | | | | E | | 1 | | | | | | | |
| | | | | | 52 | 2 | | | Borehole EBH019 terminated at 1m | | | | |
| | | | | | 51 | 3 | | | | | | | |
| | | | | | 50 | 4 | | | | | | | |
| | | | | | 49 | 5 | | | | | | | |
| | | | | | 48 | 6 | | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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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Borehole No. **EBH020/MW4**

Sheet 1 of 1

# Engineering Log - Piezometer

Project No: **GEOTKARI02021AA**

Client: ***WYONG SHIRE COUNCIL***

Date started: ***17.9.2007***

Principal:

Date completed: ***17.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model & mounting: MOBILE DRILL | Easting: 356870 | slope: -90° | R.L. Surface: 53.62

hole diameter: 125MM | Northing: 6321205 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | well details | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | None Observed | E | | 53 | 1 | | | **FILL;** Gravelly SAND, fine to medium grained, brown, fine to medium grained gravel. | D | | FILL<br>DUP 12 |
| | | | | E | | | | | | **FILL;** Clayey SAND, fine to medium grained, brown/orange, medium plasticity clay. | M | | |
| | | | | | | 52 | 2 | | | | | | |
| | | | | | | | | | | **FILL;** Silty Clayey SAND, fine to medium grained, dark grey, medium plasticity clay, some non plastic fines. | M | | |
| | | | | | | 51 | 3 | | | | | | |
| | | | | | | 50 | 4 | | CL | **Sandy CLAY;** Medium plasticity, orange/brown, fine to medium grained sand, some fine to medium grained gravel. | M>WP | | RESIDUAL |
| | | | | | | 49 | 5 | | | Borehole terminated at 4.5m | | | |
| | | | | | | 48 | 6 | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| RR | roller/tricone |
| W | washbore |
| CT | cable tool |
| DT | diatube |
| B | blank bit |
| V | V bit |
| T | TC bit |
| TBX | Tubex |

*bit shown by suffix e.g. ADT

**support**

C casing N nil

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| P | pressure meter |
| Bs | bulk sample |
| R | refusal |
| E | environmental sample |
| PID | PID measurement |
| WS | water sample |
| PZ | piezometer |
| ALT | air lift test |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 geotechnics

Borehole No. **EBH021/MW5**

Sheet 1 of 1

# Engineering Log - Piezometer

Project No: **GEOTKARI02021AA**

Client: ***WYONG SHIRE COUNCIL***

Date started: ***17.9.2007***

Principal:

Date completed: ***17.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model & mounting: MOBILE DRILL | Easting: 356945 | slope: -90° | R.L. Surface: 53.4

hole diameter: 125MM | Northing: 6321171 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | well details | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | None Observed | E | | 53 | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained, brown/dark brown, some fine to medium grained gravels. | M | | TOPSOIL<br>WELL FINISHED WITH MONUMENT ABOVE GROUND LEVEL |
| | | | | E | | | 1 | | CL | **Sandy CLAY;** Medium plasticity, orange/brown, fine to medium grained sand. | M>WP | | RESIDUAL |
| | | | | | | 52 | | | | | | | EXTREMELY WEATHERED BEDROCK |
| | | | | | | 51 | 2 | | | | | | |
| | | | | | | | 3 | | | **SANDSTONE;** Pale grey/orange. | | | HIGHLY WEATHERED BEDROCK |
| | | | | | | | | | | Borehole terminated at 3m | | | |
| | | | | | | 50 | 4 | | | | | | |
| | | | | | | 49 | 5 | | | | | | |
| | | | | | | 48 | 6 | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| RR | roller/tricone |
| W | washbore |
| CT | cable tool |
| DT | diatube |
| B | blank bit |
| V | V bit |
| T | TC bit |
| TBX | Tubex |

*bit shown by suffix e.g. ADT

**support**

C casing N nil

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| P | pressure meter |
| Bs | bulk sample |
| R | refusal |
| E | environmental sample |
| PID | PID measurement |
| WS | water sample |
| PZ | piezometer |
| ALT | air lift test |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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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Borehole No. **EBH022/MW6**

Sheet 1 of 1

# Engineering Log - Piezometer

Project No: **GEOTKARI02021AA**

Client: ***WYONG SHIRE COUNCIL***

Date started: ***17.9.2007***

Principal:

Date completed: ***17.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model & mounting: MOBILE DRILL | Easting: 356967 | slope: -90° | R.L. Surface: 54.13

hole diameter: 125MM | Northing: 6321130 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | well details | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | None Observed | E | | 54 | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some low plasticity clay. | M | | TOPSOIL FILL? WELL FINISHED WITH MONUMENT ABOVE GROUND LEVEL. |
| | | | | E | | 53 | 1 | | SC | **FILL;** Clayey SAND, fine to medium grained, orange/brown, medium plasticity clay. | M | | FILL |
| | | | | | | 52 | 2 | | CL | **Sandy CLAY;** Medium plasticity, orange/brown, fine to medium grained sand. | M | | RESIDUAL |
| | | | | | | 51 | 3 | | CL | **Sandy silty CLAY;** High pasticity, pale grey/orange, fine to medium grained sand. | | | RESIDUAL |
| | | | | | | 50 | 4 | | | | | | |
| | | | | | | 49 | 5 | | | Borehole terminated at 4.5m | | | |
| | | | | | | | 6 | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| RR | roller/tricone |
| W | washbore |
| CT | cable tool |
| DT | diatube |
| B | blank bit |
| V | V bit |
| T | TC bit |
| TBX | Tubex |

*bit shown by suffix e.g. ADT

**support**

C casing N nil

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| P | pressure meter |
| Bs | bulk sample |
| R | refusal |
| E | environmental sample |
| PID | PID measurement |
| WS | water sample |
| PZ | piezometer |
| ALT | air lift test |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

Borehole No. **EBH023**

Sheet 1 of 1

Project No: **GEOTKARI02021AA**

Client: ***WYONG SHIRE COUNCIL***

Date started: ***17.9.2007***

Principal:

Date completed: ***17.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model and mounting: MOBILE DRILL | Easting: 356994 | slope: -90° | R.L. Surface: 50.5

hole diameter: 125 mm | Northing 6321105 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | None Observed | E | 50 | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some non-plastic fines. | D | | | TOPSOIL |
| | | | | E | | 1 | | | **SANDSTONE;** Orange-pale grey. | D | | | HIGHLY WEATHERED BEDROCK. |
| | | | | | 49 | | | | Borehole EBH023 terminated at 1m | | | | |
| | | | | | | 2 | | | | | | | |
| | | | | | 48 | | | | | | | | |
| | | | | | | 3 | | | | | | | |
| | | | | | 47 | | | | | | | | |
| | | | | | | 4 | | | | | | | |
| | | | | | 46 | | | | | | | | |
| | | | | | | 5 | | | | | | | |
| | | | | | 45 | | | | | | | | |
| | | | | | | 6 | | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil

C casing

**penetration** 1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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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Borehole No. ***EBH024/MW7***

Sheet 1 of 1

# Engineering Log - Piezometer

Project No: ***GEOTKARI02021AA***

Client: ***WYONG SHIRE COUNCIL***

Date started: ***17.9.2007***

Principal:

Date completed: ***17.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model & mounting: MOBILE DRILL | Easting: 356927 | slope: -90° | R.L. Surface: 53.33

hole diameter: 125MM | Northing: 6321142 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | well details | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | | E | | 53 | | | | **FILL;** Gravelly SAND, fine to medium grained sand, brown, fine to medium grained gravel. | M | | FILL. WELL FINISHED WITH MONUMENT ABOVE GROUND LEVEL. |
| | | | | SPT | | | 1 | | | **FILL;** Clayey SAND, fine to medium grained sand, grey/brown, low to medium plasticity clay. | M | | FILL |
| | | | | | | 52 | | | | | | | |
| | | | | | | | 2 | | | **FILL;** Sandy CLAY, medium plasticity, grey/brown, fine to medium grained sand. | M>WP | | FILL. |
| | | | | | | 51 | | | | | W | | |
| | | | | | | | 3 | | | **SANDSTONE;** Orange/pale grey. | M | | MODERATELY WEATHERED BEDROCK |
| | | | | | | 50 | 4 | | | | | | |
| | | | | | | 49 | | | | | | | |
| | | | | | | | 5 | | | Borehole terminated at 4.5m | | | |
| | | | | | | 48 | | | | | | | |
| | | | | | | | 6 | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| RR | roller/tricone |
| W | washbore |
| CT | cable tool |
| DT | diatube |
| B | blank bit |
| V | V bit |
| T | TC bit |
| TBX | Tubex |

*bit shown by suffix e.g. ADT

**support**: C casing, N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: 10/1/98 water level on date shown; water inflow; water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| P | pressure meter |
| Bs | bulk sample |
| R | refusal |
| E | environmental sample |
| PID | PID measurement |
| WS | water sample |
| PZ | piezometer |
| ALT | air lift test |

**classification symbols and soil description**: based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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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Borehole No. **EBH025/MW8**

Sheet 1 of 1

# Engineering Log - Piezometer

Project No: **GEOTKARI02021AA**

Client: ***WYONG SHIRE COUNCIL***

Date started: ***17.9.2007***

Principal:

Date completed: ***17.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model & mounting: MOBILE DRILL | Easting: 356876 | slope: -90° | R.L. Surface: 53.92

hole diameter: 125MM | Northing: 6321175 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | well details | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | None Observed | E | | | | | | **FILL;** Silty SAND, fine to medium grained sand, dark brown, non-plastic fines. | M | | FILL. DUP 13<br>WELL FINISHED WITH MONUMENT |
| | | | | E | | 53 | 1 | | | **FILL;** Clayey SAND, fine to medium grained sand, orange/brown, low plasticity clay. | M | | FILL |
| | | | | | | 52 | 2 | | CL | **Sandy CLAY;** Medium plasticity, orange/grey, fine to medium grained sand. | M>WP | | RESIDUAL |
| | | | | | | 51 | 3 | | | **SANDSTONE;** Orange/pale grey. | M | | MODERATELY WEATHERED BEDROCK |
| | | | | | | 50 | 4 | | | | | | |
| | | | | | | 49 | 5 | | | Borehole terminated at 4.5m | | | |
| | | | | | | 48 | 6 | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| RR | roller/tricone |
| W | washbore |
| CT | cable tool |
| DT | diatube |
| B | blank bit |
| V | V bit |
| T | TC bit |
| TBX | Tubex |

*bit shown by suffix e.g. ADT

**support**

C casing N nil

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| P | pressure meter |
| Bs | bulk sample |
| R | refusal |
| E | environmental sample |
| PID | PID measurement |
| WS | water sample |
| PZ | piezometer |
| ALT | air lift test |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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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Borehole No. **EBH026/MW9**

Sheet 1 of 1

# Engineering Log - Piezometer

Project No: **GEOTKARI02021AA**

Client: ***WYONG SHIRE COUNCIL***

Date started: ***17.9.2007***

Principal:

Date completed: ***17.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model & mounting: MOBILE DRILL | Easting: 356856 | slope: -90° | R.L. Surface: 52.73

hole diameter: 125MM | Northing: 6321251 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | well details | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADT | | NIL | | E | | | | | | **FILL;** Gravelly SAND, fihne to medium grained sand, brown, fine to medium grained gravel. | D | | FILL. WELL FINISHED WITH MONUMENT ABOVE GROUND LEVEL. |
| | | | | SPT | | 52 | 1 | | | | | | |
| | | | | | | 51 | 2 | | | | | | |
| | | | | SPT | | 50 | 3 | | | **FILL;** Sandy CLAY, medium plasticity, grey/brown, fine to medium grained sand. | M>WP | | FILL |
| | | | | | | 49 | 4 | | | | | | |
| | | | | | | 48 | 5 | | | | | | ADT REFUSAL ON SANDSTONE BEDROCK |
| | | | | | | 47 | 6 | | | Borehole terminated at 5.5m | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| RR | roller/tricone |
| W | washbore |
| CT | cable tool |
| DT | diatube |
| B | blank bit |
| V | V bit |
| T | TC bit |
| TBX | Tubex |

*bit shown by suffix e.g. ADT

**support**

C casing N nil

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| P | pressure meter |
| Bs | bulk sample |
| R | refusal |
| E | environmental sample |
| PID | PID measurement |
| WS | water sample |
| PZ | piezometer |
| ALT | air lift test |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA01*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***24.9.2007*** |
| Principal: | |
| Date completed: | ***24.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357001 | slope: | -90° | R.L. Surface: | 50.1 |
| hole diameter: | 50 mm | Northing | 6321414 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | 50.0 | | | SM | **TOPSOIL;** Silty SAND, Fine to medium grained sand, brown. | D | | | TOPSOIL<br>DUP 49 |
| | | | | E | | 0.5 | | | **SANDSTONE;** Orange, pale grey. | D | | | HIGHLY WEATHERED BEDROCK. |
| | | | | | 49.5 | 1.0 | | | Borehole HA01 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 geotechnics

Borehole No. **HA02**

Sheet 1 of 1

Project No: **GEOTKARI02021AA**

# Engineering Log - Borehole

Client: ***WYONG SHIRE COUNCIL***

Date started: ***24.9.2007***

Principal:

Date completed: ***24.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model and mounting: HAND AUGER | Easting: 356982 | slope: -90° | R.L. Surface: 51.5

hole diameter: 50 mm | Northing 6321457 | bearing: | datum: AHD

| drilling information | | | | | | | material substance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material<br>soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL |
| | | | | E | 51.0 | 0.5 | | | **SANDSTONE;** Orange/pale grey. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | | 50.5 | 1.0 | | | Borehole HA02 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil

C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 geotechnics

# Engineering Log - Borehole

| | |
|---|---|
| Borehole No. | ***HA03*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***24.9.2007*** |
| Principal: | |
| Date completed: | ***24.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356928 | slope: | -90° | R.L. Surface: | 41 |
| hole diameter: | 50 mm | Northing | 6321516 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, dark brown. | D | | | TOPSOIL |
| | | | | E | 40.5 | 0.5 | | | **SANDSTONE;** Orange/pale grey. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | | 40.0 | 1.0 | | | Borehole HA03 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**: M mud, C casing, N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: 10/1/98 water level on date shown; water inflow; water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA04*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***24.9.2007*** |
| Principal: | |
| Date completed: | ***24.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356893 | slope: | -90° | R.L. Surface: | 40 |
| hole diameter: | 50 mm | Northing | 6321516 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL<br>DUP 50 |
| | | | | E | 39.5 | 0.5 | | CL | **Sandy CLAY;** Medium plasticity, orange/brown, fine to medium grained sand. | M<WP | | | RESIDUAL |
| | | | | | 39.0 | 1.0 | | | Borehole HA04 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA05*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***24.9.2007*** |
| Principal: | |
| Date completed: | ***24.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356865 | slope: | -90° | R.L. Surface: | 50.5 |
| hole diameter: | 50 mm | Northing | 6321444 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | D | | | TOPSOIL |
| | | | | | | | | CL | **Sandy CLAY;** Medium plasticity, orange/brown, fine to medium grained sand, some fine to medium grained gravel. | M<WP | | | RESIDUAL |
| | | | | E | 50.0 | 0.5 | | | | | | | |
| | | | | | 49.5 | 1.0 | | | Borehole HA05 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA06*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***24.9.2007*** |
| Principal: | |
| Date completed: | ***24.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356871 | slope: | -90° | R.L. Surface: | 53.5 |
| hole diameter: | 50 mm | Northing | 6321346 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, dark brown. | D | | | TOPSOIL |
| | | | | E | 53.0 | 0.5 | | | **SANDSTONE;** Orange/pale grey. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | | 52.5 | 1.0 | | | Borehole HA06 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**: M mud, C casing, N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: 10/1/98 water level on date shown; water inflow; water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA07*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***27.9.2007*** |
| Principal: | |
| Date completed: | ***27.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356967 | slope: | -90° | R.L. Surface: | 51 |
| hole diameter: | 50 mm | Northing | 6321386 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | D | | | TOPSOIL. DUP 56 |
| | | | | | | | | CL | **Sandy CLAY;** Medium plasticity, orange/brown, fine to medium grained sand. | M<WP | | | RESIDUAL |
| | | | | E | 50.5 | 0.5 | | | | | | | |
| | | | | | 50.0 | 1.0 | | | Borehole HA07 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA08*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***27.9.2007*** |
| Principal: | |
| Date completed: | ***27.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356827 | slope: | -90° | R.L. Surface: | 54 |
| hole diameter: | 50 mm | Northing | 6321325 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | | **FILL;** Gravelly SAND, fine to medium grained sand, brown, fine to medium grained gravel, some low plasticity clay. | D | | | FILL |
| | | | | E | | | | | | | | | |
| | | | | | 53.5 | 0.5 | | CL | **Sandy CLAY;** Medium plasticity, orange/brown, fine to medium grained sand. | | | | RESIDUAL |
| | | | | E | 53.0 | 1.0 | | | Borehole HA08 terminated at 1m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

Borehole No. **HA09**

Sheet 1 of 1

Project No: **GEOTKARI02021AA**

Client: **WYONG SHIRE COUNCIL**

Date started: **27.9.2007**

Principal:

Date completed: **27.9.2007**

Project: **WARNERVALE TOWN CENTRE**

Logged by: **DH**

Borehole Location: **See Figure -**

Checked by: **SD**

drill model and mounting: HAND AUGER | Easting: 356823 | slope: -90° | R.L. Surface: 54.5

hole diameter: 50 mm | Northing 6321303 | bearing: | datum: AHD

| drilling information | | | | | | | material substance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material<br>soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
| HA | | NIL | None Observed | E | | | | | **FILL;** Gravelly SAND, fine to medium grained sand, brown, fine to medium grained gravel, some low plasticity clay. | D | | | FILL |
| | | | | E | 54.0 | 0.5 | | | | | | | HA REFUSAL AT 0.5M |
| | | | | | 53.5 | 1.0 | | | Borehole HA09 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil

C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 |

BOREHOLE GEOTKARI02021AA.GPJ COFFEY.GDT 12.12.07

Form GEO 5.3 Issue 3 Rev.2

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# Engineering Log - Borehole

Borehole No. ***HA10***

Sheet 1 of 1

Project No: ***GEOTKARI02021AA***

Client: ***WYONG SHIRE COUNCIL***

Date started: ***27.9.2007***

Principal:

Date completed: ***27.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model and mounting: HAND AUGER | Easting: 356845 | slope: -90° | R.L. Surface: 53.9

hole diameter: 50 mm | Northing 6321299 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | | **FILL;** Gravelly SAND, fine to medium grained sand, brown, fine to medium grained gravel, some low plasticity clay. | D | | | FILL |
| | | | | | 53.5 | | | | | | | | |
| | | | | E | | 0.5 | | | | | | | HA REFUSAL AT 0.5M |
| | | | | | 53.0 | | | | Borehole HA10 terminated at 0.5m | | | | |
| | | | | | | 1.0 | | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil

C casing

**penetration** 1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

Borehole No. ***HA11***

Sheet 1 of 1

Project No: ***GEOTKARI02021AA***

Client: ***WYONG SHIRE COUNCIL***

Date started: ***27.9.2007***

Principal:

Date completed: ***27.9.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model and mounting: HAND AUGER | Easting: 356849 | slope: -90° | R.L. Surface: 53.5

hole diameter: 50 mm | Northing 6321299 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetrometer kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | | **FILL;** Gravelly SAND, fine to medium grained sand, brown, fine to medium grained gravel, some low plasticity clay. | D | | | FILL. DUP 57 |
| | | | | E | 53.0 | 0.5 | | | | | | | HA REFUSAL AT 0.5M |
| | | | | | 52.5 | 1.0 | | | Borehole HA11 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil

C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA12*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***27.9.2007*** |
| Principal: | |
| Date completed: | ***27.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356815 | slope: | -90° | R.L. Surface: | 54.5 |
| hole diameter: | 50 mm | Northing | 6321260 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine grained gravel. | D | | | TOPSOIL |
| | | | | | | | | | **SANDSTONE;** Orange/brown. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | E | 54.0 | 0.5 | | | | | | | |
| | | | | | 53.5 | 1.0 | | | Borehole HA12 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**: M mud, C casing, N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: 10/1/98 water level on date shown; water inflow; water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA13*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***27.9.2007*** |
| Principal: | |
| Date completed: | ***27.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356812 | slope: | -90° | R.L. Surface: | 53.5 |
| hole diameter: | 50 mm | Northing | 6321242 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | D | | | TOPSOIL |
| | | | | | | | | | **SANDSTONE;** Orange/brown. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | E | 53.0 | 0.5 | | | | | | | |
| | | | | | 52.5 | 1.0 | | | Borehole HA13 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**: M mud, C casing, N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: 10/1/98 water level on date shown; water inflow; water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA14*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***27.9.2007*** |
| Principal: | |
| Date completed: | ***27.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356809 | slope: | -90° | R.L. Surface: | 47 |
| hole diameter: | 50 mm | Northing | 6321180 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | | | | TOPSOIL |
| | | | | E | 46.5 | 0.5 | | | **SANDSTONE;** Orange/pale grey. | | | | HIGHLY WEATHERED BEDROCK |
| | | | | | 46.0 | 1.0 | | | Borehole HA14 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA15*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***27.9.2007*** |
| Principal: | |
| Date completed: | ***27.9.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356836 | slope: | -90° | R.L. Surface: | 47.5 |
| hole diameter: | 50 mm | Northing | 6321157 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | Nil | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | D | | | TOPSOIL |
| | | | | E | 47.0 | 0.5 | | | **SANDSTONE;** Orange/brown. | D | | | HIGHLY WEATHERED BEDROCK. DUP 58 |
| | | | | | 46.5 | 1.0 | | | Borehole HA15 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA16*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357006 | slope: | -90° | R.L. Surface: | 45.5 |
| hole diameter: | 50 mm | Northing | 6321347 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL. DUP 59 |
| | | | | E | 45.0 | 0.5 | | | **SANDSTONE;** Orange/brown. | | | | EXTREMELY WEATHERED BEDROCK |
| | | | | | 44.5 | 1.0 | | | Borehole HA16 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**: M mud, C casing, N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: 10/1/98 water level on date shown; water inflow; water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA17*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357048 | slope: | -90° | R.L. Surface: | 41 |
| hole diameter: | 50 mm | Northing | 6321346 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL |
| | | | | E | 40.5 | 0.5 | | | **SANDSTONE;** Orange/brown. | D | | | EXTREMELY WEATHERED BEDROCK. |
| | | | | | 40.0 | 1.0 | | | Borehole HA17 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 geotechnics

# Engineering Log - Borehole

| | |
|---|---|
| Borehole No. | ***HA18*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357011 | slope: | -90° | R.L. Surface: | 43 |
| hole diameter: | 50 mm | Northing | 6321315 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | D | | | TOPSOIL |
| | | | | | | | | | **SANDSTONE;** Orange/brown. | D | | | EXTREMELY WEATHERED BEDROCK. |
| | | | | E | 42.5 | 0.5 | | | | | | | |
| | | | | | 42.0 | 1.0 | | | Borehole HA18 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 geotechnics

# Engineering Log - Borehole

| | |
|---|---|
| Borehole No. | ***HA19*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357046 | slope: | -90° | R.L. Surface: | 38.5 |
| hole diameter: | 50 mm | Northing | 6321301 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | Nil | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, fine to medium grained gravel. | D | | | TOPSOIL |
| | | | | E | 38.0 | 0.5 | | | **SANDSTONE;** Orange/brown. | | | | EXTREMELY WEATHERED BEDROCK. |
| | | | | | 37.5 | 1.0 | | | Borehole HA19 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA20*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356975 | slope: | -90° | R.L. Surface: | 44.5 |
| hole diameter: | 50 mm | Northing | 6321290 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL |
| | | | | E | 44.0 | 0.5 | | | **SANDSTONE;** Orange/brown. | D | | | EXTREMELY WEATHERED BEDROCK. DUP 60 |
| | | | | | 43.5 | 1.0 | | | Borehole HA20 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA21*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357029 | slope: | -90° | R.L. Surface: | 38.5 |
| hole diameter: | 50 mm | Northing | 6321261 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL |
| | | | | E | 38.0 | 0.5 | | | **SANDSTONE;** Orange/brown. | D | | | EXTREMELY WEATHERED BEDROCK |
| | | | | | 37.5 | 1.0 | | | Borehole HA21 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA22*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357000 | slope: | -90° | R.L. Surface: | 40.5 |
| hole diameter: | 50 mm | Northing | 6321239 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL |
| | | | | E | 40.0 | 0.5 | | | **SANDSTONE;** Orange/brown | D | | | EXTREMELY WEATHERED BEDROCK. |
| | | | | | 39.5 | 1.0 | | | Borehole HA22 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**: M mud, C casing, N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: 10/1/98 water level on date shown; water inflow; water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA23*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357037 | slope: | -90° | R.L. Surface: | 39.5 |
| hole diameter: | 50 mm | Northing | 6321226 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | D | | | TOPSOIL |
| | | | | | | | | | **SANDSTONE;** Orange/brown. | D | | | EXTREMELY WEATHERED BEDROCK |
| | | | | E | 39.0 | 0.5 | | | | | | | |
| | | | | | | | | | Borehole HA23 terminated at 0.5m | | | | |
| | | | | | 38.5 | 1.0 | | | | | | | |

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Form GEO 5.3 Issue 3 Rev.2

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA24*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357092 | slope: | -90° | R.L. Surface: | 37.5 |
| hole diameter: | 50 mm | Northing | 6321216 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL |
| | | | | | | | | | **SANDSTONE;** Orange/brown. | D | | | EXTREMELY WEATHERED BEDROCK |
| | | | | E | 37.0 | 0.5 | | | | | | | |
| | | | | | 36.5 | 1.0 | | | Borehole HA24 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**: M mud, C casing, N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: 10/1/98 water level on date shown; water inflow; water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA25*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357101 | slope: | -90° | R.L. Surface: | 39.5 |
| hole diameter: | 50 mm | Northing | 6321178 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL. DUP 61 |
| | | | | E | 39.0 | 0.5 | | | **SANDSTONE;** Orange/brown. | D | | | EXTREMELY WEATHERED BEDROCK. |
| | | | | | 38.5 | 1.0 | | | Borehole HA25 terminated at 0.5m | | | | |

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**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA26*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356940 | slope: | -90° | R.L. Surface: | 49 |
| hole diameter: | 50 mm | Northing | 6321326 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | D | | | TOPSOIL. DUP 62 |
| | | | | | | | | | **SANDSTONE;** Orange/brown. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | E | 48.5 | 0.5 | | | | | | | |
| | | | | | 48.0 | 1.0 | | | Borehole HA26 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

Borehole No. ***HA27***

Sheet 1 of 1

Project No: ***GEOTKARI02021AA***

Client: ***WYONG SHIRE COUNCIL***

Date started: ***4.10.2007***

Principal:

Date completed: ***4.10.2007***

Project: ***WARNERVALE TOWN CENTRE***

Logged by: ***DH***

Borehole Location: ***See Figure -***

Checked by: ***SD***

drill model and mounting: HAND AUGER | Easting: 357001 | slope: -90° | R.L. Surface: 44

hole diameter: 50 mm | Northing 6321202 | bearing: | datum: AHD

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetrometer kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL |
| | | | | E | 43.5 | 0.5 | | | **SANDSTONE;** Orange/brown. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | | 43.0 | 1.0 | | | Borehole HA27 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil

C casing

**penetration** 1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA28*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | | Easting: | 357037 | slope: | -90° | R.L. Surface: |
| hole diameter: | 50 mm | | Northing | 6321186 | bearing: | | datum: AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL |
| | | | | E | | 0.5 | | | **SANDSTONE;** Orange/brown. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | | | 1.0 | | | Borehole HA28 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**: M mud, C casing, N nil

**penetration**: 1 2 3 4 — no resistance ranging to refusal

**water**: 10/1/98 water level on date shown; water inflow; water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description** based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA29*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 357066 | slope: | -90° | R.L. Surface: | 44.5 |
| hole diameter: | 50 mm | Northing | 6321158 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | D | | | TOPSOIL |
| | | | | | | | | | **SANDSTONE;** Orange/brown. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | E | 44.0 | 0.5 | | | | | | | |
| | | | | | 43.5 | 1.0 | | | Borehole HA29 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

| | |
|---|---|
| Borehole No. | ***HA30*** |
| Sheet | 1 of 1 |
| Project No: | ***GEOTKARI02021AA*** |
| Client: | ***WYONG SHIRE COUNCIL*** |
| Date started: | ***4.10.2007*** |
| Principal: | |
| Date completed: | ***4.10.2007*** |
| Project: | ***WARNERVALE TOWN CENTRE*** |
| Logged by: | ***DH*** |
| Borehole Location: | ***See Figure -*** |
| Checked by: | ***SD*** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| drill model and mounting: | HAND AUGER | Easting: | 356994 | slope: | -90° | R.L. Surface: | 49 |
| hole diameter: | 50 mm | Northing | 6321160 | bearing: | | datum: | AHD |

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

| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material: soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown, some fine to medium grained gravel. | D | | | TOPSOIL |
| | | | | | | | | | **SANDSTONE;** Orange/brown. | D | | | HIGHLY WEATHERED BEDROCK. |
| | | | | E | | | | | | | | | DUP 63 |
| | | | | | 48.5 | 0.5 | | | Borehole HA30 terminated at 0.5m | | | | |
| | | | | | 48.0 | 1.0 | | | | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil
C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown
water inflow
water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**
based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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 - Borehole

Borehole No. **HA31**

Sheet 1 of 1

Project No: **GEOTKARI02021AA**

Client: **WYONG SHIRE COUNCIL**

Date started: **4.10.2007**

Principal:

Date completed: **4.10.2007**

Project: **WARNERVALE TOWN CENTRE**

Logged by: **DH**

Borehole Location: **See Figure -**

Checked by: **SD**

drill model and mounting: HAND AUGER | Easting: 357021 | slope: -90° | R.L. Surface: 49

hole diameter: 50 mm | Northing 6321128 | bearing: | datum: AHD

| drilling information | | | | | | | material substance | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| method | penetration 1 2 3 | support | water | notes samples, tests, etc | RL | depth metres | graphic log | classification symbol | material<br>soil type: plasticity or particle characteristics, colour, secondary and minor components. | moisture condition | consistency/ density index | pocket penetro-meter kPa 100 200 300 400 | structure and additional observations |
| HA | | NIL | None Observed | E | | | | SM | **TOPSOIL;** Silty SAND, fine to medium grained sand, brown. | D | | | TOPSOIL |
| | | | | E | 48.5 | 0.5 | | | **SANDSTONE;** Orange/brown. | D | | | HIGHLY WEATHERED BEDROCK |
| | | | | | 48.0 | 1.0 | | | Borehole HA31 terminated at 0.5m | | | | |

**method**

| | |
|---|---|
| AS | auger screwing* |
| AD | auger drilling* |
| 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. ADT

**support**

M mud N nil

C casing

**penetration**

1 2 3 4 — no resistance ranging to refusal

**water**

10/1/98 water level on date shown

water inflow

water outflow

**notes, samples, tests**

| | |
|---|---|
| $U_{50}$ | undisturbed sample 50mm diameter |
| $U_{63}$ | undisturbed sample 63mm diameter |
| D | disturbed sample |
| N | standard penetration test (SPT) |
| N* | SPT - sample recovered |
| Nc | SPT with solid cone |
| V | vane shear (kPa) |
| P | pressuremeter |
| Bs | bulk sample |
| E | environmental sample |
| R | refusal |

**classification symbols and soil description**

based on unified classification system

**moisture**

| | |
|---|---|
| D | dry |
| M | moist |
| W | wet |
| Wp | plastic limit |
| $W_L$ | liquid limit |

**consistency/density index**

| | |
|---|---|
| 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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