Annexure E –
Hydrogeochemical plots
### Annexure E – Figures

#### Piper diagrams

<table>
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<tr>
<th>E1.1</th>
<th>All Lithologies – June 2016</th>
<th>E3.3</th>
<th>Ashfield Shale – Aug 2016</th>
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<td>E1.2</td>
<td>All Lithologies – July 2016</td>
<td>E3.4</td>
<td>Ashfield Shale – Sep 2016</td>
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<td>E1.3</td>
<td>All Lithologies – Aug 2016</td>
<td>E3.5</td>
<td>Ashfield Shale – Oct 2016</td>
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<td>E1.4</td>
<td>All Lithologies – Sep 2016</td>
<td>E3.6</td>
<td>Ashfield Shale – Nov 2016</td>
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<td>All Lithologies – Oct 2016</td>
<td>E3.7</td>
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<td>All Lithologies – Jan 2017</td>
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<td>All Lithologies – Feb 2017</td>
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<td>All Lithologies – March 2017</td>
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<td>E1.11</td>
<td>All Lithologies – April 2017</td>
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<td>Hawkesbury Sandstone – June 2016</td>
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<td>E1.12</td>
<td>All Lithologies – May 2017</td>
<td>E4.2</td>
<td>Hawkesbury Sandstone – July 2016</td>
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<td>Alluvium – June 2016</td>
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<td>E2.11</td>
<td>Alluvium – April 2017</td>
<td>E5.1</td>
<td>Alluvium June 2016 – May 2017</td>
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<td>Alluvium – May 2017</td>
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<td>Ashfield Shale June 2016 – May 2017</td>
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Annexure E – Figures

Schoeller Diagrams – Metals

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E6.2 Alluvium at Rozelle RZ_BH01s
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E6.7 Alluvium at The Crescent TC_BH06s
E6.8 Alluvium at The Crescent TC_BH07s
E6.9 Alluvium at The Crescent TC_BH08s
E6.10 Alluvium at The Crescent TC_BH09s
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E7.2 Ashfield Shale at St Peters SP_BH01
E7.3 Ashfield Shale at St Peters SP_BH02
E7.4 Ashfield Shale at St Peters SP_BH04
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E8.2 Hawkesbury Sandstone at Haberfield precinct HB_BH12
E8.3 Hawkesbury Sandstone at Rozelle precinct RZ_BH01d
E8.4 Hawkesbury Sandstone at Rozelle precinct RZ_BH26
E8.4a Hawkesbury Sandstone at Rozelle precinct RZ_BH26
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Title: Piper Diagram Aquifer: All lithologies Figure: E1.2
Project: M4-M5 Link WestConnex Month: July 2016 Project No: 60493796
Client: Sydney Motorway Corporation Location: Inner West Sydney

EXPLANATION
- Hawkesbury Sandstone
- Sea Water
- Alluvium
- Ashfield Shale

All lithologies July 2016

Ca$^{2+}$, Mg$^{2+}$, SO$_4^{2-}$, Cl$^-$

Mg$^{2+}$

Ca$^{2+}$

CATIONS

ANIONS

CO$_3^{2-}$, HCO$_3^{-}$

SO$_4^{2-}$
Title: Piper Diagram Aquifer: All lithologies
Project: M4-M5 Link WestConnex
Client: Sydney Motorway Corporation
Location: Inner West Sydney
Month: August 2016
Figure: E1.3
Project No: 60493796
All lithologies April 2017

EXPLANATION
- Hawkesbury Sandstone
- Sea Water
- Alluvium
- Ashfield Shale

Title: Piper Diagram
Project: M4-M5 Link WestConnex
Client: Sydney Motorway Corporation
Location: Inner West Sydney
Aquifer: All lithologies
Month: April 2017
Figure: E1.11
Project No: 60493796
Title: Piper Diagram
Project: M4-M5 Link WestConnex
Client: Sydney Motorway Corporation
Location: Inner West Sydney
Aquifer: Alluvium
Month: August 2016
Figure: E2.3
Project No: 60493796
EXPLANATION

- Alluvium
- Sea Water

Alluvium May 2017

CATIONS

Anions

SO₄²⁻ + Cl⁻

Ca²⁺ + Mg²⁺

Na⁺ + K⁺

CO₃²⁻ + HCO₃⁻

Cl⁻
EXPLANATION

- Ashfield Shale
- Sea Water

Ashfield Shale August 2016

Title: Piper Diagram
Project: M4-M5 Link WestConnex
Client: Sydney Motorway Corporation
Location: Inner West Sydney
Aquifer: Ashfield Shale
Month: August 2016
Client: Sydney Motorway Corporation

Figure: E3.3
Project No: 60493796
Title: Piper Diagram
Project: M4-M5 Link WestConnex
Client: Sydney Motorway Corporation
Location: Inner West Sydney
Aquifer: Ashfield Shale
Month: January 2017
Figure: E3.8
Project No: 60493796
EXPLANATION
- Shale
- Sea Water

Ashfield Shale March 2017

M4-M5 Link WestConnex
Sydney Motorway Corporation
Inner West Sydney

March 2017

Figure: E3.10
Project No: 60493796
Title: Piper Diagram Aquifer: Hawkesbury Sandstone
Project: M4-M5 Link WestConnex
Client: Sydney Motorway Corporation
Location: Inner West Sydney
Month: January 2017
Project No: 60493796
Figure: E4.8

EXPLANATION
- Hawkesbury Sandstone
- Sea Water

Hawkesbury Sandstone January 2017
EXPLANATION
- Hawkesbury Sandstone
- Sea Water

Hawkesbury Sandstone April 2017

Title: Piper Diagram
Project: M4-M5 Link WestConnex
Client: Sydney Motorway Corporation
Location: Inner West Sydney
Aquifer: Hawkesbury Sandstone
Month: April 2017
Figure: E4.11
Project No: 60493796
Hawkesbury Sandstone May 2017

EXPLANATION
- Hawkesbury Sandstone
- Sea Water

So_{4}^{2-} + Cl^{-}
Ca^{2+} + Mg^{2+}

Mg^{2+}
Na^{+} + K^{+}

Ca^{2+}

CO_{3}^{2-} + HCO_{3}^{-}

SO_{4}^{2-}

Cl^{-}
EXPLANATION

- June 2016
- July 2016
- August 2016
- September 2016
- October 2016
- November 2016
- December 2016
- January 2017
- February 2017
- March 2017
- April 2017
- May 2017

Hawkesbury Sandstone Monthly
HB_BH08S Jun 2016

0.00001 0.001 0.1 10 1000

As Cd Cr Cu Fe Pb Mn Hg Ni Zn

Concentration (mg/L)

HB_BH08S Jul 2016

0.00001 0.001 0.1 10 1000

As Cd Cr Cu Fe Pb Mn Hg Ni Zn

Concentration (mg/L)

HB_BH08S Aug 2016

0.00001 0.001 0.1 10 1000

As Cd Cr Cu Fe Pb Mn Hg Ni Zn

Concentration (mg/L)

HB_BH08s Oct 2016

0.00001 0.001 0.1 10 1000

As Cd Cr Cu Fe Pb Mn Hg Ni Zn

Concentration (mg/L)

HB_BH08s Nov 2016

0.00001 0.001 0.1 10 1000

As Cd Cr Cu Fe Pb Mn Hg Ni Zn

Concentration (mg/L)

HB_BH08s Mar 2017

0.00001 0.001 0.1 10 1000

As Cd Cr Cu Fe Pb Mn Hg Ni Zn

Concentration (mg/L)

HB_BH08s Apr 2017

0.00001 0.001 0.1 10 1000

As Cd Cr Cu Fe Pb Mn Hg Ni Zn

Concentration (mg/L)

HB_BH08s May 2017

0.00001 0.001 0.1 10 1000

As Cd Cr Cu Fe Pb Mn Hg Ni Zn

Concentration (mg/L)
Schoeller Diagrams - Metals - RZ_BH01s

Concentration (mg/L)

As Cd Cr Cu Fe Pb Mn Hg Ni Zn

RZ_BH01s Oct 2016

RZ_BH01s Nov 2016

RZ_BH01s Dec 2016

RZ_BH01s Jan 2017

RZ_BH01s Feb 2017

RZ_BH01s Mar 2017

RZ_BH01s Apr 2017

RZ_BH01s May 2017
Client: Sydney Motorway Corporation
Project: M4-M5 Link
Title: Schoeller Diagrams - Metals - TC_BH08s
Alluvium - The Crescent
Title: Schoeller Diagrams - Metals - SP_BH04

Ashfield Shale - St Peters

Concentration (mg/L)

As, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Zn

SP_BH04 Oct 2016

SP_BH04 Nov 2016

SP_BH04 Dec 2016

SP_BH04 Jan 2017

SP_BH04 Feb 2017

SP_BH04 Mar 2017

SP_BH04 Apr 2017

SP_BH04 May 2017
Schoeller Diagrams - Metals - SP_BH06 and SP_BH09
Ashfield Shale - St Peters

As  Cd  Cr  Cu  Fe  Pb  Mn  Hg  Ni  Zn

SP_BH06 Nov 2016

SP_BH06 Dec 2016

SP_BH09 Jul 2016

Concentration (mg/L)
Client: Sydney Motorway Corporation
Project: M4-M5 Link
Title: Schoeller Diagrams - Metals - RZ_BH26
Hawkesbury Sandstone - Rozelle Precinct

RZ_BH26 Jul 2016

RZ_BH26 Aug 2016

RZ_BH26 Sep 2016

RZ_BH26 Oct 2016

RZ_BH26 Nov 2016

RZ_BH26 Dec 2016

RZ_BH26 Jan 2017

RZ_BH26 Feb 2017

RZ_BH26 Mar 2017

RZ_BH26d Apr 2017

Figure E8.4
As Cd Cr Cu Fe Pb Mn Hg Ni Zn

Concentration (mg/L)

RZ_BH26 May 2017

Client: Sydney Motorway Corporation
Project: M4-M5 Link
Title: Schoeller Diagrams - Metals - RZ_BH26
       Hawkesbury Sandstone - Rozelle Precinct
### Field Data

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<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
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<td>Run 23</td>
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<tr>
<td>Run 24</td>
<td>100</td>
<td>98</td>
<td></td>
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<tr>
<td>Run 25</td>
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<tr>
<td>Run 31</td>
<td>100</td>
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<tr>
<td>Run 32</td>
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<tr>
<td>Run 33</td>
<td>100</td>
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<tr>
<td>Run 34</td>
<td>100</td>
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<tr>
<td>Run 35</td>
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<tr>
<td>Run 36</td>
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<tr>
<td>Run 37</td>
<td>100</td>
<td>98</td>
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</tbody>
</table>

### Rock Description

- **SANDSTONE, medium to coarse grained, light grey continued**
  - Depth 28.0 to 35.0 m
- **SANDSTONE, coarse grained, light grey**
  - Depth 35.0 to 50.0 m
- **LAMINITE**
- **SANDSTONE, medium to coarse grained, light grey**
  - CM_BH01 Terminated at 50.00 m.

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 26.0 mBGL
- **Screen Top:** 23.0 mBGL
- **Screen/Sensor Base:** 26.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 1/09/2016
- **Development Date:** -
Summary Geology (refer to geological log for full descriptions)

- ASPHALT
- Gravelly SAND
- CONCRETE
- Sandy GRAVEL, coarse grained, brown
- Sandy CLAY, red-brown
- CLAY, black
- CLAY, red
- MUDSTONE, pale grey
- MUDSTONE, dark grey and dark brown
- MUDSTONE, dark grey
- INTERBEDDED MUDSTONE AND SANDSTONE
- SANDSTONE, medium grained, light grey
- NO CORE
- SANDSTONE, medium grained, light grey
- BENTONITE
- FILTER SAND
- PVC SLOTTED SECTION WITH FILTER SAND
- FILTER SAND
- BENTONITE + CEMENT

REMETHS:
GROUNDWATER MONITORING NOTES:
Summary Geology
(refer to geological log for full descriptions)

- SANDSTONE, medium grained, light grey continued
- SANDSTONE, fine grained, grey
- SANDSTONE, medium grained, grey

CM_BH04 Terminated at 40.00 m.
**Summary Geology**
(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Asphalt</th>
<th>Sandy GRAVEL, fine and coarse grained, grey</th>
<th>Silty CLAY, red, mottled orange</th>
<th>Silty CLAY, light grey, mottled pink</th>
<th>MUDSTONE</th>
<th>MUDSTONE, light grey, mottled red, brown</th>
<th>MUDSTONE</th>
<th>NO CORE</th>
<th>MUDSTONE</th>
<th>MUDSTONE</th>
<th>LAMINITE</th>
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<tbody>
<tr>
<td>0.0 to 0.5 m</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0.5 to 21.0 m</td>
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<td></td>
<td></td>
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<tr>
<td>23.0 to 25.0 m</td>
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**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 m BGL
- **Pipe Base:** 28.0 m BGL
- **Screen Top:** 28.0 m BGL
- **Screen/Sensor Base:** 25.0 m BGL
- **Instrument Details:**
- **Installation Date:** 19/05/2016
- **Development Date:**

**Groundwater Details**

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<tr>
<th>Depth (m)</th>
<th>GATIC COVER</th>
<th>GROUT</th>
<th>BENTONITE</th>
<th>FILTER SAND</th>
<th>PVC SLOTTED SECTION WITH FILTER SAND</th>
<th>FILTER SAND</th>
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<tbody>
<tr>
<td>0.0 to 0.5 m</td>
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<tr>
<td>0.5 to 21.0 m</td>
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</tr>
<tr>
<td>21.0 to 23.0 m</td>
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<td>23.0 to 25.0 m</td>
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<td>25.0 to 30.0 m</td>
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**Remarks:**

**Groundwater Monitoring Notes:**
Summary Geology (refer to geological log for full descriptions)

SANDSTONE, medium grained, light grey

SANDSTONE, medium grained, light grey

Depth 30.0 to 32.0 m

BENTONITE

BENTONITE + CEMENT

Depth 32.0 to 50.0 m

SANDSTONE, medium grained, light grey continued

CM_BH06 Terminated at 50.00 m.
**Field Data**

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<th>Run 1</th>
<th>Run 2</th>
<th>Run 3</th>
<th>Run 4</th>
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<th>Run 13</th>
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**Rock Description**

- ASPHALT
- Sandy GRAVEL, medium to coarse grained, dark grey
- Silty CLAY, light grey, mottled red
- MUDSTONE, red, mottled light grey
- MUDSTONE, red, mottled light grey and brown
- NO CORE
- MUDSTONE, light grey, mottled red
- MUDSTONE, red-brown
- Silty CLAY, light brown
- MUDSTONE, grey
- LAMINITE
- MUDSTONE
- SANDSTONE, fine grained, brown-grey
- SANDSTONE, fine grained, grey
- SANDSTONE, medium to coarse grained, light grey

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 30.0 mBGL
- **Screen Top:** 27.0 mBGL
- **Screen/Sensor Base:** 30.0 mBGL
- **Instrument Details:**
- **Installation Date:** 31/05/2016
- **Development Date:**

**Ground Water**

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</tr>
<tr>
<td>26.0</td>
<td>10.0</td>
</tr>
<tr>
<td>28.0</td>
<td>8.0</td>
</tr>
<tr>
<td>30.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>

**Summary Geology** (refer to geological log for full descriptions)

- Depth 0.0 to 0.5 m
- Depth 0.5 to 23.0 m
- Depth 23.0 to 25.0 m
- Depth 25.0 to 27.0 m
- Depth 27.0 to 30.0 m

**Remarks:**

- GROUT
- BENTONITE
- FILTER SAND
- PVC SLOTTED SECTION WITH FILTER SAND

**Groundwater Monitoring Notes:**

- Hydromax Scout
- Hagstrom Drilling Pty Ltd

**Project Details:**

- **Client:** Sydney Motorway Corporation
- **Project:** M4-M5 Link Geotech Investigation
- **Location:** Opp 37A Arundel St, Camperdown
- **Driller:** Hagstrom Drilling Pty Ltd
- **Drill Rig:** Hydromax Scout
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A

**Important Dates:**

- **Start Date:** 27/05/2016
- **End Date:** 31/05/2016
- **Eastings:** 332503.6 m
- **Nortings:** 6249167.8 m
- **RL:** 34.82 m
- **Ver. Datum:** AHD
- **Hor. Proj/Dat:** MGA94/GDA94-56H

**Logged by:** LH
**Checked by:** BF

**Additional Details:**

- **Company:** Hydromax Scout
- **Machine slotted PVC pipe**
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 30.0 mBGL
- **Screen Top:** 27.0 mBGL
- **Screen/Sensor Base:** 30.0 mBGL
- **Instrument Details:**
- **Installation Date:** 31/05/2016
- **Development Date:**
**GATIC COVER**

**BENTONITE**

**FILTER SAND**

**PVC SLOTTED SECTION WITH FILTER SAND**

**BENTONITE + CEMENT**

**ASPHALT**

Sandy GRAVEL, grey

Silty CLAY, light brown

LAMINITE, light brown-grey to dark brown-grey

NO CORE

MUDSTONE

SANDSTONE, medium grained, light grey

LAMINITE, light brown-grey to dark brown-grey

MUDSTONE

MUDSTONE, dark grey

**Defect Spacing (mm)**

**Ground Water**

- **Depth 0.0 to 0.5 m**
- **Depth 0.5 to 1.0 m**
- **Depth 1.0 to 1.5 m**
- **Depth 1.5 to 2.0 m**
- **Depth 2.0 to 3.0 m**

*Summary Geology (refer to geological log for full descriptions)*

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 m BGL
- **Pipe Base:** 20.0 m BGL
- **Screen Top:** 17.0 m BGL
- **Screen/Sensor Base:** 20.0 m BGL
- **Instrument Details:**
- **Installation Date:** 13/05/2016
- **Development Date:**

**Field Data**

**Run 1**

- **Core Run:** 48
- **TDR (%):** 74
- **Inclination:** -90°
- **Bearing:** N/A

**Run 2**

- **Core Run:** 48
- **TDR (%):** 17
- **Inclination:** -90°
- **Bearing:** N/A

**Run 3**

- **Core Run:** 48
- **TDR (%):** 17
- **Inclination:** -90°
- **Bearing:** N/A

**Run 4**

- **Core Run:** 48
- **TDR (%):** 34
- **Inclination:** -90°
- **Bearing:** N/A

**Run 5**

- **Core Run:** 48
- **TDR (%):** 83
- **Inclination:** -90°
- **Bearing:** N/A

**Run 6**

- **Core Run:** 48
- **TDR (%):** 100
- **Inclination:** -90°
- **Bearing:** N/A

**Run 7**

- **Core Run:** 48
- **TDR (%):** 93
- **Inclination:** -90°
- **Bearing:** N/A

**Run 8**

- **Core Run:** 48
- **TDR (%):** 100
- **Inclination:** -90°
- **Bearing:** N/A

**Run 9**

- **Core Run:** 48
- **TDR (%):** 100
- **Inclination:** -90°
- **Bearing:** N/A

**REMGS: GROUNDWATER MONITORING NOTES:**
### Summary Geology
(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Defect Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.1</td>
<td>Depth 0.0 to 0.1 m</td>
</tr>
<tr>
<td>0.1 to 1.0</td>
<td>Depth 0.1 to 1.0 m</td>
</tr>
<tr>
<td>1.0 to 5.8</td>
<td>Depth 1.0 to 5.8 m</td>
</tr>
<tr>
<td>5.8 to 7.8</td>
<td>Depth 5.8 to 7.8 m</td>
</tr>
<tr>
<td>7.8 to 10.0</td>
<td>Depth 7.8 to 10.0 m</td>
</tr>
<tr>
<td>10.0 to 13.0</td>
<td>Depth 10.0 to 13.0 m</td>
</tr>
<tr>
<td>13.0 to 15.0</td>
<td>Depth 13.0 to 15.0 m</td>
</tr>
</tbody>
</table>

### Rock Description

- Sandy GRAVEL, coarse grained, dark grey
- SAND, medium grained, red
- NO CORE
- SANDSTONE, coarse grained, dark brown-red
- SANDSTONE, fine to medium grained, light grey-pink
- NO CORE
- SANDSTONE, fine to medium grained, light grey-pink
- SANDSTONE, medium grained, light grey-pink
- SANDSTONE, fine grained, dark grey and light grey
- SANDSTONE, medium grained, light grey

### Piezometer Details

- **Construction Details:**
  - Pipe Diameter: 50 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 10.0 mBGL
  - Screen Top: 10.0 mBGL
  - Screen/Sensor Base: 13.0 mBGL
  - Instrument Details: -
  - Installation Date: 24/10/2016
  - Development Date: -

- **Graphic Log:**
  - EP_BH06 Terminated at 15.00 m.

### Remarks:
GROUNDWATER MONITORING NOTES:
**Client:** Sydney Motorway Corporation  
**Project:** M4-M5 Link Geotech Investigation  
**Location:** Cnr Martin St, City West Link  
**Driller:** Hagstrom Drilling Pty Ltd  
**Hole Diameter:** 96 mm  
**Inclination:** -90°  
**Bearing:** N/A  

### Summary Geology
(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Depth Range</th>
<th>Rock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.5 m</td>
<td>Silty SAND, fine to medium grained, dark brown</td>
</tr>
<tr>
<td>0.5 to 1.0 m</td>
<td>Clayey SAND, fine to medium grained, brown to yellow-brown</td>
</tr>
<tr>
<td>1.0 to 10.7 m</td>
<td>Sandy CLAY, yellow-brown, mottled brown</td>
</tr>
<tr>
<td>10.7 to 13.0 m</td>
<td>Silty SAND, fine to medium grained, dark grey</td>
</tr>
<tr>
<td>13.0 to 17.0 m</td>
<td>SANDSTONE, fine to coarse grained, orange to orange-brown</td>
</tr>
<tr>
<td>17.0 to 28.9 m</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
</tr>
<tr>
<td>28.9 to 50.0 m</td>
<td>SANDSTONE, medium to coarse grained, light grey and light yellow-brown</td>
</tr>
<tr>
<td>50.0 to 2016 m</td>
<td>SANDSTONE, coarse grained, light grey</td>
</tr>
</tbody>
</table>

### Piezometer Details

**Construction Details:** Machine slotted PVC pipe  
**Pipe Diameter:** 50 mm  
**Pipe Top:** 0.0 mBGL  
**Pipe Base:** 14.0 mBGL  
**Screen Top:** 14.0 mBGL  
**Screen/Sensor Base:** 17.0 mBGL  
**Instrument Details:** -  
**Installation Date:** 6/05/2016  
**Development Date:** -

**Groundwater Monitoring Notes:**

**REMARKS:**

- **Field Data**
  - **Method:** HA
  - **Core Run:** Run 1
  - **Graphic Log:** -
  - **Defect Spacing:** (mm)
  - **Summary Geology:** (refer to geological log for full descriptions)

- **Rock Description:**
  - Silty SAND, fine to medium grained, dark brown
  - Clayey SAND, fine to medium grained, brown to yellow-brown
  - Sandy CLAY, yellow-brown, mottled brown
  - Silty SAND, fine to medium grained, dark grey
  - SANDSTONE, fine to coarse grained, orange to orange-brown
  - SANDSTONE, medium to coarse grained, yellow-brown
  - SANDSTONE, medium to coarse grained, light grey
  - NO CORE
  - SANDSTONE, medium to coarse grained, light grey and yellow-brown
  - SANDSTONE, medium to coarse grained, light grey and light yellow-brown
  - SANDSTONE, coarse grained, light grey
  - SANDSTONE, medium to coarse grained, light grey
  - SANDSTONE, fine grained, grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, fine to medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, coarse grained, light grey

**Engineering Log**

**Client:** NF
**Project:** M4-M5 Link Geotech Investigation  
**Location:** Cnr Martin St, City West Link  
**Driller:** Hagstrom Drilling Pty Ltd  
**Hole Diameter:** 96 mm  
**Inclination:** -90°  
**Bearing:** N/A  

**REMARKS:**

- **Groundwater Monitoring Notes:**

**ENGINEERING LOG**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
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<tbody>
<tr>
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<td>0.0</td>
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<td>48.0</td>
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</tr>
<tr>
<td>50.0</td>
<td>-48.0</td>
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</table>

**REMARKS:**

- GROUNDWATER MONITORING NOTES:
**Summary Geology**

Ground Water

<table>
<thead>
<tr>
<th>Defect Spacing (mm)</th>
<th>Rock Description</th>
<th>Defect Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>SANDSTONE, coarse grained, light grey</td>
<td>0.0</td>
</tr>
<tr>
<td>0.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
<td>0.0</td>
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<tr>
<td>0.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
<td>0.0</td>
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<td>0.0</td>
<td>SANDSTONE, medium grained, light grey</td>
<td>0.0</td>
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<tr>
<td>0.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
<td>0.0</td>
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<tr>
<td>0.0</td>
<td>SANDSTONE, coarse grained, light grey</td>
<td>0.0</td>
</tr>
<tr>
<td>0.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
<td>0.0</td>
</tr>
<tr>
<td>0.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
<td>0.0</td>
</tr>
<tr>
<td>0.0</td>
<td>SANDSTONE, medium grained, light grey</td>
<td>0.0</td>
</tr>
<tr>
<td>0.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
<td>0.0</td>
</tr>
<tr>
<td>0.0</td>
<td>SANDSTONE, coarse grained, light grey</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Groundwater Monitoring Notes:**

HB_BH02 Terminated at 50.00 m.
**Summary Geology (refer to geological log for full descriptions)**

- **Ground Water**
  - **Ground Water Note:**
  - **Einheit:**
  - **Flaum:**

**Piezometer Details**

- **Construction Details:**
  - **Pipe Diameter:** 50 mm
  - **Pipe Top:** 0.0 mBGL
  - **Pipe Base:** 19.6 mBGL
  - **Screen Top:** 14.6 mBGL
  - **Screen/Sensor Base:** 17.6 mBGL
- **Instrument Details:**
  - **Installation Date:** 1/07/2016
  - **Development Date:** -

**Remarks:** The material properties are taken from the adjacent borehole HB_BH03.
Summary Geology (refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Rock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.5</td>
<td>Sandy Silt, dark brown</td>
</tr>
<tr>
<td>0.5 to 1.0</td>
<td>Sandy Silt, dark brown to grey</td>
</tr>
<tr>
<td>1.0 to 1.77</td>
<td>Clayey Sand, fine to medium grained, dark grey-brown</td>
</tr>
<tr>
<td>1.77 to 2.0</td>
<td>Silty Sand, fine to medium grained, grey</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Sand, fine to coarse grained, dark grey</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Silty Clay, dark grey-brown</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Sandy Clay, dark grey-brown</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Silty Sand, fine to medium grained, dark grey</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Sandstone, light grey, mottled yellow-brown</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Sandstone, medium to coarse grained, light grey-brown</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Sandstone, medium grained, light grey</td>
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<tr>
<td>2.0 to 2.0</td>
<td>Sandstone, medium to coarse grained, light grey</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Sandstone, medium grained, light grey</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Mudstone</td>
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<tr>
<td>2.0 to 2.0</td>
<td>Sandstone, medium to coarse grained, light grey</td>
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<tr>
<td>2.0 to 2.0</td>
<td>Sandstone, medium grained, light grey</td>
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<tr>
<td>2.0 to 2.0</td>
<td>Sandstone, fine to medium grained, light brown-grey</td>
</tr>
<tr>
<td>2.0 to 2.0</td>
<td>Sandstone, medium to coarse grained, light grey</td>
</tr>
</tbody>
</table>

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 m BGL
- **Pipe Base:** 25.0 m BGL
- **Screen Top:** 22.0 m BGL
- **Screen/Sensor Base:** 25.0 m BGL
- **Instrument Details:** -
- **Installation Date:** 11/05/2016
- **Development Date:** -

**Ground Water**

**Defect Spacing (mm)**

- Depth 0.0 to 0.5 m —
- Depth 0.5 to 1.0 m —
- Depth 1.0 to 1.77 m —
- Depth 17.7 to 20.0 m —
- Depth 20.0 to 22.0 m —
- Depth 22.0 to 25.0 m —
- Depth 25.0 to 27.0 m —
- Depth 27.0 to 32.0 m —

**Remarks:**

GROUNDWATER MONITORING NOTES:

- **Hydrapower Scout**
- **Hagstrom Drilling Pty Ltd**

**Field Data**

- **Core Run:** Run 1
- **RQD (%):** 80
- **Ground Water:** Reduced Level (m)
  - 0.0
  - -2.0
  - -4.0
  - -6.0
  - -8.0
  - -10.0
  - -12.0
  - -14.0
  - -16.0
  - -18.0
  - -20.0
  - -22.0
  - -24.0
  - -26.0
  - -28.0
  - -30.0

**Graphic Log**

- **Method:** WA
- **Driller:** Hagstrom Drilling Pty Ltd
- **Drill Rig:** Hydrapower Scout
- **Location:** Richard Murden Res, Hawthorne Pde, Haberfield
- **Driller:** Hagstrom Drilling Pty Ltd
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A

**Engineering Log**

- **Client:** Sydney Motorway Corporation
- **Project:** M4-M5 Link Geotech Investigation
- **Location:** Richard Murden Res, Hawthorne Pde, Haberfield
- **Driller:** Hagstrom Drilling Pty Ltd
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A
- **Date:** 10/05/2016

**Horizontal Datum:** 1.58 m

**Surface:** Grass

**Flowmeter:**

- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 m BGL
- **Pipe Base:** 25.0 m BGL
- **Screen Top:** 22.0 m BGL
- **Screen/Sensor Base:** 25.0 m BGL
- **Instrument Details:** -
- **Installation Date:** 11/05/2016
- **Development Date:** -

**Ground Water Table**

- **Depth (m):**
  - 0.0 to 0.5 m
  - 0.5 to 1.0 m
  - 1.0 to 1.77 m
  - 17.7 to 20.0 m
  - 20.0 to 22.0 m
  - 22.0 to 25.0 m
  - 25.0 to 27.0 m
  - 27.0 to 32.0 m

**Summary Geology**

- Sandy Silt, dark brown
- Sandy Silt, dark brown to grey
- Clayey Sand, fine to medium grained, dark grey-brown
- Silty Sand, fine to medium grained, grey
- Sand, fine to coarse grained, dark grey-brown
- Silty Clay, dark grey-brown
- Sandy Clay, dark grey-brown
- Silty Clay, dark grey-brown
- Silty Sand, fine to medium grained, dark grey
- Sandstone, light grey, mottled yellow-brown
- Sandstone, medium to coarse grained, light grey and light yellow-brown
- Sandstone, medium grained, light grey
- Sandstone, medium to coarse grained, light grey
- Sandstone, medium grained, light grey
- Sandstone, fine to medium grained, light brown-grey
- Sandstone, medium to coarse grained, light grey

**Remarks:**

- **GROUNDWATER MONITORING NOTES:**
  - Hydrapower Scout
  - Hagstrom Drilling Pty Ltd

**Field Data**

- **Core Run:** Run 1
- **RQD (%):** 80
- **Ground Water:** Reduced Level (m)
  - 0.0
  - -2.0
  - -4.0
  - -6.0
  - -8.0
  - -10.0
  - -12.0
  - -14.0
  - -16.0
  - -18.0
  - -20.0
  - -22.0
  - -24.0
  - -26.0
  - -28.0
  - -30.0

**Graphic Log**

- **Method:** WA
- **Driller:** Hagstrom Drilling Pty Ltd
- **Drill Rig:** Hydrapower Scout
- **Location:** Richard Murden Res, Hawthorne Pde, Haberfield
- **Driller:** Hagstrom Drilling Pty Ltd
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A
- **Date:** 10/05/2016

**Horizontal Datum:** 1.58 m

**Surface:** Grass

**Flowmeter:**

- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 m BGL
- **Pipe Base:** 25.0 m BGL
- **Screen Top:** 22.0 m BGL
- **Screen/Sensor Base:** 25.0 m BGL
- **Instrument Details:** -
- **Installation Date:** 11/05/2016
- **Development Date:** -

**Ground Water Table**

- **Depth (m):**
  - 0.0 to 0.5 m
  - 0.5 to 1.0 m
  - 1.0 to 1.77 m
  - 17.7 to 20.0 m
  - 20.0 to 22.0 m
  - 22.0 to 25.0 m
  - 25.0 to 27.0 m
  - 27.0 to 32.0 m

**Summary Geology**

- Sandy silt, dark brown
- Sandy silt, dark brown to grey
- Clayey sand, fine to medium grained, dark grey-brown
- Silty sand, fine to medium grained, grey
- Sand, fine to coarse grained, dark grey-brown
- Silty clay, dark grey-brown
- Sandy clay, dark grey-brown
- Silty clay, dark grey-brown
- Silty sand, fine to medium grained, dark grey
- Sandstone, light grey, mottled yellow-brown
- Sandstone, medium to coarse grained, light grey and light yellow-brown
- Sandstone, medium grained, light grey
- Sandstone, medium to coarse grained, light grey
- Sandstone, medium grained, light grey
- Sandstone, fine to medium grained, light brown-grey
- Sandstone, medium to coarse grained, light grey

**Remarks:**

- **GROUNDWATER MONITORING NOTES:**
  - Hydrapower Scout
  - Hagstrom Drilling Pty Ltd
### Field Data

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
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<tbody>
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<tr>
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<td>-56.0</td>
</tr>
<tr>
<td>60.0</td>
<td>-58.0</td>
</tr>
</tbody>
</table>

### Rock Description

- **SANDSTONE**
  - Medium grained, light grey
  - Medium to coarse grained, light grey
- **BENTONITE**

### Piezometer Details

- **Construction Details:**
  - **Machine slotted PVC pipe**
  - **Pipe Diameter:** 50 mm
  - **Pipe Top:** 0.0 mBGL
  - **Pipe Base:** 25.0 mBGL
  - **Screen Top:** 22.0 mBGL
  - **Screen/Sensor Base:** 25.0 mBGL
- **Installation Date:** 11/05/2016
- **Development Date:** -

### Remarks

**GROUNDWATER MONITORING NOTES:**
**Ground Water**

- **Depth (m)**
  - 2.0
  - 4.0
  - 6.0
  - 8.0
  - 10.0
  - 12.0
  - 14.0
  - 16.0
  - 18.0
  - 20.0
  - 22.0
  - 24.0
  - 26.0
  - 28.0
  - 30.0

- **Reduced Level (m)**
  - 0.0
  - -2.0
  - -4.0
  - -6.0
  - -8.0
  - -10.0
  - -12.0
  - -14.0
  - -16.0
  - -18.0
  - -20.0
  - -22.0
  - -24.0
  - -26.0
  - -28.0

**Piezometer Details**

- **Construction Details**: Machine slotted PVC pipe
- **Pipe Diameter**: 50 mm
- **Pipe Top**: 0.0 mBGL
- **Pipe Base**: 12.4 mBGL
- **Screen Top**: 9.4 mBGL
- **Screen/Sensor Base**: 12.4 mBGL
- **Instrument Details**: 12.4 mBGL
- **Installation Date**: 11/05/2016
- **Development Date**: -

**Summary Geology**

<table>
<thead>
<tr>
<th>Defect Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth 0.0 to 0.5 m</td>
</tr>
<tr>
<td>Depth 0.5 to 1.0 m</td>
</tr>
<tr>
<td>Depth 1.0 to 6.0 m</td>
</tr>
<tr>
<td>Depth 6.0 to 8.4 m</td>
</tr>
<tr>
<td>Depth 8.4 to 9.4 m</td>
</tr>
<tr>
<td>Depth 9.4 to 12.4 m</td>
</tr>
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**Field Data**

<table>
<thead>
<tr>
<th>Method</th>
<th>Core Run</th>
<th>RQD (%)</th>
<th>Ground Water Level (m)</th>
<th>Depth (m)</th>
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<tbody>
<tr>
<td>WA</td>
<td>10</td>
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<td>Reduced Level</td>
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</table>

**Driller**: Hagstrom Drilling Pty Ltd

**Hole Diameter**: 96 mm

**Inclination**: -90°

**Bearing**: N/A

**Drill Rig**: HydраОw Power Scout

**Hole Diameter**: 96 mm

**Inclination**: -90°

**Bearing**: N/A

**Construction Details**: Machine slotted PVC pipe

**Pipe Diameter**: 50 mm

**Pipe Top**: 0.0 mBGL

**Pipe Base**: 12.4 mBGL

**Screen Top**: 9.4 mBGL

**Screen/Sensor Base**: 12.4 mBGL

**Instrument Details**: 12.4 mBGL

**Installation Date**: 11/05/2016

**Development Date**: -

**Ground Water Monitoring Notes**:

- **Remarks**: The material properties are taken from the adjacent borehole HB_BH08

**Summary Geology**

- Sandy SILT, dark brown
- Sandy SILT, dark brown to grey
- Sandy CLAY, dark grey
- Clayey SAND, fine to medium grained, dark grey-brown
- Silty SAND, fine to medium grained, grey
- SAND, fine to coarse grained, dark grey-brown
- Silty CLAY, dark grey-brown
- Sandy CLAY, dark grey-brown
- Silty CLAY, dark grey-brown
- Silty SAND, fine to medium grained, dark grey

**Piezometer Details**

- **Construction Details**: Machine slotted PVC pipe
- **Pipe Diameter**: 50 mm
- **Pipe Top**: 0.0 mBGL
- **Pipe Base**: 12.4 mBGL
- **Screen Top**: 9.4 mBGL
- **Screen/Sensor Base**: 12.4 mBGL
- **Instrument Details**: 12.4 mBGL
- **Installation Date**: 11/05/2016
- **Development Date**: -

**HB_BH08A Terminated at 12.40 m.**
### Field Data

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<tr>
<th>Depth (m)</th>
<th>Graphic Log</th>
</tr>
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<td>56.0</td>
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<tr>
<td>58.0</td>
<td></td>
</tr>
<tr>
<td>60.0</td>
<td></td>
</tr>
</tbody>
</table>

### Rock Description

- **SANDSTONE, medium to coarse grained, brown-grey**
- **SANDSTONE, fine to medium grained, brown-grey**
- **INTERBEDDED SHALE/SANDSTONE**
- **SANDSTONE, fine to medium grained, light grey continued**
- **SANDSTONE, fine to medium grained, grey**
- **SANDSTONE, fine to medium grained, grey**
- **SANDSTONE, fine to medium grained, brown-grey**
- **NO CORE**
- **SANDSTONE, fine to medium grained, brown-grey**

### Piezometer Details

- **Piezometer No.:** HB_BH12
- **Terminated at:** 40.00 m

---

**Summary Geology** (refer to geological log for full descriptions)

- **Depth 30.0 to 31.8 m**
- **Depth 31.8 to 36.0 m**
- **Depth 36.0 to 40.0 m**

---

**Mission Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 30.0 mBGL
- **Screen Top:** 27.0 mBGL
- **Screen/Sensor Base:** 30.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 23/06/2016
- **Development Date:** -

---

**Remarks:**

- GROUNDWATER MONITORING NOTES:
**Groundwater Monitoring Notes:**

- **Hydrapower Scout**
- **Hagstrom Drilling Pty Ltd**

**REMARKS:**

- **Field Data**
- **Rock Description**
- **Piezometer Details**

**Client:** Sydney Motorway Corporation

**Project:** M4-M5 Link Geotech Investigation

**Location:** Hubert St, Leichhardt

**Driller:** Hagstrom Drilling Pty Ltd

**Drill Rig:** Hydrapower Scout

**Hole Diameter:** 96 mm

**Inclination:** -90°

**Bearing:** N/A

**Summary Geology:**
- ASPHALT
- Sandy GRAVEL, medium to coarse grained, grey
- Silty CLAY, brown, mottled yellow
- Silty CLAY, yellow-brown, mottled red
- Silty CLAY, grey, mottled orange-yellow
- SANDSTONE, fine to coarse grained, orange to yellow-brown
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, coarse grained, light grey

**Piezometer Details:**
- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 36.6 mBGL
- **Screen Top:** 36.6 mBGL
- **Screen/Sensor Base:** 39.6 mBGL
- **Instrument Details:** -
- **Installation Date:** 26/05/2016
- **Development Date:** -

**Graphic Log:**

- Depth 0.0 to 0.5 m
- Depth 0.5 to 3.26 m

**Remarks:**

**Groundwater Monitoring Notes:**

- **Project No:** 60493796
- **Start Date:** 23/05/2016
- **End Date:** 26/05/2016
- **Logged by:** JR
- **Checked by:** BF
- **Easting:** 329206.6 m
- **RL:** 4.27 m
- **North:** 6250086.3 m
- **Ver. Datum:** AHD
- **Sheet:** 1 of 2

**Engineering Log:**

- **Client:** Sydney Motorway Corporation
- **Project:** M4-M5 Link Geotech Investigation
- **Location:** Hubert St, Leichhardt
- **Driller:** Hagstrom Drilling Pty Ltd
- **Drill Rig:** Hydrapower Scout
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A
**Summary Geology (refer to geological log for full descriptions)**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Defect Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 to 32.6 m</td>
<td>BENTONITE + CEMENT GROUT</td>
</tr>
<tr>
<td>32.6 to 34.6 m</td>
<td>BENTONITE</td>
</tr>
<tr>
<td>34.6 to 36.6 m</td>
<td>FILTER SAND</td>
</tr>
<tr>
<td>36.6 to 39.6 m</td>
<td>PVC SLOTTED SECTION WITH FILTER SAND</td>
</tr>
<tr>
<td>39.6 to 40.0 m</td>
<td>CAVE-IN BACKFILL</td>
</tr>
</tbody>
</table>

**MUDSTONE, dark grey**

**SANDSTONE, medium to coarse grained, light grey**

**SANDSTONE, medium grained**

**SANDSTONE, medium to coarse grained, light grey**

**SANDSTONE, medium to coarse grained, light grey**

**SANDSTONE, medium grained, light grey**

HB_BH14 Terminated at 40.08 m
### Field Data

<table>
<thead>
<tr>
<th>Run</th>
<th>Core Run</th>
<th>ORQ (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Graphic Log</th>
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<tbody>
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<td>Run 1</td>
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<td>Run 3</td>
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<td>12.0</td>
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<tr>
<td>Run 4</td>
<td>100.98</td>
<td>4.0</td>
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<td>10.0</td>
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<tr>
<td>Run 5</td>
<td>100.96</td>
<td>4.0</td>
<td>10.0</td>
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<td>Run 6</td>
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<td>Run 7</td>
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<tr>
<td>Run 9</td>
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<td>20.0</td>
<td>-2.0</td>
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</tbody>
</table>

### Summary Geology

(refer to geological log for full descriptions)

- Silty SAND, fine to coarse grained, brown
- SAND, medium to coarse grained, brown to orange-brown
- Clayey SAND, coarse grained, dark brown to orange-brown
- SANDSTONE, fine to medium grained, yellow-brown to brown
- SANDSTONE, medium to coarse grained, red-brown, mottled light yellow-brown
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium to coarse grained, light yellow-brown

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 22.0 mBGL
- **Screen Top:** 19.0 mBGL
- **Screen/Sensor Base:** 22.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 16/05/2016
- **Development Date:** -

### Groundwater Monitoring Notes:

- **Hydrapower Scout**
- **Hagstrom Drilling Pty Ltd**

### REMARKS:

GROUNDWATER MONITORING NOTES:
**Summary Geology**

(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0</td>
<td>-14.0</td>
</tr>
<tr>
<td>34.0</td>
<td>-16.0</td>
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<td>40.0</td>
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<tr>
<td>52.0</td>
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<td>-38.0</td>
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<tr>
<td>58.0</td>
<td>-40.0</td>
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</tbody>
</table>

**HB_BH15 Terminated at 40.08 m**

**Construction Details:**
- Machine slotted PVC pipe
- Pipe Diameter: 50 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 22.0 mBGL
- Screen Top: 19.0 mBGL
- Screen/Sensor Base: 22.0 mBGL
- Machine slotted PVC pipe
- Installation Date: 16/05/2016
- Development Date: -

**Piezometer Details**

- **Method:**
  - Core Run: 100
  - TCR (%): 100
  - RQD (%): 100
  - Ground Water Depth: 96 mm

- **Rock Description:**
  - SANDSTONE, coarse grained, light grey
  - SANDSTONE, medium to coarse grained, light grey
  - SANDSTONE, fine to medium grained, light grey
  - SANDSTONE, medium to coarse grained, light grey

**Remarks:**

GROUNDWATER MONITORING NOTES:
**GATIC COVER**

**GROUT**

**BENTONITE**

**FILTER SAND**

**PVC SLOTTED SECTION**

WITH 2 mm FILTER SAND

**FILTER SAND**

**Depth 0.0 to 0.1 m**

**Depth 0.1 to 18.5 m**

**Depth 18.5 to 21.0 m**

**Depth 21.0 to 23.0 m**

**Depth 23.0 to 26.0 m**

**Depth 26.0 to 30.0 m**

**ASPHALTIC CONCRETE**

Sandy GRAVEL, fine grained, brown and dark brown

SANDSTONE, orange brown and red brown

SANDSTONE, light grey, with red brown iron staining

SANDSTONE, medium to coarse grained, light grey

**NO CORE**

SANDSTONE, medium grained, orange-brown to light grey

**NO CORE**

SANDSTONE, medium grained, red

**NO CORE**

SANDSTONE, coarse grained, light grey

SANDSTONE, fine grained, mid grey

SANDSTONE, coarse grained, mid grey

SANDSTONE, coarse grained, mid grey

SANDSTONE, medium to coarse grained, mid grey

SANDSTONE, medium grained, mid grey

SANDSTONE, coarse grained, mid grey

SANDSTONE, medium grained, mid grey

SANDSTONE, coarse grained, mid grey

SANDSTONE, fine to medium grained,
**Groundwater Monitoring Notes:**

**Delta Base 520**

**Hagstrom Drilling Pty Ltd**

**Remarks:**

- 20
- 60
- 200600
- 2000

**Field Data**

- **Piezometer No.**
- **Sheet:** 2 of 1
- **IC_BH01**

**Engineering Log**

- **Client:** Sydney Motorway Corporation
- **Project:** M4-M5 Link Geotech Investigation
- **Location:** 46 Waterloo Street, Rozelle

**Driller:** Hagstrom Drilling Pty Ltd

**Drill Rig:**
- **Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A

**Construction Details:**
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 26.0 mBGL
- **Screen Top:** 23.0 mBGL
- **Screen/Sensor Base:** 26.0 mBGL

**Instrument Details:**
- **Installation Date:** 17/10/2016
- **Development Date:**

**Core Run**

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<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0</td>
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<td>-30.0</td>
</tr>
<tr>
<td>60.0</td>
<td>-32.0</td>
</tr>
</tbody>
</table>

**Core Properties**

- **TCR (%):**
- **RQD (%):**
**Groundwater Monitoring Notes:**

- **Hole Diameter:** 96 mm
- **Driller:** Terratest Pty Ltd
- **Drill Rig:** Hanjin DB
- **Inclination:** -90°
- **Bearing:** N/A

### Core Run Summary

<table>
<thead>
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<th>Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
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<tr>
<td>12</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>13</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

### Rock Description

- **Asphaltic Concrete**
  - Sandy GRAVEL, coarse grained, dark grey
  - SAND, medium grained, red-orange
  - SANDSTONE, medium grained, light grey
  - NO CORE
  - SANDSTONE, medium grained, light grey and red-brown
  - DOLERITE, medium grained, mid grey to grey, brown
- **Sandstone**
  - SANDSTONE, coarse grained, light grey
  - MUDSTONE, dark grey
  - SANDSTONE, medium to coarse grained, light grey
  - SANDSTONE, medium grained, light grey

### Piezometer Details

- **Construction Details:**
  - **Pipe Diameter:** 50 mm
  - **Pipe Top:** 0.0 mBGL
  - **Pipe Base:** 8.0 mBGL
  - **Screen Top:** 8.0 mBGL
  - **Screen/Sensor Base:** 11.0 mBGL
  - **Instrument Details:**
    - **Installation Date:** 20/10/2016
  - **Development Date:**

---

**Remarks:**

Groundwater monitoring notes:

- General observations and notes related to the groundwater monitoring setup and results.

---

**Additional Details:**

- Field data and summary geology references.
- Graphical representation of the borehole and monitoring points.
- Geotechnical investigation details related to the Sydney Motorway Corporation project.
**Summary Geology**
(refer to geological log for full descriptions)

- **Run 14**:
  - **Defect Spacing (mm)**
  - **Rock Description**: SANDSTONE, medium grained, light grey continued

- **Run 15**:
  - **Defect Spacing (mm)**
  - **Rock Description**: SANDSTONE, medium grained, light grey
  - **Rock Description**: SANDSTONE, fine to medium grained, light grey
  - **IC_BH02 Terminated at 35.00 m.**

**Field Data**

<table>
<thead>
<tr>
<th>Method</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Depth (m)</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 14</td>
<td>100-97</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run 15</td>
<td>100-99</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Piezometer Details**

- **Construction Details**: -
  - **Pipe Diameter**: 50 mm
  - **Pipe Top**: 0.0 mBGL
  - **Pipe Base**: 8.0 mBGL
  - **Screen Top**: 8.0 mBGL
  - **Screen/Sensor Base**: 11.0 mBGL
  - **Instrument Details**: -
  - **Installation Date**: 20/10/2016
  - **Development Date**: -

**Groundwater Monitoring Notes**: Depth 22.2 to 35.0 m

**Remarks**: GROUNDWATER MONITORING NOTES:
Ground Water

Defect Spacing (mm)

Field Data

Rock Description

Piezometer Details

Construction Details:
- Pipe Diameter: 96 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 45.0 mBGL
- Screen/Sensor Base: 45.0 mBGL

Instrument Details:
- Installation Date: 24/01/2017
- Development Date: -

Client: Sydney Motorway Corporation
Project: M4-M5 Link Geotech Investigation
Location: Derby Shire Road, Leichhardt
Driller: Hagstrom Drilling Pty Ltd
Drill Rig: DR21 WT002

Summary Geology (refer to geological log for full descriptions)

- Silty CLAY, yellow-brown
- Silty CLAY, orange-brown
- SHALE, grey and orange-brown
- NO CORE
- SHALE, grey and dark grey
- NO CORE
- SHALE, dark grey
- SHALE, dark grey
- SANDSTONE, fine grained, grey
- SHALE, dark grey
- SANDSTONE, medium grained, light grey to grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, coarse grained, light grey
- SANDSTONE, coarse grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, fine grained, mid grey to dark grey
- SANDSTONE, fine to medium grained, light grey
- SANDSTONE, coarse grained, light grey
- SANDSTONE, coarse grained, light grey
- SANDSTONE, fine to medium grained, mid grey
- SANDSTONE, coarse grained, mid grey

Remarks:
GROUNDWATER MONITORING NOTES:
### Field Data

<table>
<thead>
<tr>
<th>Run</th>
<th>TCR (%)</th>
<th>RD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 12</td>
<td>100</td>
<td>100</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
<tr>
<td>Run 13</td>
<td>100</td>
<td>100</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
<tr>
<td>Run 14</td>
<td>100</td>
<td>98</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
<tr>
<td>Run 15</td>
<td>100</td>
<td>100</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
<tr>
<td>Run 16</td>
<td>100</td>
<td>100</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
<tr>
<td>Run 17</td>
<td>100</td>
<td>100</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
<tr>
<td>Run 18</td>
<td>100</td>
<td>100</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
<tr>
<td>Run 19</td>
<td>100</td>
<td>100</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
<tr>
<td>Run 20</td>
<td>100</td>
<td>100</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
<tr>
<td>Run 21</td>
<td>100</td>
<td>98</td>
<td>Ground Water</td>
<td>Reduced Level (m)</td>
<td>Graphic Log</td>
</tr>
</tbody>
</table>

### Summary Geology

(Refer to geological log for full descriptions)

- **SANDSTONE**, medium to coarse grained, light grey to mid grey continued
- **SANDSTONE**, coarse grained, mid grey
- **SANDSTONE**, coarse grained, light grey
- **SANDSTONE**, coarse grained, light grey to brown-grey
- **SANDSTONE**, medium grained, light grey
- **SANDSTONE**, medium grained, light grey
- **SANDSTONE**, medium to coarse grained, light grey
- **SANDSTONE**, fine to medium grained, light grey
- **SANDSTONE**, coarse grained, light grey
- **SANDSTONE**, medium to coarse grained, light grey
- **SANDSTONE**, fine to medium grained, dark grey
- **SANDSTONE**, fine grained, med grey
- **SANDSTONE**, medium grained, grey
- **SANDSTONE**, fine to medium grained, light grey
- **SANDSTONE**, fine grained, mid grey
- **SHALE BRECCIA**

### Piezometer Details

- **Construction Details:**
  - Pipe Diameter: 96 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 45.0 mBGL
  - Screen/Sensor Base: 45.0 mBGL
- **Instrument Details:**
  - Installation Date: 24/01/2017
  - Development Date: -
- **Ground Water Defects:**
  - Depth 0.1 to 37.0 m
  - Depth 37.0 to 40.0 m
  - Depth 40.0 to 42.0 m
  - Depth 42.0 to 45.0 m
  - Depth 45.0 to 47.0 m
  - Depth 47.0 to 49.0 m
  - Depth 49.0 to 70.0 m

---

**REMARKS:**

**GROUNDWATER MONITORING NOTES:**

- **GROUT**
- **BENTONITE**
- **FILTER SAND**
- **PVC SLOTTED SECTION**
- **FILTER SAND**
- **BENTONITE**
- **SAND**
**Field Data**

<table>
<thead>
<tr>
<th>Run</th>
<th>TDR (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run 2</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run 3</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run 4</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Run 5</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Rock Description**

- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, fine grained, mid grey**
- **SANDSTONE, medium grained, light grey and mid grey**
- **SANDSTONE, medium grained, light grey to mid grey**

**Summary Geology**

(Refer to geological log for full descriptions)

**Defect Spacing (mm)**

- **Depth 49.0 to 70.0 m**

**Piezometer Details**

- **MT_BH02 Terminated at 70.00 m.**

**Client:** Sydney Motorway Corporation  
**Project:** M4-M5 Link Geotech Investigation  
**Location:** Derby Shire Road, Leichhardt  
**Driller:** Hagstrom Drilling Pty Ltd  
**Drill Rig:** DR21 WT002  
**Hole Diameter:** 96 mm  
**Inclination:** -90°  
**Bearing:** N/A  

**Ground Water**

- **Defect**  
- **Spacing** (mm)

**Construction Details:**

- **Pipe Diameter:** 96 mm  
- **Pipe Top:** 0.0 mBGL  
- **Pipe Base:** 45.0 mBGL  
- **Screen Top:** 42.0 mBGL  
- **Screen/Sensor Base:** 45.0 mBGL  

**Instrument Details:**

- **Installation Date:** 24/01/2017  
- **Development Date:** -

**Remarks:**

- **GROUNDWATER MONITORING NOTES:**
Ground Water

Defect
Spacing (mm)

Core Run

TCR (%) RQD (%) Reduced Level(m)

Pipe Diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 45.0 mBGL
Screen Top: 43.0 mBGL
Screen/Sensor Base: 46.0 mBGL
Instrument Details: -
Installation Date: 22/11/2016
Development Date: -

MT_BH07 Terminated at 60.00 m.

Method: TDR
Core Run: Run 10
TCR (%): 100
RQD (%): 100
Reduced Level (m): 32.0

Ground Water

SANDSTONE, medium to coarse grained, pale grey continued

SANDSTONE, medium grained, pale grey

SANDSTONE, medium to coarse grained, pale grey

SANDSTONE, medium grained, pale grey

SANDSTONE, medium grained, pale grey

SANDSTONE, fine to medium grained, pale grey to medium grey

SANDSTONE, medium grained, pale grey

SANDSTONE, medium grained, pale grey

SANDSTONE, medium grained, pale grey

SANDSTONE, fine to medium grained, medium grey

SANDSTONE, medium grained, pale grey

SANDSTONE, medium grained

SANDSTONE, fine to medium grained, medium grey

SANDSTONE, medium grained, pale grey

GROUT

BENTONITE

FILTER SAND

PVC SLOTTED SECTION WITH FILTER SOCK with 2 mm FILTER SAND

FILTER SAND

BENTONITE

GROUT

MT_BH07 Terminated at 60.00 m.

REMARKS:
GROUNDWATER MONITORING NOTES:

Hanjin DB8
Terratest Pty Ltd

Driller: Terratest Pty Ltd
Hole Diameter: 96 mm
Inclination: -60°
Bearing:

Drill Rig: Hanjin DB8

Summary Geology (refer to geological log for full descriptions)

GROUNDWATER MONITORING NOTES:

Client: Sydney Motorway Corporation
Project: M4-M5 Link Geotech Investigation
Location: 21 Paling Street, Lilyfield - parking lane
Driller: Terratest Pty Ltd
Hole Diameter: 96 mm
Inclination: -60°
Bearing:

Drill Rig: Hanjin DB8

Field Data

Rock Description

Piezometer Details

Ground Water

Defect
Spacing (mm)

Core Run

TCR (%) RQD (%) Reduced Level(m)

Pipe Diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 45.0 mBGL
Screen Top: 43.0 mBGL
Screen/Sensor Base: 46.0 mBGL
Instrument Details: -
Installation Date: 22/11/2016
Development Date: -

MT_BH07 Terminated at 60.00 m.

REMARKS:
GROUNDWATER MONITORING NOTES:

Client: Sydney Motorway Corporation
Project: M4-M5 Link Geotech Investigation
Location: 21 Paling Street, Lilyfield - parking lane
Driller: Terratest Pty Ltd
Hole Diameter: 96 mm
Inclination: -60°
Bearing:

Drill Rig: Hanjin DB8

Summary Geology (refer to geological log for full descriptions)

GROUNDWATER MONITORING NOTES:

Client: Sydney Motorway Corporation
Project: M4-M5 Link Geotech Investigation
Location: 21 Paling Street, Lilyfield - parking lane
Driller: Terratest Pty Ltd
Hole Diameter: 96 mm
Inclination: -60°
Bearing:

Drill Rig: Hanjin DB8

Field Data

Rock Description

Piezometer Details

Ground Water

Defect
Spacing (mm)

Core Run

TCR (%) RQD (%) Reduced Level(m)

Pipe Diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 45.0 mBGL
Screen Top: 43.0 mBGL
Screen/Sensor Base: 46.0 mBGL
Instrument Details: -
Installation Date: 22/11/2016
Development Date: -

MT_BH07 Terminated at 60.00 m.

REMARKS:
GROUNDWATER MONITORING NOTES:
**Field Data**

<table>
<thead>
<tr>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>87</td>
<td>0</td>
<td>58.0 mBGL</td>
</tr>
<tr>
<td>Run 2</td>
<td>100</td>
<td>15</td>
<td>48.0 mBGL</td>
</tr>
<tr>
<td>Run 3</td>
<td>98</td>
<td>90</td>
<td>51.0 mBGL</td>
</tr>
<tr>
<td>Run 4</td>
<td>100</td>
<td>93</td>
<td>50 mm</td>
</tr>
<tr>
<td>Run 5</td>
<td>100</td>
<td>97</td>
<td>30/11/2016</td>
</tr>
<tr>
<td>Run 6</td>
<td>100</td>
<td>100</td>
<td>2000</td>
</tr>
<tr>
<td>Run 7</td>
<td>100</td>
<td>100</td>
<td>2006</td>
</tr>
<tr>
<td>Run 8</td>
<td>100</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>Run 9</td>
<td>100</td>
<td>100</td>
<td>30/11/2016</td>
</tr>
<tr>
<td>Run 10</td>
<td>100</td>
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<td>30/11/2016</td>
</tr>
<tr>
<td>Run 11</td>
<td>100</td>
<td>100</td>
<td>30/11/2016</td>
</tr>
<tr>
<td>Run 12</td>
<td>100</td>
<td>100</td>
<td>30/11/2016</td>
</tr>
</tbody>
</table>

**Rock Description**

- **ASPHALT**
- **GRAVEL, black**
- **Cobbly SANDSTONE, pale brown**
- **MUDSTONE**
- **NO CORE**
- **MUDSTONE, dark brown**
- **SANDSTONE, medium grained**
- **SANDSTONE, fine grained, dark grey**
- **SANDSTONE, fine grained, light grey**
- **SANDSTONE, fine grained, grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, grey**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**

**Piezometer Details**

- **Construction Details:**
  - **Pipe Diameter:** 50 mm
  - **Pipe Top:** 0.0 mBGL
  - **Pipe Base:** 58.0 mBGL
  - **Screen Top:** 48.0 mBGL
  - **Screen/Sensor Base:** 51.0 mBGL
  - **Instrument Details:**
  - **Installation Date:** 30/11/2016
  - **Development Date:**

**Summary Geology**

(refer to geological log for full descriptions)

- Depth 0.0 to 0.1 m
- Depth 0.1 to 1.0 m
- Depth 1.0 to 44.0 m

**REMARKS:**

GROUNDWATER MONITORING NOTES:
**Field Data**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>62.0</td>
<td></td>
</tr>
<tr>
<td>64.0</td>
<td></td>
</tr>
<tr>
<td>66.0</td>
<td></td>
</tr>
<tr>
<td>68.0</td>
<td></td>
</tr>
<tr>
<td>70.0</td>
<td></td>
</tr>
<tr>
<td>72.0</td>
<td></td>
</tr>
</tbody>
</table>

**Rock Description**

- **SANDSTONE, medium grained, light grey continued**
- **SANDSTONE, fine to medium grained**

**Piezometer Details**

- **Construction Details:**
  - Hole Diameter: 96.5 mm
  - Inclination: -90°
  - Bearing: N/A

- **Method:**
  - Core Run

- **TCR (%):** 100

- **RQD (%):** 100

- **Ground Water Reduced Level (m):**
  - 0.0 mBGL
  - 58.0 mBGL
  - 48.0 mBGL

- **Screen/Sensor Base:** 51.0 mBGL

- **Instrument Details:**
  - Installation Date: 30/11/2016
  - Development Date: -

**Remarks:**

- "MT_BH11 Terminated at 70.00 m."
### Field Data

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.1</td>
<td>GATIC COVER</td>
</tr>
<tr>
<td>0.1 to 1.0</td>
<td>BENTONITE</td>
</tr>
<tr>
<td>1.0 to 22.8</td>
<td>GROUT</td>
</tr>
<tr>
<td>22.8 to 25.0</td>
<td>LAMINITE</td>
</tr>
<tr>
<td>25.0 to 27.0</td>
<td>SANDSTONE, fine grained, pale grey</td>
</tr>
<tr>
<td>27.0 to 30.0</td>
<td>PVC SLOTTED SECTION WITH FILTER SOCK with 2 mm FILTER SAND</td>
</tr>
</tbody>
</table>

### Rock Description

Summary Geology (refer to geological log for full descriptions)

- **Asphalt**
- **Fill**
- **Silty clay**
- **Clay**
- **Clay**
- **Gravelly clay, brown-grey and mottled red**
- **Shale**
- **Shale, dark grey and brown**
- **NO Core**
- **Shale, dark grey**
- **NO Core**
- **Shale, dark grey and brown**
- **NO Core**
- **Shale, dark grey and brown**
- **NO Core**
- **Shale, dark grey**
- **NO Core**
- **Shale, dark grey and brown**
- **NO Core**
- **Shale, dark grey**
- **NO Core**
- **Shale, dark grey and brown**
- **NO Core**
- **Shale, dark grey**
- **NO Core**
- **Shale, dark grey**
- **NO Core**
- **Shale, dark grey and brown**
- **NO Core**
- **LAMINITE, dark grey**
- **LAMINITE**
- **LAMINITE, fine grained, pale grey**
- **LAMINITE**
- **LAMINITE, fine grained, pale grey**
- **LAMINITE**

### Piezometer Details

- **Construction Details:**
  - Pipe Diameter: 50 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 30.0 mBGL
  - Screen Top: 27.0 mBGL
  - Screen/Sensor Base: 30.0 mBGL
  - Instrument Details: -
  - Installation Date: 11/11/2016
  - Development Date: -

- **Graphic Log**

### Remarks

GROUNDBWATER MONITORING NOTES:
### Rock Description

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Summary Geology (refer to geological log for full descriptions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.0 to 32.0 m</td>
<td>SANDSTONE, medium to coarse grained, pale grey</td>
</tr>
<tr>
<td>32.0 to 45.3 m</td>
<td>SANDSTONE, medium to coarse grained, pale grey</td>
</tr>
<tr>
<td>45.3 to 73.0 m</td>
<td>SANDSTONE, coarse grained, pale grey</td>
</tr>
</tbody>
</table>

### Piezometer Details

- **Construction Details:**
  - Pipe Diameter: 50 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 30.0 mBGL
  - Screen Top: 27.0 mBGL
  - Screen/Sensor Base: 30.0 mBGL

- **Instrument Details:**
  - Installation Date: 11/11/2016
  - Development Date: 11/11/2016

- **Method:**
  - Core Run: Run 10 - Run 20

- **Ground Water Defect Spacing (mm):**
  - Depth 30.0 to 32.0 m
  - Depth 32.0 to 45.3 m
  - Depth 45.3 to 73.0 m

- **Horizon:**
  - FILTER SAND
  - BENTONITE
  - GROUT

### Remarks

- **GROUNDWATER MONITORING NOTES:**
  - Piezometer Details
  - Construction Details:
    - Pipe Diameter: 50 mm
    - Pipe Top: 0.0 mBGL
    - Pipe Base: 30.0 mBGL
    - Screen Top: 27.0 mBGL
    - Screen/Sensor Base: 30.0 mBGL
  - Instrument Details:
    - Installation Date: 11/11/2016
    - Development Date: 11/11/2016
**Summary Geology**

(refer to geological log for full descriptions)

- SHALE BRECCIA
- SANDSTONE, coarse grained, pale grey
- SANDSTONE, medium to coarse grained, pale grey continued
- SANDSTONE, medium grained, pale grey
- SANDSTONE, medium grained, pale grey
- SANDSTONE, medium grained, pale grey
- SANDSTONE, medium grained, pale grey
- SANDSTONE, medium to coarse grained, pale grey
- SHALE BRECCIA, medium grained, pale grey
- SANDSTONE, medium grained, pale grey
- SANDSTONE, medium grained, pale grey
- SANDSTONE, medium grained, pale grey
- SANDSTONE, medium grained, pale grey

*MT_BH14 Terminated at 75.00 m.*

**Piezometer Details**

- Construction Details: -
- Pipe Diameter: 50 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 30.0 mBGL
- Screen Top: 27.0 mBGL
- Screen/Sensor Base: 30.0 mBGL
- Instrument Details: -
- Installation Date: 11/11/2016
- Development Date: -

**Ground Water Defect**

Spacing (mm)

- 20
- 60
- 200

**Field Data**

- Hole Diameter: 96 mm
- Inclination: -90°
- Bearing: N/A

**Driller:** Hagstrom Drilling Pty Ltd

**Drill Rig:** Hydrapower Scout

**Location:** Rowley Street, Camperdown

**Client:** Sydney Motorway Corporation

**Project:** M4-M5 Link Geotech Investigation

**Logged by:** KDL

**End Date:** 9/11/2016

**Easting:** 331168.4 m

**RL:** 27.39 m

**Northing:** 6248150.0 m

**Ver. Datum:** AHD

**Hor. Proj/Dat:** MGA94/GDA94-56H

**Surface:** Asphalt

**REMARKS:**

GROUNDWATER MONITORING NOTES:
**Summary Geology**
(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Defect Spacing (mm)</th>
<th>Rock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ASPHALT</td>
</tr>
<tr>
<td></td>
<td>COBBLES, red-brown, grey and brown</td>
</tr>
<tr>
<td></td>
<td>GRAVEL AND COBBLES, dark grey and red-brown</td>
</tr>
<tr>
<td></td>
<td>SHALE, light grey, mottled yellow-brown</td>
</tr>
<tr>
<td></td>
<td>SHALE</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>SHALE, dark grey</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>LAMINITE</td>
</tr>
<tr>
<td></td>
<td>SHALE</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>SHALE</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>SHALE</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>LAMINITE</td>
</tr>
</tbody>
</table>

**Ground Water**

**Method**

**Core Run**

**Ground Water Reduced Level (m)**

**Depth (m)**

**Graphic Log**

**Driller:** Hagstrom Drilling Pty Ltd

**Drill Rig:** Hydрапower Scout

**Summary Geology**
(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Defect Spacing (mm)</th>
<th>Rock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ASPHALT</td>
</tr>
<tr>
<td></td>
<td>COBBLES, red-brown, grey and brown</td>
</tr>
<tr>
<td></td>
<td>GRAVEL AND COBBLES, dark grey and red-brown</td>
</tr>
<tr>
<td></td>
<td>SHALE, light grey, mottled yellow-brown</td>
</tr>
<tr>
<td></td>
<td>SHALE</td>
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<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>SHALE, dark grey</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>LAMINITE</td>
</tr>
<tr>
<td></td>
<td>SHALE</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>SHALE</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>LAMINITE</td>
</tr>
</tbody>
</table>

**REMARKS:**

**GROUNDWATER MONITORING NOTES:**
**Summary Geology (refer to geological log for full descriptions)**

- **LAMINITE**
  - **SILTSTONE, dark grey**
- **NO CORE**
- **SILTSTONE, dark grey**
- **LAMINITE**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, fine grained, mid grey**
- **SANDSTONE, medium to coarse grained, light grey**

**Piezometer Details**

- **Construction Details:**
  - Pipe Diameter: 50 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 10.0 mBGL
  - Screen Top: 10.0 mBGL
  - Screen/Sensor Base: 13.0 mBGL
  - Instrument Details: -
- **Installation Date:** 3/11/2016
- **Development Date:** -

**Field Data**

<table>
<thead>
<tr>
<th>Method</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Depth (m)</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 12</td>
<td>100 100</td>
<td>100 100</td>
<td>100 100</td>
<td></td>
<td></td>
<td>32.0</td>
<td></td>
</tr>
<tr>
<td>Run 13</td>
<td>100 100</td>
<td>100 100</td>
<td>100 100</td>
<td></td>
<td></td>
<td>34.0</td>
<td></td>
</tr>
<tr>
<td>Run 14</td>
<td>96 97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>38.0</td>
<td></td>
</tr>
<tr>
<td>Run 15</td>
<td>96 97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>44.0</td>
<td></td>
</tr>
<tr>
<td>Run 16</td>
<td>96 97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>Run 17</td>
<td>96 97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>56.0</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS:**

GROUNDWATER MONITORING NOTES:
GROUT
Depth 13.6 to 85.0 m

SANDSTONE, fine to medium grained, light grey

SANDSTONE, medium grained, light grey

SHALE BRECCIA

SANDSTONE, medium grained, light grey

SANDSTONE, medium grained, light grey

SANDSTONE, medium grained, light grey

SANDSTONE, coarse grained, light grey

SANDSTONE, medium to coarse grained, pale grey

SANDSTONE, fine to medium grained, light grey

SANDSTONE, medium grained, light grey

SANDSTONE, medium grained, light grey

MT_BH18 Terminated at 85.18 m.
Groundwater Monitoring Notes:

- Summary Geology:

  - ASPHALT
  - Sandy GRAVEL, fine to medium grained, dark grey
  - Clayey GRAVEL, medium to coarse grained, light brown
  - Silty CLAY, orange-brown
  - CLAY, light grey
  - NO CORE
  - CLAY, light grey
  - NO CORE
  - CLAY, light grey
  - MUDSTONE, light-mid grey
  - NO CORE
  - MUDSTONE, light-mid grey
  - NO CORE
  - MUDSTONE (90%), dark grey and mid grey
  - LAMINITE
  - NO CORE
  - LAMINITE
  - MUDSTONE (90%), dark grey
  - MUDSTONE (90%), dark grey

- Piezometer Details:
  - Construction Details:
    - Pipe Diameter: 50 mm
    - Pipe Top: 0.0 mBGL
    - Pipe Base: 53.0 mBGL
    - Screen Top: 53.0 mBGL
    - Screen/Sensor Base: 58.0 mBGL
    - Instrument Details: -
  - Installation Date: 14/12/2016
  - Development Date: -

- Field Data:

  - Hole Diameter: 96 mm
  - Inclination: -90°
  - Bearing: N/A
  - Reduced Level (m):
    - 16.0
    - 14.0
    - 12.0
    - 10.0
    - 8.0
    - 6.0
    - 4.0
    - 2.0
    - 0.0
    - -2.0
    - -4.0
    - -6.0
    - -8.0
    - -10.0
  - Graphic Log:
    - Depth: 0.0 to 0.1 m
    - Depth: 0.1 to 1.0 m

REMARKS:

- Groundwater Monitoring Notes:
### Field Data

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0</td>
<td>-14.0</td>
</tr>
<tr>
<td>34.0</td>
<td>-16.0</td>
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<tr>
<td>36.0</td>
<td>-18.0</td>
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<tr>
<td>38.0</td>
<td>-20.0</td>
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<tr>
<td>40.0</td>
<td>-22.0</td>
</tr>
<tr>
<td>42.0</td>
<td>-24.0</td>
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<tr>
<td>44.0</td>
<td>-26.0</td>
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<tr>
<td>46.0</td>
<td>-28.0</td>
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<td>48.0</td>
<td>-30.0</td>
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<tr>
<td>50.0</td>
<td>-32.0</td>
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<td>52.0</td>
<td>-34.0</td>
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<tr>
<td>56.0</td>
<td>-38.0</td>
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<tr>
<td>58.0</td>
<td>-40.0</td>
</tr>
<tr>
<td>60.0</td>
<td>-42.0</td>
</tr>
</tbody>
</table>

### Rock Description

- **MUDSTONE (90%), dark grey continued**
- **MUDSTONE, dark grey**
- **SILTSTONE, mid grey to light grey**
- **SANDSTONE, fine grained, light grey**
- **LAMINITE**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, fine to medium grained, light grey**

### Piezometer Details

- **Construction Details:**
  - Pipe Diameter: 50 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 53.0 mBGL
  - Screen Top: 53.0 mBGL
  - Screen/Sensor Base: 58.0 mBGL
- **Instrument Details:**
  - Installation Date: 14/12/2016
  - Development Date: -
- **Method:**
  - Hole Diameter: 96 mm
  - Inclination: -90°
  - Bearing: N/A
- **Location:** Darley Street, Newtown

### Remarks:

- **GROUNDWATER MONITORING NOTES:**

---

**Client:** Sydney Motorway Corporation  
**Project:** M4-M5 Link Geotech Investigation  
**Location:** Darley Street, Newtown  
**Driller:** Terratest Pty Ltd  
**Drill Rig:** Hanjin DB8  
**Logged by:** NB/RKG  
**Checked by:**  
**Start Date:** 2/12/2016  
**End Date:** 15/12/2016  
**Easting:** 331680.3 m  
**RL:** 16.18 m  
**Northing:** 6246735.9 m  
**Ver. Datum:** mAHD  
**Hor. Proj/Dat:** MGA94/GDA94-56H  
**Surface:** Road Surface
**Groundwater Monitoring Notes:**

**REMARKS:**

**GROUNDWATER MONITORING NOTES:**
### Field Data

<table>
<thead>
<tr>
<th>Run</th>
<th>TCR (%)</th>
<th>ROD (%)</th>
<th>Depth (m)</th>
<th>Summary Geology (refer to geological log for full descriptions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>82</td>
<td>50</td>
<td>2.0</td>
<td>ASPHALT</td>
</tr>
<tr>
<td>Run 2</td>
<td>94</td>
<td>81</td>
<td>4.0</td>
<td>COBBLES</td>
</tr>
<tr>
<td>Run 3</td>
<td>99</td>
<td>90</td>
<td>6.0</td>
<td>Clayey SAND, fine to coarse grained, mid grey</td>
</tr>
<tr>
<td>Run 4</td>
<td>97</td>
<td>95</td>
<td>8.0</td>
<td>SANDSTONE, fine to coarse grained, yellow-brown</td>
</tr>
<tr>
<td>Run 5</td>
<td>100</td>
<td>92</td>
<td>10.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>Run 6</td>
<td>100</td>
<td>94</td>
<td>12.0</td>
<td>SANDSTONE, coarse grained, yellow-brown and light-grey</td>
</tr>
<tr>
<td>Run 7</td>
<td>100</td>
<td>95</td>
<td>14.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>Run 8</td>
<td>100</td>
<td>100</td>
<td>16.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
</tr>
<tr>
<td>Run 9</td>
<td>100</td>
<td>98</td>
<td>18.0</td>
<td>SANDSTONE, medium to coarse grained, brown grey</td>
</tr>
<tr>
<td>Run 10</td>
<td>98</td>
<td>98</td>
<td>20.0</td>
<td>SANDSTONE, coarse grained, light grey</td>
</tr>
<tr>
<td>Run 11</td>
<td>98</td>
<td>98</td>
<td>22.0</td>
<td>SHALE BRECCIA</td>
</tr>
<tr>
<td>Run 12</td>
<td>98</td>
<td>98</td>
<td>24.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>Run 13</td>
<td>98</td>
<td>98</td>
<td>26.0</td>
<td>SANDSTONE, fine to coarse grained, light grey</td>
</tr>
<tr>
<td>Run 14</td>
<td>98</td>
<td>98</td>
<td>28.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
</tr>
<tr>
<td>Run 15</td>
<td>98</td>
<td>98</td>
<td>30.0</td>
<td>SANDSTONE, coarse grained, light grey</td>
</tr>
<tr>
<td>Run 16</td>
<td>98</td>
<td>98</td>
<td>32.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
</tr>
</tbody>
</table>

### Rock Description

<table>
<thead>
<tr>
<th>Run</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>ROD (%)</th>
<th>Depth (m)</th>
<th>Summary Geology (refer to geological log for full descriptions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>82</td>
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<td>2.0</td>
<td>ASPHALT</td>
<td></td>
</tr>
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<td>94</td>
<td>81</td>
<td>4.0</td>
<td>COBBLES</td>
<td></td>
</tr>
<tr>
<td>Run 3</td>
<td>99</td>
<td>90</td>
<td>6.0</td>
<td>Clayey SAND, fine to coarse grained, mid grey</td>
<td></td>
</tr>
<tr>
<td>Run 4</td>
<td>97</td>
<td>95</td>
<td>8.0</td>
<td>SANDSTONE, fine to coarse grained, yellow-brown</td>
<td></td>
</tr>
<tr>
<td>Run 5</td>
<td>100</td>
<td>92</td>
<td>10.0</td>
<td>NO CORE</td>
<td></td>
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<td>Run 6</td>
<td>100</td>
<td>94</td>
<td>12.0</td>
<td>SANDSTONE, coarse grained, yellow-brown and light-grey</td>
<td></td>
</tr>
<tr>
<td>Run 7</td>
<td>100</td>
<td>95</td>
<td>14.0</td>
<td>NO CORE</td>
<td></td>
</tr>
<tr>
<td>Run 8</td>
<td>100</td>
<td>100</td>
<td>16.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
<td></td>
</tr>
<tr>
<td>Run 9</td>
<td>100</td>
<td>98</td>
<td>18.0</td>
<td>SANDSTONE, medium to coarse grained, brown grey</td>
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<tr>
<td>Run 10</td>
<td>98</td>
<td>98</td>
<td>20.0</td>
<td>SANDSTONE, coarse grained, light grey</td>
<td></td>
</tr>
<tr>
<td>Run 11</td>
<td>98</td>
<td>98</td>
<td>22.0</td>
<td>SHALE BRECCIA</td>
<td></td>
</tr>
<tr>
<td>Run 12</td>
<td>98</td>
<td>98</td>
<td>24.0</td>
<td>NO CORE</td>
<td></td>
</tr>
<tr>
<td>Run 13</td>
<td>98</td>
<td>98</td>
<td>26.0</td>
<td>SANDSTONE, fine to coarse grained, light grey</td>
<td></td>
</tr>
<tr>
<td>Run 14</td>
<td>98</td>
<td>98</td>
<td>28.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
<td></td>
</tr>
<tr>
<td>Run 15</td>
<td>98</td>
<td>98</td>
<td>30.0</td>
<td>SANDSTONE, coarse grained, light grey</td>
<td></td>
</tr>
<tr>
<td>Run 16</td>
<td>98</td>
<td>98</td>
<td>32.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
<td></td>
</tr>
</tbody>
</table>

### Piezometer Details

- **Construction Details:**
  - Pipe Diameter: 60 mm
  - Pipe Top: 0.0 m BGL
  - Pipe Base: 41.0 m BGL
  - Screen/ Sensor Base: 44.0 m BGL

- **Instrument Details:**
  - Installation Date: 21/12/2016
  - Development Date: -

- **Defect Spacing (mm):**
  - Depth 0.0 to 0.1 m
  - Depth 0.1 to 1.0 m
  - Depth 1.0 to 37.0 m

---

**Remarks:**

**GROUNDWATER MONITORING NOTES:**
Summary Geology (refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>ROCK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0 to 34.0</td>
<td>SANDSTONE, fine to medium grained, light-mid grey</td>
</tr>
<tr>
<td>34.0 to 36.0</td>
<td>SANDSTONE, fine to medium grained, light-mid grey</td>
</tr>
<tr>
<td>36.0 to 38.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td>38.0 to 40.0</td>
<td>SANDSTONE, fine to medium grained, light-mid grey</td>
</tr>
<tr>
<td>40.0 to 42.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td>42.0 to 44.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
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<tr>
<td>44.0 to 46.0</td>
<td>SANDSTONE, medium grained, light grey</td>
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<tr>
<td>46.0 to 48.2</td>
<td>SANDSTONE, fine grained, mid grey to dark grey</td>
</tr>
<tr>
<td>48.2 to 51.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td>51.0 to 53.0</td>
<td>SANDSTONE, fine grained, mid grey</td>
</tr>
<tr>
<td>53.0 to 55.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
</tbody>
</table>

**Piezometer Details**

- **Pipe Diameter:** 60 mm
- **Pipe Top:** 0.0 m BGL
- **Pipe Base:** 41.0 m BGL
- **Screen/Sensor Base:** 44.0 m BGL
- **Installation Date:** 21/12/2016
- **Development Date:** -

**Groundwater Notes:**

- **Groundwater Monitor:** Delta Base 525
- **Piezometer No.:** MT_BH20 Terminated at 55.00 m.

**Remarks:**

- **Groundwater Monitoring Notes:**
**Summary Geology** (refer to geological log for full descriptions)

**Rock Description**

- **ASPHALTIC CONCRETE**
- **CLAY, mottled orange-red**
- **SANDSTONE, fine to medium grained, grey and red-brown**
- **NO CORE**
- **SANDSTONE, fine to medium grained, dark brown**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, fine to medium grained, light grey and dark grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**

**Piezometer Details**

- **Construction Details:**
  - **Pipe Diameter:** 50 mm
  - **Pipe Top:** 0.0 mBGL
  - **Pipe Base:** 52.0 mBGL
  - **Screen Top:** 47.0 mBGL
  - **Screen/Sensor Base:** 50.0 mBGL

- **Instrument Details:**
  - **Installation Date:** 9/12/2016
  - **Development Date:**

**Ground Water**

- **Defect Spacing (mm)**
- **Core Run**
- **TCR (%)**
- **RQD (%)**

**Groundwater Monitoring Notes:**

- **Driller:** Hagstrom Drilling Pty Ltd
- **Drill Rig:** DR009
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A

**Field Data**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Summary Geology</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>ASFALTIC CONCRETE</td>
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<tr>
<td>4.0</td>
<td>SANDSTONE</td>
</tr>
<tr>
<td>6.0</td>
<td>CLAY, mottled orange-red</td>
</tr>
<tr>
<td>8.0</td>
<td>SANDSTONE, fine to medium grained, grey and red-brown</td>
</tr>
<tr>
<td>10.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>12.0</td>
<td>SANDSTONE, fine to medium grained, dark brown</td>
</tr>
<tr>
<td>14.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td>16.0</td>
<td>SANDSTONE, fine to medium grained, light grey and dark grey</td>
</tr>
<tr>
<td>18.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td>20.0</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
</tr>
<tr>
<td>22.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td>24.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td>26.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td>28.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td>30.0</td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
</tbody>
</table>

**Piezometer Details**

- **Depth 0.0 to 0.1 m**
- **Depth 0.1 to 1.0 m**
- **Depth 1.0 to 43.0 m**

**Remarks:**

- **Groundwater Monitoring Notes:**
**Groundwater Monitoring Notes:**

**Driller:** Hagstrom Drilling Pty Ltd  
**Drill Rig:** DR009

**Summary Geology (refer to geological log for full descriptions):**

- **Sandstone, medium grained, light grey continued**
- **Sandstone, fine to medium grained, light grey**
- **Sandstone, medium grained, light grey**
- **Sandstone, medium grained, grey and light grey**
- **Siltstone (95%)**
- **Siltstone, (95%)**
- **Shale Breccia: Sandstone (60%).**

**Piezometer Details:**

- **Construction Details:**
  - **Pipe Diameter:** 50 mm  
  - **Pipe Top:** 0.0 m BGL  
  - **Screen Top:** 47.0 m BGL  
  - **Screen/Sensor Base:** 50.0 m BGL

- **Instrument Details:**
  - **Installation Date:** 9/12/2016

- **Development Date:** -
**Groundwater Monitoring Notes:**

**Summary Geology (refer to geological log for full descriptions):**
- Fine to medium grained, light grey
- Sandstone, fine to medium grained, light grey continued
- Sandstone, fine grained, grey to dark grey
- Shale breccia: Sandstone (75%), medium to coarse grained, light yellow-brown
- Sandstone, medium grained, brown-grey
- Sandstone, fine to medium grained

**MT_BH21 Terminated at 70.00 m.**

**Piezometer Details:**
- **Construction Details:**
  - Pipe Diameter: 50 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 52.0 mBGL
  - Screen Top: 47.0 mBGL
  - Screen/Sensor Base: 50.0 mBGL
- **Instrument Details:**
  - Installation Date: 9/12/2016
  - Development Date: -
### Field Data

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0</td>
<td>-24.0</td>
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<tr>
<td>34.0</td>
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<tr>
<td>36.0</td>
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<td>50.0</td>
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<tr>
<td>56.0</td>
<td>-48.0</td>
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<tr>
<td>58.0</td>
<td>-50.0</td>
</tr>
<tr>
<td>60.0</td>
<td>-52.0</td>
</tr>
</tbody>
</table>

### Rock Description

- **CLAY, orange-brown**
- **NO CORE**
- **SANDSTONE, medium grained**
- **SANDSTONE, medium grained**
- **NO CORE**
- **SANDSTONE, medium grained**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **CLAY**
- **SANDSTONE, medium grained, light grey continued**

---

**RZ_BH01 Terminated at 30.02 m**

---

**Ground Water Monitoring Notes:**

- **Ausroc 4000 Terratest Pty Ltd**

**Remarks:**

**GROUNDWATER MONITORING NOTES:**

---

**Engineering Log**

- **Client:** Sydney Motorway Corporation
- **Project:** M4-M5 Link Geotech Investigation
- **Location:** Rozelle Rail Yards, Lilyfield
- **Driller:** Terratest Pty Ltd
- **Drill Rig:** Ausroc 4000
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A

---

**PIEZOMETER No. RZ_BH01**

- **Sheet:** 2 of 2

<table>
<thead>
<tr>
<th>Piezometer Details</th>
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<tr>
<td><strong>Construction Details:</strong> Machine slotted PVC pipe</td>
</tr>
<tr>
<td><strong>Pipe Diameter:</strong> 50 mm</td>
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<tr>
<td><strong>Pipe Top:</strong> 0.0 mBGL</td>
</tr>
<tr>
<td><strong>Pipe Base:</strong> 25.0 mBGL</td>
</tr>
<tr>
<td><strong>Screen Top:</strong> 22.0 mBGL</td>
</tr>
<tr>
<td><strong>Screen/Sensor Base:</strong> 25.0 mBGL</td>
</tr>
<tr>
<td><strong>Instrument Details:</strong> -</td>
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<td><strong>Installation Date:</strong> 23/06/2016</td>
</tr>
<tr>
<td><strong>Development Date:</strong> -</td>
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**Groundwater Details**

- **Depth (m):** 32.0 to 60.0
- **Reduced Level (m):** -24.0 to -52.0

---

**Graphic Log**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0</td>
<td>-24.0</td>
</tr>
<tr>
<td>34.0</td>
<td>-26.0</td>
</tr>
<tr>
<td>36.0</td>
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<td>38.0</td>
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<td>40.0</td>
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<td>42.0</td>
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<td>44.0</td>
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<td>46.0</td>
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<td>52.0</td>
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<td>54.0</td>
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<tr>
<td>56.0</td>
<td>-48.0</td>
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<tr>
<td>58.0</td>
<td>-50.0</td>
</tr>
<tr>
<td>60.0</td>
<td>-52.0</td>
</tr>
</tbody>
</table>

---

**Equipment Details**

- **Machine slotted PVC pipe**
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 25.0 mBGL
- **Screen Top:** 22.0 mBGL
- **Screen/Sensor Base:** 25.0 mBGL

---

**Project Details**

- **Project No:** 60493796
- **Logged by:** JR/SJ
- **Checked by:** BF
- **Start Date:** 15/06/2016
- **End Date:** 24/06/2016
- **Eastings:** 330608.9 m
- **RL:** 6.42 m
- **Nordinings:** 6250381.3 m
- **Ver. Datum:** AHD
- **Hor. Proj/Dat:** MGA94/GDA94-56H
- **Surface:** Gravel
### Summary Geology

(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Defect Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.5 m</td>
<td>-</td>
</tr>
<tr>
<td>0.5 to 4.0 m</td>
<td>-</td>
</tr>
<tr>
<td>4.0 to 6.0 m</td>
<td>-</td>
</tr>
<tr>
<td>6.0 to 6.5 m</td>
<td>-</td>
</tr>
<tr>
<td>6.5 to 9.5 m</td>
<td>-</td>
</tr>
<tr>
<td>9.5 to 9.7 m</td>
<td>-</td>
</tr>
</tbody>
</table>

### Field Data

- **Method**: Technique, method used for sampling.
- **Core Run**: Core recovery percentage.
- **ROD (%)**: Rock outcrop percentage.
- **Ground Water**: Groundwater level observed.
- **Depth (m)**: Depth of observation.
- **Graphic Log**: Graphical representation of borehole data.

#### Rock Description

- **Sandy GRAVEL**
- **Sandy GRAVEL, dark brown to dark grey**
- **GRAVEL+COBBLES, light grey to dark grey**
- **COBBLES, light grey to light yellow-brown**
- **SAND, fine to medium grained, light yellow to light grey**
- **SAND, medium grained**
- **BOULDERS**
- **Clayey SAND, fine to coarse grained**
- **SAND, fine to coarse grained, yellow-brown**
- **SILT, dark brown and yellow-brown**
- **GRAVEL, dark brown**
- **Clayey SAND, fine to medium grained**
- **SANDSTONE BOULDER**
- **Clayey SAND, fine to medium grained**

### Piezometer Details

- **Construction Details**: Machine slotted PVC pipe
  - **Pipe Diameter**: 50 mm
  - **Pipe Top**: 0.0 mBGL
  - **Pipe Base**: 9.5 mBGL
  - **Screen Top**: 6.5 mBGL
  - **Screen/Sensor Base**: 9.5 mBGL
  - **Instrument Details**: 9.5 mBGL
  - **Installation Date**: 24/06/2016
  - **Development Date**: -

### GROUNDWATER MONITORING NOTES:

The material properties are taken from the adjacent borehole RZ_BH01A.

RZ_BH01A Terminated at 9.96 m.
### Field Data

<table>
<thead>
<tr>
<th>Core Run</th>
<th>RQD (%)</th>
<th>Ground Water Reduced Level (m)</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>100</td>
<td>6.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Run 2</td>
<td>100</td>
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<td>0.0</td>
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<tr>
<td>Run 3</td>
<td>100</td>
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<tr>
<td>Run 4</td>
<td>100</td>
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<td>0.0</td>
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<tr>
<td>Run 5</td>
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<tr>
<td>Run 6</td>
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<tr>
<td>Run 7</td>
<td>100</td>
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</tr>
<tr>
<td>Run 8</td>
<td>100</td>
<td>-8.0</td>
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</tr>
<tr>
<td>Run 9</td>
<td>100</td>
<td>-10.0</td>
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<tr>
<td>Run 10</td>
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<tr>
<td>Run 11</td>
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<tr>
<td>Run 12</td>
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<tr>
<td>Run 13</td>
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<td>Run 16</td>
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<tr>
<td>Run 17</td>
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<tr>
<td>Run 18</td>
<td>100</td>
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<td>0.0</td>
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<tr>
<td>Run 19</td>
<td>100</td>
<td>-30.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Run 20</td>
<td>100</td>
<td>-32.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### Rock Description

- **Summary Geology** (refer to geological log for full descriptions)
  - Depth 0.0 to 0.5 m: GRAVEL, medium to coarse grained, yellow-brown
  - Depth 0.5 to 14.0 m: Sandy COBBLES, Sandy GRAVEL, fine to coarse grained, yellow-brown, Sandy CLAY, Gravelly Clayey SAND, fine to coarse grained, Sandy CLAY
  - Depth 14.0 to 18.0 m: SAND, medium grained, brown
  - Depth 18.0 to 31.8 m: SANDSTONE, medium to coarse grained, grey, mottled light brown, SANDSTONE, medium grained, light grey

### Piezometer Details

- **Construction Details:** machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 21.0 mBGL
- **Screen Top:** 18.0 mBGL
- **Screen/Sensor Base:** 21.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 10/06/2016
- **Development Date:** -

### Engineering Log

- **Client:** Sydney Motorway Corporation
- **Project:** M4-M5 Link Geotech Investigation
- **Location:** Rozelle Rail Yards, Lilyfield
- **Driller:** Hagstrom Drilling Pty Ltd
- **Drill Rig:** DR04-Hydropower Scout
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A
- **Easting:** 330522.6 m
- **RL:** 6.09 m
- **Northing:** 6250349.9 m
- **Ver. Datum:** AHD
- **Hor. Proj/Dat:** MGA94/GDA94-56H
- **Surface:** Grass
- **Logged by:** LH/FR
- **Checked by:** BF
- **Start Date:** 7/06/2016
- **End Date:** 9/06/2016

### Remarks

**GROUNDWATER MONITORING NOTES:**
**Ground Water**

**Defect Spacing (mm)**

**Core Run** | **TCR (%)** | **RQD (%)**
--- | --- | ---
Run 15 | 100 | 100
Run 16 | 100 | 100
Run 17 | 100 | 100
Run 18 | 100 | 100
Run 19 | 100 | 100

**Ground Water Details**

- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, fine to medium grained, light grey
- SANDSTONE, medium to coarse grained, light grey continued
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light grey

**Summary Geology**

(refer to geological log for full descriptions)

**Piezometer Details**

- Construction Details: machine slotted PVC pipe
- Pipe Diameter: 50 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 21.0 mBGL
- Screen Top: 18.0 mBGL
- Screen/Sensor Base: 21.0 mBGL
- Instrument Details: -
- Installation Date: 10/06/2016
- Development Date: -

**Field Data**

<table>
<thead>
<tr>
<th>Method</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Reduced Level (m)</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HQ3</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>32.0</td>
<td>32.0</td>
</tr>
<tr>
<td>HQ3</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>34.0</td>
<td>34.0</td>
</tr>
</tbody>
</table>

**Driller:** Hagstrom Drilling Pty Ltd

**Drill Rig:** DR04-Hydrapower Scout

**Hole Diameter:** 96 mm

**Inclination:** -90°

**Bearing:** N/A

**Depth 22.0 to 31.5 m**

**Depth 31.8 to 35.0 m**

**BENTONITE**

**BENTONITE - CEMENT GROUT**

**RZ_BH15 Terminated at 35.00 m.**

**Groundwater Monitoring Notes:**
**Summary Geology** (refer to geological log for full descriptions)

- **GATIC COVER**
- **BENTONITE + CEMENT GROUT**
- **BENTONITE**
- **FILTER SAND**
- **PVC SLOTTED SECTION WITH FILTER SAND**
- **FILTER SAND**
- **BENTONITE**

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 m BGL
- **Pipe Base:** 20.0 m BGL
- **Screen Top:** 17.0 m BGL
- **Screen/Sensor Base:** 20.0 m BGL
- **Instrument Details:** -
- **Installation Date:** 16/06/2016
- **Development Date:** -

**Ground Water**

- **Defect Spacing (mm):** -

**Field Data**

- **Core Run**
- **TDR (%):** -
- **RQD (%):** -

**Rock Description**

- **Sandy GRAVEL, fine to coarse grained**
- **GRAVEL, fine to coarse grained, dark grey**
- **GRAVEL, medium to coarse grained, yellow-brown**
- **Gravelly SAND, medium grained**
- **CLAY, dark brown-grey**
- **SAND, medium grained, light grey, mottled red**
- **SANDSTONE, medium to coarse grained, light grey, mottled red**
- **SANDSTONE, medium to coarse grained, light grey with orange staining**
- **NO CORE**
- **SANDSTONE, medium to coarse grained, light grey with orange staining**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium to coarse grained, light grey**
- **MUDSTONE, dark grey**
- **SANDSTONE, medium grained, light grey**

**Remarks:**

**Groundwater Monitoring Notes:**

- Delta 550
- Hagstrom Drilling Pty Ltd

**REMARKS:**

**Field Data**

- **PIEZOMETER No.:** 60493796
- **Logged by:** HW/LH
- **Checked by:** BF
- **Start Date:** 14/06/2016
- **End Date:** 16/06/2016
- **Easting:** 330609.4 m
- **RL:** 5.88 m
- **Northing:** 6250409.4 m
- **Ver. Datum:** AHD
- **Hor. Proj/Dat:** MGA94/GDA94-56H
**Summary Geology** (refer to geological log for full descriptions)

- **Depth 28.9 to 35.0 m**
- **MUDSTONE**
- **SANDSTONE, medium to coarse grained, light grey**
- **NO CORE**
- **MUDSTONE, dark grey continued**
- **INTERBEDDED MUDSTONE/SANDSTONE**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
  - **Pipe Diameter:** 50 mm
  - **Pipe Top:** 0.0 mBGL
  - **Pipe Base:** 20.0 mBGL
  - **Screen Top:** 17.0 mBGL
  - **Screen/Sensor Base:** 20.0 mBGL
- **Instrument Details:**
  - **Installation Date:** 16/06/2016
  - **Development Date:** -

**Groundwater Monitoring Notes:**

**REMARKS:**

- **GROUNDWATER MONITORING NOTES:**

---

**Graphic Log**

**Field Data**

<table>
<thead>
<tr>
<th>Method</th>
<th>Core Run</th>
<th>RQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.94</td>
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<tr>
<td>0.99</td>
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<td></td>
</tr>
</tbody>
</table>

**Piezometer Details**

- **PEIZOMETER No.**
- **Sheet:** 2 of 2
- **RZ_BH16**
- **Terminated at 35.00 m.**

---

**Driller:** Hagstrom Drilling Pty Ltd

**Drill Rig:** Delta 550

**Hole Diameter:** 96 mm

**Inclination:** -90°

**Bearing:** N/A

---

**Groundwater**

**Defect Spacing (mm)**

- **Core Run**
- **TCR (%)**
- **RQD (%)**

---

**Remarks:**

- **Delta 550 Hagstrom Drilling Pty Ltd**
- **REMARKS:**

---

**Field Data**

<table>
<thead>
<tr>
<th>Piezometer Details</th>
<th>Graph</th>
<th>Summary Geology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Details:</td>
<td></td>
<td>Machine slotted PVC pipe</td>
</tr>
<tr>
<td>Pipe Diameter:</td>
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<td>50 mm</td>
</tr>
<tr>
<td>Pipe Top:</td>
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<td>0.0 mBGL</td>
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<tr>
<td>Pipe Base:</td>
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<tr>
<td>Screen Top:</td>
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<td>Instrument Details:</td>
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<td>16/06/2016</td>
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<tr>
<td>Development Date:</td>
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<td>-</td>
</tr>
</tbody>
</table>

---

**Groundwater**

**Defect Spacing (mm)**

- **Core Run**
- **TCR (%)**
- **RQD (%)**

---

**Remarks:**

- **Delta 550 Hagstrom Drilling Pty Ltd**
- **REMARKS:**
**Groundwater Monitoring Notes:**

**Hydrapower Scout**

**Hagstrom Drilling Pty Ltd**

**Summary Geology (refer to geological log for full descriptions):**

- **Depth 0.0 to 0.5 m**
  - GRAVEL, medium to coarse grained
  - SAND, medium to coarse grained, light brown
- **Depth 0.5 to 15.0 m**
  - Clayey SAND, medium to coarse grained, light red-brown
  - Sandy CLAY
  - CLAY, yellow-brown
  - SAND, light brown
  - CLAY, dark grey
- **Depth 15.0 to 17.0 m**
  - SANDSTONE, medium grained, light brown mottled pink
  - SANDSTONE, medium grained, light brown mottled red-brown
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, grey and red
  - SANDSTONE, medium grained, light grey and grey
- **Depth 17.0 to 20.0 m**
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey and grey
  - SANDSTONE, medium grained, light grey

**Piezometer Details:**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 22.0 mBGL
- **Screen Top:** 19.0 mBGL
- **Screen/Sensor Base:** 22.0 mBGL
- **Instrument Details:** -
  - **Installation Date:** 22/07/2016
  - **Development Date:** -

**Remarks:**

- **FieldName:** PBZ
  - **Method:** Core Run
  - **Core Run:** 1 to 9
  - **QRD (%)**
  - **Ground Water:** Depth (m)
  - **Reduced Level (m):** Ground Water

**Page Dimensions:** 595.2x841.7

**Image Dimensions:** 57x808 to 132x825
### Field Data

<table>
<thead>
<tr>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Reduced Level (m)</th>
<th>Depth (m)</th>
<th>Graphic Log</th>
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<tbody>
<tr>
<td>Run 10</td>
<td>100</td>
<td>96</td>
<td>-28.0</td>
<td>32.0</td>
<td>Summary Geology (refer to geological log for full descriptions)</td>
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<tr>
<td>Run 11</td>
<td>100</td>
<td>90</td>
<td>-30.0</td>
<td>34.0</td>
<td>SANDSTONE, medium grained, grey continued</td>
</tr>
</tbody>
</table>

### Rock Description

- SANDSTONE, medium grained, grey continued
- SANDSTONE, medium grained, light grey and grey

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 19.0 mBGL
- **Screen Top:** 22.0 mBGL
- **Screen/Sensor Base:** 22.0 mBGL
- **Installation Date:** 22/07/2016
- **Development Date:** -

### REMARKS:

GROUNDWATER MONITORING NOTES:
### Field Data

<table>
<thead>
<tr>
<th>Defect Spacing (mm)</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth 0.0 to 0.5 m</td>
<td>Run 1</td>
<td>86.87</td>
<td>N/A</td>
<td>Sandy GRAVEL, fine to medium grained</td>
</tr>
<tr>
<td></td>
<td>Run 2</td>
<td>97.87</td>
<td>N/A</td>
<td>SANDSTONE, orange-brown and light grey</td>
</tr>
<tr>
<td></td>
<td>Run 3</td>
<td>96.62</td>
<td>N/A</td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>Run 4</td>
<td>95.90</td>
<td>N/A</td>
<td>SANDSTONE, fine to coarse grained, yellow-brown to red-brown iron-stained</td>
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<tr>
<td></td>
<td>Run 5</td>
<td>100.94</td>
<td>N/A</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
</tr>
<tr>
<td></td>
<td>Run 6</td>
<td>100.82</td>
<td>N/A</td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>Run 7</td>
<td>100.75</td>
<td>N/A</td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
</tr>
<tr>
<td></td>
<td>Run 8</td>
<td>100.10</td>
<td>N/A</td>
<td>SANDSTONE, coarse grained, light grey</td>
</tr>
<tr>
<td></td>
<td>Run 9</td>
<td>100.73</td>
<td>N/A</td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>Run 10</td>
<td>100.73</td>
<td>N/A</td>
<td>MUDSTONE, dark grey</td>
</tr>
<tr>
<td></td>
<td>Run 11</td>
<td>100.85</td>
<td>N/A</td>
<td>SANDSTONE, fine to medium grained, light grey</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDSTONE, coarse grained, light grey</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SHALE BRECCIA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDSTONE, medium to coarse grained, light grey</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDSTONE, coarse grained, light grey</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDSTONE, fine to medium grained, light grey to light yellow-grey</td>
</tr>
</tbody>
</table>

### Rock Description

- **Sandy GRAVEL**, fine to medium grained
- **SANDSTONE**, orange-brown and light grey
- **NO CORE**
- **SANDSTONE**, fine to coarse grained, yellow-brown to red-brown iron-stained
- **SANDSTONE**, medium to coarse grained, light grey
- **NO CORE**
- **SANDSTONE**, medium to coarse grained, light grey
- **SANDSTONE**, coarse grained, light grey
- **NO CORE**
- **MUDSTONE**, dark grey
- **SANDSTONE**
- **MUDSTONE**, dark grey
- **NO CORE**
- **MUDSTONE**, dark grey
- **SANDSTONE**, fine to medium grained, light grey
- **SANDSTONE**, coarse grained, light grey
- **SHALE BRECCIA**
- **SANDSTONE**, medium to coarse grained, light grey
- **SANDSTONE**, coarse grained, light grey
- **SANDSTONE**, fine to medium grained, light grey to light yellow-grey

### Piezometer Details

- **Construction Details**: Machine slotted PVC pipe
- **Pipe Diameter**: 50 mm
- **Pipe Top**: 0.0 mBGL
- **Pipe Base**: 20.0 mBGL
- **Screen Top**: 20.0 mBGL
- **Screen/Sensor Base**: 23.0 mBGL
- **Instrument Details**: -
- **Installation Date**: 13/07/2016
- **Development Date**: -

### REMARKS:

GROUNDWATER MONITORING NOTES:
**Summary Geology (refer to geological log for full descriptions)**

- **SANDSTONE, medium to coarse grained, light brown-grey**
- **SANDSTONE, fine to coarse grained, light grey**
- **SANDSTONE, coarse grained, light yellow-brown**
- **SANDSTONE, medium to coarse grained, light grey to light yellow-grey**

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 20.0 mBGL
- **Screen Top:** 20.0 mBGL
- **Screen/Sensor Base:** 23.0 mBGL
- **Installation Date:** 13/07/2016
- **Development Date:** -

**Ground Water Monitoring Notes:**

- **Delta Base 520**

**Remarks:**

- GROUNDWATER MONITORING NOTES:
**Groundwater Monitoring Notes:**

*Ausroc 4000 Terratest Pty Ltd*

**Clients:**
- Sydney Motorway Corporation
- M4-M5 Link Geotech Investigation
- Rozelle Rail Yards, Rozelle

**Driller:** Terratest Pty Ltd
**Drill Rig:** Ausroc 4000
**Hole Diameter:** 96 mm
**Inclination:** -90°
**Bearing:** N/A

**Construction Details:**
- Machine slotted PVC pipe
- Pipe Diameter: 50 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 30.0 mBGL
- Screen Top: 27.0 mBGL
- Screen/Sensor Base: 30.0 mBGL
- Instrument Details: -
- Installation Date: 29/07/2016
- Development Date: -

**Pipe Details:**
- Machine slotted PVC pipe
- Pipe Diameter: 50 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 30.0 mBGL
- Screen Top: 27.0 mBGL
- Screen/Sensor Base: 30.0 mBGL
- Instrument Details: -
- Installation Date: 29/07/2016
- Development Date: -

**Sheet: 1 of 2**

**Field Data**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Defect Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.5</td>
<td></td>
</tr>
<tr>
<td>0.5 to 23.0</td>
<td></td>
</tr>
<tr>
<td>23.0 to 27.0</td>
<td></td>
</tr>
<tr>
<td>27.0 to 30.0</td>
<td></td>
</tr>
</tbody>
</table>

**Summary Geology**
- Clayey SAND, fine to medium grained, dark grey
- SAND, fine to coarse grained, yellow-brown
- Gravelly COBBLES
- Clayey GRAVEL, fine to medium grained
- SANDSTONE, medium to coarse grained, yellow-brown
- SANDSTONE, fine to coarse grained, light grey and yellow-brown
- SANDSTONE, fine grained, light grey
- SANDSTONE, yellow-brown
- SANDSTONE, fine to coarse grained, light grey to yellow-brown
- NO CORE
- SANDSTONE, fine to coarse grained, light grey
- SANDSTONE, medium to coarse grained, light grey-grey
- SHALE BRECCIA, fine to coarse grained
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, coarse grained, light grey
- SHALE BRECCIA, medium to coarse grained
- SANDSTONE, medium to coarse grained, brown-grey to light grey
- SANDSTONE, fine to medium grained, light grey
- SANDSTONE, coarse grained, light grey and light yellow-brown
- PVC SLOTTED SECTION WITH FILTER SAND

**Remarks:**
- Groundwater Monitoring Notes:
FILTER SAND
BENTONITE

Depth 30.0 to 32.0 m

SANDSTONE, coarse grained, light grey

SANDSTONE, fine to medium grained, grey

RZ_BH28 Terminated at 35.00 m.

Ground Water

Defect Spacing (mm)

Core Run

TCR (%)

RQD (%)

Rock Description

Summary Geology (refer to geological log for full descriptions)

Piezometer Details

Construction Details:
Machine slotted PVC pipe
Pipe Diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 30.0 mBGL
Screen Top: 27.0 mBGL
Screen/Sensor Base: 30.0 mBGL
Instrument Details:
Installation Date: 29/07/2016
Development Date: -

Piping Details:
Machine slotted PVC pipe
Pipe Diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 30.0 mBGL
Screen Top: 27.0 mBGL
Screen/Sensor Base: 30.0 mBGL
Instrument Details:
Installation Date: 29/07/2016
Development Date: -

Remarks:
GROUNDWATER MONITORING NOTES:
### Field Data

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.5</td>
<td>0.0 - 0.5</td>
</tr>
<tr>
<td>0.5 - 12.0</td>
<td>0.5 - 12.0</td>
</tr>
<tr>
<td>12.0 - 14.0</td>
<td>12.0 - 14.0</td>
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<td>14.0 - 16.0</td>
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<td>21.1 - 25.0</td>
<td>21.1 - 25.0</td>
</tr>
<tr>
<td>25.0 - 35.0</td>
<td>25.0 - 35.0</td>
</tr>
</tbody>
</table>

### Rock Description

- **Asphalt**
- Sandy gravel
- Gravelly sand, medium to coarse grained
- Sandy gravel
- Gravelly sand, fine to medium grained, light grey, mottled light orange
- Gravelly sand, fine to medium grained, light grey-orange
- Sandstone, fine to medium grained, light grey-orange
- Sandstone, medium grained, light grey, yellow-grey and orange/red
- Sandstone, medium grained, light grey to orange/red
- Mudstone, grey
- Sandstone, medium grained, yellow-brown
- Sandstone, medium grained, yellow-brown
- Sandstone, medium grained, light grey
- Sandstone, medium grained, light grey
- Sandstone, medium grained, light grey
- Sandstone, fine to medium grained, light grey
- Sandstone, fine to medium grained, light grey
- Sandstone, medium grained, light grey

**Summary Geology** (refer to geological log for full descriptions)

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 19.0 mBGL
- **Screen Top:** 16.0 mBGL
- **Screen/Sensor Base:** 19.0 mBGL
- **Instrument Details:**
- **Installation Date:** 14/07/2016
- **Development Date:**

**Graphic Log**

*GATIC COVER*  
*GROUT*  
*BENTONITE*  
*FILTER SAND*  
*PVC SLOTTED SECTION WITH FILTER SAND*  
*FILTER SAND*  
*BENTONITE*  
*BENTONITE + CEMENT*
Summary Geology (refer to geological log for full descriptions)

**Ground Water**

- **Defect Spacing (mm)**
- **Core Run**
- **TGR (%)**
- **ROD (%)**
- **Ground Water Reduced Level (m)**
- **Depth (m)**

- MUDSTONE, fine grained, dark grey-grey
- SANDSTONE, fine to medium grained, light grey
- CLAY, grey
- SANDSTONE, fine to medium grained, light grey continued

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 19.0 mBGL
- **Screen Top:** 19.0 mBGL
- **Screen/Sensor Base:** 19.0 mBGL
- **Installation Date:** 14/07/2016
- **Development Date:** -

**Piezometer No.**

RZ_BH30 Terminated at 35.00 m.

**REM**

**Remarks:**

GROUNDWATER MONITORING NOTES:
**GATIC COVER**

**BENTONITE**

**BENTONITE + CEMENT**

**FILTER SAND**

**PVC SLOTTED SECTION WITH FILTER SAND**

---

**Summary Geology**

- Gravelly SAND, dark grey-black
- Gravelly SAND
- SAND, medium grained, light brown-yellow
- Clayey SAND, fine to medium grained, grey to dark grey
- SAND, fine to medium grained, light grey to light yellow
- SANDSTONE, medium grained, light grey to orange
- NO CORE
- SANDSTONE, medium grained, light grey to light yellow
- SANDSTONE, medium to coarse grained, light orange to red-brown
- SANDSTONE, medium grained, orange-red to brown
- SANDSTONE, coarse grained, mainly red to light orange
- SANDSTONE, medium grained, light grey
- SANDSTONE, fine grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, fine grained, grey
- SANDSTONE, medium grained, light grey

---

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 31.3 mBGL
- **Screen Top:** 28.3 mBGL
- **Screen/Sensor Base:** 31.3 mBGL
- **Instrument Details:** -
- **Installation Date:** 1/08/2016
- **Development Date:** -

---

**Remarks:**

**GROUNDWATER MONITORING NOTES:**
### Field Data

<table>
<thead>
<tr>
<th>Method</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
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</thead>
<tbody>
<tr>
<td>Run 11</td>
<td>100-90</td>
<td>0-5.0</td>
<td>0-5.0</td>
<td>0-5.0</td>
<td>-30.0</td>
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<tr>
<td>Run 12</td>
<td>100-100</td>
<td>0-5.0</td>
<td>0-5.0</td>
<td>0-5.0</td>
<td>-32.0</td>
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</table>

### Rock Description

- SHALE BRECCIA continued
- SANDSTONE, fine to medium grained, light grey
- SANDSTONE, medium grained, grey to dark brown
- SANDSTONE, medium grained, light grey

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 31.3 mBGL
- **Screen Top:** 28.3 mBGL
- **Screen/Sensor Base:** 31.3 mBGL
- **Instrument Details:** -
- **Installation Date:** 1/08/2016
- **Development Date:** -

### Summary Geology

(refer to geological log for full descriptions)

- PVC SLOTTED SECTION WITH FILTER SAND
- FILTER SAND
- BENTONITE

**RZ_BH38 Terminated at 35.08 m.**
Summary Geology (refer to geological log for full descriptions)

### Rock Description

- **Clayey SAND, fine to coarse grained, dark grey**
- **COBBLES**
- **Clayey SAND, fine to coarse grained, dark brown to dark grey**
- **SAND, fine to coarse grained, yellow-brown**
- **CLAY, black**
- **Sandy CLAY, black**
- **CLAY, black**
- **Sandy CLAY, black**
- **CLAY, black**
- **Clayey SAND, fine to medium grained, pale brown and dark brown**
- **CLAY, black**
- **Clayey SAND, fine to medium grained, pale brown and dark brown**
- **SANDSTONE, medium grained, pale brown**
- **NO CORE**
- **SANDSTONE, medium grained, pale grey**
- **SHALE BRECCIA**
- **SANDSTONE, medium grained, pale grey**

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 28.0 mBGL
- **Screen Top:** 25.0 mBGL
- **Screen/Sensor Base:** 28.0 mBGL
- **Installation Date:** 9/8/2016
- **Development Date:** -

### Field Data

- **NDDCAHQ3**
- **Run 1 Run 2 Run 3 Run 4 Run 5 Run 6 Run 7 Run 8 Run 9 Run 10 Run 11**
- **100 100 93 90 100 97 100 100 100 100 100**
- **100 100 100 100 100 100 100 100 100 100 100**
- **100 100 100 100 100 100 100 100 100 100 100**
- **100 100 100 100 100 100 100 100 100 100 100**
- **100 100 100 100 100 100 100 100 100 100 100**
- **100 100 100 100 100 100 100 100 100 100 100**
- **100 100 100 100 100 100 100 100 100 100 100**
- **100 100 100 100 100 100 100 100 100 100 100**
- **100 100 100 100 100 100 100 100 100 100 100**
- **100 100 100 100 100 100 100 100 100 100 100**

### REMARKS:

**GROUNDWATER MONITORING NOTES:**
Summary Geology:
- SANDSTONE, medium grained, pale grey
- SANDSTONE, medium to coarse grained, pale grey and dark grey
- SANDSTONE, medium grained, pale grey

Defect Spacing (mm):
- RZ_BH44 Terminated at 35.00 m.

BENTONITE Depth 30.0 to 35.0 m

Ground Water Monitoring Notes:
- Delta 550
- Hagstrom Drilling Pty Ltd

REMARKS:
- GROUNDWATER MONITORING NOTES:
### Summary Geology
 referencia geological log for full descriptions:

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.5 m</td>
<td>Clayey SAND, fine to coarse grained, dark grey</td>
</tr>
<tr>
<td>0.5 to 10.0 m</td>
<td>Clayey SAND, fine to coarse grained, dark brown to dark grey</td>
</tr>
<tr>
<td>10.0 to 12.0 m</td>
<td>SAND, fine to coarse grained, yellow-brown</td>
</tr>
<tr>
<td>12.0 to 15.0 m</td>
<td>CLAY, black</td>
</tr>
<tr>
<td>15.0 to 15.9 m</td>
<td>Sandy CLAY, black</td>
</tr>
<tr>
<td>15.9 to 16.6 m</td>
<td>CLAY, black</td>
</tr>
</tbody>
</table>

### Defect Spacing (mm)

<table>
<thead>
<tr>
<th>Defect Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
</tr>
</thead>
</table>

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 15.0 mBGL
- **Screen Top:** 12.0 mBGL
- **Screen/Sensor Base:** 15.0 mBGL
- **Instrument Details:**
- **Installation Date:** 10/08/2016
- **Development Date:**

### REMARKS:
The material properties are taken from the adjacent borehole RZ_BH44.
**FILTER SAND**

**BENTONITE**

**Depth 29.2 to 31.2 m**

**Light grey to light yellow-brown SANDSTONE, medium grained, light grey**

**Depth 31.2 to 35.0 m**

**SANDSTONE, medium grained, light grey**

**RZ_BH47 Terminated at 35.00 m.**
**Field Data**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Summary Geology (refer to geological log for full descriptions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.5</td>
<td>Gravely SAND, fine to coarse grained, dark brown</td>
</tr>
<tr>
<td>0.5 to 1.0</td>
<td>GRANULE, fine to coarse grained, yellow-brown</td>
</tr>
<tr>
<td>1.0 to 1.5</td>
<td>COBBLES</td>
</tr>
<tr>
<td>1.5 to 2.0</td>
<td>Gravely SAND, fine to coarse grained sand</td>
</tr>
<tr>
<td>2.0 to 2.5</td>
<td>Clayey GRANULE</td>
</tr>
<tr>
<td>2.5 to 3.0</td>
<td>Clayey SAND, fine to medium grained, yellow-brown and brown-grey</td>
</tr>
<tr>
<td>3.0 to 3.5</td>
<td>CLAY, yellow-brown and light grey</td>
</tr>
<tr>
<td>3.5 to 4.0</td>
<td>Sandy CLAY, dark grey</td>
</tr>
<tr>
<td>4.0 to 4.5</td>
<td>Clayey SAND, fine to coarse grained, dark grey</td>
</tr>
<tr>
<td>4.5 to 5.0</td>
<td>CLAY, dark grey</td>
</tr>
<tr>
<td>5.0 to 5.5</td>
<td>SAND, fine to coarse grained, light grey</td>
</tr>
<tr>
<td>5.5 to 6.0</td>
<td>Clayey SAND, fine to coarse grained, dark grey</td>
</tr>
<tr>
<td>6.0 to 6.5</td>
<td>CLAY, dark grey</td>
</tr>
<tr>
<td>6.5 to 7.0</td>
<td>Clayey SAND, fine to coarse grained, grey</td>
</tr>
</tbody>
</table>

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 18.0 mBGL
- **Screen Top:** 15.0 mBGL
- **Screen/Sensor Base:** 18.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 10/08/2016
- **Development Date:** -

**Ground Water**

- **Depth (m):** 0.0 to 0.5
- **Reduced Level (m):** 2.0

**Remarks:**

- The material properties are taken from the adjacent borehole RZ_BH47.

**Groundwater Monitoring Notes:**

- Delta Base 520
- Inclination: -90°
- Bearing: N/A
- RZ_BH47A Terminated at 21.00 m
**Groundwater Monitoring Notes:**

**Hydrapower Scout Hagstrom Drilling Pty Ltd**

**Remarks:** The material properties are taken from the adjacent borehole RZ_BH49.

**Groundwater Monitoring Notes:**

**Summary Geology:**
- **Ground Water Graph:**
  - **Depth (m):** 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0, 28.0, 30.0
  - **Reduced Level (m):** 6.0, 4.0, 2.0, 0.0, -2.0, -4.0, -6.0, -8.0, -10.0, -12.0, -14.0, -16.0, -18.0, -20.0, -22.0, -24.0

**Field Data**

- **Core Run:**
  - **Top Core:** 0.0 m
  - **Bottom Core:** 30.0 m

**Rock Description**
- **Gravel, fine to coarse grained**
  - **Depth:** 0.0 to 0.5 m
- **Cobbles**
  - **Depth:** 0.5 to 10.7 m
- **Sand, medium to coarse grained**
  - **Gravelly Clay**
  - **Depth:** 10.7 to 12.3 m
- **Sand, fine to medium grained, orange-brown**
  - **Depth:** 12.3 to 13.2 m
- **Sand, medium grained, light grey**
  - **Sandy Clay**
  - **Depth:** 13.2 to 16.2 m
- **Sand, medium grained**
  - **Depth:** 16.2 to 17.3 m
- **Sand, medium grained, dark grey**
  - **Clay, dark grey**
  - **Depth:** 17.3 to 20.1 m
- **No Core**
  - **Depth:** 20.1 to 24.5 m
- **Sandstone, fine to medium grained, yellow-brown**
  - **Sandstone, fine to medium grained, grey**
  - **Sandstone, fine to medium grained, light grey**
  - **Depth:** 24.5 to 26.2 m

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
  - **Pipe Diameter:** 50 mm
  - **Pipe Top:** 0.0 mBGL
  - **Pipe Base:** 16.2 mBGL
  - **Screen Top:** 13.2 mBGL
  - **Screen/Sensor Base:** 16.2 mBGL
- **Instrument Details:**
  - **Installation Date:** 30/06/2016
  - **Development Date:**

**Client:** Sydney Motorway Corporation

**Project:** M4-M5 Link Geotech Investigation

**Location:** Rozelle Rail Yards, Lilyfield

**Driller:** Hagstrom Drilling Pty Ltd

**Drill Rig:** Hydrapower Scout

**Field Data**

- **Method:**
  - **Core Run:**
  - **GPR (%)**
  - **Ground Water Reduced Level (m)**
  - **Depth (m)**

- **Summary Geology (refer to geological log for full descriptions):**

- **Defect Spacing (mm):**

**Remarks:** The material properties are taken from the adjacent borehole RZ_BH49.
### Field Data

<table>
<thead>
<tr>
<th>Depth Range</th>
<th>Summary Geology (refer to geological log for full descriptions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.5 m</td>
<td>GRAVEL, fine to medium grained</td>
</tr>
<tr>
<td>0.5 - 1.0 m</td>
<td>Gravelly SAND</td>
</tr>
<tr>
<td>1.0 - 18.0 m</td>
<td>SAND, coarse grained, black</td>
</tr>
<tr>
<td>18.0 - 20.0 m</td>
<td>GRAVEL, fine to medium grained</td>
</tr>
<tr>
<td>20.0 - 22.0 m</td>
<td>Clayey SAND, fine to coarse grained, dark grey</td>
</tr>
<tr>
<td>22.0 - 25.0 m</td>
<td>Clayey SAND, fine to coarse grained, yellow-brown</td>
</tr>
<tr>
<td>25.0 - 27.0 m</td>
<td>Clayey SAND, fine to coarse grained, yellow-brown, orange-brown and light grey</td>
</tr>
<tr>
<td>27.0 - 33.0 m</td>
<td>SANDSTONE, coarse grained, light grey</td>
</tr>
<tr>
<td>33.0 - 36.0 m</td>
<td>NO CORE</td>
</tr>
</tbody>
</table>

### Rock Description

- **GRAVEL**, fine to medium grained
- **Gravelly SAND**
- **Gravelly SAND**
- **SAND**, coarse grained, black
- **GRAVEL**, fine to medium grained
- **Clayey SAND**, fine to coarse grained, dark grey
- **Clayey SAND**, fine to coarse grained, yellow-brown
- **Clayey SAND**, fine to coarse grained, yellow-brown, orange-brown and light grey
- **SANDSTONE**, coarse grained, light grey
- **NO CORE**
- **SANDSTONE**, fine to coarse grained, brown and orange-brown
- **SANDSTONE**, fine to coarse grained, orange-brown and light grey
- **NO CORE**
- **SANDSTONE**, medium to coarse grained, light grey
- **NO CORE**
- **SANDSTONE**, medium to coarse grained, light grey
- **SANDSTONE**, coarse grained, light grey
- **SANDSTONE**, medium to coarse grained, light grey
- **SANDSTONE**, medium to coarse grained, light grey
- **SANDSTONE**, fine to coarse grained, light grey
- **SANDSTONE**, fine to coarse grained, light grey

### Defect Spacing (mm)

- Depth 0.0 to 0.5 m: 306
- Depth 0.5 to 1.0 m: 210
- Depth 1.0 to 1.8 m: 86
- Depth 1.8 to 2.0 m: 92
- Depth 2.0 to 2.2 m: 97
- Depth 2.2 to 2.4 m: 100
- Depth 2.4 to 2.6 m: 97
- Depth 2.6 to 2.8 m: 97
- Depth 2.8 to 3.0 m: 100

### Piezometer Details

- **Construction Details**: Machine slotted PVC pipe
- **Pipe Diameter**: 50 mm
- **Pipe Top**: 0.0 mBGL
- **Pipe Base**: 22.0 mBGL
- **Screen Top**: 22.0 mBGL
- **Screen/Sensor Base**: 25.0 mBGL
- **Instrument Details**: -
- **Installation Date**: 11/08/2016
- **Development Date**: -

- **GROUT**
- **BENTONITE - CEMENT GROUT (HIGHER % BENTONITE)**
- **FILTER SAND**
- **PVC SLOTTED SECTION WITH FILTER SAND**
- **BENTONITE**

### Remarks:

- Groundwater Monitoring Notes:
- Driller: Terratest Pty Ltd
- DRill Rig: Ausroc 4000
**Summary Geology** (refer to geological log for full descriptions)

- **Depth 27.0 to 33.0 m**
  - grey
  - NO CORE
  - SANDSTONE, medium to coarse grained, grey continued
  - SANDSTONE, fine to coarse grained, light grey to grey
  - NO CORE

**Piezometer Details**

- **Construction Details**: Machine slotted PVC pipe
  - **Pipe Diameter**: 50 mm
  - **Pipe Top**: 0.0 mBGL
  - **Pipe Base**: 22.0 mBGL
  - **Screen Top**: 22.0 mBGL
  - **Screen/Sensor Base**: 25.0 mBGL
- **Instrument Details**: -
- **Installation Date**: 11/08/2016
- **Development Date**: -

**Ground Water**

**Defect Spacing (mm)**

**Core Run**

<table>
<thead>
<tr>
<th>Run</th>
<th>TC (%)</th>
<th>RQD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>100</td>
<td>52</td>
</tr>
<tr>
<td>15</td>
<td>87</td>
<td>80</td>
</tr>
</tbody>
</table>

**Graphic Log**

- **Depth 27.0 to 33.0 m**
- **BENTONITE**

**Remarks:**

**GROUNDWATER MONITORING NOTES:**

---

**Sheet: 2 of 2**
SANDSTONE, medium to coarse grained, light grey

RZ_BH51 Terminated at 30.00 m.

Ground Water

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.00</td>
<td>-27.00</td>
</tr>
<tr>
<td>32.00</td>
<td>-29.00</td>
</tr>
<tr>
<td>34.00</td>
<td>-31.00</td>
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<tr>
<td>36.00</td>
<td>-33.00</td>
</tr>
<tr>
<td>38.00</td>
<td>-35.00</td>
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<tr>
<td>40.00</td>
<td>-37.00</td>
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<tr>
<td>42.00</td>
<td>-39.00</td>
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<td>44.00</td>
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<tr>
<td>58.00</td>
<td>-55.00</td>
</tr>
<tr>
<td>60.00</td>
<td>-57.00</td>
</tr>
</tbody>
</table>

Summary Geology
(refer to geological log for full descriptions)

- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, coarse grained, light grey
- SANDSTONE, medium to coarse grained, brown-grey and grey
- SANDSTONE, fine to coarse grained, light grey

Piezometer Details

- Construction Details: Machine slotted PVC pipe
- Pipe Diameter: 50 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 19.0 mBGL
- Screen Top: 19.0 mBGL
- Screen/Sensor Base: 22.0 mBGL
- Installation Date: 9/08/2016
- Development Date: -
### Field Data

<table>
<thead>
<tr>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Run 2</td>
<td>98</td>
<td>100</td>
<td>98</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>Run 3</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Run 4</td>
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<td>95</td>
<td>95</td>
<td>95</td>
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<td>Run 5</td>
<td>90</td>
<td>100</td>
<td>90</td>
<td>90</td>
<td>90</td>
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<tr>
<td>Run 6</td>
<td>93</td>
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<td>93</td>
<td>93</td>
<td>93</td>
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<tr>
<td>Run 7</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Run 8</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Run 9</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

### Rock Description

- Sandy GRAVEL, fine to medium grained
- Gravelly SAND, fine to coarse grained, dark brown
- GRAVEL, fine to medium grained, dark grey-black
- Clayey SAND, fine to coarse grained, brown to brown-grey
- SAND, medium to coarse grained, brown mottled yellow-brown
- Clayey SAND, fine to medium grained, yellow-brown mottled orange-brown
- SAND, fine to medium grained, brown-grey to grey
- CLAY, black
- CLAY, yellow-brown mottled orange-brown
- SANDSTONE, fine to medium grained, light grey mottled yellow-brown and red-brown
- SANDSTONE, medium to coarse grained, light yellow-brown streaked and mottled red-brown
- SANDSTONE, fine to coarse grained, yellow-brown and light grey streaked red-brown
- SANDSTONE, medium to coarse grained, light grey and light brown
- NO CORE
- SANDSTONE, medium to coarse grained, light grey and light brown
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, coarse grained, light grey
- SANDSTONE, fine to medium grained, grey

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 32.0 mBGL
- **Screen Top:** 32.0 mBGL
- **Screen/Sensor Base:** 35.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 3/08/2016
- **Development Date:** -

**Summary Geology**

(Refer to geological log for full descriptions)

- GATIX COVER
- GROUT
- BENTONITE

**Ground Water**

- **Defect Spacing (mm):**

**Groundwater Monitoring Notes:**

Ausroc 4000
Terratest Pty Ltd

**REMARKS:**

- 20602006002000

**Engineering Log**

- **Client:** Sydney Motorway Corporation
- **Project:** M4-M5 Link Geotech Investigation
- **Location:** Rozelle Rail Yards, Rozelle
- **Driller:** Terratest Pty Ltd
- **Drill Rig:** Ausroc 4000
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A
- **Project No:** 60493796
- **Logged by:** NB
- **Checked by:** BF
- **Start Date:** 1/08/2016
- **End Date:** 2/08/2016
- **Easting:** 331163.8 m
- **RL:** 2.59 m
- **Northing:** 6250784.6 m
- **Ver. Datum:** AHD
- **Hor. Proj/Dat:** MGA94/GDA94-56H
- **Surface:** Gravel
Summarized Geology (refer to geological log for full descriptions)

- SANDSTONE, fine to coarse grained, light grey
- SANDSTONE, fine to medium grained, brown-grey to light grey

Piezometer Details

- Method: Machine slotted PVC pipe
- Hole Diameter: 50 mm
- Inclination: -90°
- Bearing: N/A
- Screen/Top Base: 35.0 mBGL
- Instrument Details: -
- Installation Date: 3/08/2016
- Development Date: -

Groundwater Monitoring Notes:

- Ground Water Defect Spacing (mm)
- Core Run (T): TCR (T): RQD (T): Reduced Level (m)
- Depth (m): 30.0 to 31.7 m
- Depth: 31.7 to 34.7 m
- Depth: 34.7 to 37.9 m
- Depth: 37.9 to 40.0 m

Remarks:

- GROUNDWATER MONITORING NOTES:
Summary Geology
(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Defect Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>23</td>
<td>6</td>
<td>Asphalt</td>
<td>0</td>
<td>GATTC COVER</td>
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<tr>
<td></td>
<td></td>
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<td>Gravelly SAND, medium grained, black</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>COBBLES, pale grey</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>COBBLES</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clayey SAND, medium grained, yellow and dark brown</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>SAND, medium grained</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Sandy CLAY, dark grey</td>
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<td></td>
<td>SAND, medium grained, yellow-grey and pale grey</td>
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</tr>
<tr>
<td>Run 2</td>
<td>88</td>
<td>78</td>
<td>Asphalt</td>
<td>0</td>
<td>GROUT</td>
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<td>SANDSTONE, medium grained, orange-brown to light brown</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SANDSTONE, fine to medium grained, light grey</td>
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<td>SANDSTONE, medium grained, light grey</td>
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<td>SANDSTONE, medium grained, light grey</td>
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<tr>
<td>Run 3</td>
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<td>78</td>
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<td>BENTONITE</td>
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<td></td>
<td></td>
<td>SANDSTONE, medium grained, light grey</td>
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<td>SANDSTONE, medium grained, light grey</td>
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<tr>
<td>Run 4</td>
<td>96</td>
<td>96</td>
<td>Asphalt</td>
<td>0</td>
<td>FILTER SAND</td>
</tr>
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<td>SANDSTONE, medium grained, light grey</td>
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<td>SANDSTONE, medium grained, light grey</td>
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<td>SANDSTONE, medium grained, light grey</td>
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<td>SANDSTONE, medium grained, light grey</td>
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<td></td>
</tr>
<tr>
<td>Run 5</td>
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<td>100</td>
<td>Asphalt</td>
<td>0</td>
<td>PVC SLOTTED SECTION WITH FILTER SAND</td>
</tr>
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<td>SANDSTONE, medium grained, light grey</td>
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<td>SANDSTONE, medium grained, light grey</td>
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<td>SANDSTONE, medium grained, light grey</td>
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<td></td>
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<tr>
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<td></td>
<td></td>
<td>SANDSTONE, medium grained, light grey</td>
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<td></td>
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<tr>
<td>Run 6</td>
<td>93</td>
<td>93</td>
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<td>BENTONITE + CEMENT</td>
</tr>
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<td>SANDSTONE, medium grained, light grey</td>
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<td>SANDSTONE, medium grained, light grey</td>
<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td>SANDSTONE, medium grained, light grey</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMARKS:
GROUNDWATER MONITORING NOTES:
**Summary Geology (refer to geological log for full descriptions)**

- **Depth 25.3 to 40.0 m.**
- **BENTONITE + CEMENT**

**Ground Water**

**Defect Spacing (mm)**

<table>
<thead>
<tr>
<th>Rock Description</th>
<th>Defect Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>SANDSTONE, medium to coarse grained, pale grey continued</td>
<td></td>
</tr>
<tr>
<td>SANDSTONE, medium grained, pale grey</td>
<td></td>
</tr>
<tr>
<td>SANDSTONE, medium grained, pale grey</td>
<td></td>
</tr>
<tr>
<td>SHALE BRECCIA</td>
<td></td>
</tr>
<tr>
<td>SANDSTONE, medium grained, pale grey</td>
<td></td>
</tr>
</tbody>
</table>

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 21.0 mBGL
- **Screen Top:** 18.0 mBGL
- **Screen/Sensor Base:** 21.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 7/09/2016
- **Development Date:** -

**Field Data**

| Run 7 | | |
|------| | |
| 100 | 67 | |
| 32.0 | | |
| 34.0 | | |
| 36.0 | | |
| 38.0 | | |
| 40.0 | | |
| 52.0 | | |
| 60.0 | | |

**Rock Description**

- **Run 7:** SANDSTONE, medium to coarse grained, pale grey continued
- **Run 8:** SANDSTONE, medium grained, pale grey
- **Run 9:** SANDSTONE, medium grained, pale grey
- **Run 10:** SHALE BRECCIA
- **Run 11:** SANDSTONE, medium grained, pale grey

**Remarks:**

- **GROUNDWATER MONITORING NOTES:**
**GATIC COVER**

**GROUT BENTONITE - HIGHER % BENTONITE**

**Depth 0.0 to 0.1 m**

**Depth 0.1 to 3.0 m**

**Depth 3.0 to 51.0 m**

**ASPHALT CONCRETE**

Sandy GRAVEL, fine to medium grained, dark grey

SANDSTONE, medium grained, light grey

SANDSTONE, medium grained, light grey

SANDSTONE, medium grained, light grey

SANDSTONE, fine to medium grained, light grey

SANDSTONE, medium to coarse grained, pink-grey

SANDSTONE, fine to medium grained, light grey

SANDSTONE, fine grained, pink-brown

SANDSTONE, fine to medium grained, grey

SANDSTONE, fine to medium grained, light grey

SANDSTONE, medium to coarse grained, red brown to grey

SANDSTONE, fine to medium grained, light grey

NO CORE

SANDSTONE, fine to medium grained, medium grey

SANDSTONE, fine to medium grained, light grey

SANDSTONE, fine to medium grained, light grey

SANDSTONE, medium grained, light grey

NO CORE

SANDSTONE, fine to medium grained, light grey

SANDSTONE, fine grained, grey

SANDSTONE, medium grained, light grey

NO CORE

**Piezometer Details**

- **Construction details:**
  - Pipe diameter: 60 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 56.0 mBGL
  - Screen Top: 56.0 mBGL
  - Screen/Sensor Base: 59.0 mBGL
  - Instrument Details: -
  - Installation Date: 7/12/2016
  - Development Date: -

**Ground Water**

**Defect Spacing (mm)**

**Core Run**

**TCR (%)**

**RQD (%)**

**Method**

- **Reduced Level (m)**
  - 24.0
  - 22.0
  - 20.0
  - 18.0
  - 16.0
  - 14.0
  - 12.0
  - 10.0
  - 8.0
  - 6.0
  - 4.0
  - 2.0
  - 0.0
  - -2.0
  - -4.0

**Hor. Proj/Dat:** MGA94/GDA94-56H

**Surface:** Asphalt

**REMINDS:**

**GROUNDWATER MONITORING NOTES:**

**REMARKS:**
### Piezometer Details

**Construction details:**
- Pipe diameter: 60 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 56.0 mBGL
- Screen/sensor Base: 59.0 mBGL

**Instrument Details:**
- Installation Date: 7/12/2016
- Development Date: -

### Summary Geology

*Refer to geological log for full descriptions*

#### Rock Description

- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, fine to medium grained, grey**
- **MUDSTONE, dark grey**
- **SANDSTONE, fine to medium grained, light grey**
- **INTERBEDDED SILTSTONE/SANDSTONE**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, fine grained, light grey**
- **SANDSTONE, fine to medium grained, light grey**
- **SANDSTONE, fine grained, mid grey**

### Defect Spacing (mm)

- Depth 3.0 to 51.0 m
- Depth 51.0 to 53.6 m
- Depth 53.6 to 56.0 m
- Depth 56.0 to 59.0 m
- Depth 59.0 to 61.4 m

### Remarks:

- **GROUNDWATER MONITORING NOTES:**
- **REMARKS:**
FILTER SAND
BENTONITE
GRAVEL

Depth 59.0 to 61.4 m
Depth 61.4 to 63.0 m
Depth 63.0 to 70.0 m

SANDSTONE, fine grained, mid grey continued
SANDSTONE, medium to coarse grained, light grey
SANDSTONE, fine to medium grained, light grey
SANDSTONE, fine to medium grained, light grey
SANDSTONE, fine to medium grained, light grey
SANDSTONE, fine to medium grained, light grey

RZ_BH60 Terminated at 70.14 m.

SANDSTONE, fine to medium grained, light grey

REMARKS:
GROUNDWATER MONITORING NOTES:
GATC COVER
BENTONITE
GROUT
Depth 0.0 to 0.1 m
Depth 0.1 to 1.0 m
Depth 1.0 to 4.0 m
ASPHALT
GRAVEL, medium to coarse grained, dark grey
GRAVEL and COBBLES, grey-brown
SAND, medium grained, orange-brown to red-brown
SANDSTONE, medium to coarse grained, red-brown
NO CORE
SANDSTONE, medium to coarse grained, red-brown
SANDSTONE, medium to coarse grained, light grey
SANDSTONE, medium to coarse grained
SANDSTONE, fine to medium grained, light grey
SANDSTONE, fine to medium grained, light grey and mid grey
SANDSTONE, fine to medium grained, light grey

FIELD DATA

PIEZOMETER No. RZ_BH64
Sheet: 1 of 2

Driller: Hagstrom Drilling Pty Ltd
Hole Diameter: 96 mm
Inclination: -90°
Bearing: N/A

SANDSTONE, fine to medium grained
SANDSTONE, fine to medium grained, light grey
SANDSTONE, fine to medium grained, light grey and mid grey
SANDSTONE, fine to medium grained, light grey

REMARKS:
GROUNDWATER MONITORING NOTES:
### Field Data

<table>
<thead>
<tr>
<th>Core Run</th>
<th>TCR (%)</th>
<th>ROD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>88</td>
<td>40</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Run 2</td>
<td>98</td>
<td>88</td>
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<tr>
<td>Run 3</td>
<td>95</td>
<td>93</td>
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<td></td>
<td></td>
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<tr>
<td>Run 4</td>
<td>98</td>
<td>98</td>
<td></td>
<td></td>
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<tr>
<td>Run 5</td>
<td>89</td>
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<td>Run 6</td>
<td>70</td>
<td>56</td>
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<td>Run 7</td>
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<tr>
<td>Run 8</td>
<td>104</td>
<td>92</td>
<td></td>
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<tr>
<td>Run 9</td>
<td>104</td>
<td>96</td>
<td></td>
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<tr>
<td>Run 10</td>
<td>104</td>
<td>88</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Rock Description

Summary Geology (refer to geological log for full descriptions)

- ASPHALTIC CONCRETE
- Sandy GRAVEL, fine to medium grained, light grey, brown
- SANDSTONE, fine to coarse grained, light grey
- SANDSTONE, medium to coarse grained, red-brown
- SANDSTONE, fine to coarse grained, light brown, red-brown
- NO CORE
- SANDSTONE, fine to coarse grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- NO CORE
- SANDSTONE, coarse grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- NO CORE
- SANDSTONE, coarse grained, light grey
- SANDSTONE, fine to coarse grained, light mid grey
- NO CORE
- SANDSTONE, fine to coarse grained, light mid grey
- SANDSTONE, coarse grained, light grey
- SANDSTONE, coarse grained, light grey
- NO CORE
- SANDSTONE, coarse grained, light grey
- SANDSTONE, medium to coarse grained, light grey

### Piezometer Details

- Construction Details:
  - Pipe Diameter: 60 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 51.0 mBGL
  - Screen Top: 46.0 mBGL
  - Screen/Sensor Base: 49.0 mBGL
- Instrument Details: -
- Installation Date: 14/12/2016
- Development Date: -

### Engineering Log

- Client: Sydney Motorway Corporation
- Project: M4-M5 Link Geotech Investigation
- Location: Opposite 53 Alfred Street, Lilyfield
- Driller: Hagstrom Drilling Pty Ltd
- Hole Diameter: 96 mm
- Inclination: -90°
- Bearing: N/A
- Drill Rig: Delta Base 525
- Easting: 330961.5 m
- RL: 12.91 m
- Northing: 6250999.7 m
- Ver. Datum: AHD
- Hor. Proj/Dat: MGA94/GDA94-56H
- Surface: Asphalt

### Groundwater Monitoring Notes:

Delta Base 525
Hagstrom Drilling Pty Ltd

REMARKS:
2015_ANZ_PIEZO  20161216_AECOM_T3_EREN_2-07.GPJ  AECOM_2-07_LIBRARY.GLB 13.2.2017

### Piezometer Details

- Defect Spacing (mm)
- Field Data
- Rock Description
- Construction Details:
  - Pipe Diameter: 60 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 51.0 mBGL
  - Screen Top: 46.0 mBGL
  - Screen/Sensor Base: 49.0 mBGL
- Instrument Details: -
- Installation Date: 14/12/2016
- Development Date: -

### Graphical Log

- Depth 0.0 to 0.1 m
- Depth 0.1 to 1.0 m
- Depth 1.0 to 40.5 m

### Remarks:

GROUNDWATER MONITORING NOTES:
**Summary Geology**
(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Ground Water Defect</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0</td>
<td>NO CORE</td>
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<tr>
<td>34.0</td>
<td>NO CORE</td>
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<tr>
<td>36.0</td>
<td>NO CORE</td>
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<tr>
<td>38.0</td>
<td>NO CORE</td>
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<tr>
<td>40.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>42.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>44.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>46.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>48.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>50.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>52.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>54.0</td>
<td>NO CORE</td>
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<tr>
<td>56.0</td>
<td>NO CORE</td>
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<tr>
<td>58.0</td>
<td>NO CORE</td>
</tr>
<tr>
<td>60.0</td>
<td>NO CORE</td>
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</table>

**Graphic Log**

<table>
<thead>
<tr>
<th>Method</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Reduced Level (m)</th>
<th>Depth (m)</th>
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<tbody>
<tr>
<td>Run 11</td>
<td>100.90</td>
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<td>32.0</td>
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<td>Run 13</td>
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<td>36.0</td>
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<td>Run 14</td>
<td>100.98</td>
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<td>38.0</td>
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<tr>
<td>Run 15</td>
<td>100.99</td>
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<td>40.0</td>
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<td>Run 16</td>
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<td>42.0</td>
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<td>Run 17</td>
<td>100.97</td>
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<td>44.0</td>
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<td>Run 18</td>
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<td>Run 19</td>
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<td>Run 21</td>
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<tr>
<td>Run 22</td>
<td>88.77</td>
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<td></td>
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<td>54.0</td>
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</table>

**Construction Details**

- **Pipe Diameter:** 60 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 51.0 mBGL
- **Screen Top:** 46.0 mBGL
- **Screen/Sensor Base:** 49.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 14/12/2016
- **Development Date:** -

**Peizometer Details**

- ** piezometer:** 1
- **Piezometer No.:** 60493796
- **Sheet:** 2 of 2
- **RZ_BH67**
- **Method:**
  - **Hole Diameter:** 96 mm
  - **Inclination:** -90°
  - **Bearing:** N/A
- **Driller:** Hagstrom Drilling Pty Ltd
- **Drill Rig:** Delta Base 525
- **Location:** Opposite 53 Alfred Street, Lilyfield
- **Start Date:** 8/12/2016
- **End Date:** 15/12/2016
- **Easting:** 330961.5 m
- **RL:** 12.91 m
- **Northing:** 6250999.7 m
- **Ver. Datum:** AHD
- **Hor. Proj/Dat:** MGA94/GDA94-56H
- **Surface:** Asphalt

**Remarks:**

GROUNDWATER MONITORING NOTES:
**RZ_BH67**

**Client:** Sydney Motorway Corporation  
**Project:** M4-M5 Link Geotech Investigation  
**Location:** Opposite 53 Alfred Street, Lilyfield

**Driller:** Hagstrom Drilling Pty Ltd  
**Drill Rig:** Delta Base 525  
**Hole Diameter:** 96 mm  
**Inclination:** -90°  
**Bearing:** N/A

---

**Ground Water Monitoring Notes:**

**Piezometer Details**

<table>
<thead>
<tr>
<th>Construction Details:</th>
<th>Pipe Diameter:</th>
<th>Pipe Top:</th>
<th>Pipe Base:</th>
<th>Screen Top:</th>
<th>Screen/Sensor Base:</th>
<th>Instrument Details:</th>
<th>Installation Date:</th>
<th>Development Date:</th>
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</thead>
<tbody>
<tr>
<td>-</td>
<td>60 mm</td>
<td>0.0 mBGL</td>
<td>51.0 mBGL</td>
<td>46.0 mBGL</td>
<td>49.0 mBGL</td>
<td>-</td>
<td>14/12/2016</td>
<td>-</td>
</tr>
</tbody>
</table>

**Driller:** Hagstrom Drilling Pty Ltd  
**Start Date:** 8/12/2016  
**End Date:** 15/12/2016

**Easting:** 330961.5 m  
**Northing:** 6250999.7 m  
**RL:** 12.91 m  
**Ver. Datum:** AHD

**Hor. Proj/Dat:** MGA94/GDA94-56H  
**Surface:** Asphalt

---

**Summary Geology (refer to geological log for full descriptions):**

- **NO CORE**
- **SANDSTONE, coarse grained, light grey**
- **NO CORE**
- **SANDSTONE, coarse grained, light grey**
- **SANDSTONE, fine to medium grained, light grey**
- **SANDSTONE, coarse grained, light grey**
- **SANDSTONE, medium to coarse grained, light grey**
- **NO CORE**

**RZ_BH67 Terminated at 60.00 m.**

---

**Remarks:**

**GROUNDWATER MONITORING NOTES:**
### Field Data

<table>
<thead>
<tr>
<th>Method</th>
<th>Core Run</th>
<th>TGR (%)</th>
<th>ROD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Depth (m)</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Graphic Log</td>
</tr>
</tbody>
</table>

#### Summary Geology
(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Defect Spacing (mm)</th>
<th>Rock Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>SAND, fine to medium grained, orange-brown to brown</td>
</tr>
<tr>
<td>60</td>
<td>SAND (60%), fine to medium grained</td>
</tr>
<tr>
<td>200</td>
<td>SANDSTONE, fine to medium grained, yellow-brown to light orange-brown</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>SANDSTONE, fine to medium grained, orange-brown to yellow-brown</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>SANDSTONE, fine to medium grained, light brown to light grey, speckled yellow-brown</td>
</tr>
<tr>
<td></td>
<td>SANDSTONE, fine to medium grained, light grey</td>
</tr>
<tr>
<td></td>
<td>SANDSTONE, fine to medium grained, light grey</td>
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<td>SANDSTONE, fine to medium grained, light grey</td>
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<tr>
<td></td>
<td>SANDSTONE, fine to medium grained, light grey</td>
</tr>
<tr>
<td></td>
<td>NO CORE</td>
</tr>
<tr>
<td></td>
<td>SANDSTONE, fine to medium grained, light grey</td>
</tr>
<tr>
<td></td>
<td>SANDSTONE, medium grained, light grey</td>
</tr>
<tr>
<td></td>
<td>SILTSTONE, dark grey</td>
</tr>
<tr>
<td></td>
<td>BRECCIA, light grey to mid grey</td>
</tr>
<tr>
<td></td>
<td>SILTSTONE, dark grey</td>
</tr>
</tbody>
</table>

### Piezometer Details

#### Construction details:
Pipe diameter: 96 mm  
Pipe Top: 0.0 mBGL  
Pipe Base: 41.0 mBGL  
Screen Top: 38.0 mBGL  
Screen/Sensor Base: 41.8 mBGL  
Instrument Details: -  
Installation Date: 24/01/2017  
Development Date: -

#### Groundwater MONITORING NOTES:

**REMARKS:**
### Field Data

<table>
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<tr>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Graphic Log</th>
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</thead>
<tbody>
<tr>
<td>Run 14</td>
<td>100</td>
<td>99</td>
<td>34.0 mBGL</td>
<td>32.0 m</td>
<td>32.0 m</td>
</tr>
<tr>
<td>Run 16</td>
<td>100</td>
<td>99</td>
<td>36.0 mBGL</td>
<td>34.0 m</td>
<td>34.0 m</td>
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<td>Run 17</td>
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<td>38.0 mBGL</td>
<td>36.0 m</td>
<td>36.0 m</td>
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<tr>
<td>Run 18</td>
<td>100</td>
<td>99</td>
<td>41.0 mBGL</td>
<td>38.0 m</td>
<td>38.0 m</td>
</tr>
<tr>
<td>Run 19</td>
<td>100</td>
<td>99</td>
<td>42.8 mBGL</td>
<td>41.0 m</td>
<td>41.0 m</td>
</tr>
</tbody>
</table>

### Rock Description

- **SANDSTONE, fine to medium grained, light grey to mid grey**
- **SANDSTONE, medium grained, light grey continued**
- **SANDSTONE, fine grained, mid grey**
- **SANDSTONE, medium grained, light grey**
- **BRECCIA**
- **SANDSTONE, fine grained, light grey**

### Piezometer Details

- **Construction details:**
  - Pipe diameter: 96 mm
  - Pipe Top: 0.0 mBGL
  - Pipe Base: 41.0 mBGL
  - Screen Top: 38.0 mBGL
  - Screen/Sensor Base: 41.8 mBGL
- **Instrument Details:**
  - Installation Date: 24/01/2017
  - Development Date: -

### Groundwater Monitoring Notes

- **Defect Spacing (mm):**
  - Core Run 20: 20 mm
  - Core Run 21: 60 mm

- **Method:**
  - TCR

- **Graph Log:**
  - Depth 1.0 m to 34.0 m
  - Depth 34.0 m to 36.0 m
  - Depth 36.0 m to 38.0 m
  - Depth 38.0 m to 41.0 m
  - Depth 41.0 m to 42.8 m
  - Depth 42.8 m to 50.0 m

- **PIEZOMETER No.:**
  - RZ_BH69 Terminated at 50.00 m.

- **RL:**
  - Road Surface

- **Ver. Datum:**
  - MAHD

- **Location:**
  - Albion Street, Rozelle

- **Easting:**
  - 330556.1 m

- **Northing:**
  - 6251217.0 m

- **RL:**
  - Road Surface

- **Hor. Proj/Dat:**
  - MGA94/GDA94-56H

- **Ms:**
  - M4-M5 Link Geotech Investigation

- **Sydney Motorway Corporation**

- **Albion Street, Rozelle**

- **Checked by:**
  - RKG

- **End Date:**
  - 25/01/2017

- **Logged by:**
  - RKG

- **Start Date:**
  - 17/01/2017

- **Project No:**
  - 60493796

- **Sheet:**
  - 2 of 2

- **Project:**
  - M4-M5 Link Geotech Investigation
### Summary Geology
(refer to geological log for full descriptions)

- **CONCRETE**
  - Silty CLAY, orange-brown
  - Silty CLAY, orange-brown and red-brown
  - Silty CLAY, light grey and red-brown
  - Silty CLAY, light grey mottled red-brown

- **MUDSTONE**
  - Light grey mottled red-brown
  - Grey and light grey

- **LAMINITE**
  - Dark grey

### Piezometer Details
- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 m BGL
- **Pipe Base:** 19.0 m BGL
- **Screen Top:** 19.0 m BGL
- **Screen/Sensor Base:** 16.0 m BGL
- **Instrument Details:** N/A
- **Installation Date:** 8/09/2016
- **Development Date:** N/A

### Ground Water

---

**Groundwater Monitoring Notes:**

- **Hydrapower Scout**
  - Hagstrom Drilling Pty Ltd

---

**Remarks:**

- **2015_ANZ_PIEZO  20151216_AECOM_T1_T2_T3_DUMMY FOR PIEZO_2-07.GPJ  AECOM_2-01-AA.GDT  60493796AECOM_2-07_LIBRARY.GLB 16.12.2016**
### Field Data

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<tr>
<th>Method</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Reduced Level (m)</th>
<th>Graphic Log</th>
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<td>000 60</td>
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<td>34.0</td>
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</tr>
</tbody>
</table>

**Summary Geology**  
(refer to geological log for full descriptions)

### Rock Description

- **MUDSTONE, dark grey continued**
- **LAMINITE**
- **MUDSTONE, dark grey**

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe  
  - **Pipe Diameter:** 50 mm  
  - **Pipe Top:** 0.0 mBGL  
  - **Pipe Base:** 39.0 mBGL  
  - **Screen Top:** 39.0 mBGL  
  - **Screen/Sensor Base:** 36.0 mBGL  
  - **Instrument Details:** -  
  - **Installation Date:** 8/09/2016  
  - **Development Date:** -

- **Defect Spacing (mm):**
  - Depth 0.5 to 31.9 m -
  - Depth 31.9 to 34.0 m -
  - Depth 34.0 to 36.0 m -
  - Depth 36.0 to 39.0 m -
  - Depth 39.0 to 40.7 m -

**SP_BH01 Terminated at 40.66 m.**

**Groundwater Monitoring Notes:**

**REMARKS:**

**Client:** Sydney Motorway Corporation  
**Project:** M4-M5 Link Geotech Investigation  
**Location:** May Street, Playground, cnr Applebee St, St Peters  
**Driller:** Hagstrom Drilling Pty Ltd  
**Hole Diameter:** 96 mm  
**Inclination:** -90°  
**Bearing:** N/A  
**Pipe Diameter:** 50 mm  
**Pipe Top:** 0.0 mBGL  
**Pipe Base:** 39.0 mBGL  
**Screen Top:** 39.0 mBGL  
**Screen/Sensor Base:** 36.0 mBGL  
**Instrument Details:** -  
**Installation Date:** 8/09/2016  
**Development Date:** -
### Summary Geology (refer to geological log for full descriptions)

- **CONCRETE**
- **CLAY, yellow-brown to red-brown**
- **Silty CLAY, light grey**
- **Silty CLAY, red-brown and light yellow-brown**
- **CLAY, light grey with yellow-brown laminations**
- **LAMINITIE**
- **LAMINITIE**
- **NO CORE**
- **LAMINITIE**
- **MUDSTONE**
- **NO CORE**
- **MUDSTONE**

### Piezometer Details
- **Construction Details**: Machine slotted PVC pipe
  - **Pipe Diameter**: 50 mm
  - **Pipe Top**: 0.0 mBGL
  - **Pipe Base**: 9.8 mBGL
  - **Screen Top**: 3.8 mBGL
  - **Screen/Sensor Base**: 9.8 mBGL
- **Instrument Details**: -
- **Installation Date**: 30/05/2016
- **Development Date**: -

### Field Data

<table>
<thead>
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<th>CRQD (%)</th>
<th>Ground Water Reduced Level (m)</th>
</tr>
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<td>79.52</td>
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<td>20.0</td>
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<td>3</td>
<td>100.68</td>
<td>100.83</td>
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<td>4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
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<td></td>
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</table>

### Remarks:

- **GROUNDWATER MONITORING NOTES**:
  - **Hydrapower Scout**
  - **Hagstrom Drilling Pty Ltd**
- **Construction Details**:
  - **Pipe Diameter**: 50 mm
  - **Pipe Top**: 0.0 mBGL
  - **Pipe Base**: 9.8 mBGL
  - **Screen Top**: 3.8 mBGL
  - **Screen/Sensor Base**: 9.8 mBGL
- **Instrument Details**: -
- **Installation Date**: 30/05/2016
- **Development Date**: -

### Rock Description

- **CONCRETE**
- **CLAY, yellow-brown to red-brown**
- **Silty CLAY, light grey**
- **Silty CLAY, red-brown and light yellow-brown**
- **CLAY, light grey with yellow-brown laminations**
- **LAMINITIE**
- **LAMINITIE**
- **NO CORE**
- **LAMINITIE**
- **MUDSTONE**
- **NO CORE**
- **MUDSTONE**

---

**Project No**: 60493796  **Checked by**: BF
**Logged by**: NB  **End Date**: 30/05/2016
**Start Date**: 25/05/2016  **Location**: North Park Road, St Peters
**Driller**: Hagstrom Drilling Pty Ltd  **Drill Rig**: Hydрапower Scout
**Hole Diameter**: 96 mm  **Inclination**: -90°  **Bearing**: N/A
BENTONITE + CEMENT

NOT OBSERVED

Depth 17.0 to 46.0 m

MUDSTONE

LAMINITE

MUDSTONE, dark grey

SP_BH02 Terminated at 46.00 m

SP_BH02 Terminated at 46.00 m

Summary Geology (refer to geological log for full descriptions)

Defect Spacing (mm)

Ground Water

PROJECT No: 60493796
Logged by: NB
Checked by: BF
Start Date: 25/05/2016
End Date: 30/05/2016

Easting: 331844.8 m
RL: 19.49 m
Northing: 6246375.9 m
Ver. Datum: AHD
Hor. Proj/Dat: MGA94/GDA94-56H Surface: Concrete

BENTONITE + CEMENT
### Field Data

<table>
<thead>
<tr>
<th>Run</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
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<tbody>
<tr>
<td>Run 1</td>
<td>100</td>
<td>0</td>
<td>n/a</td>
<td>Sandy GRAVEL, coarse grained, dark grey</td>
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<tr>
<td>Run 2</td>
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<td>0</td>
<td>n/a</td>
<td>MUDSTONE, light grey</td>
<td>2.0</td>
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<tr>
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<tr>
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<td>n/a</td>
<td>LAMINITE</td>
<td>6.0</td>
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<tr>
<td>Run 5</td>
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<td>100</td>
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<td>MUDSTONE, dark grey</td>
<td>8.0</td>
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<tr>
<td>Run 6</td>
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<td>100</td>
<td>n/a</td>
<td>MUDSTONE, dark grey</td>
<td>10.0</td>
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<tr>
<td>Run 7</td>
<td>0</td>
<td>100</td>
<td>n/a</td>
<td>MUDSTONE, dark grey</td>
<td>12.0</td>
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<tr>
<td>Run 8</td>
<td>0</td>
<td>100</td>
<td>n/a</td>
<td>MUDSTONE, dark grey</td>
<td>14.0</td>
</tr>
<tr>
<td>Run 9</td>
<td>0</td>
<td>100</td>
<td>n/a</td>
<td>MUDSTONE, dark grey</td>
<td>16.0</td>
</tr>
<tr>
<td>Run 10</td>
<td>0</td>
<td>100</td>
<td>n/a</td>
<td>MUDSTONE, dark grey</td>
<td>18.0</td>
</tr>
<tr>
<td>Run 11</td>
<td>0</td>
<td>100</td>
<td>n/a</td>
<td>MUDSTONE, dark grey</td>
<td>20.0</td>
</tr>
<tr>
<td>Run 12</td>
<td>0</td>
<td>100</td>
<td>n/a</td>
<td>MUDSTONE, dark grey</td>
<td>22.0</td>
</tr>
<tr>
<td>Run 13</td>
<td>0</td>
<td>100</td>
<td>n/a</td>
<td>MUDSTONE, dark grey</td>
<td>24.0</td>
</tr>
<tr>
<td>Run 14</td>
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<td>100</td>
<td>n/a</td>
<td>MUDSTONE, dark grey</td>
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<td>100</td>
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<td>MUDSTONE, dark grey</td>
<td>30.0</td>
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</table>

### Summary Geology

- CONCRETE
- CLAY, mottled brown-white
- LAMINITE
- MUDSTONE, light grey
- MUDSTONE, dark grey

### Rock Description

- Sandy GRAVEL, coarse grained, dark grey
- MUDSTONE, light grey
- MUDSTONE, dark grey
- LAMINITE

### Piezometer Details

- **Method**: HOLE SLIT PVC pipe
- **Pipe Diameter**: 50 mm
- **Pipe Top**: 0.0 mBGL
- **Pipe Base**: 9.8 mBGL
- **Screen Top**: 3.8 mBGL
- **Screen/Sensor Base**: 9.8 mBGL
- **Instrument Details**: -
- **Installation Date**: 30/05/2016
- **Development Date**: -

### Engineering Log

- **Client**: Sydney Motorway Corporation
- **Project**: M4-M5 Link Geotech Investigation
- **Location**: Applebee St, St Peters
- **Driller**: Hagstrom Drilling Pty Ltd
- **Drill Rig**: Delta 550
- **Hole Diameter**: 96 mm
- **Inclination**: -90°
- **Bearing**: N/A

---

**REMARKS:**

**GROUNDWATER MONITORING NOTES:**
**Summary Geology**

- **Mudstone, dark grey continued**
- **Laminite**
- **Mudstone, dark grey**

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 9.8 mBGL
- **Screen Top:** 3.8 mBGL
- **Screen/Sensor Base:** 9.8 mBGL
- **Instrument Details:**
- **Installation Date:** 30/05/2016
- **Development Date:** -

**Graphic Log**

- **SP_BH04 Terminated at 40.00 m.**
<table>
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<tr>
<th>Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Method</th>
<th>Ground Water</th>
<th>Core Run</th>
<th>Reduced Level (m)</th>
<th>Defect Spacing (mm)</th>
<th>Defect</th>
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<tbody>
<tr>
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<td>Asphalt</td>
<td>6.00</td>
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<td>4.00</td>
<td>6.00</td>
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<td>NQD</td>
<td>Gravelly SAND</td>
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<td>4.00</td>
<td>6.00</td>
<td>8.00</td>
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<td>100</td>
<td>NQD</td>
<td>Silty CLAY, dark grey</td>
<td>10.00</td>
<td>6.00</td>
<td>8.00</td>
<td>10.00</td>
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<td>Run 7</td>
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<td>100</td>
<td>NQD</td>
<td>MUDSTONE</td>
<td>12.00</td>
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<td>10.00</td>
<td>12.00</td>
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<td>100</td>
<td>NQD</td>
<td>INTERBEDDED MUDSTONE/SANDSTONE</td>
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<td>10.00</td>
<td>12.00</td>
<td>14.00</td>
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<td>100</td>
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<td>16.00</td>
<td>12.00</td>
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<td>16.00</td>
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<td>100</td>
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<td>INTERBEDDED MUDSTONE/SANDSTONE</td>
<td>18.00</td>
<td>14.00</td>
<td>16.00</td>
<td>18.00</td>
</tr>
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<td>Run 3</td>
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<td>100</td>
<td>NQD</td>
<td>LAMINITE</td>
<td>20.00</td>
<td>16.00</td>
<td>18.00</td>
<td>20.00</td>
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<td>18.00</td>
<td>20.00</td>
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</tr>
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<td>100</td>
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<td>Asphalt</td>
<td>6.00</td>
<td>2.00</td>
<td>4.00</td>
<td>6.00</td>
</tr>
<tr>
<td>Run 12</td>
<td>100</td>
<td>100</td>
<td>AUG</td>
<td>Gravelly SAND</td>
<td>8.00</td>
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<td>6.00</td>
<td>8.00</td>
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<tr>
<td>Run 11</td>
<td>100</td>
<td>100</td>
<td>AUG</td>
<td>Silty CLAY, dark grey</td>
<td>10.00</td>
<td>6.00</td>
<td>8.00</td>
<td>10.00</td>
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<td>100</td>
<td>AUG</td>
<td>MUDSTONE</td>
<td>12.00</td>
<td>8.00</td>
<td>10.00</td>
<td>12.00</td>
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</table>

**Summary Geology (refer to geological log for full descriptions):**

- **Asphalt**
- **Gravelly SAND**
- **Silty CLAY, dark grey**
- **MUDSTONE**
- **INTERBEDDED MUDSTONE/SANDSTONE**
- **NO CORE**
- **INTERBEDDED MUDSTONE/SANDSTONE**
- **LAMINITE**
- **MUDSTONE**
- **LAMINITE**

**Piezometer Details:**

- **Construction Details:** Machine slotted PVC
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 20.0 mBGL
- **Pipe Base:** 23.0 mBGL
- **Screen Top:** 18.0 mBGL
- **Screen/Sensor Base:** 25.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 6/06/2016
- **Development Date:** -

**Remarks:**

*GROUNDWATER MONITORING NOTES:*
Sp_Bh06 Terminated at 40.00 m.
### Field Data

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<th>Reduced Level (m)</th>
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<tr>
<td>0.5 - 1.0 m</td>
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<td>1.0 - 18.5 m</td>
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<td>18.5 - 21.0 m</td>
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<td>21.0 - 23.0 m</td>
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<td>23.0 - 26.0 m</td>
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<tr>
<td>26.0 - 28.0 m</td>
<td>0.0</td>
</tr>
<tr>
<td>28.0 - 30.2 m</td>
<td>-2.0</td>
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</tbody>
</table>

### Rock Description

- **SAND, fine to coarse grained, dark brown to brown**
- **SAND, fine grained, dark brown**
- **Silty CLAY, light yellow-brown**
- **Silty CLAY, light grey to grey-brown**
- **LAMINITE**
- **INTERBEDDED MUDSTONE/SANDSTONE**
- **MUDSTONE**
- **LAMINITE**

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 26.0 mBGL
- **Screen Top:** 23.0 mBGL
- **Screen/Sensor Base:** 26.0 mBGL
- **Instrument Details:**
- **Installation Date:** 23/05/2016
- **Development Date:**

### Remarks:

- **GROUNDWATER MONITORING NOTES:**
### Piezometer Details

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<td>-20.0</td>
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<td>36.0</td>
<td>-22.0</td>
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<td>38.0</td>
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<td>58.0</td>
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</tr>
<tr>
<td>60.0</td>
<td>-46.0</td>
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</table>

### Field Data

<table>
<thead>
<tr>
<th>Method</th>
<th>Core Run</th>
<th>CRQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Rock Description

Summary Geology:
(refer to geological log for full descriptions)

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 26.0 mBGL
- **Screen Top:** 23.0 mBGL
- **Screen/Sensor Base:** 26.0 mBGL
- **Installation Details:** -
- **Development Date:** 23/05/2016

### Remarks

**Groundwater Monitoring Notes:**

- **Client:** Sydney Motorway Corporation
- **Project:** M4-M5 Link Geotech Investigation
- **Location:** WCX2 Yard, SW Corner, 4-16 Campbell St, St Peters
- **Driller:** Hagstrom Drilling Pty Ltd
- **Drill Rig:** Hydropower Scout
- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A
- **Start Date:** 20/05/2016
- **End Date:** 25/05/2016
- **RL:** 12.90 m
- **Northing:** 6245948.3 m
- **Ver. Datum:** AHD
- **Hor. Proj/Dat:** MGA94/GDA94-56H
- **Surface:** Concrete

---

**REMARKS:**

**GROUNDWATER MONITORING NOTES:**

- **Client:** Hydropower Scout
- **Logged by:** Hagstrom Drilling Pty Ltd
- **Checked by:** BF
- **End Date:** 25/05/2016
- **RL:** 12.90 m
- **Northing:** 6245948.3 m
- **Ver. Datum:** AHD
- **Hor. Proj/Dat:** MGA94/GDA94-56H
- **Surface:** Concrete
**Summary Geology**

(refer to geological log for full descriptions)

- **ASPHALT**
- **CONCRETE**
- SAND, fine to coarse grained, dark brown-grey
- SAND, medium to coarse grained, dark brown
- CLAY, brown to grey-brown
- SAND, medium to coarse grained, yellow-brown
- CLAY, dark grey
- Clayey SAND, fine to medium grained, dark grey to dark brown-grey
- SAND, coarse grained, dark grey
- CLAY, grey to light grey
- Sandy CLAY, grey
- CLAY, dark grey-black
- SAND, coarse grained, brown-grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light brown
- SANDSTONE, medium to coarse grained, light grey to light yellow
- NO CORE
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey

**Piezometer Details**

- Construction Details: Machine slotted PVC pipe
- Pipe Diameter: 50 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 28.0 mBGL
- Screen Top: 25.0 mBGL
- Screen/Sensor Base: 28.0 mBGL
- Instrument Details: -
- Installation Date: -
- Development Date: -

**Ground Water**

**Driller:** Hagstrom Drilling Pty Ltd
**Drill Rig:** Hydrapper Scout

**Groundwater Monitoring Notes:**

**REMARKS:**

**FIELD DATA**

<table>
<thead>
<tr>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>100</td>
<td>98</td>
<td>79</td>
<td>0.0</td>
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<tr>
<td>Run 2</td>
<td>100</td>
<td>96</td>
<td>97</td>
<td>2.0</td>
</tr>
<tr>
<td>Run 3</td>
<td>100</td>
<td>96</td>
<td>93</td>
<td>4.0</td>
</tr>
<tr>
<td>Run 4</td>
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<tr>
<td>Run 5</td>
<td>100</td>
<td>93</td>
<td>96</td>
<td>8.0</td>
</tr>
<tr>
<td>Run 6</td>
<td>100</td>
<td>96</td>
<td>96</td>
<td>10.0</td>
</tr>
<tr>
<td>Run 7</td>
<td>98</td>
<td>84</td>
<td>84</td>
<td>12.0</td>
</tr>
</tbody>
</table>

**REMARKS:**

GROUNDWATER MONITORING NOTES:

- Reduced Level (m)
  - 2.0
  - 0.0
  - -2.0
  - -4.0
  - -6.0
  - -8.0
  - -10.0
  - -12.0
  - -14.0
  - -16.0
  - -18.0
  - -20.0
  - -22.0
  - -24.0
  - -26.0

**Hole Diameter:** 96 mm
**Inclination:** -90°
**Bearing:** N/A

**Summary:**

- **GATIC COVER**
- **GROUT**
- **BENTONITE**
- **FILTER SAND**
- **PVC SLOTTED SECTION WITH FILTER SAND**
- **ASPHALT**
- **CONCRETE**
- **SAND, fine to coarse grained, dark brown-grey**
- **SAND, medium to coarse grained, dark brown**
- **CLAY, brown to grey-brown**
- **SAND, medium to coarse grained, yellow-brown**
- **CLAY, dark grey**
- **Clayey SAND, fine to medium grained, dark grey to dark brown-grey**
- **SAND, coarse grained, dark grey**
- **CLAY, grey to light grey**
- **Sandy CLAY, grey**
- **CLAY, dark grey-black**
- **SAND, coarse grained, brown-grey**
- **SANDSTONE, medium to coarse grained, light grey**
- **SANDSTONE, medium grained, light brown**
- **SANDSTONE, medium to coarse grained, light grey to light yellow**
- **NO CORE**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
**Groundwater Monitoring Notes:**

**Summary Geology (refer to geological log for full descriptions):**

- SANDSTONE, medium grained, light grey continued
- Clayey GRAVEL, fine to coarse grained, dark grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SILTSTONE, dark grey
- SANDSTONE, medium grained, light grey

**Piezometer Details:**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 22.0 mBGL
- **Screen Top:** 22.0 mBGL
- **Screen/Sensor Base:** 22.0 mBGL

**Instrument Details:**

- **Installation Date:** 28/06/2016
- **Development Date:** -

**Ground Water Defect Spacing (mm):**

- **Run 8:** 98
- **Run 9:** 100
- **Run 10:** 100
- **Run 11:** 100
- **Run 12:** 100
- **Run 13:** 100
- **Run 14:** 100

**Field Data:**

- **Core Run:**
  - **TCR (%):**
    - 98
    - 95
    - 92
    - 98
    - 97
    - 80
  - **ROD (%):**
    - 80
  - **Ground Water Reduced Level (m):**
    - 32.0
    - 34.0
    - 36.0
    - 38.0
    - 40.0
    - 42.0
    - 44.0
    - 46.0
    - 48.0
    - 50.0
  - **Depth (m):**
    - 0.0
    - 0.3
    - 0.6
    - 0.9
    - 1.2
    - 1.5
    - 1.8
    - 2.1
    - 2.4
    - 2.7
    - 3.0
    - 3.3
    - 3.6
    - 3.9
    - 4.2
    - 4.5
    - 4.8
    - 5.1
    - 5.4
    - 5.7
    - 6.0
  - **Graphic Log:**
    - Depth 30.0 to 32.0 m
    - Depth 32.0 to 50.0 m

**Remarks:**

- **BENTONITE**
- **BENTONITE + CEMENT**
### Summary Geology

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 to 0.5 m</td>
<td>ASPHALT</td>
</tr>
<tr>
<td>0.5 to 2.0 m</td>
<td>CONCRETE</td>
</tr>
<tr>
<td>2.0 to 3.0 m</td>
<td>SAND, fine to coarse grained, dark brown-grey</td>
</tr>
<tr>
<td>3.0 to 3.5 m</td>
<td>SAND, medium to coarse grained, dark brown</td>
</tr>
<tr>
<td>3.5 to 6.0 m</td>
<td>CLAY, brown to grey-brown</td>
</tr>
<tr>
<td>6.0 to 6.5 m</td>
<td>SAND, medium to coarse grained, yellow-brown</td>
</tr>
<tr>
<td>6.5 to 8.0 m</td>
<td>CLAY, dark grey</td>
</tr>
<tr>
<td>8.0 to 10.0 m</td>
<td>Clayey SAND, fine to medium grained, dark grey to brown-grey</td>
</tr>
<tr>
<td>10.0 to 12.0 m</td>
<td>SAND, coarse grained, dark grey</td>
</tr>
<tr>
<td>12.0 to 14.0 m</td>
<td>Clayey SAND, fine to medium grained, dark grey</td>
</tr>
<tr>
<td>14.0 to 16.0 m</td>
<td>CLAY, dark grey</td>
</tr>
<tr>
<td>16.0 to 18.0 m</td>
<td>CLAY, grey to light grey</td>
</tr>
<tr>
<td>18.0 to 20.0 m</td>
<td>Sandy CLAY, grey</td>
</tr>
</tbody>
</table>

GATIC COVER

GROUT

BENTONITE

FILTER SAND

PVC SLOTTED SECTION WITH FILTER SAND

FILTER SAND

BENTONITE

### Remarks

GROUNDWATER MONITORING NOTES:
GATIC COVER
BENTONITE
FILTER SAND
FILTER SAND

Depth 0.0 to 0.5 m
Depth 0.5 to 4.2 m
Depth 4.2 to 5.2 m
Depth 5.2 to 8.2 m
Depth 8.2 to 8.5 m

Sandy SILT, dark brown
Sandy GRAVEL, fine to coarse grained, dark brown
Clayey SAND, fine to medium grained, light brown/orange to dark grey
CLAY, grey
Clayey SAND, fine grained, grey-dark grey
SAND, fine to medium grained, light grey

TC_BH06A Terminated at 8.50 m.
**Ground Water**

<table>
<thead>
<tr>
<th>Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>Run 2</td>
<td>100</td>
<td>80</td>
</tr>
<tr>
<td>Run 3</td>
<td>100</td>
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<td>Run 4</td>
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<td>Run 5</td>
<td>100</td>
<td>85</td>
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<tr>
<td>Run 6</td>
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<td>90</td>
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<td>Run 7</td>
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<td>100</td>
</tr>
<tr>
<td>Run 8</td>
<td>100</td>
<td>98</td>
</tr>
</tbody>
</table>

**Construction Details:**
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 m BGL
- **Pipe Base:** 22.0 m BGL
- **Screen Top:** 19.0 m BGL
- **Screen/Sensor Base:** 22.0 m BGL
- **Installation Date:** 5/07/2016
- **Development Date:** -

**Piezometer Details**

- **Summary Geology:**
  - SAND, fine to coarse grained, yellow-brown and orange-brown mottled grey
  - SAND, medium grained, dark grey
  - SANDSTONE, medium to coarse grained, orange-brown
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, yellow-brown
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SHALE BRECCIA, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey
  - SANDSTONE, medium grained, light grey

- **Piezometer Details:**
  - **Depth 0.0 to 0.5 m**
  - **Depth 0.5 to 1.0 m**
  - **Depth 1.0 to 15.0 m**
  - **Depth 15.0 to 17.0 m**
  - **Depth 17.0 to 19.0 m**
  - **Depth 19.0 to 22.0 m**
  - **Depth 22.0 to 24.0 m**
  - **Depth 24.0 to 26.0 m**
  - **Depth 26.0 to 40.0 m**

**REMARKS:**
- **GROUNDWATER MONITORING NOTES:**
  - Hydrapower Scout
  - Hagstrom Drilling Pty Ltd

**Field Data**

- **Hole Diameter:** 96 mm
- **Inclination:** -90°
- **Bearing:** N/A

**Piezometer No:** TC_BH07

**Logged by:** TC

**Checked by:** BF

**Start Date:** 1/07/2016

**End Date:** 4/07/2016

**Easting:** 330746.0 m

**Northing:** 6250373.6 m

**Ver. Datum:** AHD

**Hor. Proj/Dat:** MGA94/GDA94-56H
**Field Data**

<table>
<thead>
<tr>
<th>Run</th>
<th>Core Run</th>
<th>TCR (%)</th>
<th>RQD (%)</th>
<th>Ground Water Reduced Level (m)</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 9</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>-28.0</td>
<td>32.0</td>
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<tr>
<td>Run 10</td>
<td>98</td>
<td>98</td>
<td>98</td>
<td>-30.0</td>
<td>34.0</td>
</tr>
<tr>
<td>Run 11</td>
<td>98</td>
<td>98</td>
<td>98</td>
<td>-32.0</td>
<td>36.0</td>
</tr>
</tbody>
</table>

**Rock Description**

- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey

**Defect Spacing (mm)**

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 22.0 mBGL
- **Screen Top:** 19.0 mBGL
- **Screen/Sensor Base:** 22.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 5/07/2016
- **Development Date:** -

**Summary Geology**

(refer to geological log for full descriptions)

**Remarks:**

**Groundwater Monitoring Notes:**

**TC_BH07 Terminated at 40.00 m.**
**Field Data**

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>4.0</td>
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<td>14.0</td>
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<td>16.0</td>
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<tr>
<td>28.0</td>
<td>-24.0</td>
</tr>
<tr>
<td>30.0</td>
<td>-26.0</td>
</tr>
</tbody>
</table>

**Summary Geology (refer to geological log for full descriptions)**

- Depth 0.0 to 0.5 m
- Depth 0.5 to 2.5 m
- Depth 2.5 to 5.5 m
- Depth 5.5 to 6.0 m

**Graphic Log**

- **Driller**: Hagstrom Drilling Pty Ltd
- **Drill Rig**: Hydrapower Scout
- **Hole Diameter**: 96 mm
- **Inclination**: -90°
- **Bearing**: N/A
- **Depth**: 0.0 to 6.0 m

**Construction Details**
- **Pipe Diameter**: 50 mm
- **Pipe Top**: 0.0 mBGL
- **Pipe Base**: 5.5 mBGL
- **Screen Top**: 2.5 mBGL
- **Screen/Sensor Base**: 5.5 mBGL
- **Instrument Details**: -
- **Installation Date**: 6/07/2016
- **Development Date**: -

**Client**: Sydney Motorway Corporation

**Project**: M4-M5 Link Geotech Investigation

**Location**: Grass Verge, Railway Parade, Annandale

**Logged by**: TC

**Project No**: 60493796

**Checked by**: BF

**Start Date**: 1/07/2016

**End Date**: 4/07/2016

**Easting**: 330747.4 m

**RL**: 2.13 m

**Northing**: 6250375.0 m

**Ver. Datum**: AHD

**Hor. Proj/Dat**: MGA94/GDA94-56H

**Surface**: 

- **BENTONITE**
- **FILTER SAND**
- **PVC SLOTTED SECTION with FILTER SAND**
- **BENTONITE**

**Remarks**:

- **GROUNDWATER MONITORING NOTES**
### Summary Geology
(refer to geological log for full descriptions)

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Ground Water</th>
<th>Reduced Level (m)</th>
<th>Core Run</th>
<th>RQD (%)</th>
<th>TCR (%)</th>
<th>Defect Spacing (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.0</td>
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<td>34.0</td>
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<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.0</td>
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</tbody>
</table>

- **SANDSTONE, medium grained, light grey**
- TC_BH08 Terminated at 40.00 m.
- Depth 10.0 to 40.0 m.
- BENTONITE + CEMENT

### Groundwater Monitoring Notes:

Delta 550
Hagstrom Drilling Pty Ltd

**Remarks:**

- GROUNDWATER MONITORING NOTES:
### Field Data

<table>
<thead>
<tr>
<th>Core Run</th>
<th>RQD (%)</th>
<th>Ground Water Level (m)</th>
<th>Reduced Level (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 1</td>
<td>92</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Run 2</td>
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<td>Run 3</td>
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<td>Run 4</td>
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<tr>
<td>Run 6</td>
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<td>10.0</td>
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<tr>
<td>Run 7</td>
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<td>12.0</td>
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<td>Run 8</td>
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</tr>
<tr>
<td>Run 20</td>
<td>100</td>
<td>40.0</td>
<td>38.0</td>
</tr>
</tbody>
</table>

### Rock Description

- **Gravelly SAND, fine to medium grained, brown**
- **Clayey SAND, fine to medium grained**
- **SAND, medium grained, light brown**
- **Clayey SAND, medium grained, dark grey**
- **Sandy CLAY, brown to light brown**
- **SANDSTONE, fine to medium grained, red**
- **NO CORE**
- **SANDSTONE, fine to medium grained, red-brown**
- **NO CORE**
- **SANDSTONE, medium to coarse grained, dark orange-brown**
- **BRECCIA, medium grained, light grey**
- **SANDSTONE, medium grained, light grey**
- **MUDSTONE, dark grey**
- **SANDSTONE, medium grained, light grey**
- **SANDSTONE, medium to coarse grained**
- **SANDSTONE, medium grained, light grey**

### Piezometer Details

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 21.0 mBGL
- **Screen Top:** 21.0 mBGL
- **Screen/Sensor Base:** 24.0 mBGL
- **Instrument Details:** -
- **Installation Date:** 4/7/2016
- **Development Date:** -

### Summary Geology

(refer to geological log for full descriptions)

- **Gravelly SAND, fine to medium grained, brown**
- **Clayey SAND, fine to medium grained**
- **SAND, medium grained, light brown**
- **Clayey SAND, medium grained, dark grey**
- **Sandy CLAY, brown to light brown**

---

**Remarks:**

GROUNDWATER MONITORING NOTES:
**Ground Water**

**Defect Spacing (mm)**

<table>
<thead>
<tr>
<th>Core Run</th>
<th>TC (%)</th>
<th>RQD (%)</th>
<th>Reduced Level (m)</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run 19</td>
<td>100</td>
<td>100</td>
<td>-28.0</td>
<td></td>
</tr>
<tr>
<td>Run 20</td>
<td>100</td>
<td>100</td>
<td>-30.0</td>
<td></td>
</tr>
<tr>
<td>Run 21</td>
<td>100</td>
<td>100</td>
<td>-32.0</td>
<td></td>
</tr>
<tr>
<td>Run 22</td>
<td>100</td>
<td>100</td>
<td>-34.0</td>
<td></td>
</tr>
<tr>
<td>Run 23</td>
<td>100</td>
<td>100</td>
<td>-36.0</td>
<td></td>
</tr>
<tr>
<td>Run 24</td>
<td>100</td>
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<td>-38.0</td>
<td></td>
</tr>
<tr>
<td>Run 25</td>
<td>100</td>
<td>100</td>
<td>-40.0</td>
<td></td>
</tr>
</tbody>
</table>

**Rock Description**

- **Summary Geology** (refer to geological log for full descriptions)
- MUDSTONE, dark grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light grey
- TC_BH09 Terminated at 40.00 m.

**Piezometer Details**

- **Construction Details:** Machine slotted PVC pipe
- **Pipe Diameter:** 50 mm
- **Pipe Top:** 0.0 mBGL
- **Pipe Base:** 21.0 mBGL
- **Screen Top:** 21.0 mBGL
- **Screen/Sensor Base:** 24.0 mBGL
- **Instrument Details:**
- **Installation Date:** 4/07/2016
- **Development Date:** -

**Field Data**

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<tr>
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<th>RQD (%)</th>
<th>Reduced Level (m)</th>
<th>Graphic Log</th>
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</thead>
<tbody>
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<td>Run 19</td>
<td>100</td>
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<td>-28.0</td>
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<tr>
<td>Run 20</td>
<td>100</td>
<td>100</td>
<td>-30.0</td>
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<tr>
<td>Run 21</td>
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<td>100</td>
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<tr>
<td>Run 23</td>
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<td>-36.0</td>
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<tr>
<td>Run 24</td>
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</tr>
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<td>Run 25</td>
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<td>100</td>
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<td></td>
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</tbody>
</table>

**REMARKS:**

**GROUNDWATER MONITORING NOTES:**
Summary Geology (refer to geological log for full descriptions):

- Gravelly SAND, fine to medium grained, brown
- Clayey SAND, fine to medium grained
- SAND, medium grained, light brown
- Clayey SAND, medium grained, dark grey
- Sandy CLAY, brown to light brown

Piezometer Details:
- Construction Details: Machine slotted PVC pipe
- Pipe Diameter: 50 mm
- Pipe Top: 0.0 mBGL
- Pipe Base: 2.0 mBGL
- Screen Top: 2.0 mBGL
- Screen/Sensor Base: 5.0 mBGL
- Instrument Details: -
- Installation Date: 4/07/2016
- Development Date: -

Remarks: The material properties are taken from the adjacent borehole TC_BH09.

Groundwater Monitoring Notes:
Annexure G – Laboratory permeability and porosity data
DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

Client: AECOM
Source: EP_BH04 25.30-25.46m
Address: PO Box Q410, QVB PO Sydney NSW 1230
Sample Description: FR Sandstone
Project: M4-M5 Link Project (60493796)
Report No: S20465-TP
Job No: S16175
Lab No: S20465
Test Procedure: AS1289 6.7.3

Sampling:
Permeant Used: Sydney tap water

Comments

Permeant Used: Sydney tap water

<table>
<thead>
<tr>
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<th>Date Sampled</th>
<th>Sampled by Client</th>
<th>Undisturbed Sample Condition</th>
<th>Rock Core</th>
<th>Confining Pressure (kPa)</th>
<th>Back Pressure (kPa)</th>
<th>Mean Effective Stress (kPa)</th>
<th>Specimen Saturation Pressure (kPa)</th>
<th>Sample Height (mm)</th>
<th>Sample Diameter (mm)</th>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

PERMEABILITY \( k_{(20)} = 3.2 \times 10^{-8} \) (m/sec)

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Authorised Signatory:

Ian Goldschmidt

25/01/2017

NATA Accredited Laboratory Number: 14874

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Unit 8/10
Bradford Street
Alexandria NSW 2015
DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

Client: AECOM  
Source: MT_BH01 59.43-59.61m

Address: PO Box Q410, QVB PO Sydney NSW 1230  
Sample Description: FR Sandstone

Project: M4-M5 Link Project (60493796)  
Report No: S20504-TP

Job No: S16175  
Lab No: S20504

Test Procedure: AS1289 6.7.3  DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

Preparation: Prepared in accordance with the test method

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<tr>
<th>Undisturbed Sample Condition</th>
<th>Rock Core</th>
<th>Confining Pressure (kPa)</th>
<th>600</th>
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<tbody>
<tr>
<td></td>
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<td>Mean Effective Stress (kPa)</td>
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<tr>
<td></td>
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<td>Sample Height (mm)</td>
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<td></td>
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<td>Sample Diameter (mm)</td>
<td>61.1</td>
</tr>
</tbody>
</table>

PERMEABILITY  \( k_{(20)} = 6.4 \times 10^{-8} \) (m/sec)

Comments
Permeant Used: Sydney tap water

Authorised Signatory:  
Ian Goldschmidt  
25/01/2017

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Unit 8/10  
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Alexandria NSW 2015

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## DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

**Client:** AECOM  
**Source:** MT_BH07 42.38-42.58m  
**Address:** PO Box Q410, QVB PO Sydney NSW 1230  
**Sample Description:** FR Sandstone  
**Project:** M4-M5 Link Project (60493796)  
**Report No:** S20535-TP  
**Job No:** S16175  
**Lab No:** S20535

**Test Procedure:** AS1289 6.7.3  
**UNIVERSITY OF SYDNEY**  
**DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER**

### Preparation
- Prepared in accordance with the test method

<table>
<thead>
<tr>
<th>Undisturbed Sample Condition</th>
<th>Rock Core</th>
<th>Confining Pressure (kPa)</th>
<th>600</th>
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<td>Back Pressure (kPa)</td>
<td>500</td>
</tr>
<tr>
<td>Mean Effective Stress (kPa)</td>
<td></td>
<td>Specimen Saturation Pressure (kPa)</td>
<td>500</td>
</tr>
<tr>
<td>Sample Height (mm)</td>
<td></td>
<td>Sample Diameter (mm)</td>
<td>94.4</td>
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<td></td>
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<td>61.1</td>
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</tbody>
</table>

### Permeability

\[ k_{(20)} = 4.8 \times 10^{-8} \text{ (m/sec)} \]

### Comments
- Permeant Used: Sydney tap water

---

**Authorised Signatory:**

25/01/2017

Ian Goldschmidt

NATA Accredited Laboratory Number: 14874

**NATA Accredited Laboratory Number:** 14874

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Unit 8/10  
Bradford Street  
Alexandria NSW 2015
# DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

**Client:** AECOM  
**Source:** HB_BH24 18.27-18.45m

**Address:** PO Box Q410, QVB PO Sydney NSW 1230  
**Sample Description:** FR Sandstone

**Project:** M4-M5 Link Project (60493796)  
**Report No:** S20653-TP

**Job No:** S16175  
**Lab No:** S20653

**Test Procedure:** AS1289 6.7.3 DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

**Sampling:** Sampled by Client  
**Date Sampled:** Unknown

**Preparation:** Prepared in accordance with the test method

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<thead>
<tr>
<th>Sample Description</th>
<th>Rock Core</th>
<th>Confining Pressure (kPa)</th>
<th>Back Pressure (kPa)</th>
<th>Mean Effective Stress (kPa)</th>
<th>Specimen Saturation Pressure (kPa)</th>
<th>Sample Height (mm)</th>
<th>Sample Diameter (mm)</th>
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</thead>
<tbody>
<tr>
<td>Undisturbed Sample Condition</td>
<td>Rock Core</td>
<td>600</td>
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</table>

**PERMEABILITY**  

\[ k_{(20)} = 5.3E-08 \text{ (m/sec)} \]

**Comments**  
Permeant Used: Sydney tap water

---

**Authorised Signatory:**  
**Date:** 25/01/2017

**NATA Accredited Laboratory Number:** 14874

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DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

Client: AECOM  
Source: MT_BH19 35.16-35.41m

Address: PO Box Q410, QVB PO Sydney NSW 1230  
Sample Description: FR Mudstone

Project: M4-M5 Link Project (60493796)  
Report No: S20925-TP

Job No: S16175  
Lab No: S20925

Test Procedure:  
AS1289 6.7.3 DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

Sampling: Sampled by Client  
Date Sampled: Unknown

Preparation: Prepared in accordance with the test method

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<tr>
<th>Undisturbed Sample Condition</th>
<th>Rock Core</th>
<th>Confining Pressure (kPa)</th>
<th>Back Pressure (kPa)</th>
<th>Mean Effective Stress (kPa)</th>
<th>Specimen Saturation Pressure (kPa)</th>
<th>Sample Height (mm)</th>
<th>Sample Diameter (mm)</th>
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</thead>
<tbody>
<tr>
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<td>61.2</td>
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**PERMEABILITY**  
$k_{(20)} = 1.0 \times 10^{-10}$ (m/sec)

Comments
Permeant Used: Sydney tap water

Authorised Signatory:  
23/02/2017

NATA Accredited Laboratory Number: 14874  
Ian Goldschmidt

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Unit 8/10  
Bradford Street  
Alexandria NSW 2015
PERMEABILITY

\[ k_{(20)} = 8.9 \times 10^{-10} \text{ (m/sec)} \]

Comments
Permeant Used: Sydney tap water

Authorised Signatory:

Ian Goldschmidt

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DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

Client: AECOM  
Source: RZ_BH64 38.43-38.61m

Address: PO Box Q410, QVB PO Sydney NSW 1230  
Sample Description: FR Sandstone

Project: M4-M5 Link Project (60493796)  
Report No: S21050-TP

Job No: S16175  
Lab No: S21050

Test Procedure: AS1289 6.7.3

Sampling: Sampled by Client  
Date Sampled: Unknown

Preparation: Prepared in accordance with the test method

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</tr>
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<td>Sample Diameter (mm)</td>
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</tbody>
</table>

PERMEABILITY \( k_{(20)} = 2.1 \times 10^{-9} \) (m/sec)

Comments

Permeant Used: Sydney tap water

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NATA Accredited Laboratory Number: 14874

Authorised Signatory: 

Ian Goldschmidt  
Date: 23/02/2017

Macquarie Geotechnical  
Unit 8/10 Bradford Street  
Alexandria NSW 2015
**DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER**

**Client:** AECOM  
**Source:** RZ_BH67 42.00-42.20m  
**Address:** PO Box Q410, QVB PO Sydney NSW 1230  
**Sample Description:** FR SANDSTONE  
**Project:** M4-M5 Link Project (60493796)  
**Report No:** S21086-TP  
**Job No:** S16175  
**Lab No:** S21086

**Test Procedure:**  
AS1289 6.7.3 \ DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

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<td>Back Pressure (kPa)</td>
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<td>Specimen Saturation Pressure (kPa)</td>
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<td>Sample Height (mm)</td>
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<td></td>
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<td>Sample Diameter (mm)</td>
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</tr>
</tbody>
</table>

**PERMEABILITY**  
$k_{(20)} = 1.4E-09$ (m/sec)

**Comments**  
Permeant Used: Sydney tap water

**Authorised Signatory:**  
Ian Goldschmidt  
23/02/2017

**NATA Accredited Laboratory Number:** 14874

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Bradford Street  
Alexandria NSW 2015
### DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

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<td>AECOM</td>
<td>MT_BH11 53.38-53.56m</td>
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<table>
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<th>Project</th>
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<tr>
<td>M4-M5 Link Project (60493796)</td>
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#### Sample Preparation

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<td>Sample height (mm)</td>
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<td>Rock Core</td>
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<tr>
<td>Undisturbed Sample Condition</td>
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<td>Confining Pressure (kPa)</td>
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<td>Back Pressure (kPa)</td>
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#### Permeability

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<th>PERMEABILITY k_{(20)} = 4.4E-09 (m/sec)</th>
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</thead>
</table>

#### Comments

- Permeant Used: Sydney tap water

---

**Authorised Signatory:**

Ian Goldschmidt

31/01/2017

**NATA Accredited Laboratory Number: 14874**
**DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER**

Client: AECOM  
Source: MT_BH12 46.11-46.25m

Address: PO Box Q410, QVB PO Sydney NSW 1230  
Sample Description: FR Sandstone

Project: M4-M5 Link Project (60493796)  
Report No: S20618-TP

Job No: S16175  
Lab No: S20618

**Test Procedure:**  
AS1289 6.7.3  DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

**Sampling:**  
Permeant Used: Sydney tap water

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<th>Preparation</th>
<th>Date Sampled</th>
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<tbody>
<tr>
<td>Undisturbed Sample Condition</td>
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<td></td>
<td>Back Pressure (kPa)</td>
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<td>Mean Effective Stress (kPa)</td>
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<td></td>
<td>Specimen Saturation Pressure (kPa)</td>
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<td>Sample Height (mm)</td>
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<tr>
<td></td>
<td></td>
<td>Sample Diameter (mm)</td>
</tr>
</tbody>
</table>

**PERMEABILITY**  
\[ k_{(20)} = 4.1E-08 \text{ (m/sec)} \]

**Comments**  
Permeant Used: Sydney tap water

**Authorised Signatory:**  
Ian Goldschmidt  
31/01/2017

NATA Accredited Laboratory Number: 14874

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Unit 8/10
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Alexandria NSW 2015

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DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

Client: AECOM
Source: MT_BH16 79.45-79.58m

Address: PO Box Q410, QVB PO Sydney NSW 1230
Sample Description: FR Sandstone

Project: M4-M5 Link Project (60493796)
Report No: S20710-TP

Job No: S16175
Lab No: S20710

Test Procedure: AS1289 6.7.3

Sampling: Sampled by Client
Comments: Permeant Used: Sydney tap water

Preparation: Prepared in accordance with the test method

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<th>Confining Pressure (kPa)</th>
<th>Back Pressure (kPa)</th>
<th>Mean Effective Stress (kPa)</th>
<th>Specimen Saturation Pressure (kPa)</th>
<th>Sample Height (mm)</th>
<th>Sample Diameter (mm)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>600</td>
<td>500</td>
<td>100</td>
<td>500</td>
<td>61.2</td>
<td>60.1</td>
</tr>
</tbody>
</table>

PERMEABILITY 

\[ k_{(20)} = 1.5 \times 10^{-7} \text{ (m/sec)} \]

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Authorised Signatory:

Ian Goldschmidt
31/01/2017

Macquarie Geotechnical
Unit 8/10
Bradford Street
Alexandria NSW 2015

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# Determination of Permeability of a Soil - Constant Head Method

## Using a Flexible Wall Permeameter

### Client:
AECOM

### Source:
RZ_BH60 49.15-49.30m

### Address:
PO Box Q410, QVB PO Sydney NSW 1230

### Sample Description:
FR Sandstone

### Project:
M4-M5 Link Project (60493796)

### Report No:
S20741-TP

### Job No:
S16175

### Lab No:
S20741

### Test Procedure:
AS1289 6.7.3

### Sampling:
Sampled by Client

### Comments:
Permeant Used: Sydney tap water

### Preparation:
Prepared in accordance with the test method

<table>
<thead>
<tr>
<th>Undisturbed Sample Condition</th>
<th>Rock Core</th>
<th>Confining Pressure (kPa)</th>
<th>Back Pressure (kPa)</th>
<th>Mean Effective Stress (kPa)</th>
<th>Specimen Saturation Pressure (kPa)</th>
<th>Sample Height (mm)</th>
<th>Sample Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undisturbed</td>
<td></td>
<td>600</td>
<td>500</td>
<td>100</td>
<td>500</td>
<td>70.0</td>
<td>61.0</td>
</tr>
</tbody>
</table>

### Permeability

\[ k_{(20)} = 1.4E-09 \text{ (m/sec)} \]

---

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Ian Goldschmidt

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Unit 8/10
Bradford Street
Alexandria NSW 2015
**PERMEABILITY**  \[ k_{(20)} = 2.3 \times 10^{-9} \text{ (m/sec)} \]

**Client:** AECOM  
**Source:** MT_BH16 39.25-39.43m

**Address:** PO Box Q410, QVB PO Sydney NSW 1230  
**Sample Description:** FR Mudstone

**Project:** M4-M5 Link Project (60493796)  
**Report No:** S20757-TP

**Job No:** S16175  
**Lab No:** S20757

**Test Procedure:** AS 1289 6.7.3  
DETERMINATION OF PERMEABILITY OF A SOIL - CONSTANT HEAD METHOD USING A FLEXIBLE WALL PERMEAMETER

**Preparation:** Prepared in accordance with the test method

<table>
<thead>
<tr>
<th>Undisturbed Sample Condition</th>
<th>Rock Core</th>
<th>Confining Pressure (kPa)</th>
<th>Back Pressure (kPa)</th>
<th>Mean Effective Stress (kPa)</th>
<th>Specimen Saturation Pressure (kPa)</th>
<th>Sample Height (mm)</th>
<th>Sample Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>600</td>
<td>500</td>
<td>100</td>
<td>500</td>
<td>81.3</td>
<td>60.8</td>
</tr>
</tbody>
</table>

**Permeant Used:** Sydney tap water

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31/01/2017

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Bradford Street  
Alexandria NSW 2035
ROCK POROSITY & DENSITY REPORT

Client: AECOM
Address: PO Box Q410, QVB PO Sydney NSW 1230
Project: M4-M5 Link Project (60493796)
Job No: S16175

Source: EP_BH04 25.30-25.46m
Sample Description: FR Sandstone
Report No: S20465-RP
Lab No: S20465

Test Procedure: AS4133 2.1.1 Rock porosity and density tests - Determination of rock porosity and dry density - Saturation and caliper techniques
Sampling: Sampled by Client
Date Sampled: Unknown
Preparation: Prepared in accordance with the test method

<table>
<thead>
<tr>
<th>Sample # 1</th>
<th>Sample # 2</th>
<th>Sample # 4</th>
<th>Sample # 4</th>
<th>Sample Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Density (t/m$^3$)</td>
<td>2.187</td>
<td>2.213</td>
<td>2.192</td>
<td>2.084</td>
</tr>
<tr>
<td>Porosity Value (%)</td>
<td>14.8</td>
<td>12.8</td>
<td>12.4</td>
<td>14.3</td>
</tr>
<tr>
<td>Change in Shape</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Change in Competency</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

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Date: 20/01/2017

NATA Accredited Laboratory Number: 14874

Report Form: RP
Issue 1 - Revision C - Issue Date 20/4/15
## Rock Porosity & Density Report

**Client:** AECOM  
**Source:** HB_BH24 18.27-18.45m  
**Address:** PO Box Q410, QVB PO Sydney NSW 1230  
**Sample Description:** FR Sandstone  
**Project:** M4-M5 Link Project (60493796)  
**Sample No:** S20653-RP  
**Job No:** S16175  
**Lab No:** S20653

**Test Procedure:** AS4133 2.1.1  
**Sampling:** Sampled by Client  
**Date Sampled:** Unknown  
**Preparation:** Prepared in accordance with the test method

<table>
<thead>
<tr>
<th>Sample # 1</th>
<th>Sample # 2</th>
<th>Sample # 4</th>
<th>Sample # 4</th>
<th>Sample Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Density (t/m³)</td>
<td>2.289</td>
<td>2.237</td>
<td>2.214</td>
<td>2.213</td>
</tr>
<tr>
<td>Porosity Value (%)</td>
<td>13.2</td>
<td>14.6</td>
<td>14.6</td>
<td>13.9</td>
</tr>
<tr>
<td>Change In Shape</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Change in Competency</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

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**Issue:** RP  
**Revision:** C  
**Issue Date:** 20/4/15

**Authorised Signatory:**  
**Date:** 19/01/2017

**NATA Accredited Laboratory Number:** 14874

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Unit 8/10  
Bradford Street  
Alexandria NSW 2015
# ROCK POROSITY & DENSITY REPORT

**Client:** AECOM  
**Source:** MT_BH01 59.43-59.61m  
**Address:** PO Box Q410, QVB PO Sydney NSW 1230  
**Sample Description:** FR Sandstone  
**Project:** M4-M5 Link Project (60493796)  
**Report No:** S20504-RP  
**Job No:** S16175  
**Lab No:** S20504

**Test Procedure:**  
AS4133 2.1.1 Rock porosity and density tests - Determination of rock porosity and dry density - Saturation and caliper techniques

**Sampling:** Sampled by Client  
**Date Sampled:** Unknown

**Preparation:** Prepared in accordance with the test method

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Dry Density (t/m³)</th>
<th>Porosity Value (%)</th>
<th>Change In Shape</th>
<th>Change in Competency</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1</td>
<td>2.129</td>
<td>13.4</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td># 2</td>
<td>2.021</td>
<td>10.8</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td># 4</td>
<td>2.181</td>
<td>14.3</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td># 4</td>
<td>2.064</td>
<td>13.8</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

**Sample Average:** 2.099

---

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**Authorised Signatory:**  
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20/01/2017

**Report Form:** RP  
**Issue 1 - Revision C - Issue Date 20/4/15**
**ROCK POROSITY & DENSITY REPORT**

<table>
<thead>
<tr>
<th>Sample # 1</th>
<th>Sample # 2</th>
<th>Sample # 4</th>
<th>Sample # 4</th>
<th>Sample Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Density (t/m³)</td>
<td>2.260</td>
<td>2.223</td>
<td>2.235</td>
<td>2.290</td>
</tr>
<tr>
<td>Porosity Value (%)</td>
<td>11.6</td>
<td>11.5</td>
<td>10.7</td>
<td>11.3</td>
</tr>
<tr>
<td>Change In Shape</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Change in Competency</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

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Date: 20/01/2017

NATA Accredited Laboratory Number: 14874

MACQUARIE GEOTECH

Report Form: RP

Issue 1 - Revision C - Issue Date 20/4/15

Page 1 of 1
<table>
<thead>
<tr>
<th>Sample #</th>
<th>Dry Density (t/m³)</th>
<th>Porosity Value (%)</th>
<th>Change In Shape</th>
<th>Change in Competency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.059</td>
<td>13.5</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2.193</td>
<td>16.1</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2.230</td>
<td>14.7</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2.170</td>
<td>10.0</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>2.163</td>
<td>13.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Authorised Signatory:

Chris Lloyd

Date: 20/01/2017
# ROCK POROSITY & DENSITY REPORT

**Client:** AECOM  
**Source:** MT_BH12 46.11-56.25m  
**Address:** PO Box Q410, QVB PO Sydney NSW 1230  
**Sample Description:** FR Sandstone  
**Project:** M4-M5 Link Project (60493796)  
**Report No:** S20618-RP  
**Lab No:** S20618

**Test Procedure:** AS4133 2.1.1  
**Sampling:** Sampled by Client  
**Preparation:** Prepared in accordance with the test method

<table>
<thead>
<tr>
<th>Sample # 1</th>
<th>Sample # 2</th>
<th>Sample # 4</th>
<th>Sample # 4</th>
<th>Sample Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Density (t/m³)</td>
<td>2.095</td>
<td>2.060</td>
<td>2.041</td>
<td>2.012</td>
</tr>
<tr>
<td>Porosity Value (%)</td>
<td>19.2</td>
<td>19.1</td>
<td>18.4</td>
<td>18.1</td>
</tr>
<tr>
<td>Change In Shape</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Change in Competency</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

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NATA Accredited Laboratory Number: 14874

[Signature]

Date: 20/01/2017

Chris Lloyd
Macquarie Geotechnical
Unit 8/10 Bradford Street
Alexandria NSW 2015

Report Form: RP  
Issue 1 - Revision C - Issue Date 20/4/15  
Page1of1
# ROCK POROSITY & DENSITY REPORT

Client: AECOM  
Source: MT_BH16 79.45-79.58m

Address: PO Box Q410, QVB PO Sydney NSW 1230  
Sample Description: FR Sandstone

Project: M4-M5 Link Project (60493796)  
Report No: S20710-RP

Job No: S16175  
Lab No: S20710

Test Procedure: AS4133 2.1.1 Rock porosity and density tests - Determination of rock porosity and dry density - Saturation and caliper techniques

Sampling: Sampled by Client  
Date Sampled: Unknown

Preparation: Prepared in accordance with the test method

<table>
<thead>
<tr>
<th>Sample # 1</th>
<th>Sample # 2</th>
<th>Sample # 4</th>
<th>Sample # 4</th>
<th>Sample Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Density (t/m$^3$)</td>
<td>2.236</td>
<td>2.251</td>
<td>2.253</td>
<td>2.253</td>
</tr>
<tr>
<td>Porosity Value (%)</td>
<td>14.5</td>
<td>15.0</td>
<td>14.0</td>
<td>14.9</td>
</tr>
<tr>
<td>Change In Shape</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Change in Competency</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

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Date: 19/01/2017

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Report Form: RP  
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ROCK POROSITY & DENSITY REPORT

Client: AECOM
Source: MT_BH16 39.25-39.43m

Address: PO Box Q410, QVB PO Sydney NSW 1230
Sample Description: FR Mudstone

Project: M4-M5 Link Project (60493796)
Report No: S20757-RP

Job No: S16175
Lab No: S20757

Test Procedure: AS4133 2.1.1 Rock porosity and density tests - Determination of rock porosity and dry density - Saturation and caliper techniques

Sampling: Sampled by Client
Date Sampled: Unknown

Preparation: Prepared in accordance with the test method

<table>
<thead>
<tr>
<th>Sample # 1</th>
<th>Sample # 2</th>
<th>Sample # 4</th>
<th>Sample # 4</th>
<th>Sample Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Density (t/m³)</td>
<td>2.519</td>
<td>2.452</td>
<td>2.505</td>
<td>2.530</td>
</tr>
<tr>
<td>Porosity Value (%)</td>
<td>5.3</td>
<td>5.8</td>
<td>5.6</td>
<td>5.8</td>
</tr>
<tr>
<td>Change in Shape</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Change in Competency</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

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Authorised Signatory: Chris Lloyd
Date: 19/01/2017
# ROCK POROSITY & DENSITY REPORT

**Client:** AECOM  
**Source:** RZ_BH60 49.15-49.30m

**Address:** PO Box Q410, QVB PO Sydney NSW 1230  
**Sample Description:** FR Sandstone

**Project:** M4-M5 Link Project (60493796)  
**Report No:** S20741-RP

**Job No:** S16175  
**Lab No:** S20741

**Test Procedure:**  
AS4133 2.1.1 Rock porosity and density tests - Determination of rock porosity and dry density - Saturation and caliper techniques

**Sampling:** Sampled by Client  
**Date Sampled:** Unknown

**Preparation:** Prepared in accordance with the test method

---

<table>
<thead>
<tr>
<th>Sample # 1</th>
<th>Sample # 2</th>
<th>Sample # 4</th>
<th>Sample # 4</th>
<th>Sample Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Density (t/m³)</td>
<td>2.010</td>
<td>2.049</td>
<td>2.089</td>
<td>2.065</td>
</tr>
<tr>
<td>Porosity Value (%)</td>
<td>13.7</td>
<td>14.1</td>
<td>14.5</td>
<td>15.0</td>
</tr>
<tr>
<td>Change In Shape</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Change in Competency</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

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Chris Lloyd  
19/01/2017

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**Report Form:** RP  
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